# Hands-On Knowledge Co-Creation and Sharing:
Practical Methods and Techniques

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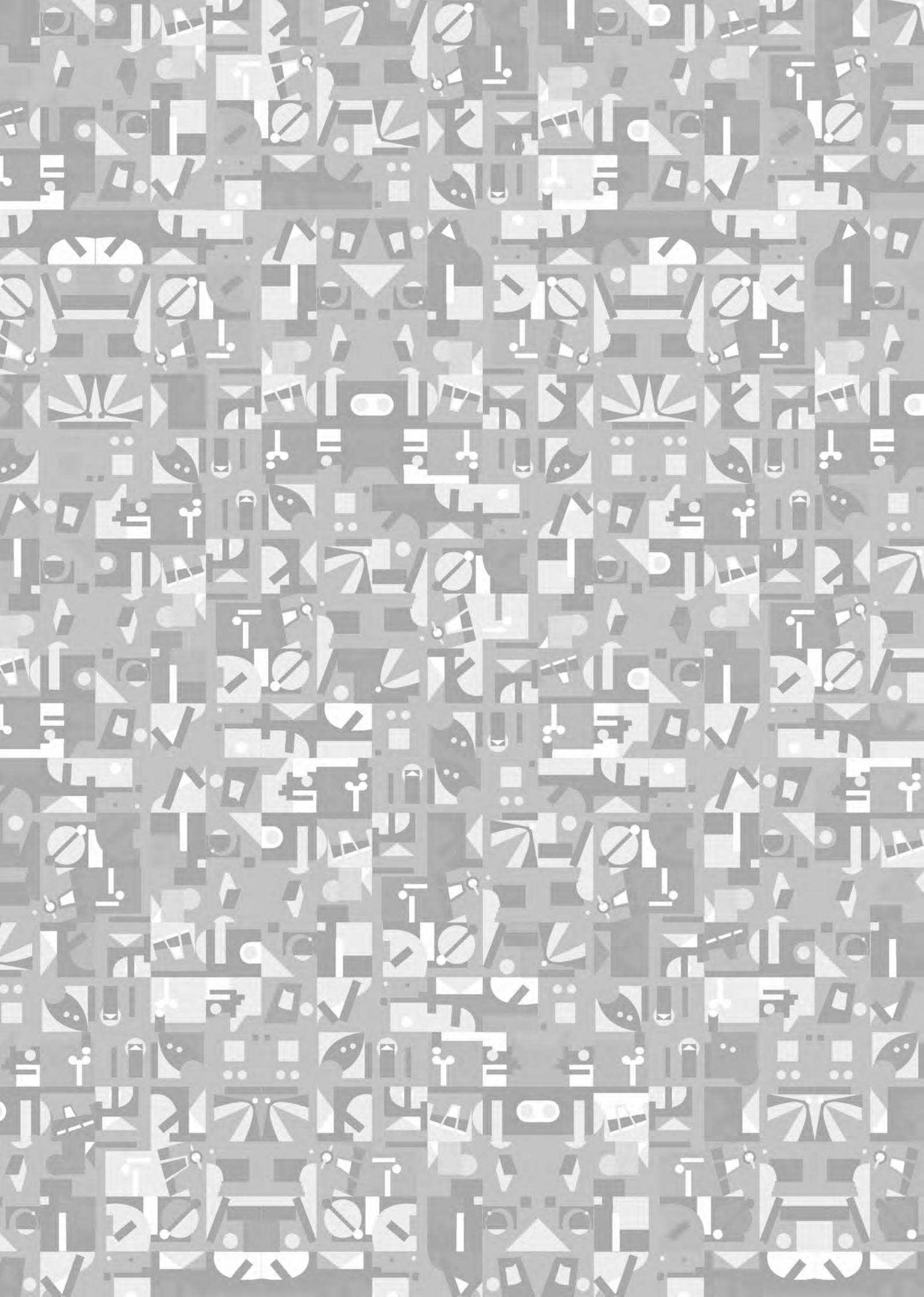
Knowledge BOARD

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Hands-On Knowledge Co-Creation and Sharing:

Practical Methods & Techniques

Edited by:

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Preface

Background and Introduction

The content management team of KnowledgeBoard launched its first book entitled "Real-Life Knowledge Management: Lessons from the Field" in April, 2006. This book was a collection of eighteen industrial case studies from twelve different countries. What differentiated this book from others lay in the fact that most of the case studies were a recording of the vast experiences of knowledge workers: the real people on the field. The book was and continues to remain a success and is used in numerous large and small organisations to solve real-life problems today based on learnings from and adaptation of the case studies to the operational norms of these organisations. It is furthermore used as valuable teaching, training and reference material, at different universities and training centres.

During a Contactivity event in 2006, participants of the event mentioned the need for a set of practical methods and techniques for effective knowledge co-creation and sharing. The initial idea was to prepare a list of existing methods and techniques in the form of a short article. During this process, we noted that while existing methods were reasonably well-documented, there existed several undocumented methods and techniques that were developed and used for specific organisational contexts by knowledge workers. Through further requests from different KnowledgeBoard community members for a new book on practical methods and techniques for knowledge creation and sharing, the content management team of KnowledgeBoard launched a call for KnowledgeBoard's second book. "Hands-On Knowledge Co-Creation and Sharing: Practical Methods and Techniques", the book you now hold in your hands, or browse on your screen is the result.

This book presents thirty different hands-on methods and techniques for knowledge co-creation and sharing within collaborative settings. It showcases a wide range of moderation, facilitation, collaboration, and interaction mechanisms through the use of different face-to-face and online methods and techniques. Each presented method/technique is augmented with real-life cases on its use; provides directions on what needs to be done before, during, and after the use of each method/technique to achieve tangible and measurable results; provides a set of tips and tricks on the use and adaptation of the method/technique for different contexts and settings; and provides a list of potholes to avoid when using the method/technique.

The prime audience of this book is industry practitioners, event moderators, facilitators, consultants, researchers, and academia with an interest in the use and development of effective techniques and mechanisms to foster knowledge co-creation and sharing. This book is expected to equip them with a set of usable practical methods and techniques for knowledge co-creation and sharing.

Method/Technique Structure

All thirty methods/techniques presented in this book have been purposely organised around a common content structure to provide you with a quick overview of the method/technique followed by the pre-requisites, the method/technique itself, the post-requisites, real cases, and some key do's and don'ts. The table below lists the main sections within each method/technique and what you can expect to find/learn in each section.

Section	What to Expect
Snapshot (Quick Learning)	This section provides a quick overview of the method/ technique that is presented containing brief information on the types of situations where the method/technique may be used, what the method/technique is, and what are the expected results from its use.
Context (Where & What)	This section describes the different contexts and situations where the method/technique may be used. It should provide information on the purpose, duration, number of participants, and main goals of the method/technique.
Preparation (The Checklist)	This section presents what needs to be done before the method/technique is used in terms of invitations for participation, specific reading or working material, planning, selection of support facilitators/moderators, configuration of any online tools, etc.
Toolkit (The Essentials)	This section elaborates on what is required for the method/technique in terms of the required interaction space (room, open air, etc.), and specific materials and tools (flipcharts, post-its ®, whiteboards, laptops, projectors, large sheets of papers, etc.).
Making it Happen (The Approach & the Action)	This is the main section that describes in detail the approach that is used to exercise the method/technique/tool that is presented. It contains information on how to start, work through the different stages, and end the method/technique.
Results & Next Steps (The Follow-Up)	This section describes what typically happens once the method/technique has been used in terms of results, follow-up actions, next steps, further interaction, consolidation, after action reviews, and who does what, why, when, how, and where.
Real Cases (As it has Happened)	This section concentrates on the presentation of one or more real cases / situations where the method/technique has been used. Its aim is to provide proof of how the technique has been used and what adaptations have been made for a given context.
Tips & Tricks (To-Do)	This section provides a list of tips and tricks in terms of to-do items to ensure the method/technique works effectively.
Potholes (Not-to-Do)	This section contains a list of some "potholes" that need to be watched out for and provides hints on how can they be avoided.
Acknowledgements	This section is an acknowledgement to other persons or organisations that have in some meaningful way contributed to the development or use of the presented method/technique.
Resources (References)	This section lists key references and resources that may provide more information on the method/technique.
Author Biographies	This section provides brief biographies of the authors who have presented the method/technique. It presents the background and main areas of interest of the author(s) of the method/technique.

How to Navigate through this Book

The methods/techniques presented in this book have been structured based on a set of perspectives (lenses) to ease the identification of a method/technique for a specific context. As an example, one may be looking for a particular "type" of method such as a workshop, to be used within a specific "time" frame for a particular "aim". All the methods/techniques in this book have therefore been broadly categorised by "aim", "type", and "time".

Aim

Type

Time
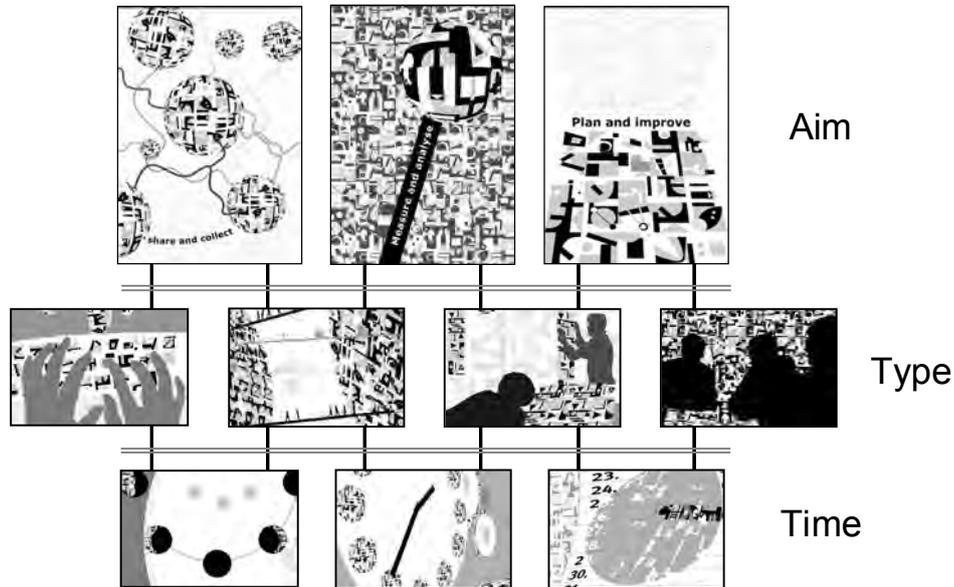
This book contains three main sections based on the main "aim" of the method/technique. The sections are:

- "Share and collect"
- "Measure and analyse"
- "Plan and improve"

As all of these aims are of course highly inter-related, the categorisation only provides a general hint as to where the main focus of a method/technique is. Overall, each method/technique essentially covers two or more aims.

While placed within a particular section (aim), each method/technique has been assigned one of the following "type" and "time" categories:

Time		
Methods/techniques that can be realised within **hours.**	Methods/techniques that can be realised within **days.**	Methods/techniques that need **months or years** to be realised.

Type			
Software tools	Networking	Communities of Practice	Workshops

Most methods/techniques and their possible variations/adaptations may span several "aim", "type" and "time" categories. For ease of understanding and structuring purposes though, a given method/technique has been associated with only one "aim", "type" and "time" category. The table below is an indication of how the different methods/techniques have been categorised in this book. It should serve as a starting point to identifying the method(s)/techniques(s) that you may require for a particular purpose.

		Method / Technique																												
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
Aim	Share and Collect	x	x	x	x	x	x	x	x	x																					
	Measure and Analyse										x	x	x	x	x	x	x	x													
	Plan and Improve																		x	x	x	x	x	x	x	x	x	x	x	x	x
Type	Software tools							x						x	x	x				x									x	x	
	Networking Events	x		x			x			x																					
	Communities of Practice							x										x				x	x			x	x				
	Workshops		x		x	x					x	x	x			x	x			x				x	x			x			x
Time	Hours	x			x	x											x			x			x					x			
	Days		x						x	x	x	x							x						x						x
	Months/Years			x			x	x						x	x	x	x		x			x	x		x		x	x		x	x

Let us now explore what we may learn from each of the methods/techniques presented in this book.

Share and Collect

Method/Technique 1:

Visual Power Networking

Patricia Wolf, Peter Troxler & Abdul Samad (Sami) Kazi

Visual Power Networking is a facilitation technique best suited for the early phases of a conference, when delegates should get to know each other and initial contacts should be made amongst delegates. It requires typically just under an hour of time and guarantees that every delegate would meet at least three other delegates with similar or complementary interests and expertise.

Keywords: networking, information visualisation, disruptive moderation and facilitation

Method/Technique 2:

Using Cognitive Edge Methods for Knowledge Creation and Collective Sense-Making

Sonja Blignaut

The methods integrate knowledge and insights from a range of disciplines, including Complexity Science, Naturalistic Decision Making, Social Complexity, Anthropology & Cognitive Psychology. These methods are bottom-up, emergent and collaborative; and have proven to be extremely effective for knowledge sharing, extraction, and innovative solutioning.
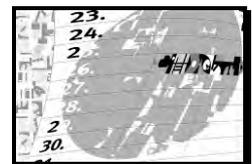
Keywords: disruptive, emergence, complex facilitation, knowledge management, innovation

Method/Technique 3:

Exploration Tours – Connecting Past, Present & Future

Ron Dvir, Hank Kune, Paolo Martinez & Arye Dvir

Exploration Tours are an exciting, fun and yet purposeful alternative to the ordinary methods of conferences or short courses. They are vehicles to explore the past, present and future of the concepts people work with. A good Exploration Tour is a springboard for multiple follow-ups, some which are concrete and some less tangible.
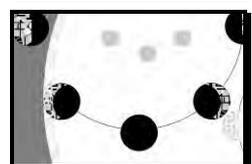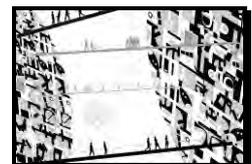
Keywords: exploration, future centers, contactivity, knowledge tours

Method/Technique 4:

Appraisal Interviews as a Tool for Organizational Knowledge Sharing

Marinita Schumacher, Corinna Flöck & Mounib Mekhilef

Appraisal Interviews stand mainly for management by objectives, wherein objectives are set, plans determined, performance reviewed and rewards given. They focus on the work results of a certain period of time and help both superiors and subordinates to clearly identify and define responsibilities and aims.

Keywords: performance appraisal, knowledge sharing, organisational learning

Method/Technique 5:

Group Analysis of Knowledge Test Results as a Knowledge Sharing Method

Małgorzata Grabus & Katarzyna Grunwald

The group analysis of the test results method (GAKTR) is particularly useful for services based on legal knowledge. This includes legal consulting services, i.e. insurance companies, tax firms, legal advisors or any other consultants whose activities are based on frequently changed laws, acts or regulations.

Keywords: knowledge collection and sharing, knowledge sharing culture, workshops, learning

Method/Technique 6:

Leveraging Interaction Through Cooperation

David Kato & Devanildo Damião
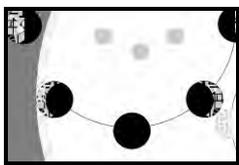
Nurturing connections between individuals from different backgrounds and disciplines can support efficient knowledge management within organisations. The method presented is a moderation framework based upon a theoretician-empiricist approach that can be used for any virtual community characterized by the physical distance of its members. It supports networking, and the sharing of best practices and innovations.

Keywords: : knowledge management, communities, share knowledge, moderation

Method/Technique 7:

Building a Global Online Community

Cüneyt Budak

This method/technique outlines the design process for a thematic web portal targeted at building an online community involving all the interested people in the world. The aim in such an initiative is to publicize and promote creative contributions from all around the world, and provide an open and useful database for all presentations and related resources. A case of an online showcase of world architectures is presented.
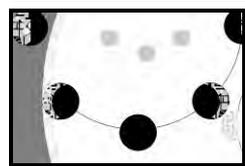
Keywords: web-based communities, global social networks, web portal design

Method/Technique 8:

Social Software Tools for Personal Knowledge Management

Swaran Sandhu

Social software tools are easy-to-use and encourage the sharing of knowledge. These tools usually consist of Weblogs, Wikis and a Tagging service, often combined into one application. This method/technique highlights how organisations can harness the power of social software tools.

Keywords: social software, weblogs, wikis, rss, tagging

Method/Technique 9:

Finding the Fire between the Nodes - Contactivity Events

Ron Dvir, Ed Mitchell & Abdul Samad (Sami) Kazi

This method/technique introduces the contactivity fringe events approach that is a collaborative and constructivist alternative to the traditional conference model. It can be applied in various contexts and acts as a refreshing approach to stimulate dialogue, knowledge sharing, and innovation within a "joy zone".
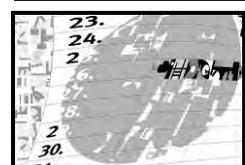
Keywords: contactivity, fringe event, wiki, joy zone, networking, multi-domain facilitation

Measure and Analyse

Method/Technique 10:

An Integrated Approach to Enabling More Effective Knowledge Flows in an Organisation

Christine van Winkelen & Jane McKenzie

This method/technique allows you to build an integrated picture of the major knowledge flows affecting an organisation and to diagnose what enables them to be more effective. It supports information gathering and structuring and is intended to be a diagnostic step within the process of developing and implementing a Knowledge Management strategy.

Keywords: knowledge management, learning, collaboration, coherence, value

Method/Technique 11:

Successful Innovation from Effective Knowledge Management

David. W. Birchall & George Tovstiga

This method/technique presents a toolkit for KM experts engaged in innovation projects. The toolkit includes an introduction into innovation management within organisations, case studies illustrating the interface between KM and innovation at different levels, and a check list for the degree to which an organisation's KM approach supports innovation.

Keywords: innovation strategy, innovation process, knowledge management audits

Method/Technique 12:

Co-creation Methodologies to Identify, Select and Maintain Knowledge Value Indicators

Paolo Petrucciani
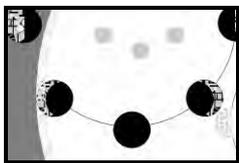
This method/technique presents several instruments for facilitating project work-paths based consensual and co-created roadmaps. These dynamic roadmaps gather and visualise insights of participants on 'what KM processes may imply for the company' and on 'how some knowledge indicators may be explained and utilized for organization benefit'.

Keywords: co-creation roadmap, consensus techniques, knowledge mapping

Method/Technique 13:

Social Network Analysis: A Practical Method to Improve Knowledge Sharing

Tobias Müller-Prothmann

This method/technique outlines the necessary steps and applications of a social network analysis and provides suggestions for practical interventions and follow-up activities to influence network actors, their relationships, and network structure to improve knowledge sharing between individuals, groups, and organisations.
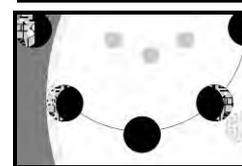
Keywords: communities, knowledge management, innovation, social network analysis

Method/Technique 14:

To Know What You Know at the Right Time: Knowledge Visualisation and Sharing Via a Cartographic Process-Oriented Approach

Alexandra Müller-Stingl, Waltraud Grillitsch & Robert Neumann

This method/technique demonstrates the use of knowledge visualisation and sharing techniques for knowledge transfer within Competence Centers. Different contexts in which the method is used and the important contextual framework required before the initiative are described.
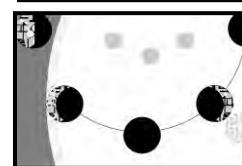
Keywords: knowledge sharing, visualisation concept, strategic road-mapping

Method/Technique 15:

Redesigning Communities of Practice using Knowledge Network Analysis

Remko Helms

The Knowledge Network Analysis method/technique is intended for practitioners responsible for the development and support of communities of practice. It is typically applied to the members of a single community. It helps to identify and visualise communities within a "push network" and the bottlenecks for knowledge exchange within the communities.
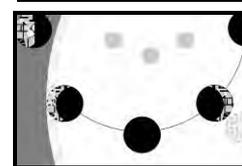
Keywords: knowledge networks, knowledge network analysis, social network analysis

Method/Technique 16:

Getting Stakeholders Involved in Regional Strategy Development: Basis-SWOT-Workshops

Patricia Wolf, Christoph Hauser & Simone Schweikert

The Basis-SWOT-Workshop methodology can be used in bottom-up strategy development processes with different and heterogeneous stakeholder groups. Its main objective is to stimulate discussions among the participants on the main objectives for the future development of their innovation strategies and systems.

Keywords: facilitation, interaction modalities, knowledge identification, adaptation, sharing

Method/Technique 17:

Multi-stage Analysis for Knowledge Reflection

Jens O. Meissner
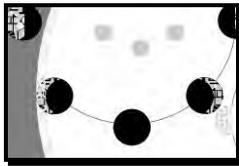
The presented multi-stage analysis method/technique is a powerful tool to visualise partly hidden and implicit knowledge of organisations that is embodied in everyday interactions and knowledge practices. It consists of a series of problem-centred interviews conducted with relevant actors in the field of interest and performed by a group of interested participants. The subsequent analysis helps to sustain processes of cultural learning.

Keywords: narrations, qualitative interview, social construction, cultural learning, landscape

Plan and Improve

Method/Technique 18:

Improving the Facilitation of Organisational Knowledge Creation

David. W. Birchall, Jean-Anne Stewart & Mike Pedler

The effective facilitation of group processes, including task groups, management teams and large group meetings, is increasingly recognised as a key organisational competence. This method/technique is aimed at those engaged in the facilitation of knowledge management initiatives; either as facilitators or as commissioners of facilitation.

Keywords: facilitation, group processes, competency, communities of practice

Method/Technique 19:

The Power of Disruption: Understanding the Unexpected

Patricia Wolf, Albert Vollmer, Peter Troxler & Abdul Samad (Sami) Kazi

This method/technique outlines a special facilitation method for an "unusual" innovation management workshop. "Power of Disruption" aims at enabling participants to understand the nature and potential of unexpected events in innovation processes and at empowering them to make use of such events in a productive way.
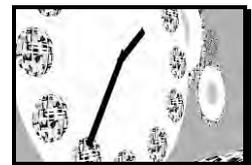
Keywords: disruptive moderation and facilitation, innovation management, disturbances

Method/Technique 20:

Collect and Share Existing Knowledge on Collaborative Multidisciplinary Scientific Research Processes

Ayalew Kassahun, Huub Scholten & Adrie J.M. Beulens

A collaborative knowledge-based system to support multi-disciplinary research is presented. The system provides a glossary of terms, process definitions, support for different user types, a knowledge base, and a knowledgebase editor.
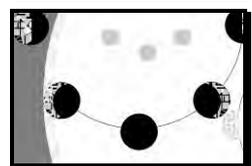
Keywords: co-creation, communities, knowledge artefacts, ontologies

Method/Technique 21:

Developing, Nurturing, and Sustaining Communities of Practice

Rony Dayan & Yossi Pasher
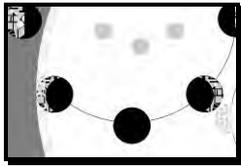
A set of methods/techniques that have been developed and used in a large aerospace organisation for developing, nurturing and sustaining Communities of Practice are presented. The need to adapt existing methods/techniques to the specific needs of an organisation is demonstrated.

Keywords: CoP, Community, practice, industry, aerospace

Method/Technique 22:

Mediation and the Mediatory Approach

Markus Hess

Usually, managers call mediation experts and ask for help in evaluating and settling a conflict within their team when internal channels for resolving conflicts were tried but have failed and thus been abandoned. Mediation is an approach that supports identification and dealing with conflicts in teams. It is a way of working with others in difficult situations in a manner that is democratic and saves face for all parties involved.

Keywords: mediation, moderation, group facilitation, conflict solving

Method/Technique 23:

Defining, Instituting and Sustaining a Knowledge Management Program

Gurbans S. Chatwal & Srinivas P. Jagannath
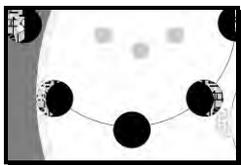
This method/technique serves as a reference for organisations aiming to create a sustainable Knowledge Management program. It provides a generic checklist on the steps that have to be processed while initiating the project and identifying, implementing, institutionalising and improving the selected Knowledge Management solution.

Keywords: knowledge management, knowledge measurement, strategies, knowledge

Method/Technique 24:

CABD - A Complexity Science-Based Method for Robust Business Development

Liza Wohlfart

Complexity Science is a promising discipline for business development, as it builds on the conviction that it is visions people should focus on and lessons learned from natural systems. The CABD method/technique tries to incorporate complexity ideas, with a focus on practical applicability, instead of theoretic disputes.

Keywords: robust business development, complexity science, brainstorming

Method/Technique 25:

Learning and Performance Support for Effective Innovation and Improving Engineering Processes at IAI

Rony Dayan, Ron Algor, Daniel Naor & Avi Kedem

The use of an e-learning system for capturing lessons learned and conclusions from previous experience and reusing them for current and future developments is presented. Its use in the elimination of design errors hidden in engineering products and activities is demonstrated.
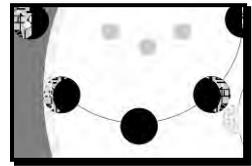
Keywords: CoP, community, practice, industry, aerospace

Method/Technique 26:

Strategic Role of Physical Settings for Creating and Sharing Knowledge

Mustafa Kurt

An organisational culture that supports knowledge sharing between employees is characterised by intense interaction and communication. Offices, meeting rooms and cafeterias play an important role in supporting this culture. The presented method/technique highlights the basic principles of physical space management that supports knowledge sharing.
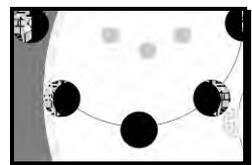
Keywords: knowledge creation, knowledge sharing, physical settings, arte-facts

Method/Technique 27:

Future Workshops - The Unthinkable and How to Make It Happen

Peter Troxler & Beate Kuhnt

Future Workshops is a method/technique to develop a vision of the future shared by the participants. It is best suited for solving problems in organisations such as factories, co-ops and unions, schools and youth centres, pressure groups and voluntary organisations, neighbourhoods and communities.

Keywords: action planning, participation, social inclusion, disruptive, empowerment

Method/Technique 28:

A People Centric Approach to Creating Taxonomies and Knowledge Artefacts

Shashi Kadapa
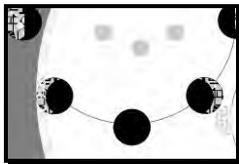
Key issues to be addressed when building a knowledge management portal include: how to create a taxonomy, what type of documents to keep in the KM portal and how to create a knowledge capture mechanism in the organisation. This method/technique presents how to create a KM portal that is well organized, does not confuse people, and is in line with an organization's need for knowledge capture and sharing.

Keywords: taxonomy, knowledge artefacts, knowledge capture mechanisms, templates

Method/Technique 29:

A System-based Approach to the Introduction of Knowledge Management

Mark Hefke
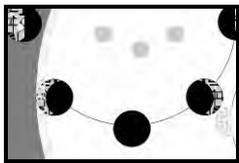
This method/technique presents a toolkit that has been developed for supporting consultants in Knowledge Management (KM) consulting processes by providing them with previously captured best practices from other KM consulting projects. With the help of the toolkit, best practices are structured through the system's ontology-based case base in which they are also stored.

Keywords: knowledge management, case-based reasoning, semantic web, ontologies

Method/Technique 30:

Strategic Roadmapping and Implementation Actions

Abdul Samad (Sami) Kazi

To continuously evolve and innovate, organisations and industrial sectors need to set clear evolutionary paths facilitating a transition from a "current" state to an envisioned "future" state. This method/technique presents a simple and visual approach for developing strategic roadmaps supplemented with a set of well-defined implementation actions that support realisation of the elements of the roadmap.
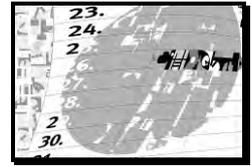
Keywords: strategic roadmapping, implementation actions, time to industry, thematic priorities

Acknowledgements

First and foremost, we would like to acknowledge and appreciate the enthusiasm and contributions from the numerous authors that have contributed to this book. They have shared their experiences and lessons learned from their reservoir of methods and techniques for knowledge co-creation and sharing. This book would not have been possible had it not been for them. We would also like to acknowledge the support of the European Commission and in particular its IST programme for their financial support for KnowledgeBoard.

We would like to thank you, the reader, for taking the initiative and time to explore and learn from the vast experience presented in the methods/techniques and their respective cases in this book. We certainly believe that this will aid you in your efforts to create and share knowledge within collaborative settings.

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Liza Wohlfart, IAT University of Stuttgart / Fraunhofer IAO, Germany

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KnowledgeBoard, July 2007.
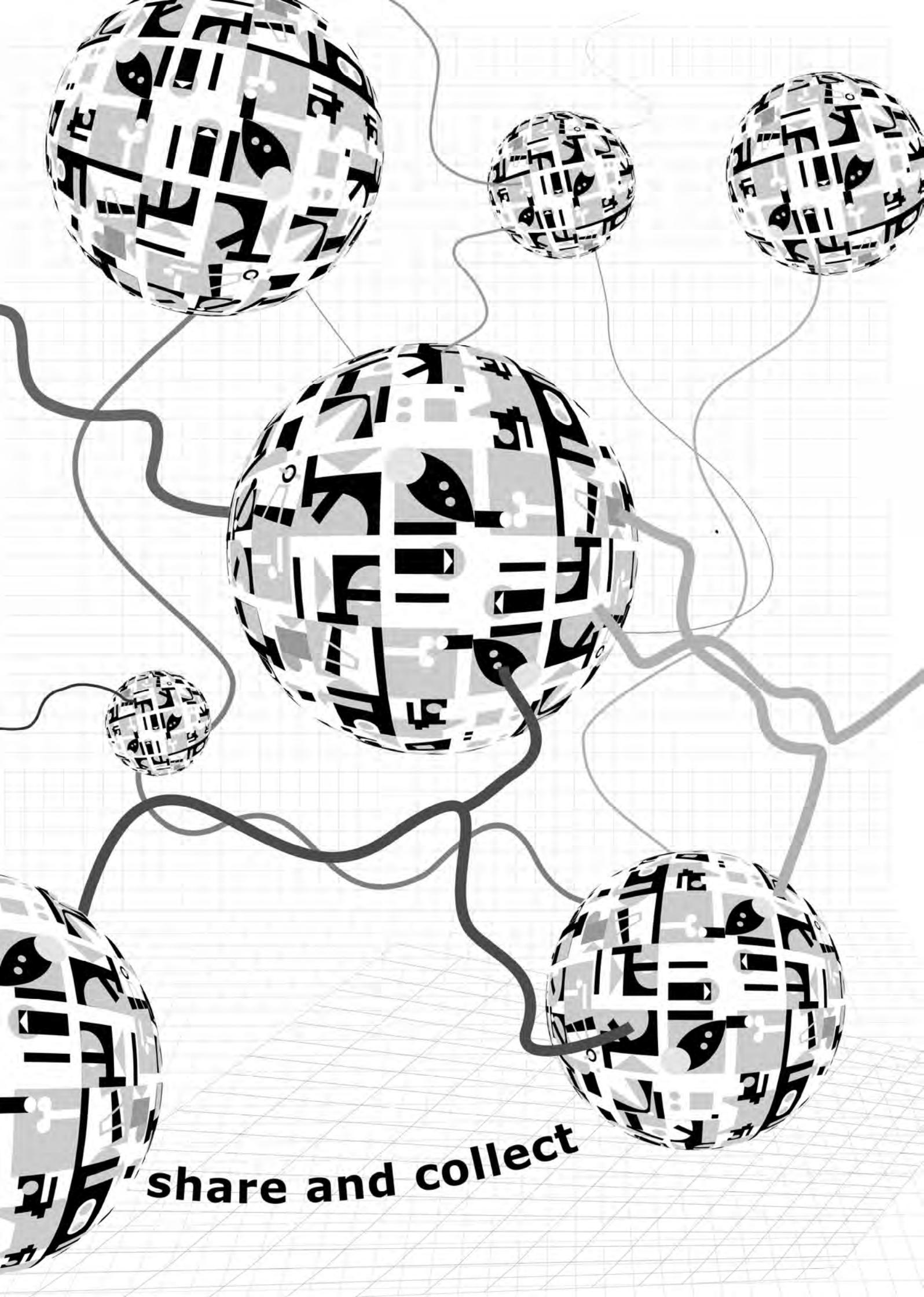
share and collect

Visual Power Networking

Patricia Wolf, Peter Troxler & Abdul Samad (Sami) Kazi

Visual Power Networking

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Snapshot (Quick Learning)

Visual Power Networking is a facilitation technique best suited for the early phases of a conference, when delegates should get to know each other and initial contacts should be made amongst delegates.

Visual Power Networking requires typically just under an hour of time and guarantees that every delegate would meet at least three other delegates with similar or complementary interests and expertise.

Visual Power Networking creates a buzz amongst the audience. It leaves delegates in an energetic and open state of mind. They are positively activated, easily interested in new topics and they engage readily in some hands-on activities.

Visual Power Networking establishes connections between delegates that can be further built upon in break out groups and other small-group activity during the conference.

Finally, Visual Power Networking creates links between delegates that have the potential to last longer than the conference itself, because they are not randomly generated but purposefully created based on the understanding of every single delegate's interests and needs.

Keywords: networking, information visualisation, facilitation of meetings and workshops, disruptive moderation and facilitation, overcoming communication problems

Context (Where & What)

At the beginning of conferences, workshops, meetings, etc. quite often people from different contexts gather and are supposed to work and network together for a few days. However, most conference organisers don't address this purpose specifically, but leave it to the delegates to get to know each other. Hatcher, Wiessner, Storberg and Chapman (2006) argue that conferences are typically organized to share and report information, but rarely purposively designed to generate new learning. Particularly if it is not 'normal', accepted behaviour to talk to new people delegates remain stuck in their own circles; thus the potential of meeting new people is not put to good use.

The Visual Power Networking is designed for all these environments as where people who don't know each other have to be stimulated to talk to each other, but where there is very limited time available and people tend to be shy.

A Visual Power Networking session can take anything between 30 and 90 minutes, with an optimum duration of just under an hour for a conference size of up to 100 delegates. The method does not scale particularly well to accommodate for lager audiences.

Through Visual Power Networking delegates get to know each other, they know who is in the room and they get a picture of the different topics that are there to talk about.

Visual Power Networking works well as an icebreaker; it creates an atmosphere of interest in other delegates and it stimulates the sharing of knowledge and experience.

Visual Power Networking is a method that does not focus on gurus or experts. Delegates are less likely to establish themselves as dominant in front of the plenary in an early stage of a conference since everybody gets the chance to talk to everybody else on a basis of equality.

Particularly for smaller groups Visual Power Networking produces a visual diagram of potential connections between delegates. This diagram can stay visible during the whole conference so delegates or facilitators can easily refer back to it.

Preparation (The Checklist)

In preparation of a Visual Power Networking session it is advisable to collect delegates' profiles beforehand. Typically such a profile would include names, affiliation, fields of expertise or experience of the delegates and an indication which topics they are interested in or what expertise they are looking for. Ideally a recent photograph of the delegate can be added to the profile. This information can easily be collected when delegates register for the conference. This is particularly easy when delegates register online.

For the actual Visual Power Networking Session two sets of these profiles need to be available in printed format on individual A4 sheets. One set of profiles is handed back to the delegates, e.g. at check-in, with the instruction to have it ready for the Visual Power Networking session.

A second set is put up in the room where the session will take place. Since several people will be trying to read these profile sheets simultaneously it is a good idea not to cram them into a too confined space but to be able to leave some space between individual sheets when put up on a wall next to each other. Ideally, the walls can be covered with an extra layer of wallpaper before putting up profiles so participants are able to write down notes or messages directly on the wall next to the profiles.

Optionally, a third set could be handy as a backup if delegates appear at the session without their printed profile. Alternatively an easy way to print out profiles could be provided since profile sheets have a tendency to go AWOL.

An interesting variation would be to include the profile information on the delegates' badges. Another variation would be to hang two sets of profiles on the walls and have delegates find their own profiles at the beginning of the session. Additional time would have to be allowed in this case.

Toolkit (The Essentials)

For the Visual Power Networking session, an open plan space is required. The space should provide enough pin boards or plain walls where profile sheets can be put up. Chairs and tables should be removed from the room.

Delegates will need pens to make notes and to write down delegates' names, also on the sheets that are put up on the walls. Therefore ball pens are not best suited, so it is best to have pencils available. Ideally this would have been considered when putting together the delegates pack.

Every delegate gets three pieces of post-it notes, either pre-printed with their name and affiliation, or blank ones on which they would write their names and affiliation.

Additionally a large (2 x 2 meters) sheet of paper is needed for the visualisation of the network.

Making it Happen (The Approach & the Action)

In preparation

1. Delegates have to fill in their profile before the conference: Name, organisation, topic interests and fields of expertise or experience, and expertise they are seeking for.

2. Facilitators write delegates' names on the large sheet of paper, e.g. in a circle. This sheet of paper will later be used for the visualisation of the connections between participants.

3. Facilitators put up delegates' profiles on the pin boards or on the walls of the room where the session takes place.

Visual Power Networking Session

For the Visual Power Networking Session, delegates gather in the room where the session will take place. The profiles are already hanging on the walls, and there is no seating available. A small stage, chair or ladder is provided for the lead facilitator to be clearly visible in the crowd. Before the session begins, the facilitators have to make sure that all delegates have their own profiles, pens and Post-its ready.

If people have to find their own profiles on the walls and take one copy while leaving the second on the wall, they now can be instructed to do so. Note that this can consume a considerable amount of time. Also if additional profiles have to be handed out or printed, the impact on the schedule might be considerable. Delegates who already have their own profiles ready will easily be able to spend their time reading other peoples profiles.

The session proper

Step	Duration	Activity
Introduction	5 min	The facilitators present themselves to the audience. The lead facilitator briefly explains the purpose of the session and outlines the 3 steps of the session:

1. Exchange: Get to know each other in pairs.
2. Marketplace: Search 3 potential contacts for partner.
3. Greeting: Find and meet the 3 potential contacts, 'add a face to the name'.

Now the facilitators launch the 'Exchange' phase by encouraging

Step	Duration	Activity
		people to get into pairs with somebody standing next to them who they don't already know. Facilitators have to be a bit pushy in this phase.
Exchange	5 min	Delegates get together in pairs and have 5 minutes (in total) to explain their own profiles to their partner. In the case of an uneven number of delegates, either one group of three can be formed.
		Everybody tries to understand, what their partner is interested in and what contacts they would be looking forward to making at this conference.
		At the end of this phase, delegates exchange their profile sheets and the three post-its with their names and affiliation, i.e. everybody should now have the profile sheet of their partner and the post-its with the names of their partners in their hands.
		Then the facilitator launches the 'Marketplace' phase.
Marketplace	15 min	Everybody searches through the profiles on the walls to find potential contacts for their partner.
		A potential contact could either be someone who shares the same interests and expertise as their partner or it could be somebody who has the specific knowledge, experience or expertise their partner is looking for at this conference.
		Once they have found a suitable profile, they note down the name of this delegate on the profile sheet of their partner. Also, they stick one of the post-its on the profile sheet of the potential contact on the wall. They might also want to make a note of the reason for selecting this contact.

Then they go on to search for the next potential contact, then for the third.

Once they have completed the search they return to their partner and hand back the profile sheet. Equally they get their profile sheet back.

After 10 minutes, the facilitators give an indication of the time passed and that there are only 5 minutes left to accomplish the task.

Then the facilitator launches the 'Greeting' phase.

Step	Duration	Activity	
Greeting	15 to 20 min		Delegates start searching the crow for their potential contacts, meet and greet them, establish that they indeed share common interests and express the wish to meet again during the conference.
		In the meantime, facilitators start to draw the Visual Network. For each connection suggested by the delegates (and as indicated by the post-its on the profiles on the wall) they draw a line connecting the two names on the large sheet of paper. Since time will probably not be sufficient, this is only the start of the Visual Network, and the facilitators or support staff should complete the picture after the end of the session.	
		Alternatively the network could be captured electronically in a spreadsheet or drawn by the partner who suggested the connections.	
		After 10 and 15 minutes the facilitators give an indication of the time passed.	
End	5 min	The facilitators show the (beginning of) the Visual Network to all delegates (and if appropriate explain that the drawing will be finished later on), or they refer to the electronically captured network.	
		The facilitators once more stress the purpose of the session and highlight how many interesting and content-rich connections have been made in a comparatively short amount of time and that everybody has met at least four people who were new to them, who would share their interests or who would have that particular expertise the delegates have been looking for. The connections established are not randomly generated but purposefully created based on the understanding of every single delegate's interests and needs, thanks to the collective power of the audience.	
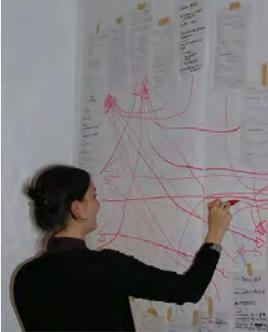
Afterwards

The resulting Visual Network, if drawn up properly, can remain in the meeting space or anywhere else for delegates to remind them of the session. Also the profiles can be used further as some kind of a message board. On occasions delegates have found it appropriate to stick their business cards on the profile sheets of delegates they would have liked to meet or to scribble small messages to other delegates. If that is the intention, the facilitators should mention that explicitly so delegates actually do check back with their profiles to find out if there is a message waiting for them.

Results & Next Steps (The Follow-Up)

The immediate result and main benefit of a Visual Power Networking session is that it generates a real buzz among delegates, it does energize them, and it creates an atmosphere where people do want to do something together.

This is particularly important to notice for conference organisers and has to be taken into account accordingly when scheduling a Visual Power Networking session: The session immediately following Visual Power Networking can benefit from that thriving energy in the audience – or destroy it completely. Hence you would want that next session to require a positively activated audience that easily is interested in the topic and readily engages in some hands-on activities.

Far more difficult, it seems, is to keep the connections between delegates alive. Ideally the conference schedule would allow coming back to these connections at several points over the course of the event. For example small-group activities could be held in break out groups that reflect similar interests as identified in the Visual Power Networking session. Lunches or receptions are other opportunities where delegates can take up the Visual Power Networking contacts again.

After the conference electronic contact details could be sent out to delegates to remind them of their connections, ideally combined with the respective delegates' profiles. However, eventually it is the delegates' own responsibility to keep these contacts alive.

Real Cases (As it has Happened)

Contactivity

The **Contactivity Conference 2006 in London Greenwich** was a very practical two day gathering of 64 Knowledge Management (KM) practitioners, academics and consultants, modelled within a Community of Practice (CoP) framework across both the virtual and physical worlds (Mitchell, 2006). The aim was to familiarize participants with a number of different knowledge sharing methods, Visual Power Networking being one of about five methods. Participants came from all over Europe; most of them didn't know each other. However, there was a core group of the KB community that did know each other very well. In order to make people talk to each other beyond existing contacts, the organisers decided to have a Visual Power Networking session in the morning of the first day.

Before the conference, participants registered on a wiki and filled in their profiles online. These profiles were printed out by the conference organisers (two copies) and brought to the conference. For participants who did not fill in their profile online beforehand, empty templates were available. The facilitators prepared the room and started the session as described above.

The process went very well and participants' feedback was excellent. They especially liked that they were forced to check the profiles of everybody in order to find interesting people for their partners and that the session stimulated a lot of communication with people they didn't know beforehand. People e.g. said 'I had many useful conversations and some would not have happened without the event design' and 'got to see connections with people I wouldn't have thought of otherwise.' One third of the participants voted the Visual Power Networking as 'the best bit' of the Contactivity event. Asked what methods participants would want to use themselves Visual Power Networking ranked second (after Open Space).

However, one of the participants tried to abuse the networking exercise as marketing opportunity; instead of searching contacts for his partner, he was putting his own business cards next to the profile of people he was interested to meet. While one might think that this could be an interesting extension to the Visual Power Networking exercise, participants did not respond at all to his advances. Therefore we would suggest that such behaviour would best be actively discouraged.

After the conference, participants were sent the list of connections they had made (presented in an excel sheet).

Masters Course on Knowledge Management

The **masters course on Knowledge Management at ETH Zurich,** provided by the research group 'Psychology of Work in Organisation and Society' at the Center for Enterprise Sciences, is an integral part of the studies for the master of advanced studies in management, technology, and economics (MAS MTEC). In June 2006, 32 Students participated in this course.

Apart from providing participants with an overview on Knowledge Management theory, the objective of the course was to teach participants several methods for knowledge sharing and to let them try out these methods (learning by experiencing). A third objective was to create an atmosphere of trust among the participants who mostly did not know each other as most of them did not follow the same courses since they were coming from different industrial backgrounds. In its second part of the course, the participants were to simulate a Community of Practice and to exchange quite sensitive information on how their companies practiced the sharing of knowledge. To be able to do this, students had to explicitly know the background of everybody in the room in order to feel safe.

Thus, a variation of the above-described Visual Power Networking was introduced. At the beginning, everybody had to talk to everybody for two minutes and exchange information on professional background and hobbies. This was done in two groups. The students took notes about the person they were talking to. After having talked to everybody, the students had to indicate which of the other students would be most interesting for them to exchange experiences with. To do this a large sheet of paper had been prepared beforehand which had the names of all students written on it along the edges. The students then had to draw lines between their own name and the name of their most interesting partners. This visual network remained visible for everybody during the whole rest of the course and was re-used for group building and the CoP simulation exercise.

At the end of the course, students had to review all the methods that had been presented. Particularly the feedback on Visual Power Networking was very positive. One student told the story how he some weeks later he was participating in a team project with several other students whom he did not know, except one from the KM course. In this team, he said, cooperation with the one student he knew from the KM course was much better that with the others. He explicitly concluded that this was due to the Visual Power Networking exercise where he got a broad overview on the experiences and background of the other student.

UnBla 2007

At the first UnBla event on regional innovation held in Luzern, Switzerland, a variation of the method was used. Noting that the audience constituted "locals" (Swiss), and "travellers" (delegates from abroad), the idea was to introduce locals to travellers, and what better way to do so than by sharing gifts. Before the event itself, each delegate was asked to bring a gift from their homeland, to put their business card or a name tag in the gift, and to then gift wrap it.

At the event, the gifts from the "locals" were put on one table, and those from the "travellers" on another table. Delegates were then asked to pick-up a random gift from the table other than where their gift was placed. After opening the gift, their task was to find the person who had provided the gift, to thank them, learn about their background, and identify their main interest areas related to regional innovation. Each person thus, met at least two persons: one whose provided gift they took, and one to who took the gift they had provided.

After meeting their new colleagues and learning about their background, interests, and needs, participants participated in creating a visual network connecting different people with each other based on background, interests, and needs.

Gifts: The Trigger for Networking

Rush: What will I get and who will I thank?

Thanks: Thanking & learning about each other

Connections: The people to meet ☺

This variation of the method proved to be quite fun and beneficial to participants, as not only did they meet people and share interests, but also got a gift each to remember.

Tips & Tricks (To-Do)

☑ Do give delegates the opportunity to prepare their profile beforehand, and provide some examples of good and useful profiles. Maybe think even of giving a bad profile as an example of how not to fill in a profile.

☑ During the session, give clear instructions to the audience what exactly to do in each step. It might be helpful to demonstrate what delegates are required to do.

☑ Don't worry, if the 20 minutes of the 'Greeting' phase are not sufficient to finish the Visual Network diagram. This can be done during the next session by a facilitator or support staff.

☑ Do make good use of the potential connections created during the Visual Power Networking session, e.g. when splitting up the audience for break-out sessions.

☑ Do make good use of the profiles on the walls, be it as message board or for delegates to give feedback or make announcements.

Potholes (Not-to-Do)

☒ Don't let the experts (or worse: the self-elected gurus) dominate the networking session, e.g. by abusing their profile for personal marketing, or by adding their business card to the profiles during the Visual Power Networking session. There is plenty of opportunity to do that afterwards.

☒ Don't force delegates into selecting topics or areas of interest from a pre-defined list only. This limits the expressive power of profiles.

☒ Don't rely only on capturing the network electronically. The physical and omnipresent manifestation of the many connections created during the Visual Power Networking session is the best way to remind delegates of the value of this particular exercise.

Acknowledgements

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Using Cognitive Edge Methods for Knowledge Creation and Collective Sense-making
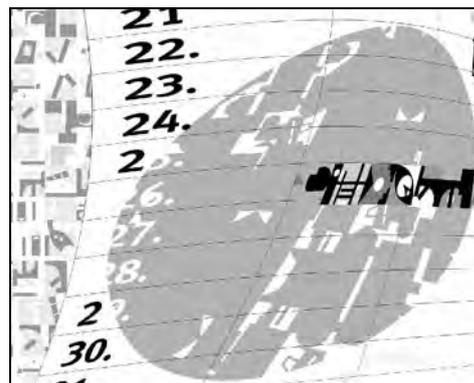
Sonja Blignaut

Using Cognitive Edge Methods for Knowledge Creation and Collective Sense-making

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Snapshot (Quick Learning)

Cognitive Edge (previously Cynefin) is an international network of researchers, consultants and practitioners who apply Open Source methods developed by Prof Dave Snowden. These methods integrate knowledge and insights from a range of disciplines, including Complexity Science, Naturalistic Decision Making, Social Complexity, Anthropology and Cognitive Psychology. The methods discussed in this document are bottom-up, emergent and collaborative; and has proven to be extremely effective for knowledge sharing and extraction as well as innovative solutioning.

In the described project instances, multiple parallel workshop processes were run simultaneously, and many different, but complementary outputs were produced over a two-day interactive workshop. This process is completely scalable, in Australia it was run with several hundred participants, in South Africa with 30.

The power of the Cognitive Edge methodology and approach comes from …..

- The use of narrative as a key component of collecting and understanding knowledge in context
- Sense making and meaning being socially constructed by those involved in and impacted by, the issue under consideration
- Allowing multiple perspectives to be visible and recognised
- Valuing dissent without requiring attribution of blame
- Providing perspectives and frameworks that enable people to take action in addressing complex issues
- Complimenting and working in conjunction with existing normative tools and processes, and
- Consultants and facilitators facilitating process but not being involved in content in the initial stages

Cognitive Edge methods are highly adaptable and can be used in a multitude of diverse contexts. The case studies discussed in this article primarily cover short narrative enquiry interventions aimed at understanding complex issues, culminating in open-space type sense-making and strategic solutioning workshops. Applications are diverse, ranging from innovation and strategic planning, new product development to knowledge mapping and cultural change interventions.

From an Organisational Development (OD) point of view, these techniques are also extremely valuable, especially because it views the organisation as a complex entity that needs to be respected and treated as such. In contrast to many quantitative OD techniques, the Cognitive Edge methods do not claim to be able to exactly measure pre-defined organisational constructs in order to make predictions or diagnoses. It allows (and thereby empowers) the system to diagnose and treat itself. It moves participants' thinking away from "problem", "quantity" and "certitude" towards "mystery", "quality" and "assurance". This allows the system to explore its own imagination and to see new possibilities for the future.

Keywords: disruptive, emergence, complex facilitation, knowledge management, innovation

Context (Where & What)

Objectives differ according to context, but measurable outcomes of these processes include comprehensive sets of cultural indicators, knowledge objects (comprising both codified and experiential knowledge artefacts), and large volumes of tangible suggestions to address complex issues. Another key objective of these processes is to increase the levels of interaction and dialogue between key stakeholders whether internal to an organisation or external, thereby establishing new social networks, or increasing the cohesiveness of existing social networks.

This methodology can be used as a short term workshop based intervention e.g. strategic planning or as the culmination of a longer term pre-hypothesis research project to understand a complex problem. It has been used successfully for conflict resolution, and ensures that the voices of all stakeholders are heard.

The actual workshop is usually conducted over one or two days, with the number of participants varying between 12 and 300 (the ideal number of participants is usually around 36). In some circumstances, a number of identical workshops can be conducted, with the data integrated for a final activity. The critical variables for participation and effective outcomes is a shared context, and diversity of perspectives,

Preparation (The Checklist)

Although not a pre-requisite (as the methodology is open source) it is strongly recommended that the facilitator attends a Cognitive Edge accreditation training course before applying any of these methods. A further recommendation is to be mentored through the first couple of workshops i.e. to observe how experienced Cognitive Edge facilitators run these workshops before facilitating one yourself. The approach to facilitation of complex processes differs markedly from traditional facilitation techniques, and these differences need to be understood. For example, ambiguous instructions are intentional, not assisting participants to find the 'right' answers fundamental, and any interventions into group process happen at a system, not individual level.

Due to the highly disruptive nature of this methodology, a capable facilitator is a critical success factor in the process.

Participants need not do any preparation prior to the session – typically we find that the less prepared they are (and the less they know about the session and the process) the better. A detailed invitation is therefore not necessary. Agendas only indicate timing of breaks etc, but no detail is supplied as to the process and specific activities.

If emergent cultural indicators are required as output of the workshop, it is beneficial to collect the narrative material that serves as input to the process in advance. This will allow the facilitator to prepare the anecdotes, print them out on A4 sheets and prepare a story wall in the workshop space (cover an entire wall with printed anecdotes). Workshop participants usually find these walls irresistible, and simply reading through about the real experiences of others has a tremendous impact on them.

An adequate number experienced and well briefed facilitators must be arranged to run the session. The number of facilitators depends on the number of participants, smaller groups (12 and less may require only 1 facilitator), larger groups (more than 36) may require more than 3. A guideline would be to have a 1 facilitator for every 12 participants. Not all facilitators have to be equally experienced though – 3 strong facilitators with a couple of 'assistants' should easily be capable of successfully guiding the workshop. Given the emergent nature of the process, facilitators must be adaptable, and prepared to quickly modify processes.

Facilitators and assistants should be well briefed and reach agreement before the workshop as to how the workshop outputs will be 'marked' between steps. It is important to know for example which wall which data item originated from, which hexies belonged to the same clusters etc. Usually we assign a number to each group and a letter to each cluster – all hexies are then marked accordingly with a ball point pen between activities. Timelines need to be marked so as to indicate their order.

A skilled cartoonist – although this requirement is often ignored, it adds tremendous value to the process. In addition to bringing an element of novelty that keeps the participants engaged, visual representation adds a deeper dimension to the outputs that has significant value to the interpreters of the output. Cartoons also aid communication efforts after the workshop (e.g. to communicate a newly formulated strategy to staff who didn't attend the workshop), as images can convey complex meaning in a simple fashion, and people relate to cartoons differently than to text or Powerpoint presentations.

Toolkit (The Essentials)

For the workshop the following are required:

- A large open workshop venue with ample open wall space which you are allowed to paper. It is best if the venue is off-site to ensure minimal distraction of participants by operational crises and other activities such as email etc.

- The workshop venue should be set up banquet style i.e. participants seated around round tables (between 6 and 10 per table)

- Large sheets of paper to cover the walls in the workshop venue(unprinted newsprint or flip chart paper that come in rolls work well for this purpose)

- Hexagonal post-it notes (hexies) in at least 6 different colors (if not available, square notes can be used, but it is not recommended as it has a detrimental effect on clustering as people tend to think in categories when presented with square notes – also, the clusters require a lot more wall space when squares are used)

- Fine tipped permanent markers to write on the hexies – it is important that the text written on the hexies is visible from a distance of about 2m away to aid the clustering exercises.

- Flip charts (1 for each table)

- A high resolution digital camera to capture workshop outputs after each step e.g. to document clusters before they are broken up and taken off the walls.

- During the process participants need to come up with various actions or suggestions. In order to facilitate this process at least 200 A5 action forms need to be prepared (it works well if 3 or 4 different paper colors are used for this). These forms typically have the following headings: Activity (which activity produced this action); what? (describe the action); Who can do it (i.e. ourselves, our direct management, the executive); By When (estimated timeframe); How can success be measured?

Making it Happen (The Approach & the Action)

Overview

The main premise of these workshops is to facilitate multiple concurrent streams, each busy with a different (and sometimes unrelated) task. Most of these streams use anecdotal narrative material as input. The larger group is typically broken into smaller sub-groups, either in a random fashion or according to role, level etc. It also works well to allow smaller groups to self-form according to interest in a specific topic that will be discussed at a specific table. The composition of the group working together is also constantly changing. The intent is to ensure that multiple possibilities and opportunities are created, with the convergence into preferred positions or actions being deferred as long as possible.

Initially the entire group is given one instruction (although they may be given different topics) to be complete in the smaller groups. Once they've settled into this activity, various people are taken from their respective groups and tasked with another (often unrelated) activity performed on the walls. An effective way of doing this is to ask the groups to nominate one or two people to participate in a new task. These new groups remain busy with their tasks for a short time; they're then sent back to the tables and asked to send two other nominees back to their wall. In this way, 3 or more tasks can be completed simultaneously.

Because of the emergent and disruptive nature of some of the methods we employ, it is very difficult for participants to influence the outcome to their benefit. Complex facilitation and disruption reduces opportunities for dominant personalities to influence the results. The social construction aspect of the process makes it difficult for those engaged to deny the results and at the same time, difficult for executives to challenge, as these results were created by the environment itself, not by an external consultant or expert.

When facilitating such a workshop, emergence is encouraged and premature convergence discouraged through disruption and very vague instructions. Many participants find the process uncomfortable, especially those preferring highly structured workshop environments with fixed agendas and predictable results. It is not unusual for some participants not to return to the 2nd day of the workshop, but fortunately they are in the minority. Most participants find the process highly engaging and different, and once they manage to overcome their discomfort, they are usually energised at the end of the workshop.

The process is highly adaptable, and any of a multitude of components can be used in the different work streams. There are no recipes and no one best way of conducting such a workshop, so it will therefore probably be most effective to discuss some of the process components we've combined in the past and present the detail of an actual workshop under real cases, rather than attempting to explain the various options. Once the guiding principles are understood, facilitators can customise the process and plan their own workshops according to the context and need.

Possible process components

1. Anecdote circles

This component can be included in the actual workshop, but we find that is most beneficial to conduct these sessions well before the workshop in order to have the narrative outputs transcribed.

During these informal facilitated sessions, participants are stimulated to share real experiences (their own, or someone else's) that pertains to the issue under investigation. An example of a probing question we could use to stimulate experiences around job satisfaction or culture would be: If you run into a very good friend of yours and they tell you they've been offered a job in your company similar to your own, what experiences would you share with them to encourage him to join, and what experiences would you share to discourage him to join? This is very different from normal survey questions where the hypothesis of the researcher is already contained in the questions, and therefore the results typically indicate only what the researcher thought to find.

The anecdotes collected in this fashion is transcribed (verbatim), printed out and pasted on one wall of the workshop venue walls. At various times throughout the 2 day workshop, groups will be asked to review the anecdotes and find various elements in them. We will discuss this in more detail later.

One point to note here – when transcribing and editing the anecdotal material, be sure to retain the authenticity of the stories i.e. don't correct grammar, remove 'uhm's' etc. The 'messier' the stories, the more obvious their authenticity and therefore the more trust worthy they are to

participants. The only editing we do is to remove names and identifying word patterns, and to remove chatter and unsubstantiated opinions from the transcribed text.

2. Identifying knowledge disclosure points and ASHEN

ASHEN

Over the last couple of years, Knowledge Management theory has focussed on the differences between tacit and explicit knowledge. To our mind, this is a gross over simplification, as Knowledge in itself is a complex phenomenon that transcends such simple classification. (Dave Snowden, 2000)

Knowledge is also highly contextual; we only know what we know in the context of needing to know it. In order to provide this context, we make use of Knowledge Disclosure Points (KDPs) (Snowden 1998a) which comprise decisions, judgments, problem resolution and learning. They are the points at which we use or create knowledge. People find it easier to remember using knowledge than to answer the question "*What do you know*". A more meaningful question would be: "*When you made that decision, what knowledge did you use?*"

It is at this point where the ASHEN framework is utilised to provide a more complete picture of the applied knowledge, provide a language to make sense of what we find, and provide a mechanism to move directly to action. ASHEN is a mnemonic term that represents the following:

Artefacts: all the existing codified information (or explicit knowledge) currently held in the organisation. Examples include: processes, documents and databases; essentially every constructed knowledge object that exists external to a person.

Skills: In this context, a skill is something that I can tangibly measure whether someone has it or not. For example, you can either create a Word document, or you can't. Skills can be taught, whether through study, or by on-the-job training.

Heuristics: Guidelines of rules of thumb. We use heuristics to make decisions when we don't necessarily have all the facts we need. In people with deep expertise in certain areas these heuristics manifest as 'gut feel' reactions.

Experience: Experience is largely self explanatory, although it is worthwhile to note that experience may collective, rather than individual which makes it difficult for organisations to manage.

Natural talent: By definition a natural talent is a special ability or gift that makes someone better at doing something than most other people. It cannot be managed, but we can improve our ability to identify and nurture it.

Therefore by asking the ASHEN question in the context of a KDP meaningful answers can be obtained e.g. *When you made that decision, what **artefacts** did you use, or would you like to have had? What **skills** did you have or need and how are they acquired? What **heuristics** do you use to make such decisions quickly, what is the range of their applicability? What **experience** do you have and what experience do the people you respect in this field have? What **natural talent** is necessary? How exclusive is it? Who else has it?* (Snowden, 2000). Once we've obtained

these insights it is relatively easy to move to action, i.e. how can we protect key artefacts or obtain ones we're missing? How can we make sure our people have the necessary skills?

In the workshop groups are asked to read through the narrative material on the wall and are tasked to find Knowledge Disclosure Points (KDP's). Each identified KDP is written on a hexagonal post-it note (hexie) and pasted on an assigned wall. The group is then tasked to cluster these according to likeness and to identify the ASHEN elements associated with each KDP cluster e.g. when you make these type of decisions, what Artefacts, Skills, Heuristics, Experience, Natural talent do you use. These elements are written onto different colored hexies, pasted around the KDP clusters, and later clustered for likeness themselves.

The groups are then tasked to come up with specific actions based on the ASHEN outputs e.g. How do we address skill/artefact gaps? How do we gain the necessary experience etc? These actions are captured on action sheets and pasted on another dedicated wall.

3. Decision information flow map

This process stimulates the group to identify all the decisions that they make, or are aware that other people make related to the field of study. These are produced by brainstorming, challenges, reviews of narrative material etc, and once complete are clustered and grouped.

Once this is complete, for each decision point cluster three things are identified: (i) information currently used; (ii) information that, if it was available, would improve the decision; (iii) how the decision is communicated. Finally "information in" is matched to "information out" between the various decision clusters.

The DIFM is produced bottom up and once complete provides the following:

- The basic input needed for an improvement plan to create mechanisms for gathering and making available the information needed

- Contrasting the bottom up "this is how it is" map with the process map of the organisation "this is how it should be", the differences can often explain failure in, or inefficient operations planning improved information flow to improve decision effectiveness

4. Emergent cultural indicators

Participants are tasked to look for characters in the stories, to copy them onto hexies and paste them on a dedicated wall. Others are similarly tasked to look for behaviours or beliefs and others for topics. A different color hexie is used for each of these, and a specific wall is assigned to each. Once enough items have been identified for each of the walls (characters, behaviors and topics) participants are told to start clustering these according to likeness. Throughout this process participants are continually disrupted, they are sent to join groups busy with other tasks and send back volunteers etc. There is therefore no cohesion in the groups working on this task.

New participants check the clusters and change them where necessary. Once they are satisfied with the clusters, they are asked a perspective question e.g. on the character wall we'd ask: "If you were this character cluster's best friend or worst enemy, how would you describe it i.t.o. character traits". These are written down on hexagons with a contrasting colour and placed around the cluster. Once they've exhausted the attributes they can think of, participants are sent

back to their respective groups and once again asked to send fresh participants to these walls. The attributes generated by the first group are marked (to indicate which cluster they were assigned to), removed from the wall and scattered on another wall. Each new group of participants repeated this process, until the facilitator feels that enough attributes have been generated for each of the 3 walls.

The attributes are clustered and named, and these named clusters represent emergent Archetypes, Themes and Values that represent the culture of the group that created them.

See Figure 1 for a graphical representation of the process
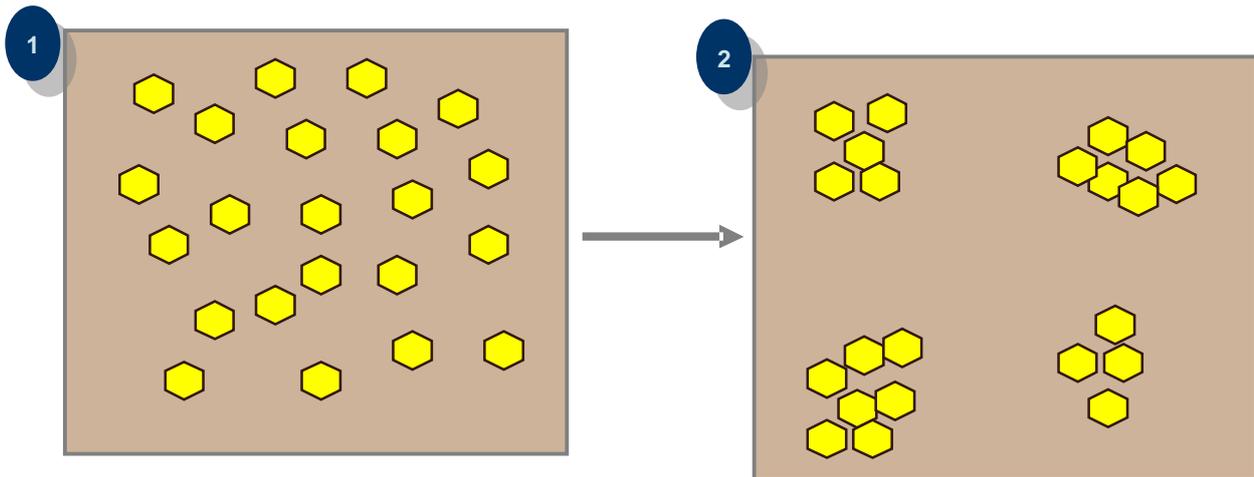
1
· Distribute the hexies randomly on a brown paper wall (1 wall each for characters, issues & behaviors)

2
· Cluster for likeness

· Name the clusters
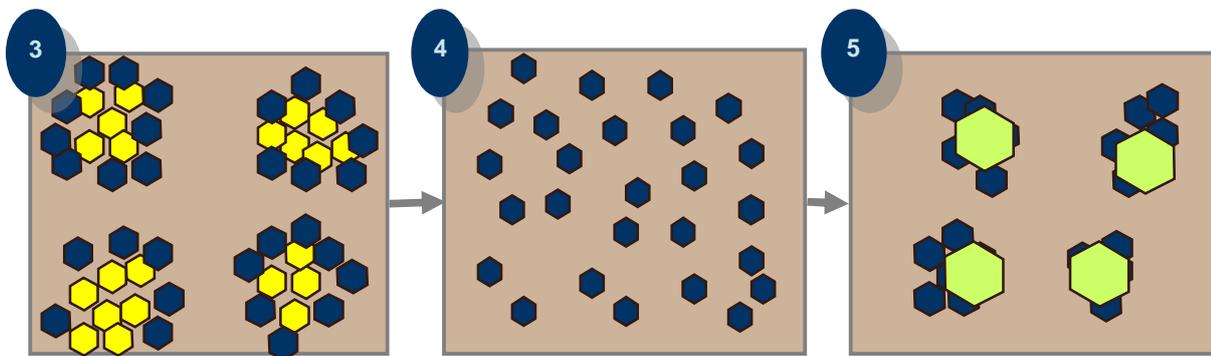
3
· Place the attributes around the cluster
· Using a ball point pen, mark the attributes, so they are linked to the original cluster (this is a tracking element used for later analysis)

4
· Remove attributes to another wall and distribute randomly while repeating the process with other participants

5
· Cluster the attributes for likeness
· Name the new clusters
· These names represent emergent properties i.e. Archetypes, Themes and Values

Figure 1

Figure 2 shows an example of an archetype. In this case what is particularly interesting is the high correlation of this archetype to the client character cluster. This seems to indicate that people in this environment expect their clients to act like this before even engaging with them, and therefore treat them accordingly. This has high negative implications for customer service in this organisation.
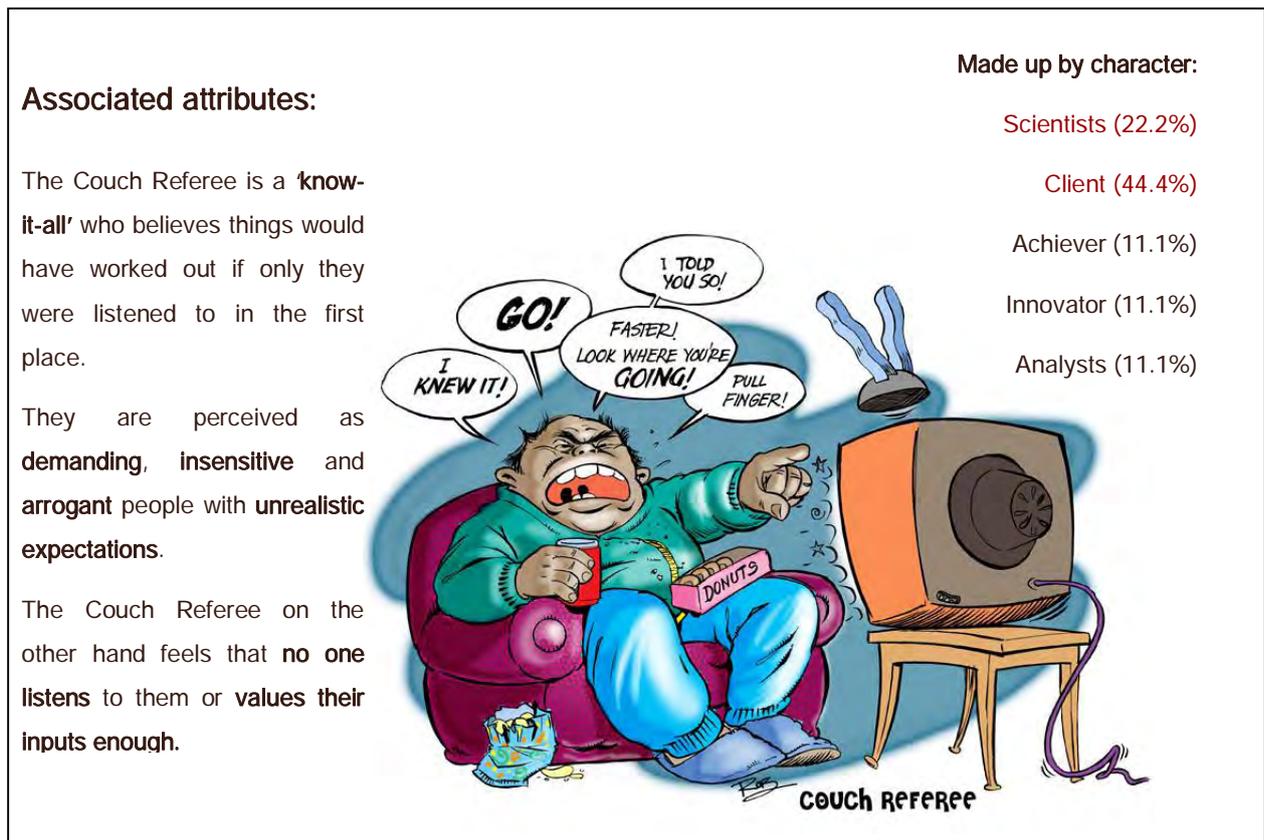
Figure 2

5. Ritual dissent

The entire group is given one task, to be completed in table format, e.g. each table is told to construct a story utilising anecdotes on the story wall. Each group is told to nominate a spokesperson (with a robust personality who doesn't bear a grudge!). After a limited period of time, the spokespersons rotate to another group to present their outputs. This group is instructed to simply listen while the spokesperson presents, they are not allowed to ask questions or comment. The spokespersons are then asked to turn their chairs around and sit with their backs to the group. The groups are tasked to be as critical as possible about what was presented to them, the spokesperson is only allowed to listen and take notes, they are not allowed to comment, ask questions or defend. The spokespersons return to their groups and share the other group's comments. Each group then has the opportunity to re-work their outputs before the process is repeated.

This process of presenting and critiquing is called Ritual Dissent. It introduces dissent in a ritualised and non-threatening fashion and is a good way to prevent the group from converging on a solution (in this case a story) too quickly. It serves as a challenge and encourages divergence and creative thinking. This method can be used very effectively during strategic planning sessions as well as while designing business cases etc as it ensures robustness in the produced output.

6. Future backwards

The future backwards is a group timeline based technique that breaks entrained thinking patterns and provides insight into the current top-of-mind issues, aspirations and fears that are present within a group.

Once again the groups work on walls (not tables). The first step is to brainstorm their current reality around a specific topic e.g. in terms of knowledge sharing in your environment, what is currently working well, what is not working well etc. These ideas are written onto hexies (one color) and placed in one big cluster (Today) on the wall. Throughout the process it is important to emphasize that it is not necessary for groups to gain consensus. Every group member's view is valid, and therefore should be captured and placed on the wall.

Once they've completed the Today cluster, the groups are tasked to build a real timeline (using different color hexies) made up of key events that they feel led to the current state. The key here is that they have to work backwards, i.e. start with the most recent event and work backwards into the past. Participants often find this difficult, but this is a necessary step as working backwards starts breaking their entrained patterns of thinking.

After completing the timeline, they're asked to build a second cluster below Today that represents to them the worst scenario they can possible imagine (Doomsday or Hell). They use a different colored hexie for this cluster. Once complete they're tasked to come up with a fictional timeline (once again working backwards) of made up of fictional events that caused Doomsday to occur. This fictional timeline must intersect with the actual timeline at one of the real events and can contain an accident (event no-one had any control over). Once complete, they group is similarly tasked to create a Heaven or Golden Age cluster above Today, once again with a fictional path back to the real timeline.

Once the groups have completed the exercise, they are given a short break. During this time, the facilitators mark the outputs according to which group they belong to. The hexies are then removed from the walls, combined and re-distributed to 4 different walls (today on one, the actual timeline on another and one each for heaven and hell).

Participants are divided into 4 combined groups and tasked to cluster the hexies for likeness on each of the walls. These clusters are named, and represent themes that were present in multiple group outputs. Typically themes in today represent top of mind issues, themes in heaven represent aspirations and themes in hell represent fears.

A final step would be to engage a cartoonist to sit with the various groups and create a visual representation of what heaven, hell and today would look like, based on the emerged themes.

7. The Cynefin framework

The Cynefin framework is a sense-making framework with two ordered and two un-ordered domains, all four of which are considered valid in context. There is also the domain of disorder in the centre which is used where there is no agreement about the nature of the system or issue. A system may have different aspects present in more than one domain.

Groups map their issues onto the Cynefin framework using hexies. This provides a basis for agreed action and decision making. It ensures that the appropriate intervention strategy is chosen for the particular issue or system under consideration.

Complex

- Cause and effect are only coherent in retrospect and do not repeat
- **Pattern** management\ Complex adaptive systems
- Every time we think we've solved the issue it returns in a different form
- Infinite range of possible outcomes that aren't possible to predict up front –

Complicated

- Cause and effect are separated over time and space – **complicated** but discoverable
- Domain of the **expert and methodology**
- Scenario planning, systems thinking, learning organisation
- Issues are not transparent but become clear through analysis – resemble familiar

Un-ordered systems

- No cause and effect relationships perceivable
- Stability-focused intervention – **action is required**
- Crisis management
- Issues are unexpected – catch you completely off guard

Ordered Systems

- Cause and effect relations repeatable, perceivable and predictable
- Legitimate **best practice**
- Standard operating procedures ; process re-engineering
- Issues are familiar and obvious

Chaotic

Simple

1. Ordered domains:

- Context free – can learn from other organisations/situations and apply lessons directly
- Most traditional management planning and analysis tools assume order – and are appropriate for these domains

(a)   Simple Order

In this domain, relationships between cause and effect are self evident, and therefore it is possible to define **best practice.** Simple order may be a result of social convention or legislation rather than some pre-given norm; for example which side of the road we drive on.

Decision making process: *Sense Categorise Respond*

Problem solving: identification of the rules, procedures, that needs to be changed. Implementation through direct command from the centre; no variations are tolerated; domain of best practice.

(b)   Complicated Order

While there are repeatable relationships between cause and effect for issues/systems in this domain, they require analysis and research to uncover good practice. This is the domain of systems dynamics, scenario planning and comprises the bulk of standard management consultancy techniques and management science research.

Decision making process: *Sense Analyse Respond*

Problem solving: agree which group of experts will be tasked with determining the best approaches. Domain of good practice – usually more than one way of achieving desired outcomes so as long as experts agree can become part of embedded practice. Some element of judgement is needed.

2. Un-ordered domains

- In these domains we are not able to manage the whole system - therefore we need to intervene in the ordered elements of an unordered system (the things that people agree can and should be changed)

- Un-ordered domains are contextual – options must emerge from a specific situation – not copied

- Critical importance of social construction

(a) Complex Un-order

For issues and systems in this domain, the relationship between cause and effect is only ever understood in retrospect, making this a domain of probes and pattern management. Narrative techniques are powerful tools to use to make sense of the system, as they convey complex knowledge in context. There are multiple outcomes or options that are possible and preferred options emerge in response to probes and multiple experiments.

Decision making process: *Probe Sense Respond (explore)*

Problem solving: domain of emergent practice; contextually specific; design probes/experiments to test what will make a difference; those that are successful are moved to ordered domains and embed (exploit), those that aren't are disrupted.

(b) Chaotic Un-order

The level of turbulence experienced in chaotic situations results from a lack of any perceivable relationships between cause and effect except at a very micro level. With no precedent, and no way of identifying patterns or opportunities for probes, the only available option is to act to stabilise the situation and move the issue close to the boundary of another domain.

Decision Making Process: Act sense respond

Problem solving: domain of novel practice if crisis is managed effectively… and an innovation team 'shadows' the crisis team to capture ideas. Action is the only way forward – either attempt

order through edict (moving to simple domain) or immediately try multiple probes to shift to complex domain.

Additional information on these and other components are available on the Cognitive Edge web site (http://www.cognitive-edge.com)

Results & Next Steps (The Follow-Up)

What differentiates the outcomes of these workshops from other techniques is that in addition to tangible outputs such as knowledge artefacts and decision information flow maps, cultural indicators are also produced from pre-gathered narrative. Archetypes, themes and values are extracted from gathered stories through an emergent process. Future Backwards has current top-of-mind issues, aspirations, fears as output. These two techniques are excellent diagnostic tools, and because of their emergent nature aren't open to gaming. The Future Backwards also has as an output actual timelines with key events and turning points that led to the current state and that inform collective and individual decision making (corporate memory). Often we forget what we know until context reminds us, and these timelines offer an excellent device for further knowledge disclosure, as the events provide context for people to recollect and share their knowledge.

During these events participants are tasked to define possible solutions for issues that were identified during the workshops. In all cases the number of suggestions, as well as the quality and level of practicality of these suggestions were much higher than those from more traditional planning workshops. Due to the bottom-up and emergent nature of the process, participants have a sense of ownership of the outcomes and buy-in is therefore more likely.

Another key benefit of the bottom-up narrative approach is the natural resonance it creates within many different cultural groupings. In contexts where cultural diversity often inhibits communication and knowledge flow, we found that narrative and story provided a translation mechanism between western and indigenous cultures. The process is also non-threatening, everyone has a voice, and the facilitator does not get involved in a 'leadership' role.

Indirect questions and narrative disclosure proved to be remarkably effective at preventing camouflage behavior amongst participants. Using anecdote circles to gather narrative material proved to be a very effective mechanism for the extraction of knowledge, even items that would be considered highly sensitive. The depth of knowledge gathered in a very short time span was astounding.

The cultural indicators (archetypes, themes and values) that emerge from the process contain within them a rich and powerful potential for organisational transformation. Work teams throughout the organisation can, for instance, have follow-up workshops around these metaphors. The power of making sense of one's reality in terms of metaphors, allows not only for much deeper insight, but also for creative and imaginative visions of new futures that were previously hidden to the group. Allowing this metaphoric re-envisioning process to unfold can lead to results and decisions that the expert-consultant would never have been able to imagine.

Real Cases (As it has Happened)

1. South African Government Agency

This workshop was the culmination of a bigger project conducted in a government agency in South Africa. The objective of the project was to understand experiential knowledge and how knowledge sharing could be enabled between newer employees and experienced 'experts' in a highly pressurised environment. Another objective was to investigate the feasibility and benefits of using narrative as a vehicle for knowledge transfer. See figure 3.

The workshop ran over 2 days and what was especially significant was the level of engagement of all the participants. Although we lost a couple of participants at the end of day 1, those that remained all contributed 100%, unlike other traditional workshops where a small group of people ends up doing the bulk of the work.

Prof. Snowden was the lead facilitator at this workshop, with Sonja Blignaut and Jean Cooper as co-facilitators. Internal staff members were trained and assisted in the process when required.
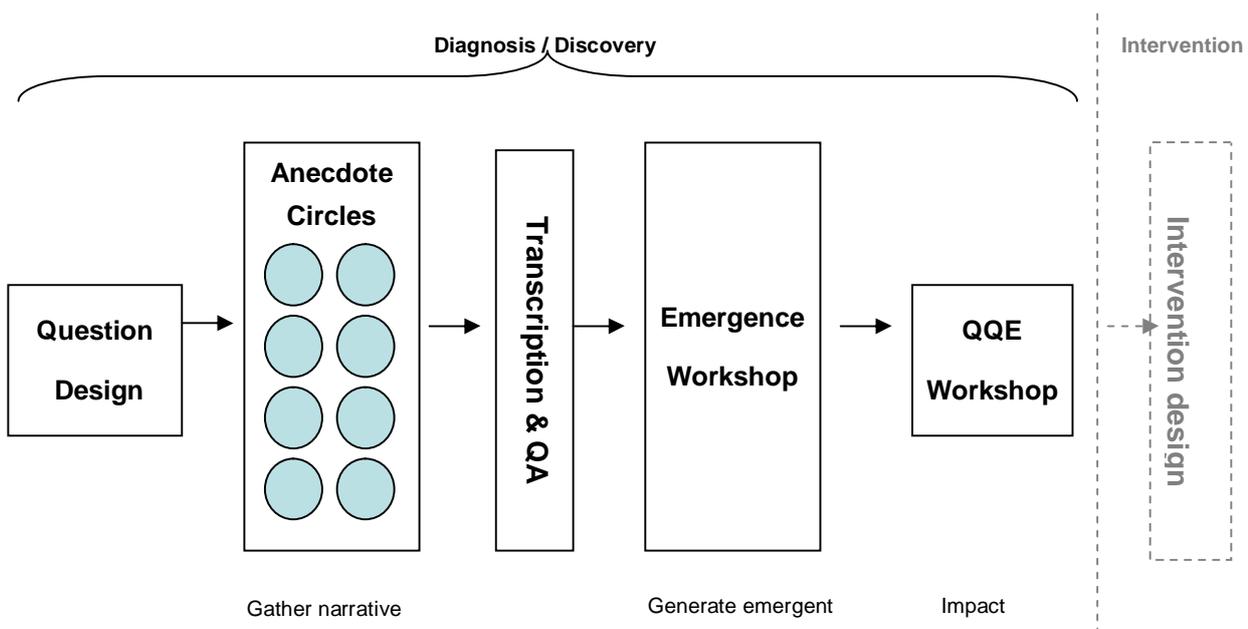
Figure 3

Prior to the workshop, several anecdote circles were held with approximately 10 participants in each. Participants were stimulated to share real experiences (their own, or someone else's) that pertained to their jobs and specifically times when experiential knowledge (manifested as gut-feel) were utilised.

The anecdotes collected in this fashion was transcribed (verbatim), printed out and pasted on one wall of the workshop venue walls so that it was entirely covered with A4 anecdote sheets. What is interesting to note is how much of an attraction the story wall was to the participants. Throughout the 2 days, whenever they had spare time or during breaks, there were always people at the wall,

reading the stories and many conversations were happening around these stories. This in itself had a tremendous impact on the workshop participants.

Workshop specifics:

The walls of the workshop facility were effectively used to display the stories, record, build, and cluster various emergent properties during the multiple exercises. Figure 4 shows diagram of the facility illustrates the outputs produced. At the end of the workshop, these combined work displayed on the walls made a powerful impact that conveyed the value received far more effectively than a documented report.
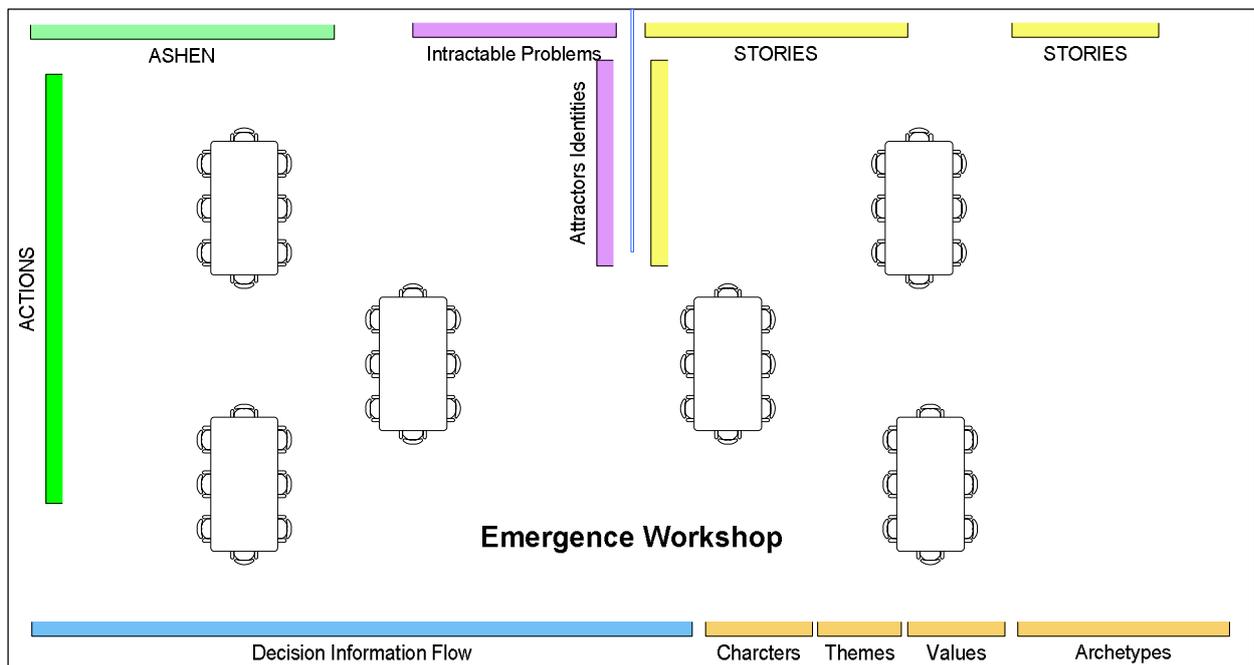
Figure 4

On the first day the participants were asked to (in their table groupings which were randomly selected) come up with knowledge items they frequently use during their day to day activities. All the participants found this to be a difficult exercise (this was intentional), and it brought home one of the key rules of Knowledge Management – it is very difficult to 'know what you know' without proper context.

Prof. Snowden then introduced and explained the ASHEN Knowledge framework. Up to this stage of the workshop, all the groups were focussed on the same tasks. After explaining ASHEN, the group was split into 3 concurrent streams, groups were allowed to self-organise around the activities they wished to work on:

Group 1 – Knowledge disclosure points and ASHEN:

One group of participants was sent to the story wall to review the anecdotes and use them to provide the needed context for knowledge disclosure. Participants were tasked to identify Knowledge Disclosure Points (KDP's)

Later during the day, this group was split into 3 sub-groupings (one group looking at Artefacts and Skills, another at Experience and Natural Talent, and the last one at Heuristics), adding more ASHEN elements and clustering them for likeness. After clustering, they were asked to identify specific **actions** that could enhance knowledge transfer in their environment, based on the ASHEN clusters e.g. How can the agency go about acquiring new artefacts or better utilise existing artefacts? Which training interventions and strategies can be put in place to ensure people have the necessary skills to perform their job roles? What strategies can be put in place to allow people to gain the necessary experience? How can the company better identify and nurture natural talent? It was emphasized to the groups that these actions should have **tangible and measurable** outcomes, and that they had to focus on actions that could reasonably be done by them or their managers. The reason for this was to keep them from platitudes, 'they should' actions aimed at the executive, and to get them to think about things they could take responsibility for and that could lead to positive change in the environment.

Group 2 – Decision Information Flow Map (DIFM):

The second group started working on a Decision Information Flow Map (DIFM).

Producing the DIFM is an involved process that kept this group busy for most part of the 2 days. The DIFM map was produced within the workshop, but the comparison with formal process was left for post workshop processing.

Group 3 – Emergent Cultural Indicators:

6 to 8 of the participants who initially joined either of the other two walls were asked to form this 3rd group after about 15 mins spent at the previous walls. We allow them to become engaged in the other tasks, so that they feel that the initial task is the main task, and that they feel that is more important. We do this to make sure that they don't over analyse and spend too much time thinking about what they are doing while participating in this third task, as this is where the emergent cultural indicators are produced.

The initial group of 8 participants continued with the task for a while, looking for characters, topics and behaviours in the stories and starting the clustering. They were sent back to their tables and asked to send back other group members. This new group continued with the task. This process repeated until the process neared its end and Dave asked for volunteers (who hadn't been involved in this task yet), who would form the final group of participants at these walls and would continue to work with the cartoonist.

Towards the end of day 2 the group was tasked to look at all these outputs, record their interpretations of the outcomes (what does it mean to them that these archetypes, themes and

values are present in the environment) and to select one or more stories that they feel are relevant to their interpretation.

While the three groups were busy with their main activities (as described above) they were interrupted at various times to participate in sub-activities such as constructing teaching stories from the actual anecdotes, selecting stories on the wall they felt were most surprising, most inspiring and most typical etc. (here the entire group participates in the same activity, in table group format)

At the end of the workshop, the outputs included:

- A complete Decision Information Flow Map

- A knowledge map (ASHEN) and associated actions

- Emergent cultural indicators (Archetypes, Themes and Values)

- Constructed Stories

- More than 100 practical actions and suggestions

Participant reaction
- "I think this process has given me a much broader view and understanding of what other member's challenges are within the organisation"
- "By sharing experiences during this workshop, I've realised that sharing experiences with colleagues at the workplace can be beneficial"
- "This is an eye opener and very interesting workshop which teaches a person a lot of knowledge"
- "An excellent 2-day seminar with a very unique approach. One worth talking about and not just another consultant trying to fix what is broken but rather we (employees) telling what is broken and how to fix it"

2. South African banking client

A division of a large financial institution was about to embark on a new strategic planning process and wanted to understand the current perception of their employees. Multiple Future Backwards processes were run, and the combined themes were drawn by a cartoonist. These cartoons were widely used in the subsequent communications around the new strategy. Figure 5 shows an example of the cartoon that was created to describe the heaven state:
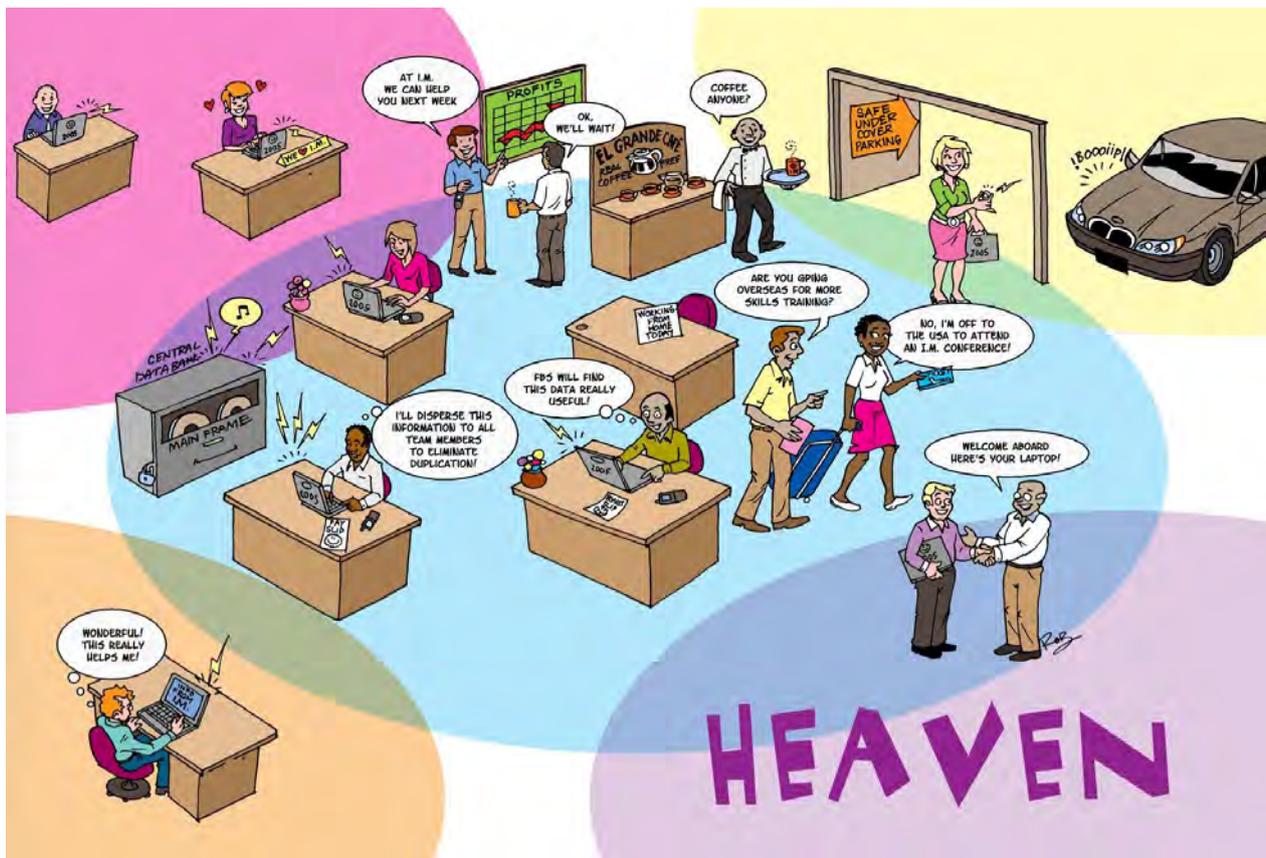
Figure 5

3. A state based education and training department in Australia

This department conducts an annual leadership forum. A recently appointed Chief Executive wished to explore the current culture as they prepared for major change resulting from new Government directions and initiatives.

What was done:

- The Cognitive Edge data base 'Sensemaker' was used to capture stories from all staff in the Department (see the Cognitive Edge website for further information)

- Three Cognitive Edge facilitators were supported by 20 internal 'boundary riders', who were introduced to the tools and processes the day before the Forum. This group assisted in distributing resources, identifying process problems and other issues

- The forum was held in a basketball stadium, involving around 300 people; the mezzanine was used to distil meaning from the stories as well as providing a 'whole of system' view for facilitators to monitor

- The activities undertaken were

  o Future Backwards – a process that is an alternative to scenario planning. By Initially undertaking this in stakeholder groups at a 'Big Picture' level, differences in perspective become visible

- o Future backwards – at a strategic issue level. Participants were invited to choose which issue to work on and therefore work groups were self-selecting

- o Mapping of the issues on the Cynefin Framework, providing the basis for developing recommendations based on the decision rules that underpin the framework

- o Development of recommendations for action (some 70 recommendations in the four domains of the framework were developed for 6 complex strategic issues)

- o Ritual dissent – was used to test the robustness of proposals by peers

- o In parallel, distillation of values, themes and archetypes from the stories in stakeholder groups

Outcomes:

In addition to the specific recommendations, other outcomes were…

- The capacity to examine different stakeholder perspectives

- The transfer of capability – all participants are able to use the tools and processes in their own workplace (feedback has been received that some have done this)

- For each of the stakeholder groups, an understanding was gained through the Future backwards process of

    - o Corporate memory

    - o Aspirations

    - o Fears

- Endorsement of the process by the minority indigenous representatives, in their own words "This is the first time we have felt able to participate equally in any department activity"

- An understanding of current critical cultural issues (from the stories that had been collected)

Tips & Tricks (To-Do)

þ Always make sure that the sponsor understands that the process is emergent, that neither you nor they can control of influence the outcomes

þ If using the Cynefin framework, use the 'butterfly stamping' exercise (see web site) so that people become familiar with the framework before applying it to their own data

þ Have a number of 'back up' activities that can be introduced if necessary

þ If collecting stories to use, make sure that people telling the stories know how the material will be used

þ When conducting an anecdote circle, try to find as informal a venue as possible – avoid conference rooms

þ Always make sure to mark hexies as to which wall and if applicable which cluster they belong to before removing them

þ Take pictures of outputs before removing them off the walls

Potholes (Not-to-Do)

Ø Try to avoid mixing levels of seniority in groups as less senior group members will often not feel free to contribute

Ø Diversity should be maximised, but always ensure that there is enough shared context between group members – don't put completely unrelated people in the same group

Ø Don't tell participants what the process will entail in advance

Ø Facilitators should never get involved in the content or give examples as this will put their own perspective on the results and dilute the authentic voice of the people

Ø Don't become anxious if the group seems confused. Trust the process.

Ø Don't agree to predetermined outcomes no matter what a client might request or expect

Ø Don't leave dysfunctional groups operating – intervene by introducing additional activities for 'those who have contributed the most so far…" (as determined by the groups themselves)

Ø Do not edit published narrative material in any way, except to remove identifying names

Acknowledgements

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Author Biography

Sonja Blignaut is an experienced business consultant with many years strategic consulting experience in large corporate organisations. Around 3 years ago, she found her niche when she was introduced to Dave Snowden's Cognitive Edge methodology whilst employed by IBM Business Consulting Services. She has since focused her career on the application of complexity-based methods on seemingly intractable business issues such as Culture change, Customer Experience and Innovation. She has completed many successful projects, both locally and international and has been appointed as the only approved Cognitive Edge accreditation provider in South Africa. She has delivered accreditation training courses to (among others) the global Knowledge & Learning division of IBM in Atlanta. Sonja is a director of Dialogue, a small consulting firm in South Africa as well as the Centre for Complexity Studies affiliated to the Potchefstroom Business School, University of North West in South Africa.

Exploration Tours – Connecting Past, Present & Future

Ron Dvir, Hank Kune, Paolo Martinez and Arye Dvir
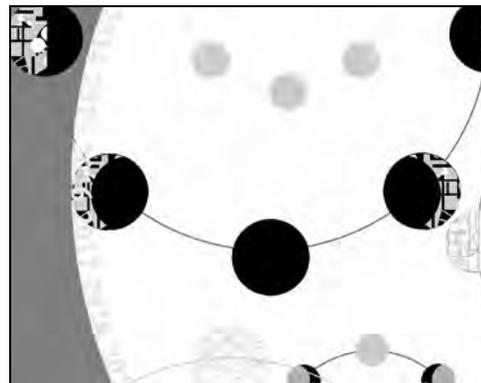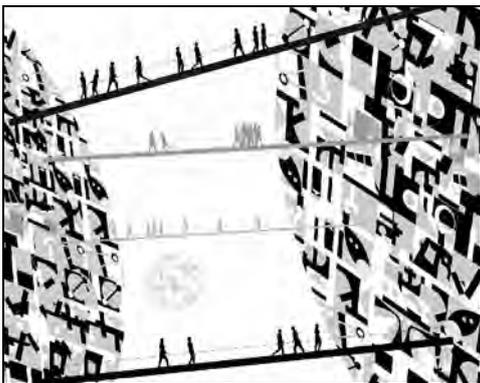
Exploration Tours –

Connecting Past, Present & Future

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Artwork by landscape architect Arye Dvir (tsard@netvision.net.il)

Snapshot (Quick Learning)
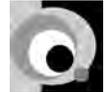
How can a group of people explore an important question, address a complicated challenge, or learn about an emerging domain together?

This chapter offers the Exploration Tour as an exciting, fun and yet purposeful alternative to the ordinary methods of conferences or short courses. It is a vehicle to explore the past, present and future of the concepts people work with.

The Exploration Tour can take many forms and may vary in length, scope, pace and format. We describe here our experiences with three-day tours, involving some 50-60 participants exploring four or five destinations, and addressing one or two "big questions". Two cases are presented: a tour in the Netherlands that explored five Dutch Future Centers, and a tour in Tuscany that asked: "what can we learn from the innovation secrets of Leonardo da Vinci"?
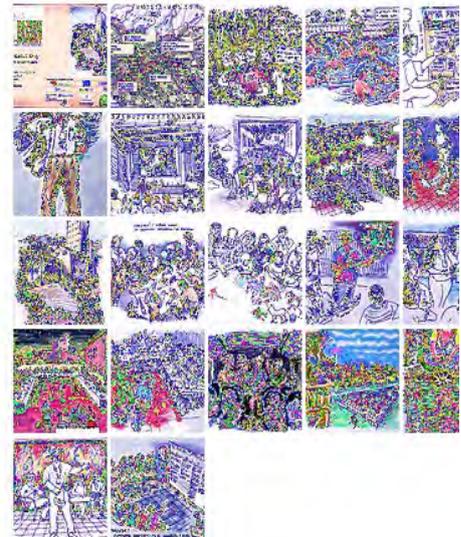
Artistic impressions from the Leonardo Exploration Tour (spring 2006).

Preparing a tour is a long and complex process, which addresses many issues: creating the tour "story", planning the path, working with local stakeholders, planning the exploration activities, dealing with the logistics, preparing the explorer kits, building a fascinating group of explorers, and much more.

Our experience is that this pre-tour process – just as much as the tour itself - becomes a most satisfactory adventure, which results in effective learning, strong community, surprising perspectives, new friendships, and tangible outcomes.

Viva explorers.

Keywords: exploration, future centers, contactivity, knowledge tours

Context (Where & What)

Bring 50 or 60 inspiring people from all over the world together – many of whom have never met before – and ask them to exchange ideas and experiences about how to create added value in their work. What's the best way to organize the work processes in order to get maximum benefit of the collective intelligence of the people attending? You can organize a conference, with keynote speakers, research papers and presentations, and a social programme in the evening. This approach may work well in some contexts; but when the people you invite are themselves innovators, creative people involved in developing and running innovation labs, creativity spaces and "future centres", you can choose an approach more suited to the passion of the people participating and the nature of their work. You can create a future center experience – a series of dynamic, inspiring and surprising *future spaces* designed to bring out the creativity and playfulness of the participants. You can set people in motion, figuratively and literally, moving them around amongst ideas and idea-enabling workspaces, creating environments to enhance idea generation, learning and knowledge sharing. You can create an *exploration tour* to **explore the past, present and future of the concepts people work with**, and in this way create collaborative workspaces for knowledge co-creating and sharing.

Future Centres: an international development

The idea of a "future center", which had one of its first practical realizations at Skandia (Sweden) in the 1990's, has since spread to a number of different countries. Both in the public and private sector there are many initiatives that have been inspired by future center concepts; they operate under names such as future centers, innovation labs, mindlabs, academies, and solution spaces. Many practitioners working with these concepts know only a few of their colleagues and, because the various centres operate under a large variety of names, people often don't realize that others working with similar concepts under different names are actually direct colleagues with whom they can actively exchange knowledge and experience.

The Future Center Exploration Tours have been organized so that a broad cross-section of practitioners can meet each other, physically experience a number of *future spaces*, explore mutually interesting concepts and provide a basis for learning together in the future.

What are the main goals this method can achieve?
Exploration tours are activities designed to achieve a wide range of objectives. These include:
- *Inspiration*. Exploring new ideas from a broad range of initiatives and new directions for thinking about – and acting on – future center concepts now and in the future.
- *Learning*. How others translate future center concepts into actual projects: what works, what does not work, and why?
- *Social innovation*. How can these centres and their underlying concepts contribute to social innovation?
- *Networking*: What is the basis for personal and organizational cooperation, consortium forming and community in the future?
- *Leveraging*. What is the leveraging potential for helping to launch new centres?

How many people can participate?

The method is suitable to groups of up to 60 people. A group of up to 60 people can meet and interact with each other in the course of three days, creating the spirit of community which is important to the Exploration Tour method. It is also possible for a group of this size to travel together in one or two touring cars, which enhances the interaction while "on the road".

Of course, the number of participants for a tour depends on the possibilities of the places to be visited, and the number of people they can accommodate.

Preparation (The Checklist)

Here we present a systematic process for preparing an Exploration Tour. Please be aware: in reality the proess is more chaotic, less linear and full of surprises. We started the preparation process 6-8 months before the event. In your case it might require a shorter or longer lead time.

Kick-off

✓ Check options and agree on a location and (preferably local) organizer. Agree tentative dates.

✓ Establish a steering team. Typically 3-4 people, committed to invest lots of time, talent, contacts and imagination in the tour. Trust, as well as complimentary skills, is critical.

Planning

✓ Build the "story" – what is the focus of the tour? What is the narrative? What kind of places we would like to visit?

✓ Communicate with local stakeholders who might hosts parts of the tour – leaders of organisations, city officials, managers of interesting sites, etc. *What's in it for them?*

✓ Create the tour path – rough timing and routing to the various sites. Plan the optimal size of the explorer group, based on physical and other constraints.

✓ A pre-tour will help in the fine tuning of the planning, identifying how unique features of each location can be used, and building relationships with the local stakeholders.

✓ Make a detailed plan, hour by hour. Specify logistical issues e.g. transport, responsibilities (who facilitate which session) etc. Make the plan diverse and exciting. Include surprises.

✓ Plan the tour budget. Calculate costs, and plan revenues of cover them – think about fees for participants as well as fundraising (usually for covering specific costs e.g. hosting a specific dinner) with local stakeholders. Plan the logistics (hint: this is a time consuming task).

Participants:

✓ Invite potential participants – based on members of the targeted community, personal contacts etc. Send an attractive invitation, and follow up with telephone calls when needed.

✓ Interact with the participants – send an initial event plan, ask for their ideas, seek issues they want to focus on, identify workshops they propose to run during the tour.

✓ Invite participants to send some information about themselves – send them a profile template 6 weeks before the tour. Invite them to send relevant material – papers & presentations.

✓ Package the participant profiles, papers, the tour programme, and information about the locations in the form of a guidebook (we use both hardcopy, CD and tour website media).

| Initial route planning | Guidebook (CD version) | Pre-tour |
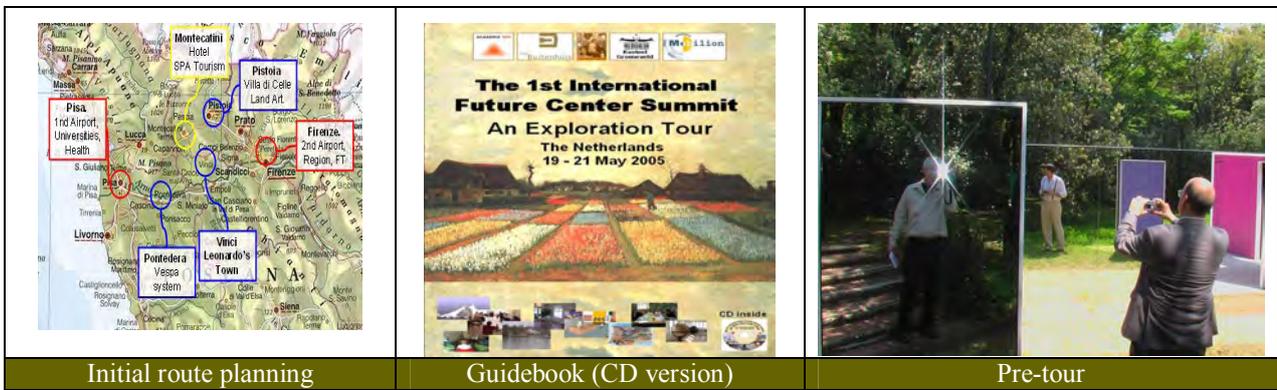
Toolkit (The Essentials)

The following chart shows the building blocks of a good Exploration Tour. The two case studies will provide you with concrete examples of how to create and use each of them. The best advice we can give you is: look at this list, but then create your own – depending on the opportunities and constraints of your own tour, the special features of the participants, location, routing, community, and of course – your imagination.
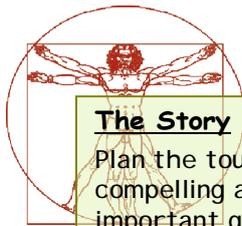
The Story

Plan the tour around a compelling and important question and/or challenge. Create a story-board which connects the question, path, specific locations, activities and participants.

The People

Up to 60 participants.

Diversity – background, expertise, 3 generations, multiple disciplines.

All with passion for the tour subject.

The Organizers

A tour leader.

Small planning team.

Involve local stakeholders.

The Exploration Activities

Interactive, engaging all participants.

Diverse set of learning and exploration workshops (see Leonardo case: pool-shop, walk-shop, cave-shop).

The Route

Fascinating destinations which highlight different aspects of the tour subject.

Typically 1-2 destinations per day.

Have one base camp (hotel) if geographically possible.

The bus time is a good opportunity for informal interaction.

The Documentation

Use all or some of the following channels:

•Video, film

•Photo (+web album)

•Illustrations (+web illustrated tour diary)

•Report by a writer, journalist

The Explorer Kit

Small backpack.

Notebook, pen, post-its, hat, exploration guide book, etc.
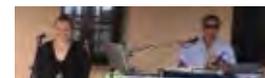
The Social Activities

Good meals, long dinners, good things to drink

Music, dancing

And some free time (for shopping, individual exploration)

The Back-office

Deals with logistics (accommodation, transportation, finance) special needs, unexpected problems

The Exploration Guidebook

Tour map, program, participant profiles and photos, information about the destinations, relevant papers by participants, etc.

The Organizers Kit

Megaphone.

Lots of workshop materials – white and brown papers, flip-charts, markers, post-its, masking tape.

Charm, charisma and leadership.

Making it Happen (The Approach & the Action)

Each Exploration Tour is unique. Here we suggest a generic three-day agenda which shows some of the typical elements of an Exploration Tour.

Day 1	AM	Participants arrive at the base camp. Spontaneous encounters.
		Registration. Providing the explorer kit.
	PM	Official opening by the tour leader (+ logistical notes, "rules of the game", brief agenda).
		Meet at the base camp (hotel) and travel to the 1st destination (or meet directly at the 1st destination).
		Initial round for "getting to know each other".
		Explore tour theme through workshops and other interactive learning activities.
	Evening	Long dinner, music, dancing etc.
		Back to the base camp.
Day 2	AM	Travel to the 2nd destination. Consider running a *bus-shop* (workshop at the bus).
		Explore tour theme through workshops and other interactive learning activities
	PM	Travel to the 3rd destination.
		Explore tour theme through workshops and other interactive learning activities.
		Two free hours – shopping, leisure, individual exploration, etc.
	Evening	Long dinner, music, dancing etc.
		Back to the base camp
Day 3	AM	Travel to the 4th destination.
		Explore tour theme through workshops and other interactive learning activities.
		Run a concluding session: identify follow-ups and feedback
	PM	End of official programme.
		Interested participants are invited to explore the places individually, at their own pace.

At the tour destinations, many exploration, interaction and active learning methods can be used, and many of them or described in this book. For example, we used the following methods:

Knowledge Café's, Open Space workshops, sessions for the co-creation of future images, garden walks, computer-aided brainstorming workshops, and more.

The objective is always the same: to enable opportunities for deep reflection, exposure to new perspectives, and for conducting meaningful - and sometimes also purposeful - conversations.

Variations:

Your own tour will probably be completely different – you may choose for a one-day tour or perhaps a two week tour, focus on only two locations or possibly on four places a day. Also, you may consider splitting the group into smaller subgroups that will visit different destinations, meeting each afternoon to share insights and learning.

Contactivity Constellations

The explorers can use diverse interactive constellations, exploring some issues and sites individually, in pairs, in small groups or collectively as a whole. We recommend mixing conversation and exploration modes in order to maximize the experience and the learning, and to create deeper relationships and better collaboration amongst the exploration tour participants.

The following figure shows the constellations used in the two cases described later in this chapter.

Site A — Welcome + introduction to the tour

Site B
Pair conversations - getting to know each other
Parallel exploration paths: e.g. Cave-shop, e.g. Walk-shop, e.g. Pool-shop
Wrapping up insights from the paths
Sharing the insights

Site C
Full group discussion
Individual exploration
Knowledge Cafe
Sharing discoveries + local expert speakers

Legend
Full group activity
Individual exploration
Pair activities
Large group workshops
Small group workshops

Site D
Group exploration of the site
Small group discussions
Open Space – discuss future collaboration
Concluding session – action plan and farewell

Results & Next Steps (The Follow-Up)

A good Exploration Tour is a springboard for multiple follow-ups, some which are concrete and some less tangible. Expect surprises – probably in your Exploration Tours new types of outcomes will emerge as a result of the unique combination of participants, social constellations and experiences during the tour . Here we list some of the results that emerged from our tours:

❖ **Contactivity:** New contacts, friendships, business relationships and even partnerships were established.

❖ **Inspiration:** Participants reported that they went back to their normal life and work "charged with energy", "fresh ideas" and "new perspectives".

❖ **Local Impact:** the local stakeholders e.g. the hosts at the various tour destinations were given some good ideas and concrete suggestions by the participants. It is good practice to package those ideas in a form of report.

❖ **Next Tour**: Each tour resulted in initial ideas and/or concrete steps towards the next one.

❖ **Community**: Initial steps to create a community of practice for the participants and additional players were taken. An internal online collaborative working environment was created after the second Summit to facilitate on-going contactivity.[1]

❖ **Business, Academic or Social Initiatives**: ideas for concrete projects to be carried out by the group were discussed and kicked-off.

❖ **Documentation**: an electronic photo album (we used www.flickr.com) and illustrated tour report were created and used to prolong the enjoyment, re-experience the tour, and share part of the experience with other people.

❖ **Lessons Learned**: the tour organizers accumulated a long list of lessons learned and transferred them to the organizers of the next event.

Result: illustrated diary of the Tuscany Exploration Tour (presented in flickr.com).

Result: the OpenFutures EC project initiated on the Dutch tour (open-futures.net)

Follow up process

The final session, typically about two hours, should be dedicated to looking back and looking forward. Different forms of conversation can be used. For example, in one of the tours we used a Open Space workshop format. In another tour we used a computerised brainstorming system (Zing). The following questions can be asked: What was good and not so good about the tour? How would you make the next event more exiting and more relevant? Where could we have the next tour? Who would like to host it and who can help organize it? What joint initiatives can the group undertake (and what are the concrete next steps)?

Follow-up process: Explorers at an Open Space session about the created a community, at the end of the 5 Dutch Future Centers tour

Follow up process: Explorers at an electronic Brainstorming session , at the end of the Leonardo Exploration tour.

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[1] For more information on the collaborative Future Center Community space: contact paolo.martinez@tin.it.

Real Cases (As it has Happened)

The Dutch Case: An Exploration Tour of Five Dutch Future Centers

Context

The first international *Future Center Summit*, in the form of an Exploration Tour, was held in The Netherlands on 19-21 May 2005. The tour lasted three days and included visits to five Dutch Future Centers for the public sector, situated in different parts of the country. The event was attended by 54 Participants from 12 countries on four continents.

This Summit & Exploration Tour was organized so that a broad cross-section of practitioners can meet each other, physically experience a number of centres, explore mutually interesting concepts and provide a basis for learning and possible collaboration in the future. It was an opportunity to meet and work with people from all over the world who are actively putting Future Center concepts into practice, as well as with people in the process of creating new concepts and methodologies for future centers, innovation workspaces, and labs for social innovation.

What was the programme

The five Dutch centres provided a unique setting for bringing people and ideas together, and for active reflection on both the practical application of these concepts and on the future of future centers. During on-site visits there were keynotes, knowledge cafés, demonstrations, dialogue, experiential parks, and virtual visits to a broad range of international initiatives.

The programme was very full and people were kept busy from early morning to well into the evening each day. Every morning the group was brought by bus to one the centres. In the afternoon the bus brought the group to another centre. The activities at each of the Future Centers were different, organized around the themes relevant to the participants and according to methods and techniques characteristic of how the centres work. These activities included sandwich-board meeting spaces, creative walks in gardens, human 'power point' sessions, electronic brainstorming, and dance demonstrations. The atmosphere was informal, inviting and inspiring; with ample time for meeting people, opportunities for sharing experience, co-creating new ideas, and having fun. In the words of Leif Edvinsson, the exploration tours was a "**joy-zone**" in which participants could think together about the state-of-the-art and the future of future centers.

Follow-up

Developing a wider network of practitioners was one of the aims of the session. And this is what happened. People left the Summit & Tour with a network of like-minded practitioners with whom they could share experiences and help each other to improve working practice in the months which followed.

In addition to the broader network which was created, the Exploration Tour created the basis for developing a European Commission project around Future Centres. A group meeting on the last day of the Summit created the first contours of a plan, which was later developed by a consortium of 12 partners into the OpenFutures project. This project was submitted to the European Commission, which accepted it in early 2006. OpenFutures officially began in May 2006 and will run for two years (www.open-futures.net).

Exploration tour steering team: Hank Kune, Ron Dvir, Leif Edvinsson, Edna Pasher.

The tour – photographic report

Day 1, AM: SZW **Welcome by the tour leader**	**Day 1, AM: SZW** **e-Brainstroming**	**Day 1, PM: the Country House** **Conversation**
Day 1, PM: the Country house **The Sandwich workshop**	**Day 1, PM: the Country house** **The Sandwich workshop**	**Day 2, AM: the Shipyard** **The group welcome**
Day 2, PM: The Shipyard **The explorers**	**Day 2: Castle Groeneveld:** **Workshop at the garden**	**Day 2: Castle Groeneveld** **Instead of powerpoint**
Day 3, AM: Mobilion **The illustrations gallery**	**Day 3, AM: Mobilion** **Concluding workshop**	**Day 3, AM: Mobilion** **Human PowerPoint**
Day 3, AM: Mobilion **Exploring**	**Day 1-3: Dutch Roads** **The Exploration bus**	**Day 1-3: Dutch Landscapes**

The Italian Case: Leonardo Future Center Exploration Tour

At the final session of the Dutch Future Centers exploration tour, in spring 2005, Paolo Martinez from Firenze Tecnologia offered to host in Tuscany the next Summit of the emerging Future Center community. 12 months later, on 17 June 2006 12:00 AM, a group of 55 people started out on their own three-day journey.

The preparation process is roughly described in the planning checklist section presented earlier in this paper. We would like to focus here on few aspects of the preparation phase.

Perhaps the most important step was the creation of the tour narrative. It emerged gradually to include two interwoven issues:

1. What can we learn from Leonardo and his time? Which methods and approaches we can adopt to modern innovation system?

2. How can we apply the concept of Future Center *anytime, any place*? Are there not less expensive, more temporary and dynamic alternatives to the fixed location future centers which were visited in the Dutch Exploration Tour a year ago?

In the background there was a third question – how can we use Future Center methods to help citizens and local leader to renew their regions, cities and towns?

The second interesting aspect was the planning of the exploration route. We chose locations that provided an interesting opportunity to explore the above questions, while at the same time acting as excellent settings for good personal and group experiences. At each location we planned sessions which made the best use of the unique characteristics of the place. The final list included four locations:

❖ **Montecatini** (an aging tourism town) and the spa resort of Grotta Giusti (Monsummano Terme) where we used three exploration methods – a Walk-shop, Pool-shop and Cave-shop (see illustrations below).

❖ **Piaggio Museum** in the factory at Pontedera – we looked at innovation past and present in the museum, and used the Knowledge Café method to bring our ideas together.

❖ **Vinci** – the town of Leonardo. Here we drew inspiration from the Leonardo da Vinci museums, organized a "drawing the future" workshop with local children in the town kindergarten, and developed innovative prototypes at the Leonardo da Vinci library.

❖ **Villa Celle open-air Gori Collection** – here we explored serious issues through a tour of the gardens, exploring art, landscape, sculpture and installations with a magician who told us the stories about the place and the art there. The tour was concluded with an electronic-brainstorming session, followed by an Open Space workshop to reflect on the tour, discuss possible follow-up and create action plans.

A third interesting aspect was the interaction with local stakeholders. The tour organizer communicated extensively with the hosts of the tour at the various sites to ensure that both explorers and hosts benefited from the tour. The interaction took place at many moments during the long preparation period before the event, including the pre-tour which the organizing team took about six weeks before the actual event, and during the tour itself. For example, at a pre-tour workshop with city officials in Vinci, we explored ideas about how Leonardo would renew the town if he were active today. Similar discussion took place with officials and interested people in Montecatini, and in the harbour city of Livorno.

One of the outcomes was that an American participant discovered the concept of Future Centers and now applies it in America. The group also initiated several steps to strengthen the sense of community – initial talks about the next summit, the planning of a community website, a nomadic art exhibition between centres. The tour itself was documented in a photo album and an

illustrated diary (see: References section). As one of the lessons learned, we understood that the next Exploration Tour should visit fewer locations and offer more time for in-depth discussion.

Exploration tour steering team: Paolo Martinez, Ron Dvir, Hank Kune, Leif Edvinsson

Illustrated report: Human moments and special methods.

Pool-shop at Montecatini Terme	**Cave-shop at Montecatini Terme**	**Reporting about the walk-shop at Montecatini Terme**
Knowledge Café at the Piaggio factory	**Virtual exploration of 14 Future Centers (the *Work in progress* film)**	**"Drawing future Images" in a workshop with Vinci children**
Prototyping workshop at Vinci Library	**Exploring some of Leonardo'sl inventions**	**Art workshop at the Villa Celle open air museum**
Concluding workshop at the Villa Celle – presenting ideas for follow-ups	**The future bus – improvisation on the Exploration Tour bus**	**The tour leader: "*It is difficult to herd creative people*" (PM)**

Source: the Illustrated diary, Ron & Arye Dvir – see References lists.

Tips & Tricks (To-Do)

- ☑ Identify a motivated and capable local organiser able to engage local actors, resources, and logistic/organisational support.

- ☑ Make sure there is one clear leader for the tour – and that he or she can provide both a welcoming atmosphere and a sense of direction.

- ☑ Engage the internal team that will take care of organisational and logistic support at least three months before the event. Make sure that all budgetary requirements are covered through sponsorship and/or by the participant fees.

- ☑ Involve local stakeholders, and add some local touch and context to the tour.

- ☑ Organise a pre-tour which includes some seminars or knowledge cafés. This will prepare the ground, inform and involve local stakeholders, by making them aware of the activities and aims of the event.

- ☑ Make good use of the tour time, but also ensure that the schedule has enough space to accommodate surprises, and provides enough time for contemplation, relaxation, and socializing.

- ☑ If the tour is successful, organize a series of subsequent similar events, perhaps on an annual basis. Make sure that there is a sense of continuity but also enough fresh thinking. A balance of 50% newcomers and 50% repeaters has worked for us.

- ☑ If you go for a series of tours, keep renewing the methods, style, focus, and issues.

- ☑ Create a balance between three elements: social experience, tourist experience and content creation, through the mix of fast activities, deep conversation, and various interactive methods.

- ☑ Create a sense of group with a special hat, a backpack, a special notebook, pen or other object.

- ☑ On the last day, conduct a conversation about "next steps" and "action items" for the group; talking clearly about responsibility (who does what and when) is important.

- ☑ Engage the organisers of the previous tour to learn from their experience, and provide support in the organisation of the next event.

Participating in the tour is an emotional experience. People who meet on the tour often want to remain in touch and co-create new futures together. Take steps to facilitate the community that develops, providing tools like a website or other shared spaces for exchanging contacts and ideas, and providing feedback after the tour.

Potholes (Not-to-Do)

- ☒ Don't make the plan too ambitious – leave enough time for relaxed interaction and reflection.

- ☒ Always understand that you will take a lot more time than you could ever imagine in the organisation and running of the event.

- ☒ Don't be stingy when it comes to eating and drinking. The atmosphere that you create will be fed by nurturing all the senses, and of course good food and drink is an excellent way to do so.

Acknowledgements

The two exploration tours which are describe in this paper were highly collaborative events involving many people and organisations. We must thank the following individuals and institutions:

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Author Biographies

Ron Dvir is the Founder and CEO of Innovation Ecology. He is planner and integrator of innovation systems in general, and of innovation engines and Future Centers in particular. Ron has an engineering degree, a M.Sc. in Computer Integrated Manufacturing, and a Ph.D. in Intellectual Capital Management. Before founding Innovation Ecology, Ron was Chief Knowledge Officer in a large high-tech organization, and developer of quality infrastructures. He is a developer and implementer of innovation concepts, methods and tools. He likes to embed artwork in business and research work, and to plan new forms of events and contactivity channels. Ron is a member of the planning team of the Future Center Exploration Tours.

Hank Kune is director of Educore, a consultancy specialized in advising government organisations on user-centred innovation processes. Hank studied Educational Technology at the University of Wales, and has put this systemic perspective on personal and organizational change to use in a great variety of projects in the past 35 years. His expertise lies in developing and guiding hands-on processes of participative policy-making and implementation, in organizing processes of organizational learning, and in furthering the future orientation of government and its stakeholders. He works extensively with various governmental organizations. His work has played a central role in introducing the concept of future centers in the Netherlands, and in furthering the practical application of this concept in Europe.

Paolo Mario Remo MARTINEZ, born in Brazil, from Italy, as social scientist (sociologist and geographer) he is the head researcher of Interactive Innovation and collaborative methodologies at Firenze Tecnologia, the innovation agency of Florence's Chamber of Commerce. With 20 years of experience he is currently working for public and private organisations to create environments favourable to innovation through interaction and creativity, and by involving stakeholders and end users in awareness, fast-prototyping and decision making processes. He is the coordinator of the IST OpenFutures proejct, and leader and co-organiser of the second International Da Vinci Future Center Summit in June 2006. Author of numerous articles on interactive innovation, networking and competence based innovation.
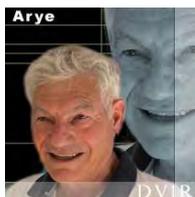
Arye Dvir's nickname, as a child, was Picasso. Arye studied Landscape Architecture and Environmental Planning at the University of California, Berkeley and the University of Pennsylvania. For many years he was the Chief Architect of the National Parks Authority of Israel, responsible for the planning of some major world- known national parks, such as Massada, Old Jerusalem Walls National Park, Mount Carmel, and the Roman old town of Caesary. In whatever he is involved with, Arye applies his artistic talent to communicate ideas by means of friendly and cheerful illustrations. In the recent years he has been collaborating with his son Ron, in multiple knowledge visualization projects.

Appraisal Interviews as a Tool for Organizational Knowledge Sharing

Marinita Schumacher, Corinna Flöck and Mounib Mekhilef

Appraisal Interviews as a Tool for Organizational Knowledge Sharing

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Snapshot (Quick Learning)

Appraisal Interviews stand mainly for management by objectives, wherein objectives are set, plans determined, performance reviewed and rewards are given. They focus on the work results of a certain period of time and help both, superiors and subordinates, to clearly identify and define responsibilities and aims. For subordinates, appraisals include the chance to measure their own skills and performance and to document accomplishments and identify areas for improvement. As a superior, it gives an insight into the subordinate's view of his own strengths and weaknesses and helps to gauge his understanding of expectations and standards. In this way it reminds of forgotten accomplishments and helps to develop ways to overcome obstacles and barriers.

This chapter gives an overview of the utilisation of Appraisal Interviews and demonstrates why they are an important tool for organisational knowledge sharing. Above all it provides practical guidelines to help implementing and using the instrument in organisations.

Keywords: performance appraisal, knowledge sharing, organisational learning, organisational development, human resource management

Context (Where & What)

Mainly developed in the USA the history of performance appraisal roots can be traced to Taylor's pioneering time and motion studies (Steinmann, H./ Schreyögg, G., 2005). Nowadays Appraisal Interviews as a tool for performance appraisals are strongly embedded in the organisational strategy and organisational philosophy of numerous large enterprises as well as in Small and Medium Sized Enterprises (SMEs) and in research institutes.

Appraisal Interviews are often meant to analyse a past working period based on milestones that have been set to identify progresses and developments as well as deficits of the employee. Based on these results future goals and milestones are set together on mutual agreement.

The overall aim of the instrument is to realise potential and increase the effectiveness and efficiency of the organisation. Although Appraisal Interviews can be defined as a periodical measurement of the employee's progress towards the objectives of the organisation the focus lies on the organisation itself. Therefore Appraisal Interviews can be described as an important tool to support organisational learning, knowledge management implementation and knowledge sharing.

More specifically, the purpose of the organisation is to identify organisational or operational changes which are meant to enable individuals to maintain and thereby improve their performance and improve the effectiveness and efficiency of the organisation's management. Individuals and organisations stand in a sequential reciprocal interaction and learn from each other by an active exchange of their knowledge (Hagehülsmann, H./ Hagehülsmann, U., 1998, p. 268. This process of the interdependency is called organisational learning and leads to an enhancement of the knowledge basis of the individual and the organisation (Probst, G.J.B. et al., 2000 p. 46). While the process of learning produces new knowledge, knowledge impacts future learning. The fundamental challenge of a learning organisation is the linkage of individual learning with the learning process of the organisation. To establish the change organisations have to invest in shared thoughts and actions. Appraisals must therefore address the development of the 'whole person' and the 'whole organisation' and not only some of their skills that are required for a next working period. By translating organisational goals into individual objectives Appraisal Interviews should thus not only focus on job performance and job skills training but should always be embedded in the context of supporting the individual and the organisation to grow and attain fulfilment.

According to Nonaka and Takeuchi (1997) the creation of knowledge within organisations is the result of a continuous cycle of dynamic interactions between tacit and explicit knowledge. By diagnosing and articulating individual and organisational problems tacit knowledge which is according to Polanyi (1974) unarticulated, intuitive and non-verbalized is converted into explicit verbalised knowledge and becomes collective knowledge.

Nonaka and Takeuchi defined four processes called **Externalisation, Internalisation, Combination, and Socialisation** which are mutually complementary and interdependent.
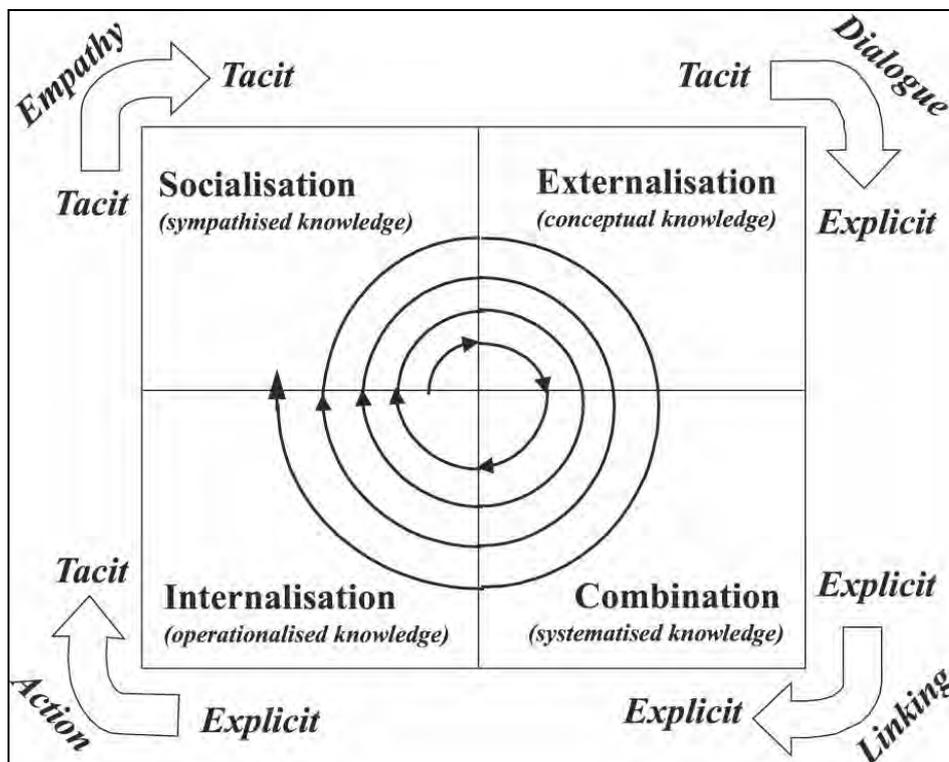
Figure 1 Knowledge spiral (based on Nonaka, I./ Takeuchi, H., 1995)

Organisational knowledge is converted from explicit to tacit, from individual to collective and back again through these four processes which are briefly explained in the following.

Socialisation (tacit to tacit)

Socialisation includes the shared information and communication of tacit knowledge between individuals. Knowledge sharing in the socialisation process takes place without producing explicit knowledge through face-to-face communication or shared experience.

Externalisation (tacit to explicit)

Through conceptualisation and ultimate articulation, typically in collaboration, some proportion of the individual's tacit knowledge is captured in explicit form.

Combination: (explicit to explicit*)*

Explicit knowledge can be shared in meetings, via documents, e-mails, etc., or through education and training. Usually this is well established in organisations.

Internalisation (explicit to tacit)

In order to react on information, individuals have to understand and internalise it, which involves creating own tacit knowledge. Closely linked to learning by doing, the explicit knowledge becomes part of the individual's knowledge base and becomes an asset for the organization (Nonaka, I./ Takeuchi, H., 1995, p.70).

In our context, Externalisation and Internalisation processes can be understood as aspects of organisational learning

It is important that all members of an organisation are willing to share their knowledge in order to foster the organisational learning process. Beside this, they are supposed to know how they should perform, which states the need for superiors to inform subordinates about their performance. In this context, it is necessary that subordinate and superiors share responsibilities in order to build the knowledge basis. Some superiors avoid this crucial task, while others experience anxiety and discomfort doing it. According to Nonaka and Takeuchi the interchange of knowledge and learning processes takes place at four different ontological levels: the individual, the group, the organisational and the inter-organisational level. This points out that it is rather necessary to create a structural and cultural frame of the organisation which encourages the individual, the group and the organisation as a whole, to learn from each other by sharing their knowledge (Schwarz, G./ Beck, R., 1997, p. 123).

Although, collective knowledge is more than the sum of the individuals' knowledge, organisational learning is not only the process of sharing knowledge. Knowledge sharing has to be conceptually interlocked to initiate organisational learning (Thiel, M., 2002, p.104).

Appraisal Interviews offer these conceptual frames of knowledge sharing and thus support the process of organisational learning. They can be seen as an instrument for the realisation of the 'learning organisation' which offers specific starting points to integrate individuals, groups and organisations into learning processes to create an organisational knowledge basis.

In order to achieve these aims it is important that Appraisal Interviews take place in a positive and supportive spirit which recognises good practice and acknowledges contributions that individual employees have made in the course of their work. Appraisals Interviews should be a positive experience. The appraisal process provides a platform for development and motivation. Organisations should thus foster a feeling that they constitute a positive opportunity to get the best out of their staff and the processes (Lamberti, M.-A./ Sommerfeld, V., 2003, p.100). Once Appraisal Interviews are an established part of the organisational structure, they support the implementation of continuous and open communication and foster the process of knowledge sharing.

As a matter of fact, Appraisal Interviews cover a wide range of knowledge management processes which go beyond the process of knowledge sharing. As they aim at clearly defining roles and responsibilities within the organisation, and make them transparent for colleagues, they can support the members of the company or unit to identify experts. They also allow identifying synergies between employees within the same unit and across the company which is an important basis for the establishment of communities of practice and for knowledge exchange. According to Grote and Grote (1996) can Appraisal Interviews at the same time be seen as a method for Personal Knowledge Management as they permit the employees to analyse his own performance and to make him aware of his competencies and deficits.

They usually address a pre-defined set of subjects which allows to easily comparing results and progresses and are based on semi-structured interview guidelines.

The following chapter provides a detailed structure for the usage of Appraisal Interviews and presents an Interview guideline which can be used in organisations.

Remember: This is just a general proposition for the structure of the process - the content and the direction are as flexible as your organisation allows, or can be persuaded to allow.

Making it Happen (The Approach & the Action)

In this section we focus on giving guidelines for the implementation and execution of Appraisal Interviews into the organisational context. Based on our personal experience and following suggestions given by Grote and Grote (1996) we have developed an approach consisting of 6 steps. The approach is explained in a general and simple way and can be easily used in almost any organisational setting.

1. Establish performance standards for each position and the criteria for evaluation As a basis for your evaluation, each position in the organisation should be clearly described. If you want the employee to do something, you must tell him exactly what you want. This means that both sides are supposed to have a clear understanding about which tasks are most important to perform the job, which skills and behaviours are required and acceptable, which goals should be accomplished, and which result are expected.

The successful performance of a task is thus based on a clear understanding of what is expected from the employee. He should therefore be provided with a detailed job description. It is recommended to communicate the job description in written form as well as during a conversation with the employee. Once this is ensured, a basis for successful performance appraisal is established, which permits to identify goals and performance expectations.

Remember: Initiating and maintaining positive communication about work expectations and work performance is management's responsibility!

2. Establish performance evaluation policies on when to rate, how often to rate and who should rate

This task is important in order to ensure coherence amongst all employees. The supervisor should hold an appraisal interview with each subordinate in order to discuss his appraisal and to set objectives for the upcoming evaluation period. Be aware, that experts advise that the employee's development and salary discussions should not occur in the same interview.

When Usually all employees of a company or department are rated on the same date or during a certain time period. These dates should be communicated well in advance to give each employee

the possibility to prepare himself and implement the performance interviews in the daily work schedule.

How often In most companies appraisal performance is held once per year. However, more and more organisations shift to 6-monthly or quarterly evaluations. This is convenient especially in fast moving organisations, as it permits a more frequent up-date of the aims and objectives according to the current developments in the field.

Who should rate The most common evaluation is the appraisal by the superior. In large organisations usually the line manager is in charge of the evaluation as he is closer to the job and the employee as a general manager would be. But the organisation can for example also appoint a committee of several superiors who perform the evaluation or even hire an expert or a team of experts from outside the organisation.

3. Prepare Your Interview Guidelines and Evaluation Criteria

Preparation is the key to success!

Always keep in mind that the appraisal you write will be in the employee's personnel file for years to come. You have a responsibility, therefore, to write an evaluation that is accurate, objective, fair, and free of exaggerations about the employee's performance. Therefore it is extremely important to be well prepared for the interview. You should beforehand develop a frame for the guided interview. In fact, Appraisal Interviews are effective if they are conducted properly. An even better result can be achieved if the appraisal process is clearly explained to and agreed by all people involved.

The following questions can be used as an orientation for the preparation of your interview and should be adapted according to your personal work situation1.

- • Where have you been?
- • Where are you now?
- • Where do you want to go?
- • How are you going to get there?
- • What do you need to do this?
- • What are your strengths and weaknesses?
- The performance interview should ensure that the following points will be addressed:
- • Review of overall progress
- • Discussions of problems that were encountered
- • Agreement about potential performance improvement possibilities
- • Discussion how current performance is in line with long term carrier goals
- • Specific action plans for the coming year

Bear thus in mind when preparing your interview guide that your aim is to analyse the past period and to set goals and standards for the employee's job performance. You should use open questions whenever possible which will give room for mutual agreements upon objectives. Beside this, you should also use a proper documentation scheme, which gives you the possibility to make additional comments. Complete the appropriate appraisal form, providing space for ratings, rating justifications, development plans, etc. Then review the appraisal guidelines and the evaluation form with your supervisor/manager and obtain his agreement prior to the performance phase.

Beside the above mentioned general advice there are a few more points that you should consider in order to prepare the individual meetings. Before each meeting you should take some minutes time to valuate the subordinate's performance, your interactions and the employee's history. It is important that you have a clear picture of the person and the related job profile. Make sure that you have input from all relevant sources and try to identify the assumptions and blind spots you may have concerning the employee. If you identify any problems try to find their roots. You should be critical regarding your own performance and reflect if your own actions could be a source of the employee's problems.

4. Schedule the Interviews

Some guidelines should be also followed when setting time and date for the personal meeting between you and the employee. Your interviews should be scheduled beforehand, to permit you and the employee to get prepared for the meeting and to avoid time pressure. Notify the employee of the date and time and give him the possibility to agree or disagree. You should also allow enough time to assure a relaxed atmosphere. Choose a private place for the personal meeting that, if possible free from distractions and/or interruptions. If you use your own office make sure that you are not disturbed by visitors and/or your telephone.

5. Conduct the Face-to-Face Performance Appraisal Meeting

This is the most important phase of the Performance Appraisal. After all preparation is done and dates are fixed you can finally start with the actual interviews. In this section we will give you a brief introduction to the possible procedure and give you some guidelines how to behave in the different stages of the interview.

During the interview you should always bear in mind that your mission is to evaluate the employee's performance and to set aims and milestones for the next working period. In setting objectives to be followed by the employee, the principles are to be met SMART which means according to Lamberti and Sommerfeld (2003):

- **S**pecific.
- **M**easurable.
- **A**ttainable.
- **R**ealistic.
- **T**ime-limited.

There are three generally used approaches to these interview situations: tell and sell, tell and listen and problem solving – the using of which depends mainly on the experience level of the employee.

First of all welcome the employee by putting him at ease and setting a positive tone. You can offer coffee or tea to loosen up the situation. Use the first minutes to introduce the topic of the meeting by explaining the process and reasons for discussion. Stress that this is an opportunity to help the employee grow and invite his questions and remarks. At this point you can also encourage the employee to present his own view concerning the appraisal process in general and tell him that all aims and objectives will be set mutually. During the whole interview you should listen actively and be objective, honest, non-judgemental and consistent in your reaction towards the employee. Let the employee talk about his own appraisal of his performance and/or any plans for further development and act whenever possible as a guide.

Share your view of the employee's performance by calmly presenting your points. Review key performance categories and the employee's performance against established organisational goals and standards, using specific examples whenever possible to prove your statements and to make them more comprehensive. Recognise the employee's contribution, describing major accomplishments and/or improvements. Correct any new or on-going performance problems. If you consider it as necessary to solve problems immediately always involve the employee in developing solutions.

Whenever you take additional notes try to be as concrete as possible and use examples to support your ratings.

During the interview your shared aim is to set objectives, goals and milestones for the future working period. Mutual agreements upon goals and priorities are an expected outcome of the interview. You should write down any occurring agreements, action plans, timeframes and target dates, etc.

At the end of the interview it is important to summarise what has been addressed. Allow time for questions and/or concerns to be asked and communicated. Address any points raised by the employee and be honest, but tactful if you disagree with his assessment.

Close the meeting by scheduling a date to obtain the employee's signature on the review.

6. Summarise the decisions and agree on the evaluation

After the end of the interview all relevant results and milestones have to be summarised. This is gain part of the person who conducted the interview.

Decisions have to be clearly described and if necessary underlined with examples. Try to be as detailed as possible, without putting to much pressure in your wording. Then the filled appraisal form is presented to the employee. If possible take some time to sit down together again and go through the appraisal. In case of disagreements you should re-discuss this with the employee and maybe change the wording according to this.

Once both of you have agreed on the evaluation your signature concludes the performance appraisal. You should provide the employee with a photocopy of their completed, signed appraisal, so he can at any time, have a look at it and act according to the set aims and objectives.

Toolkit (The Essentials)

In this part we want to present you a sample interview guideline. The questions are very general, so that they can be used in almost every work environment. We suggest you to organise the Appraisal Interviews around the following 8 basic questions and propose for each of them a set of sub questions which can be used to deepen your conversation. The presented interview guideline is mainly based on our own practical experience in several German organisations.

1) Follow-up from previous appraisal interview (unless this is the first):

   - *Has the agreement been implemented?*

   - *Why not?*

2) Which tasks or type of tasks went particularly well?

   - *Why did they go so well?*

3) Which tasks or type of tasks did not go well?

- *Why did they not go well?*

4) How do you feel about the content of your work/your area of work?

- *Do the distribution and prioritising of tasks work well?*

- *How are your qualifications, skills and experiences employed at work?*

5) How could your current job be further developed?

- *Do you have any suggestions for new tasks you would like to undertake?*

- *Are there any current tasks you would like to be exempted from?*

- *Do you have any suggestions for improvements?*

- *What are your objectives or suggestions for the next year as regards professional development and training?*

6) What is your opinion of the working relationship between you and your colleagues?

- *Are there any conflicts that disturb the working climate?*

- *Do you feel that responsibilities are clearly defined?*

7) Are your physical working conditions satisfactory?

- *Do you have any suggestions for improvements?*

8) Any other relevant circumstances?

- *Are there any other circumstances you would like to mention which influence your work situation?*

- *Domestic circumstances?*

- *Circumstances at your work place not covered by previous items?*

Results & Next Steps (The Follow-Up)

Based on the results of the interview the employee and leader decide together on an action plan and set milestones for the next period.

Usually the agreed appraisal is signed by both parties and then handed out to the employee. This is important to give him the possibility of keeping track of his aims and objectives. If one of the objectives is to perform any advanced trainings or further education those will usually be arranged as soon as possible after the performance interview, to motivate the employee. As multiple factors are analysed within the interview they allow identifying future prospects. Considered as an investment in the future, organisations use Appraisal Interviews as an important instrument to support organisational learning, KM implementation and knowledge sharing.

It is possible to have additional meetings during the next performance period if one or both parties feel a necessity. This could for example be the case if the employee faces unexpected problems related to domestic or work related circumstances or if the overall situation in the work environment changes.

As figure 2 shows, the process of Performance Appraisal is ongoing. Once goals and objectives for the next period have been defined they act as a basis for the next evaluation period. This loop helps to make progresses and developments transparent and thus foster organisational knowledge sharing.

Plan the Performance Identify
Performance Goals
Communicate Goals
Establish Performance Criteria

Determine: Responsibility for
Appraisal Period
Appraisal Method(s)
Computer Software

Anticipate and Consider
Effective Performance Appraisal Systems

Examine Work Performed

Management Support
Coaching

Appraise the Results

Conduct Appraisal Interview
Discuss Goals for Next Period

Figure 2 Steps within the Performance Appraisal

Tips & Tricks (To-Do)

þ DO assure the employee that individual performance development is the primary goal or purpose and the appraisal review is just one part of the total process

þ DO develop people in the way they want to go, not just the way the organisation thinks it needs people to be

þ DO let the employee know you are really interested in making the interview productive.

þ DO motivate through agreeing in helpful aims, targets, achievement

þ DO give useful feedback

þ DO admit your mistakes when you are at fault

þ DO show appreciation of the employee's success

þ DO be frank and tactful in discussing the employee's short comings

þ DO direct criticism at the employee's work rather than at him personally

þ DO aim for simplicity, fairness, objectivity, openness, usefulness

þ DO record in writing the minutes

þ DO evaluate and refine your appraisal interview system as necessary

Potholes (Not-to-Do)

- Ý DON'T fail to review past errors, but do not dwell on them
- Ý DON'T dominate the conversation
- Ý DON'T talk down to the employee
- Ý DON'T discuss any other person for the purpose of comparison
- Ý DON'T imply in any way the interview was arranged for warning or reprimanding the employee
- Ý DON'T feel obliged to agree on everything
- Ý DON'T get lost in detailed discussions
- Ý DON'T compare interpersonally
- Ý DON'T refuse in receiving feedback
- Ý DON'T see the Appraisal Interview as wasted paperwork
- Ý DON'T fear the emotions that can be unleashed

Acknowledgements

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Group Analysis of Knowledge Test Results as a Knowledge Sharing Method

Małgorzata Grabus and Katarzyna Grunwald
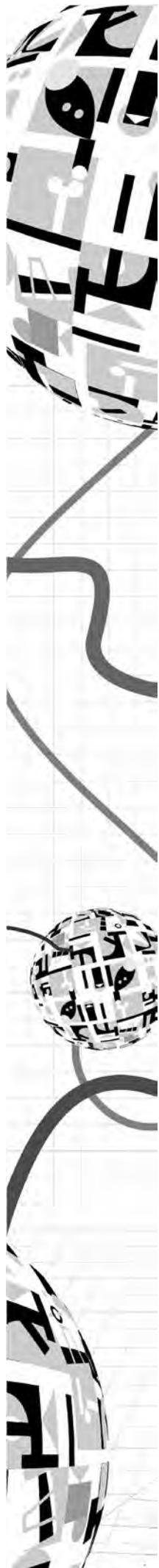
Group Analysis of Knowledge Test Results as a Knowledge Sharing Method

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Snapshot (Quick Learning)

Group analysis of knowledge test results (in particular the one repeated on a regular basis) may be successfully applied to the organizations that seek their competitive advantage in using continuously updated knowledge of the employees (all of them or the majority) and count on positive synergy effect when this knowledge is shared.

This is exceptionally important in areas that require regular renewal of formal codified knowledge available in overwhelming profusion from outside of the organization, and subsequently need to use that knowledge in a creative manner based on broad associations, as for example the legal companies.

Generally, organisations that test frequently the legal knowledge of their employees are more likely to be competitive in the market. However, what is of great importance is the follow-up with in-depth group discussions between employees and the facilitator together with thorough examination of all questions.

Technically, initially the method involves external sources monitoring, trainings, test preparation, learning, test execution, scoring and finally an open discussion - **actual group analysis of the test results** that facilitates effective sharing of the gathered knowledge. A highly professional and respected moderator leads the meeting, and the discussion refers to every question of the test, going deep down to details and presenting the issues in wide contexts.

Moreover, the motivating factors are of great importance. They include moderate competitiveness, task assignments with the positive influence of a "spirit" of co-operation for common objectives. Also, test results influence positively socio-psychological aspects such as individuals' respect, self-image and employee's position within the group.

Tangible and measurable objectives of using group analysis of test results differ depending on domain specifics. Among others, it could indicate that employees' knowledge is maintained at a high level despite the changes in the relevant body of knowledge and a decrease in employees' mistakes. In addition, all parties involved feel stronger when working in a team.

Keywords: knowledge collection and sharing, knowledge sharing culture, workshops, learning, personal knowledge management

Context (Where & What)

The group analysis of the test results method (GAKTR) is particularly useful for services based on the legal knowledge. This includes legal consulting services, i.e. insurance companies, tax

firms, legal advisors or any other consultants whose activities are based on frequently changed laws, acts or regulations.

This is the **type of knowledge** that primarily determines the usefulness of the method. It is a combination of the following elements:

- Highly variable **explicit elements** that are in force and binding such as laws, claws, acts, regulations, verdicts, which are clearly codified, and produced out of the organisation. These elements are available in the official list of sources that are not limited, and can potentially change. For example, the official verdicts or cases and their binding interpretations which need to be continuously updated.

- **Tacit elements** such as possible application to real cases, ideas for further use in the organisation. They constitute potential resources that add value to the organizations' activities. These elements are often personalized, although it is expected and highly probable that in course of dynamic and creative exchange the co-creation will take place and new knowledge can emerge, as it has been described by Nonaka & Takeuchi (2001).

To some extent, the state and the local administration may have similar needs, namely transfers of strictly codified knowledge. This method is based on rational-legal knowledge and fits the bureaucratic requirements described by Max Weber. However, what lacks in the Weberian model is the absence of the emotional dimension. The method that we present needs to include a positive relation between the facilitator and the employees. (See also below).

It is interesting to note however, that it seems that good results of this method can be achieved in non-legal domains as well. Particularly sectors of new economy experiencing dynamic development such as in the Information and Communication Technology (ICT) or even in Hi-Technology in general. Even though the knowledge in ICT and HT is not defined in legal terms, but the rules of building the legal language and IT language are based on the same roots and follow the same formal thinking principles. We argue that the system of legal knowledge and IT knowledge are similar in their structure, and that the method may be adopted there just with minor adjustments.

Instead of revolving laws, there should be tested general and generic knowledge (including newest research results), product knowledge (solutions offered by competitors, or even by other departments of the own corporation), or eventually knowledge on tools and methods improving the processes. This may prove that sometimes there is more need for inspiring role of the group analysis of test results than for simple sharing of the knowledge that has been gathered individually.

Another important factor is the size of the company or rather the size of the focus group. The method has been developed and implemented in small and medium size enterprises. It is **primarily recommended for SMS's** because of the **close relationship, which exist between the moderator,** mostly a superior and employees. This is an important factor for the effectiveness of the presented method. Moreover, since all participants in the focus group are professional with knowledge form a relationship based on mutual respect with slightly superior knowledge of the moderator.

Recommended number of people taking part in a group analysis session ranges from 10 to 18 people, although fewer participants are also acceptable as long as the discussion offers enough heat due to various points of view. However in case of more than 15 people it might be better to consider dividing the group in two. If the group counts so many members the level of emotional engagement into the discussion significantly decreases, as it is easy to hide behind more active colleagues. Also if the room becomes crowdy some impediments to communication may be observed. Nevertheless it is possible to use the same test for more than one group.

In case of large corporations the method may be applied „locally" by managers of individual departments (or teams, but not multispecialized project teams) provided that their relations with employees are close, and based on trust (both in terms of professional respect and friendship). For the same reasons the use in administration structures may be limited. Recommended use is summed up and presented in the table below (Table 1).

Table 1. Recommended use of the method

Aspect	Description
Knowledge kind	**Composite** of explicit and tacit elements. Where: **Explicit knowledge** is highly variable, in force and binding (laws, codes, regulations, verdicts, clauses, cases and interpretations), clearly codified, and produced out of the organization, and available from a limited official sources, and which need to be continuously updated and verified **Tacit knowledge** includes prospective resources of adding value to the organizations' activity (e.g. possible application to real cases, ideas for further use)
Kind and number of participants	Professionals specialized in the same domain (best 12-15 per session, possible less but not more than 18)
Organization size	Best SMEs, or individual mono-specialized units (departments) of big corporations
Moderator / group relationship	Emotionally positive, based on real professional supremacy
Additional features	Moderator possessing high level of professional knowledge, interpersonal skills, basic practical skills for leading the group analysis sessions

The method results in:

- Increase in knowledge of individuals (measured with test scores, and subsequently with task completion efficiency),

- Increase in employees productivity,

- Reduction in number of professional mistakes,

- Motivating effects,

- Building a cooperative culture.

For the above reasons the method is considered to be primarily a tool facilitating the managerial work (not a system tool). It might be combined with reward system or with the evaluation system.

Preparation (The Checklist)

The whole cycle **of the GAKTR method** takes approximately half a year and consists of five main stages:
1. Initial preparations (list of sources, gathering materials, trainings)
2. Learning
3. Test preparations
4. Test execution and scoring
5. Actual session of group analysis of the test results.

The first four stages are of extreme importance for the effectiveness of the actual analysis session.

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┌─────────────────────────────────────────────┐                    ┌──────────────┐
│ ┌───────────────────────┐                    │                    │              │
│ │ Determining the scope │                    │                    │              │
│ │  of knowledge and the │      ⬀              │                    │              │
│ │ list of relevant sources│   ⬋   ┌────────┐ │        ⬅⬆⬇➡         │              │
│ └───────────────────────┘       │        │ │                    │              │
│            ⬍                    │Trainings│ │   ⬄⇨          │   Learning   │
│ ┌───────────────────────┐       │        │ │                    │              │
│ │     Gathering the     │   ⬋   └────────┘ │                    │              │
│ │       materials       │   ⬊              │                    │              │
│ └───────────────────────┘                  │                    │              │
└─────────────────────────────────────────────┘                    └──────────────┘
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(diagram)

┌──────────────────────────────┐
│   Test preparation   │
└──────────────────────────────┘
                ⬇
┌──────────────────────────────┐
│ Test execution and scoring │
└──────────────────────────────┘
                ⬇
┌──────────────────────────────┐
│   Group analysis of   │
│ the knowldge test results session │
└──────────────────────────────┘
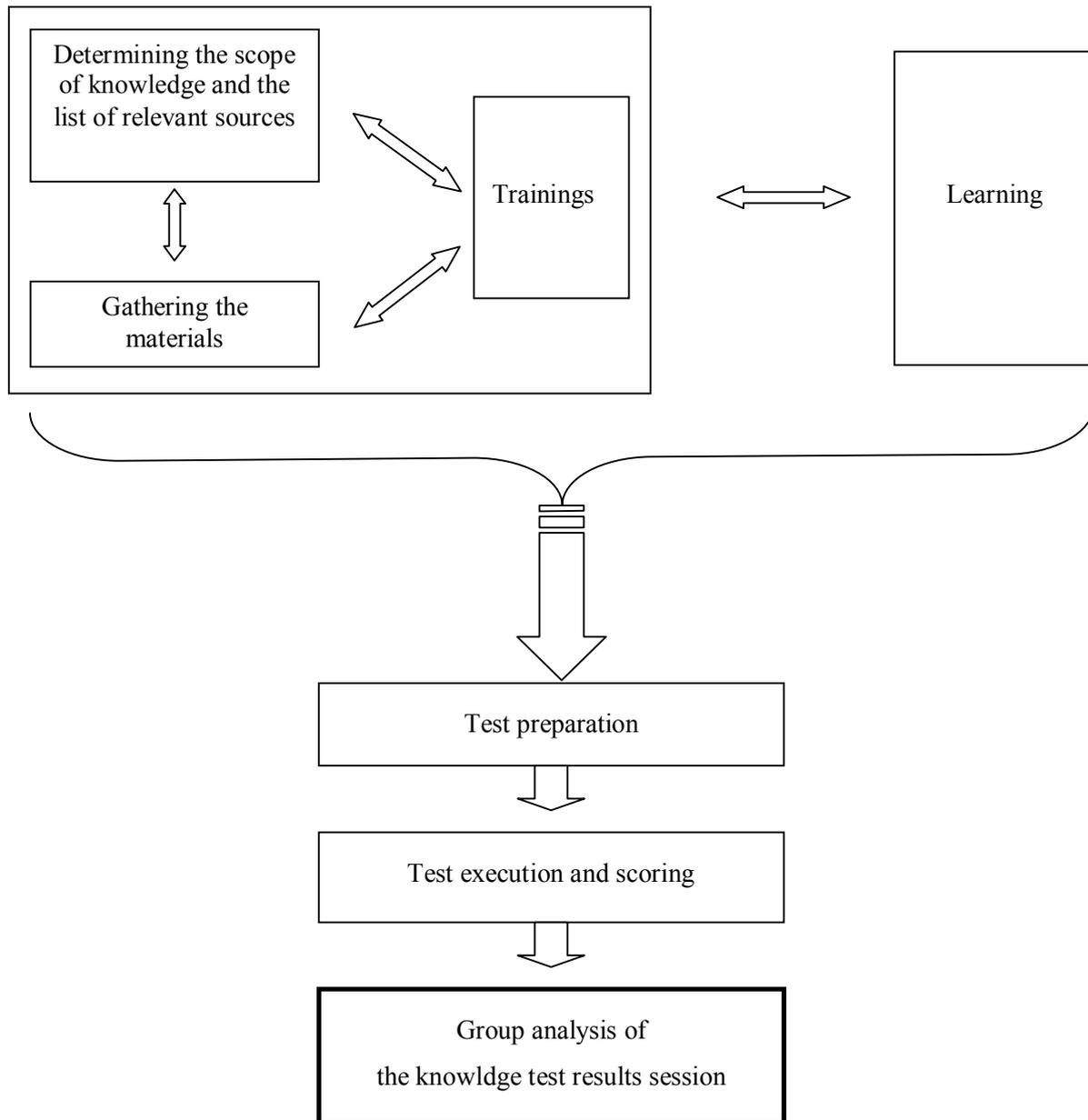
Figure 1. Stages of the GAKTR cycle

The activities involved partly take part simultaneously and they are interdependent as pictured in Figure 1. For example the initial rough list of relevant sources is continuously updated both by a moderator and by participants, who may discover new media (e.g. starting up magazines, WebPages) or new knowledge in them in course of their studying process.

It is important that learning includes individually conducted research and studying as well as participation in provided by the organization lectures and trainings (offered by internal or external agents).

The detailed elements that constitute successful application of the method are presented in form of the checklist in the following table (Table 2).

Table 2. Preparations checklist

1.	Establish the scope of interest.	√
2.	Establish the rough list of reference resources that have to be taken into consideration in order to cover entire scope of needed knowledge	√
3.	Inform on test and analysis session dates. *(This starts building the tension).*	√
4.	Inform participants on the scope of interest and on the rough list.	√
5.	Establish a communication platform *(This might be an intranet tool in form of wiki, or a simple Lotus based table, or any other tool facilitating knowledge sharing even as simple as a mailing list. You may also rely on non-computer tools, like a board, or printouts that are updated on various other occasions. Make sure the chosen platform is the one the majority of the participants are well used to in their everyday activities. Keep it simple and reduced just to the verified sources. Remind about updated in regular intervals).*	√
6.	Start gathering materials; encourage the participants to add their findings.	√
7.	Provide participants with every necessary means – on-line access to databases, literature, subscriptions, etc. but first of all provide a variety of suitable trainings.	√
8.	Let the participants learn, start learning yourself and better be faster in it than they are.	√
9.	Prepare the test and a score card. *(Approximately covering 12-15 of multiple choice questions, a couple of open questions (4-5) and 2-3 cases to be analysed. Make sure that it fits into 30 minutes long test session. The test form are best to be printed out and filled during the test session; an on-line version is possible, but less recommended, as scoring should sum up to a full 100%).*	√
10.	Execute the test. Score the results, but do not announce them instantly – wait 3-5 days. *(Make sure the testing does not last longer than 30, max 45 minutes. Limited time is useful as you do not want anyone to score a 100%, and it hells the participants to highly concentrate due to a little stress. The delay is recommended as the days between the test session and the scores announcement are the time of high involvement and concentration of participants who willingly search for correct answers and easily remember their findings made at that time.)*	√
11.	Prepare: - Sources necessary to present correct answers or to indicate the reasons for the mistakes; - Blank version of subsequent test questions, in form which facilitates focusing the group attention (preferably as PPT slides); - The information on the scores in per cent (the overall results, the average, the median, the lowest and the highest). The results should be informative and appealing, preferably presented as attractive graphs; - List of issues you consider particularly worth being noticed and remembered by participants.	√

Having completed the above list you may execute the group analysis of the test results session.

Toolkit (The Essentials)

For the actual session of group analysis of the test results requires the following facilitations should be provided.

- A room large enough to contain the whole group of tested employees.

- The seating arranged in a way allowing for undisturbed communication among participants, preferably in a semi circle with some opening for a moderator positioned in a way helping to focus people's attention and also allowing for case presentation on the screen (subsequent projection of questions, and proper answers).

- Multimedia equipment (laptop, projector or eventually just flip-charts).

- Test sores graphs, blank test questions to be presented for all to see.

- Reference sources (including an on-line access to subscribed resources).

- Water, coffee & tea, perhaps crackers (for participants).

Making it Happen (The Approach & the Action)

General approach is based on common teaching method, where group work has proved effective in knowledge development, in particular when this is the case of group analysis of previously individually processed issues [Mikuła & Potocki 1997, Potocki 2001]. The test technique is rather simple, however it plays a significant role not only as a control and evaluation tool but also as the one having a certain didactic value itself [Komorowska 1974] the important factor is the test enrichment by group analysis. Such a procedure is successfully used in language teaching, although the content is usually less complex than in case of professional knowledge update. The actual analysis session of the proposed method resembles the AAR (After Action Review) technique as it is described by Dixon and Kaplan [Dixon & Kaplan 2006], group techniques of creative thinking, and group problem solving techniques as well as CoPs and to some extent Knowledge Fairs [Davenport & Prusak 1998]. The method supports not only the increase in individual knowledge resources but also results in synergy effects and as such is seen both with a Knowledge Sharing and Knowledge Co-creation lenses.

The important distinction in case of test results analysis is the narrowed output field – the session aims to finding just one good idea in each case, which will be advantageous and obligatory for subsequent activity of the organisation, and which also fits into the law in force. Therefore it seems that the method is original and has not been used in such a shape before although it uses well-known techniques.

Besides that, there have been incorporated motivating factors based on moderate competitiveness, task assignments and positive influence of cooperation atmosphere supplemented with common objectives. Also social issues as individuals respect, image and position are directly affected by test results.

Table 3. A course of the GAKTR session

A Introduction	Warming up
	General evaluation of the test
	Encouragement
B Step by step test analysis	Open and closed questions (Q 1, Q 2, ….Q n)
	Case analysis and solving
	Mistakes list
	Key issues list
	Practical application
C Scores presentation	Correct answers exposition
	Average group scores presentation in %
	Individual scores announcement
	Remaining the previous tests
	Brief pointing out what has been achieved and where the results can be found
D Support	Emotionaly positive conclusion

Emotions are count among crucial factors of effectiveness of a process of learning [Kurcz 1992]. The role of attitudes and emotions was an object of research conducted by P.I. Zinczenko [Kurcz 1992] as well as R.M.Yerkes and J.D.Dodson [Strelau 1992]. Classical research on the role of punishments and awards conducted E.L. Thorndike [Włodarski 1989]. And it is best when these emotions are **mixed** – negative (as perhaps being a little stressed with ones mistake possible exposure) with positive (a supportive, friendly atmosphere of a group aiming at the same direction). In case of the presented method positive emotions are vital to en extreme degree. They should dominate in the whole knowledge sharing process. Finally the old truth that people remember what they have an opportunity to say is another component of the success.

The main and final stage of the procedure i.e. **the GAKTR session** lasts approximately 60 - 120 minutes. If it is longer than 60 minutes – it is wise to make a 5-10 minutes break.

The session may be broken down as presented in the table above (Table3.). The detailed description of the subsequent stages may be presented as follows.

STAGE A

INTRODUCTION

Objectives:
- to create good atmosphere, focus everyones attention on expected efforts, and
- to support mental capabilities of participants.

Recommended duration:
- no more than 3 minutes

Warming up	A facilitator explains the further proceeding in particular if the session takes place for the first time or if there are new employees in the group. If there is any tension some ice-breakers may help.
General evaluation of the test	A facilitator expresses his opinion and compares the results to previous occasions in general terms (better/worse).
Encouragement	It is recommended that facilitator expresses his trust into participants' capabilities, gathered knowledge, sharing willingness and creative thinking necessary to go over the test once again.

STAGE B

STEP BY STEP ANALYSIS

Objectives:

- to go through every detail and share knowledge gathered on them,
- to make everyone familiar with correct answers,
- to have these answers repeated for better remembering.
- to built on the gathered knowledge and conclusions
- to co-create practical application ideas

Important:

- A facilitiator takes the role of a moderator.
- Scores remain unknown to maintain the interest.
- Everyone should take part and speak up (including shy and reserved ones who should be helped). Activity of participants should be balanced.
- Participants are encouraged to offer their answers and substantiate them with relevant sources. Doubts are cleared.
- Participants should not be over criticised even if mistaken.
- A moderator makes sure that correct solution is found.
- Pointing out people, who were mistaken should be avoided - the procedure aims at finding good solutions not the scapegoats
- The general rules of creative work techniques (brain storming, group problem solving, etc) should be remembered and obtained.

Recomended duration:

- 40 to 60 minutes

Open and closed questions	Each participant is provided with a blank paper version of the test they made or this is exposed by any other means (projetctor) for everyone to see. Subsequently moderator exposes each question and it is discussed over. Participants volunteer their answers, discuss and establish the right one. Correct answer is highlighted on the screen and presented together with the source that it is based on; and then written on the flip-chart (table) and left visible for later use. The same procedure is applied to every next question, but moderator should control the time consuption. Moderator makes sure that everyone can contribute. <u>Output</u>: A written list of correct answers (and their sources).
Case analysis and solving	The moderator presents (on the screen or flip-chart) the solutions that were provided by participants during the test. The proposals are discussed and their advantages are written down separately. The group decides which solution is the most advantageous for the company objectives fulfilment and writes it down also separately. Moderator makes sure that no more than one idea is approved in each case. <u>Output</u>: A written best-case solution that is approved as the guideline for the company.
"Mistakes" list	Moderator helps making the list of issues that made most of the participants mistaken. The list of mistakes is created temporarily. <u>Output</u>: A list of issues that were mistaken
Key issues list	As quickly as possible the group attention should be drawn to pointing out the key isssues resulting from the knowledge that has been shared, which are important. The key issues are considered to be potentially profitable or dangerous for the organization performance. <u>Output</u>: Listk of key issues to remember.
Practical application	Participants offer their ideas on every possible practiacal application of the commonly gathered knowledge. Possible template drafts product ideas are formed and people assigned for further improvement of them. <u>Output</u>: Possible further applications clearly stated; drafts of templates or products.

STAGE C

SCORES PRESENTATION & SUMMING UP

Objectives:

- Reaching the emotional climax

- Providing precise and idividualised feedback

Important:

- No one should feel disregarded due to his results.

Recommended duration: max 10 minutes

Correct answers exposition	Any flipcharst or wirtings created previously are removed from the sight. Both lists of correct answers are exposed again. Using projector or flipcharts moderator makes sure that everyone can both SEE and HEAR the correct versions.
Average group scores presentation in %	This is when prepared earlier graphs are presented revealing subsequently the average, the median, the lowest and the highest scores. They should be compared with previous results (if they are available).
Individual scores announcement	The moderator distributes the test scores and allows 2-3 minutes for reading them. Anonymous individual ranking is presented. The results might be discussed if the participants fill like doing so. Each participant receives his individual scores, position in ranking, previous tests results and 2-3 sentences long conclusion. Moderator offers his time to talk indiviually with participatns later on.
Remainding the previous tests	Brief reference to previously gathered knowledge resources should be made, and their validity checked. <u>Output</u>: Corrections made on previous summing up lists.
Gentle conclusion	Brief pointing out what has been achieved and where the results can be found (on the platform for everyone to keep learning and improving them).

STAGE D

SUPPORT

Objectives:
- Let the people go back to their work with the sense of appreciation and self-esteem.
- Emotional support is of an utmost importance

Recommended duration: max 1 minute.

Emotional support	Thanks for effective work. Emotionaly positive conclusion.

Results & Next Steps (The Follow-Up)

The method application, in particular as a regularly repeated full cycle, will help to maintain sustained high level of employees' knowledge nevertheless the changes in the relevant body of knowledge. Also this is a convenient way for building a knowledge sharing culture, for team integration, and also for effective product offers improvement.

The measures for progress monitoring will vary depending on individual organization needs. The main responsibilities at this stage are again assigned just to one person – a facilitator/moderator, who was described earlier as a person particularly respected for his/her professional supremacy. A facilitator (who is usually a superior as well) should elaborate a customized set of parameters that are important for the organization performance. These usually include:

- Number of new products or product improvements

- Positive reductions in error or faults statistics

- Shorter time per task needed

Recommended follow-ups include also regular checking the bottlenecks that were identified in course of the procedure. These might be:

- Products checks, whether they indeed have incorporated the knowledge shared and developed,

- People checks - those who scored low, should be check and perhaps helped

- Path-holes avoidance - the list of mistakes made during the test and difficulties during the group discussion should be used as a guideline indicated what should be avoided and particularly precisely checked.

Real Cases (As it has Happened)

The method can be presented based on the case study of a project designed and implemented by the president of a medium-sized insurance brokerage company. Group analysis of knowledge test results has been implemented there as a crucial part to Knowledge Improvement System aiming at continuous increase of knowledge resources and more effective use of possessed intangibles. The system covers also regular trainings (internal ones every month, and other taking place approximately every 3 months), meetings with suppliers (every fortnight) and workshops (case analysis) that facilitate initial gathering of required knowledge. The trainings are presented in the following table (Table 4).

Table 4. Trainings offered by the brokerage company

Name	Source	Frequency	Description
Trainings	Internal	Every month for everyone	Most experienced employees teach others on current issues, plus everyone shares their insights on new readings
Product trainings	External or Internal	Every 2 weeks for everyone	• Meetings with suppliers - i.e. insurance companies inform on available kinds of property insurance, and on product logic; • Alternatively most experienced employees teach others
Case study analysis	Internal	Every 2 months for everyone	Led by a company lawyer; Mostly cases on liquidation of damages
Professional trainings (law, formal)	External	ca. each person once every 3 months	Irregular, according to the market offer available

In last three years there have been introduced regular **knowledge tests** followed up with **group analysis** of their results. These sessions take place twice a year and exploit the trainings outputs significialntly.

Every few months there were prepared professional knowledge tests that covered law amendments and laws that have not been changed together with a few special cases. The reference sources included:

a/ Insurance act, and amendments,
b/ Obligatory insurance act and amendments,
c/ Insurance Brokerage Act and amendments,
d/ Civil Law,
e/ „Prawo Asekuracyjne" quarterly and other magazines,
f/ General Insurance Conditions of various insurance companies,
g/ Insurance companies Bulletins,
h/ commercial analysis (audits, opinions) and their conclusions.

Company president, who is also a leader in terms of knowledge and competences, developed the questions. **His leading position in terms of personal knowledge and professional respect is considered a substantial feature of the method**.

The test date was announced well in advance, at least 5 months before. Since that moment the employees worked individually on preparations, which included research, studying and learning by heart. They were provided the hints which resources are relevant.

The test took place in a conference room and lasted approximately 30 minutes. Paper forms with multiple choice questions were filled. Then the president scored the outputs, and the results were presented no sooner than 3 days after the test.

The test results were scored by the president and they reveal a noticeable improvement of the lowest scores level, with sustained highest ones (Figure 2). Similar presentations were prepared for presenting individual achievements.

	I 2003	II 2003	I 2004	II 2004	I 2005	II 2005	I 2006
median	86%	88%	82%	84%	84%	95%	90%
highest	91%	94%	94%	96%	97%	97%	95%
lowest	77%	68%	62%	74%	77%	77%	84%
average	83%	84%	81%	85%	86%	90%	90%
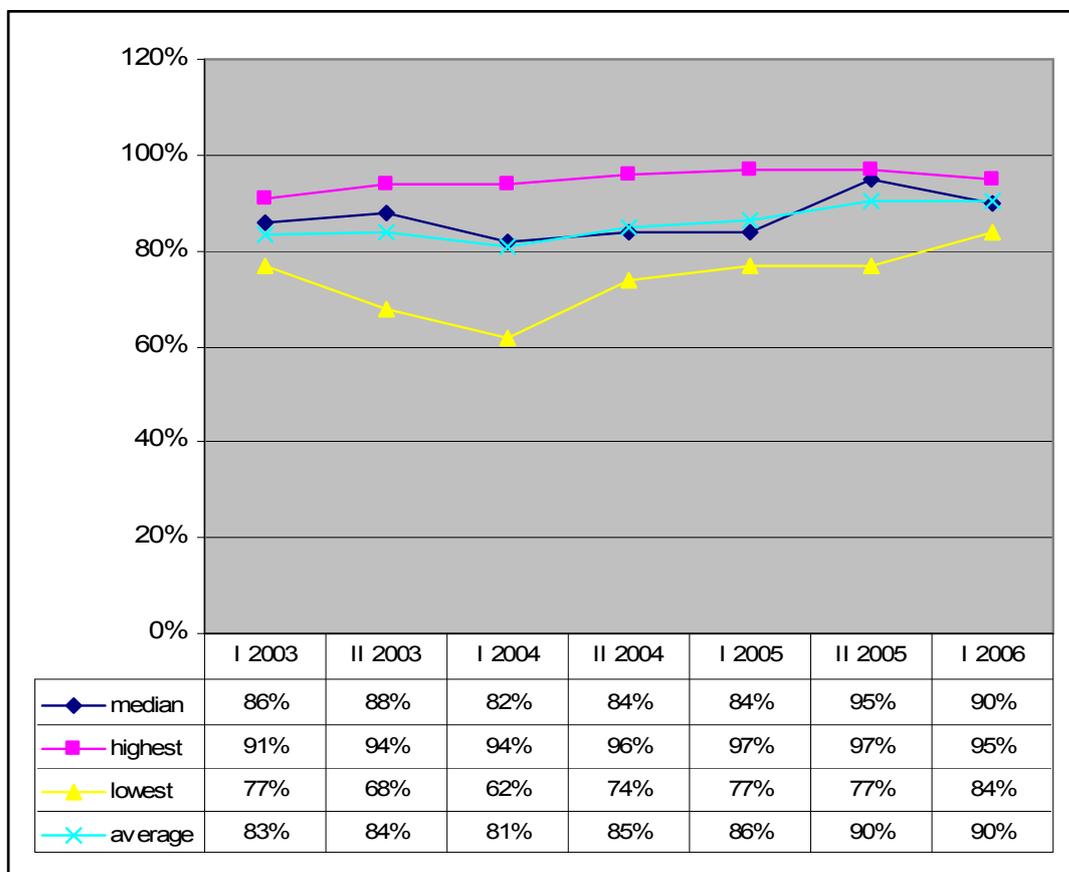
Figure 2. Test scores in the brokerage company

The actual group analysis of the test results took place on a separate day, and offered the participants some comforts like fresh morning mind or no additional duties to help high concentration. The results and particular issues were group discussed and analysed aiming at their practical use.

This has resulted in a significant increase in employees' motivation to their knowledge development, in the strengthening of knowledge sharing culture, and also in the organization improved financial effectiveness.

Main motivating factors seemed to consist of: ambition, friendly competition, prospective influence on periodical performance appraisal system results, comparison of previous test results, as well as the increasing company performance observed by stakeholders and measured by means of insurance policy records (viewed within the range of a couple of years) or the services quality level verified under the implemented ISO system. A synergy effect has been achieved in the course of discussion, knowledge and opinion exchange. The method efficiency has been measured:

- Directly – by participants evaluation, and superior's evaluation;

- Indirectly – by product offers enrichment with solutions transferred from other segments, and by quality level monitoring (no complaints reported).

The method resulted in:

- Increase in knowledge of individuals (measured with test scores, and subsequently with task completion efficiency),

- Increase in employees productivity,

- Less time consumption per client,

- Less claims or complaints from clients,

- New products development,

- Motivating effects,

- Building a cooperative culture.

Tips & Tricks (To-Do)

Before the group analysis session

☑ Be **extremely supportive** and help your team to gather the knowledge beforehand: supply them with books and publications, magazines, on-line access to relevant resources; also mention difficult cases and provoke discussion.

☑ Make sure they know that you **approve** their learning all year long (not only right before the test).

☑ Make sure they are aware that their **permanent knowledge update is important** for you not less then the test scores.

☑ Make sure you **learn faster** then they do.

☑ Make them **compete with you** not each one with another.

☑ The best results are achieved when the team members **aim at high group results** (more than at individual scores) – try to **pass this attitude** on them.

<u>During the group analysis session</u>

☑ Make sure they feel comfortable (no other obligations on that day).

☑ Search for right answers, not for mistakes.

☑ Make people speaking about the issues they are good at.

☑ Allow some time for reading individual scores and accepting them emotionally, and do not move forward untill you have people's attention and eyes back on you.

☑ Moderate the discussion so that everyone has his opportunity.

☑ Make sure everyone receives possitive feedback and fills good after the session.

Potholes (Not-to-Do)

During the group analysis session

☒ Don't be strict and official.

☒ Don't disclose the results too early, you might loose a significiant part of interest.

☒ Don't over expose mistaken answers.

☒ Don't chase the people who gave wrong answers.

☒ Don't allow discussing the individual results, you aim at finding good solutions.

Acknowledgements

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Leveraging Interaction through Cooperation

David Kato and Devanildo Damião
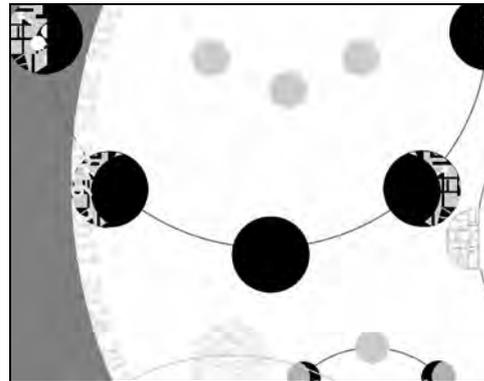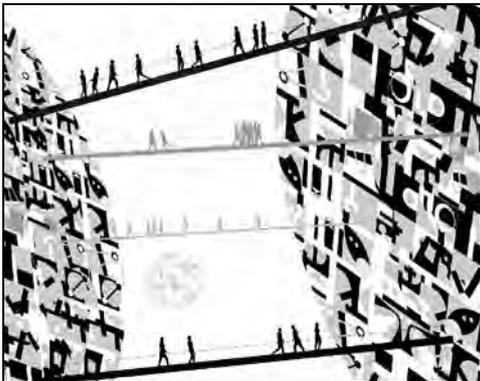
Leveraging Interaction through Cooperation

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Snapshot (Quick Learning)

Factors such as high competitiveness and profound changes demand that organizations manage their knowledge efficiently. Traditional methodologies used on majority of companies don't allow managers to assess the huge benefit leveraged by the interaction of people with different and complementary knowledge. Nurturing connections can bring important results to the organization, such as best practices sharing and innovations. Fostering an environment that motivates people to collaborate and being innovative demands new organizational arrangements, amongst which, the Communities of Practice (CoP) are distinguished, a concept that comes from two sociological streams of study: social structure and situational experience (Piper, 2003). The first deals with the study of norms, institutions and rules, focusing on the discourse, social system and history. The second, studies the dynamics of the daily life emphasizing the agents and its intentions (Wenger,1998).

CoPs appear from the interactions and situations that involve people in the day-by-day. Communities had always existed, professional unions from the classical Greek and the guilds from the medieval ages are historical examples of its existence (Wenger and Snyder, 2000).

They exist in all traditional organizations, in an explicit form or not, they form a social grouping independent of the formal organizational structure defined by organizational charts and they are a good social arrangement for knowledge management, organizational and individual learning.

One of the biggest challenges of a community is to leverage interaction among the members. A community of practice is a complex form of human organization and demands different approaches from those used to the traditional management to crop its results. This chapter is based upon a theoretician-empiricist approach and focus on the role of the community moderator. The moderation framework presented here can be used on any virtual communities characterized by the physical distance of the members, it is verified by the case study presented on this chapter that the obstacles had been surpassed, and the communities had gotten great success for the motivation and engagement of the participants.

The case study presented is based upon ABIPTI's communities of practices, a major project of a Management of Technology Portal, an outcome of a partnership of the Brazilian Ministry of Science and Technology, the Financier of Studies and Projects (FINEP) and the ABIPTI.

Keywords: knowledge management, communities, share knowledge, moderation

Context (Where & What)

The techniques presented here can be use on any virtual community of practice. To understand the techniques presented here, it is important to understand the concept of communities of practice, group of people who share concern or passion about something that they do and interact on a regular basis to learn how to make it in a better way (Wenger,1998; Wenger e Snyder, 2000; Wenger, McDermott e Snyder, 2002).

According Lenz and Peter (1998) apud Floriano Jr. (2004), CoP are groups of people who posses similar objectives and interests and use common practices, work with the same tools and express themselves with a similar language to reach a specific goal. Through the common practices, these people develop and share the same beliefs and values.

According Terra and Gordon (2002), CoP consists of people who are informally and contextually tied up through a common interest on learning and practical application of a body of knowledge and they are based on strong trust relationships and on contributions that each one brings to the community.

CoPs are interesting because, they create value to the organization and to the individuals on the short and long term. Wenger articulates these benefits around those variables to show the value for each one (Table 1)

Table 1: Benefits for the organization and for the individuals.

	Short Term	**Long Term**
Members	Help in the challenges Access to experts Self-esteem Fun with the colleagues Meaning to the work	Personal development Reputation Professional identity Networking Better professional chances
Organization	Solution of problems Economy of time Knowledge sharing Synergies between units Reuse of resources	Leverage strategic capabilities Remain up to date Innovation Retention of skilled professional New strategies

Source: Wenger, McDermott e Snyder, 2002.

Wenger and Snyder (2000) had elaborated a comparative table (Table 2) to explain the differences among others forms of social grouping that exists inside the organizations:

Table 2: Difference between CoPs and other forms of organization

Type of Group	What is the purpose?	Who are the members?	What keeps them together?	How long does it last?
Community of practice	To develop the capacities of the members; to construct and to share knowledge.	Members are chosen among themselves.	Passion, engagement and identity with *expertise* of the group.	While there is interest for the group to keep it.
Formal Group of Work	To deliver products or services.	All the people that reports to the manager of the group.	The working group necessity and shared goal.	Until the next reorganization.
Project Team	To complete a specific task.	Employees selected by the managers.	The project's milestones and objectives	Until the project is completed
Informal Network	Collect and distribute information about businesses.	Friends and fellow workers.	Reciprocal needs.	While there is reason for the person to participate

Source: Wenger and Snyder,2000

Beyond theses differences, the CoPs can be viewed by the organization in different forms, varying in accordance with the degree of acceptance or legitimacy in front of the formal structure. In a lower degree they are unknown and could go illegal, legitimized, supported and finally, institutionalized (Wenger, McDermott e Snyder, 2002). One possible way to institutionalize a CoP is to assign a formal moderator.

The moderation is critical to a CoP. It gives rhythm to the community, energizing the participation. But moderating a CoP is a real complex activity. The next sections of this article try to summarize some techniques and advices collected from the field to help people facing this challenge. Figure 1 presents how the article is organized:
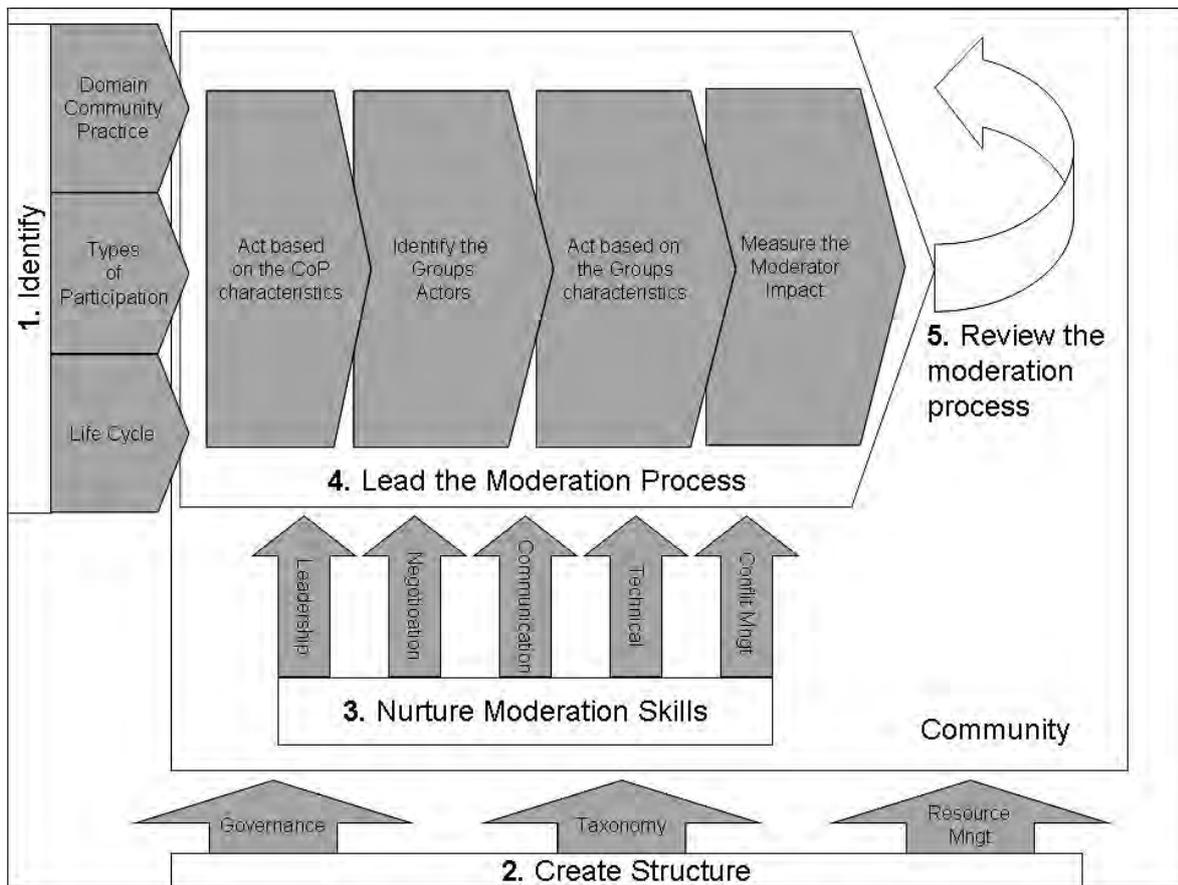
Figure 1: Moderation Process

1. Preparation (The Checklist): Groups 1 (Identify) and 2 (Create Structure).

2. Toolkit (The Essentials): Group 3 (Nurture Moderation Process)

3. Making it Happen (The Approach & the Action): Group 4 (Lead the Moderation Process)

4. Results & Next Steps (The Follow-Up): Group 5 (Review the Moderation Process)

Preparation (The Checklist)

Before getting in to action, the practitioner must identify three elements (domain, practice and community) that differentiate the CoPs of other social groupings (Wenger, 1998; Wenger, McDermott and Snyder, 2002).

- Domain: the body of knowledge that gives the sense of common identity. When clear-cut, it legitimizes the community, enforcing its values and its goals for the members and stakeholders (Wenger, McDermott e Snyder, 2002; Kimieck, 2002 e Floriano Jr., 2004).

- Communities: it creates "social factories of learning". Around a specific domain, the community becomes a central element of the interaction, learning, knowledge sharing and construction of strong trust relationships, enabling a sense of belonging and engagement (Wenger, McDermott e Snyder, 2002; Kimieck, 2002 e Floriano Jr., 2004).

- Practice: this element differentiates CoPs from simple groups of interest (linked to an area of the knowledge, without an related practice). The practice is based on frameworks, ideas, information, styles, language, histories and documents that are shared. If the domain deals with the topic of the community, the practice is the specific knowledge that the CoP develops, share and nurtures.

Identified those elements, the practitioner must understand the dynamic of the participation. Wenger (1998) uses the term participation to mention relationships and social experiences on a broad sense. The participation is a complex process that combines making, thinking, felling and belonging. Wenger emphasizes the importance of the structural elements, since they give sense and motivation to the participation.

Beyond the participation concept, we must highlight the non-participation, since it is an inevitable part and interact with the participation to create richer experiences. If a person can't participate of a discussion due his lack of knowledge, this situation makes him aware, motivating the search of new knowledge.

Wenger (1998) differentiates in two types of relationships. The first one is the peripheral, which the non-participation is necessary to allow a type of complete participation. The second one is the marginality, where the non-participation does not allow the complete participation. The Communities of Practice do not possess homogeneous levels of adhesion. They can vary in accordance to the engagement of the member with the activities of the CoP:

- The nuclear group is the one that heats the community existence

- The complete adhesion is defined by the member that are recognized as practioners

- The peripheral participation is formed by people who belong to the community with specific contribution and engagement

- The transactional participation is defined by people who interact with the community, without being a member.

- The passive access is the one where the person enters in contact with the artifacts created by the community.

CoPs, as organics social events, follow a life cycle, passing through diverse stages during its existence. Each moment must be followed by specific actions to nurture the participation and development of the community, bring positive results to the organization and to the members. The table that follows (Table 3) suggests actions to the development of the CoPs (Wenger, McDermott e Snyder, 2002) according to each of the stages of life of a community.

Table 3: Stages of a CoP.

Potential	Expansion	Maturation	Activity
Pinpoint the main goal	Create a case of membership	Identify *gaps* of knowledge and create a learning agenda	Institutionalize a community voice
Define the domain and identify questions of engagement	Launch the community	Define the CoP role inside the organization	Renew the community
Develop a case for action	Start the events and spaces	Redefine the frontiers of the community	Create groups of work to renew
Identify coordinator and potential intellectual leaders	Legitimate the community's moderator	Create routines to membership and processes	Call new members to be part of the nuclear group
Connect the members of the community	Build connections among the member that will take part of the nuclear group	Measure the community's value	Develop new leaderships
Develop a preliminary design: create models and ideas on how the community will work. It helps the communities to deals with hard situations on the initial stage.	Find knowledge, ideas, insights and practices that should be shared	Keep the focus	Follow the new member
	Create a routine to write and organize documents	Create and maintain a knowledge base	Search new relationships and benchmarks outside the organization
	Identify opportunities to create value		
	Receive the managers recognition		

The last stage in a CoP lifecycle is called dispersion or transformation. The community can take several paths. It can be finished, become a club of friends, restart an expansion, become two or more communities, join in another community or become a recognized center of excellence to the organization.

It is important to emphasize that results of a Community do not appear randomly, but are outcomes of intense work of sowing, nurture and harvest. To accomplish the goal, it is necessary to:

- Construct a good <u>structure</u> to receive the community,
- This structure includes <u>managing</u> resources.

In Virtual Communities, the most dynamic process of knowledge exchange takes place in the discussion board. So it's critical to construct a <u>strong structure</u>, when we are talking about structure, two critical aspects must be highlighted:

- Taxonomy: that allows to cross and recover information;
- Governance: community rules that structuralizes relations of responsibilities, rights and duties of the participants.

These facts lead for the necessity of an effective administration and its classic planning activities, organization, direction and control, creating, then a propitious environment for the development of the CoP. Moreover, a Community needs to manage <u>diverse resources</u>, they are:

- Content,

- Technology,

- Reports, statistics,

- Synchronous and asynchronous communication,

- News articles and others.

The background provided by identifying the CoP (domain, community and practice), the type of participation, the life cycle and the strong structure allow the moderator to prepare himself to be a good moderator.

Toolkit (The Essentials)

A moderator must assume different roles, according to the situation he is facing:

- Coordinator: to organize the interactive space. The information must have a logical and friendly organization, allowing easy access. The contents must be concise, without duplication of subjects. The subjects must possess notes on the problem, justifications and objectives.

- Host: to receive the participants. The new participants must receive special attention, being assisted and receiving instructions for use. The incentive is essential.

- Motivator: to stimulate the participation. The moderator must monitor the discussions and verify the participation level, leveraging the participation using of contacts and provocations. The doubts must readily be directed to the possible specialist.

- Judge: to solve the conflicts. As in any environment that involves people, in the communities some conflicts between the participants occur. The moderator must act based on the politics to nullify the conflict. When he detects possible sources of conflict, he must act quickly and with discernment.

To assume those roles, he must have some skills. The challenge considered in this work implies in a reflection on some empirical moderator experiences of Communities, and revision of literature, highlight the main skill for a good performance:

- Leadership Skills: the moderator must open communication channels with the participants, allowing to absorb its demands and to construct a vision that reflects the thought of the Community. The members will feel that their objectives had been considered and will support the mission of the leader.

- Negotiation Skill: the moderator must constantly negotiate the demands related to the participation with the members; the moderator must have in mind the scarcity of time and to show good point to engage people in order to participate. The negotiation is not only limited to the internal participants, sometimes the moderator will have to negotiate with external organizations, representing the Community.

- Communication Skill: it involves the good communication with the different members of the Community, some recognized as experts and others with little experience. The communication of the rules and limits must be clear to them all. He must possess good

writing to prevent misleading interpretation and easiness of oral communication to represent the community in events.

- Conflict Management Skill: some conflicting subjects, competitions between members/institutions and personal characteristics of the participants lead to conflicts. The moderator must understand the characteristics of the participants and prevent that conflict become constant in the environment of the Community. The moderator must be a great "fire fighter" and, above all, to use positively this kind of situations that can exist.

- Technical Skill: the virtual environment demands adequate use of specific tools, so the moderator must have technical skill to transit freely in this environment. The technique does not mean to dominate programming skills, but know how to interact, without problems, within the virtual environment and how to obtain the best results of the technological resources.

It can be affirmed that the main function of a moderator is know how to deal with people. He must possess good perception of the individual necessities to motivate them to share knowledge. It's important to know that the abilities presented here do not deplete all characteristics necessary to find an ideal moderator, since this set of abilities is not easily found, but require a lot of preparation.

Making it Happen (The Approach & the Action)
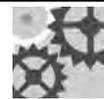
The moderation must be aligned with the background information gathered on the preparation part of this chapter. Some actions are specific according to the CoP characteristics, but empirical evidences show some actions that delivers high value to any community:

- Teaching how to use the tool and constantly collect feedbacks of the participants. To be "together" with the people (actually or virtually), divulging the Portal and also helping to use the tool.

- Monitoring constantly, mainly the new participants. Any anomaly detected in the tool must immediately be addressed to the technical support, therefore the perfect functioning of the forum is a key success factor of the community, since the unsatisfied will hardly return or recommend the forum. The insertion of content together with the participants is also important to help to create critical mass.

- Sensibility to diversify the subjects under different perspectives, to know the people and to engage them to participate. In the beginning, it is indicated to select a few subjects and to deepen discussions. Many subjects can cause dispersion. To select the subjects, it is essential to search and to conciliate diverse opinions.

- Dynamism to keep the rhythm of the questionings and doubts that appears. They must be directed for users with capacity to answer them. The one that answers the questions must be thanked with high impact.

- Shelter each new participant with welcome followed of tips that stimulate the participation. Each new participant must receive an email with a welcome message.

The dynamics of the forums will allow the moderator to create different profiles of participants, amongst which: the active participant, the capricious one, receptive and the specialist. Using those profiles, he can use different models of treatment in accordance with them (Table 4).

- Active: he participates on a spontaneous and continuous form;

- Capricious: he is registered, but he rarely participates and disappears for long periods;

- Receptive: He constantly access the community and he observes what it is happening;

- Specialist: he rarely participates in a spontaneous form, but it reacts when necessary

Table 4: Characteristics of different groups of actors.

	Active	**Capricious**	**Receptive**	**Specialist**
Participation	Frequent	Rare	Frequent	Sporadical
Importance	High	Low	Average	High
Treatment suggested	Special Care	Supervision	Provoker	Special Cares
Impact of the participation	Average	Low	Average /low	High
Position	Pro-active	Reactive	Accomodated.	Active.
Main action	To participate	Not defined	To observe	To answer

The negotiation with other entities will make possible the collaboration, access and share of information. The contribution must be stimulated in different levels, with the goal to promote initiatives that promote growth. The developed partnerships must be explored, mainly to promote events and generation of contents.

Results & Next Steps (The Follow-Up)

To ensure that the moderation process is giving true results, it's important to use some metrics, using metrics to access the CoP results it's a complex and controversial subject that deserves a full chapter and it's beyond the scope of this chapter. Measuring the results provide some background information to the moderator who can reconsider his actuation. Below we list some possible metrics:

- Access / Participation

- Creation of Content

- Events

- New Members

- Stories of Success

- Interaction between geographically disperse members

Real Cases (As it has Happened)

The ABIPTI's1 communities of practices are part of a major project of a Management of Technology Portal, the project is a result of a partnership of the Ministry of Science and Technology, the Financier of Studies and Projects (FINEP) and the ABIPTI.

Specifically in the ABIPTI, the project is concerned with actions to stimulate the knowledge sharing among the professionals of the 15 institutions affiliated to the ABIPTI. It was decided to develop Communities of Practice as the main action to nurture the collaboration, initially, the communities domains were: Quality Management (QM), Intellectual Property (IP), Geological Risks and Feeding Security. Those communities (Figure 2) were created because the knowledge flow is better when there is a specific theme to the community. The domain of the community was chosen by professionals of the institutions during ABIPTI's meeting, those themes are important to a broad range of institutions and there are teams of experts to deal with questions related on the communities. This case study deals with two communities (IP and QM) during the year of 2004.

Figure 2: ABIPTI's Communities Portal

There are a lot of cases of communities that enabled huge financial results. This kind of results come, in general, from specifics economics scenarios and value chains, so, it's very sensible to changes.

Research institutes, our research object, are less sensible to changes then other kinds of organizations, because there are well defined technological lifecycles and structured processes of changes. The essence of a research institute is defined by limited resources and strict financing scenarios. Thus, it would be improper, an analysis that emphasizes the success of a Community based on immediate financial returns.

The criteria to be considered while assessing the results of the community must be aligned with the main goals of the Management of Technology Portal project, it is possible to identify that one of the main objectives is the integration and interaction among the institutes.

Considering the context presented, an important criteria is the range of the institutes in the communities. To answer this criteria, it's important to see that the institutes are from different

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[1] ABIPTI: It's a Brazilian association of institutions that research new technologies

parts of Brazil (Fucapi – Amazonas; SENAI Cettind – Bahia; Tecpar – Paraná; Cetec – Minas Gerais; Fiocrus – Rio de Janeiro; Cientec – Rio Grande do Sul; etc). Other important questions that show the results of the communities are the outputs created by the members. The experience with the community provided events of great success (Figure 3)

Figure 3: Tecpar - November 2004 /Paraná

The table below (Table 5) presents information about the events:

Table 05: Communities' Events

Themes	Local	Date
Quality Management	IPT – São Paulo	September - 2004
Intellectual Property	Tecpar - Paraná	November – 2004

The community also enabled the development of researches and academic papers, with prominence for the monograph carried through with focus in the Community of Practice of the Abipti (Priscilla Alves, Instituto de Educação Superior de Brasília - Comunidades de Prática)

To renew the members' engagement, it's important to show the moments of interaction with success experiences (Figure 4).
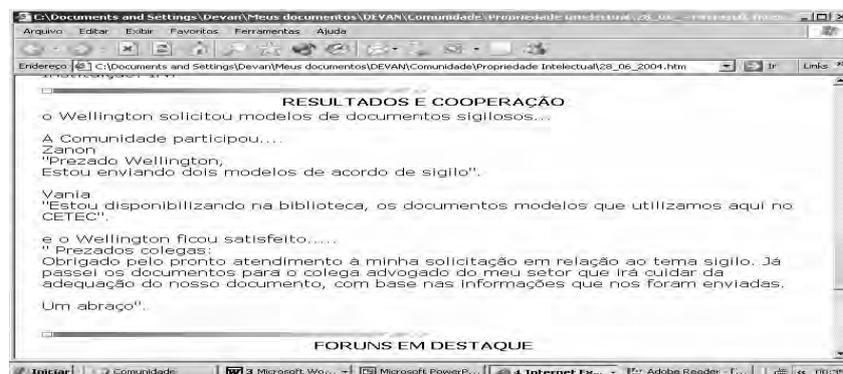
Figure 4: Experience of Cooperation[2]

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[2] Welligton requested some models of contracts. Vânia and Zanon answered the request and helped Welligton to face this challenge.

One indicator of the operation of a community is the capability to create interaction and show the importance to internal and external members. The ABIPTI community stimulates relationships with external actors with great success with organizations such as ASPI (http://www.aspi.org.br – Associação Paulista de Propriedade Intelectual), Rede Tecnologica REPICT from Rio de Janeiro (http://redetec.org.br) and, with the help of Angela Puhlmann (IPT), responsible by the nucleus of Intellectual Property of the Institute, the events are divulged on a crossed form. (http://www.ipt.br)

To follow (Table 6), detail some statistics of the Community of Intellectual Property (used as reference), demonstrating the evolution in the use. The result shows a substantial improvement in all factors.

Table 6: Evolution – Intellectual Property Community

	February 2004	Abril 2004	November *2004
Accesses	650	1072	2630
Documents published	58	42	100
Number of downloads in the Library	165	221	230
Participation in the Forum	96	117	316
Participation in the P&R	3	17	20
Participants	60	98	108

It is important to stand out that the great contribution in publications is the fact that allows the community access highly qualified digital knowledge base validated by a public of experts on the subject.

Another important aspect is the growth in the number of participants. It makes possible to infer the alignment of the culture to share knowledge between the diverse institutes. The increase of participation in the forums reflects the dynamism of exchange of information and knowledge between the participants (Figure 5).

FORUNS EM DESTAQUE

ANÁLISE DE PATENTES.
TRANSFERÊNCIA DE TECNOLOGIA.

ACOMPANHE......

Mensagem de Chaddad

" Bom dia, Camila.
Em minha opiniao, este e o ponto fucral para mais rapida geracao de riqueza no pais: disponibilizar as empresas o conhecimento ja pronto nos Institutos e Universidades, atraves de licenciamentos negociados. Embora entenda que o modelo da oferta nao seja o mais indicado, nao podemos desconsiderar todo este manancial acumulado.
A forma de atrair e motivar as Empresas, que desconhecem completamente este potencial, e o grande desafio."

Mensagem de Marcelo Barbosa...

" Olá pessoal !
Acho que deve ser trabalhado o estímulo a que as empresas busquem a inovação pela academia. Parece que São Paulo deu um passo nesse sentido, ao promulgar lei estadual que permite aos pesquisadores trabalharem algum tempo dentro das empresas, em regime especial."

Figure 5: Testimonial of Interaction in the Community's Forum

Tips & Tricks (To-Do)

- ☑ To identify the main actors and subjects that can awake the interest of the Community;

- ☑ It is advisable to create at least one part of the forum especially destined to the presentation of new participants;

- ☑ To promote the participation of the members of the forums identifying the motivational factors for each group of participants;

- ☑ To stimulate that each participant post a first message in the forum;

- ☑ To consider and to open new subjects to prevents that the discussions turn aside from the subject originally considered;

- ☑ To present and to foment the discussion of the norms and behaviours of the forum.

- ☑ Publication of photos of the participants is an excellent resource to be used in the forums

- ☑ The propagation of photos next to the messages is indicated

- ☑ The creation of "forms" with photo and some basic data of identification of the participants of the Community

- ☑ Synchronous tools of communication such as chat will be useful to promote bigger interaction between the people. Whenever it is possible, invite specialists for moderated chats.

Potholes (Not-to-Do)

- ☒ Not to organize and co-ordinate the process of presentation of new members of the forums;

- ☒ Leave messages of new participants without reply;

- ☒ Leave new participant of the forum alone;

- ☒ To allow conflicts between participants;

- ☒ To take the decisions without consulting the group.

Acknowledgements

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Building a Global Online Community
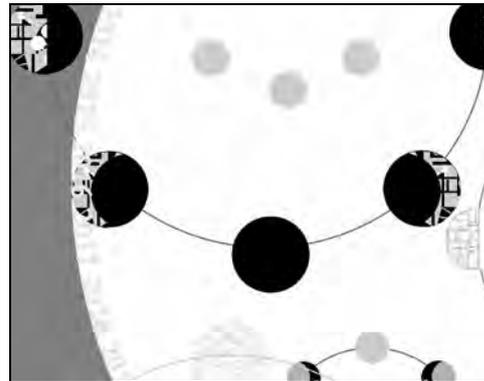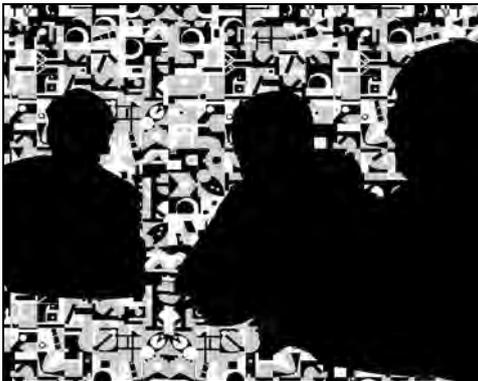
Cüneyt Budak

Building a Global Online Community

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Snapshot (Quick Learning)

This chapter outlines the design process for a thematic web portal targeting to build an online community involving all the interested people in the world. The aim in such an initiative is to publicize and promote creative contributions from all around the world, and provide an open and useful database for all presentations and related resources. In order to become global, practitioners and scholars from all countries should be invited to submit or nominate new work or research to be featured on this portal for the appreciation and evaluation by an international community.

"New social software technologies can support the conference experience, and perhaps go beyond." (Suter, et al. 2005) We can even predict that a global online community, collaborating at a portal with an adequate design for a specific content, being easily accessible for a much wider public anytime can be much more effective than many international conferences.

As Kevin Kelly (2005) has wonderfully described, "There is only one time in the history of each planet when its inhabitants first wire up its innumerable parts to make one large Machine. Later that Machine may run faster, but there is only one time when it is born. You and I are alive at this moment." The future of the "Semantic Web" will converge all our of diverse efforts for online collaboration on a ubiquitous platform. (Shadbolt, et al. 2006) But still "Provenance -that is, the when, where, and conditions under which data originated- has become a key requirement in a range of applications. We might well need the help of researchers in areas as diverse as social network analysis and epidemiology to understand how information and concepts spread on the Web and how to establish their provenance and trustworthiness."

Crompton and Murchland (2002) have attempted to identify the Critical Success Factors in online community building as good leadership, strong relationships and effective environment. They categorized the key features of the effective community environment, i.e. the portal, as follows (although they regard them not as critical as the former two factors):

- Identification of the author, time, topic and keywords for each contribution;

- Capacity to edit contributions for a nominated period;

- Search facilities based on forum, keywords, text, date ranges and authors;

- Capacity to contribute files / documents and images to supplement text;

- Facilities to organise / index these supplementary objects;

- Ability to determine what members had last read in order to determine whether they have had a chance to read recent contributions;

- Tools for monitoring participation, enabling leaders to contact those who withdraw to seek feedback and encourage participation; and

- Tools for survey, polls, or other mechanisms for determining opinions or making decisions.

The ideas that are discussed in this chapter draw from our recent experience in designing a global community portal for knowledge creation in a specific field, i.e. architecture. Formulating a generic description of the characteristics encompassing all the possible Online Knowledge Networks would be a too ambitious task for this study. But it also appears to be true that the model we have developed can easily be adapted for other global community portals each one focusing at a different theme and content. In our globalizing world, all professions or disciplines –artistic, technical, literary, or scientific- share similar concerns for international collaboration. And the mechanisms required for the online sharing and discussing of designs, artworks, articles, or other products of creativity and scholarship are basically the same. Thus the guidelines explained in the following sections can be helpful in building different global communities for sharing thematic content as diverse as music, fashion, poetry, industrial design, or agricultural practices.

The BETA version of the The World Architecture (WA) Community Portal will be fully functional on March 2007 so that the readers of this chapter will be able to examine online all the described processes and watch the growth of the community. We will also try to implement experimental new features suggested by the KB community members during 2007.

Keywords: Web-based Communities, Online Communication, Global Social Networks, Web Portal Design.

Context (Where & What)

When you approach the online communities from the perspective of conventional CoP experiences you might be disappointed with the results of most experiments for online cooperation (SCHWEN and HARA, 2003). Facilitating existing real world communities with online instruments poses a completely different set of problems than those when one is trying to create in cyberspace a community from scratch. The very existence of such a project depends on the achievement of a certain "critical mass" in terms of contributing members, the size of which varies according to the scale of expectations -mainly determined by the "focus" of the project- which is hard to quantify. (Preece, 2003: 16)

This condition requires a special attention to "the five dimensions of usability" as defined by Quesenbery (2003): a product should comply with the 5 E's creating usability goals by being Effective, Efficient, Engaging, Easy to Learn, and Error Tolerant.

One main issue to be considered here is the "Digital (and Cultural) Divide" because a basic premise of our approach is that the contributions from all parts of the world will have equitable chances to be represented, promoted, reviewed and criticized at this international arena. This implies a special emphasis on the countries that are not sufficiently covered by international media. If the core content of the website is visual, it mainly addresses a visual literacy that all professionals and enthusiasts are expected to share. But the language barrier will remain as a major drawback against a truly transcultural collaboration until translation software become more plausible.

The specific objectives of a thematic portal can be defined as follows:

- provide a guide to related contemporary practices in all countries.
- facilitate access to "THEORY" for all scholars, students, and enthusiasts;
- stimulate public interest in the related field to overcome the introvert character of the disciplinary discourse and make it a issue of general intellectual culture and gossip;

- help responsible professionals and interested clients meet each other at a global scale;

- provide an opportunity for local practices to become internationally recognized and discussed by prominent scholars;

- make the expertise and experience in the related industries of all countries globally available;

- enable professionals from diverse conditions to confront their ideas and concepts, share their experiences, broaden their knowledge, and learn from their differences;

- discuss the role of the profession in developing conditions by questioning the established paradigm of the discipline;

- question issues of modernism, globalization, identity, inequality and development;

- use the Internet's potential for transforming educational theory and practice in the specific field of study by linking the resources and talents of a global community

IN SEARCH OF NEW PARADIGMS AND REVOLUTIONARY OUTLOOKS

New paradigms in the evolution of a discipline, in general, can best emerge from the new information networks that are inclusive. This pattern is most plausible for art and design practices of our concern, in particular. Basically, local practices have available only an established abstract notion of their discipline and a closed local community of professionals and scholars from a similar background to have their work evaluated. Our claim here is that these conditions can only be overcome through a rich dialogue within a transnational community.

If we consider the established paradigm of a discipline as a well-defined and well-fortified territory, the Internet provides free territory to form new communities outside its hegemony. What is primarily a "public domain" in the internet might easily turn into a "communal domain", develop away from abstract discourse to an agora for "communicative action," embrace diversity, and reveal contradictions present in the established discourse.

GIVING VOICE TO THE VOICELESS

If we return to our specific case for a dramatic example, anyone familiar with architectural websites is aware of the domination of the prevalent paradigm of architecture throughout the world. You may find excellently designed websites from South America or throughout Asia promoting the same few European architects as representing contemporary architecture. It is true that perfection or high aspirations in architecture may not be a priority in backward conditions. But there is large building activity everywhere, the architecture of which remains deprived from any public or professional criticisms that are essential for their development.

One of them is in Ethiopia, an experimental dwelling in Addis Ababa by Ahadu Abaineh. This dwelling, by good chance, won an award from The Architectural Review magazine in Britain in 2002.
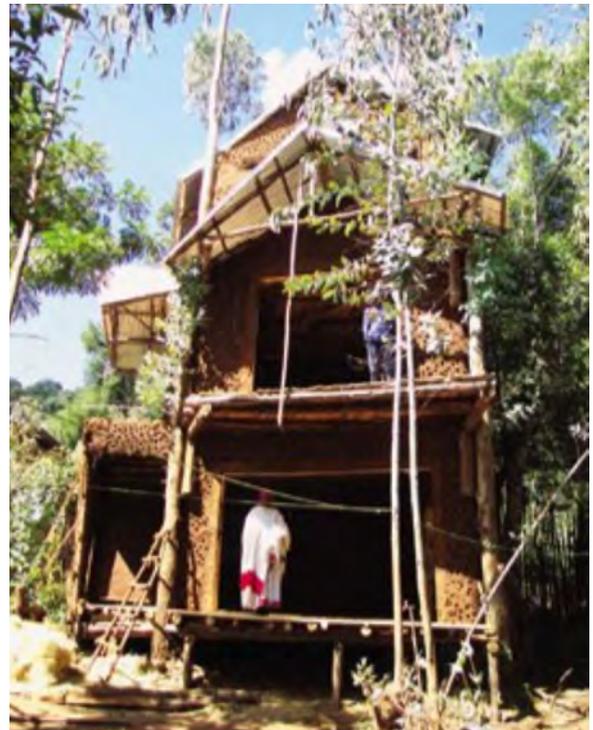
A HOUSE FROM ETHIOPIA

This "ar+d" award is conceived to discover and celebrate the work of architects and designers not necessarily well known and usually at the start of independent careers.

After this particular publicity, the building became one of the scarce references from countries in backwards conditions for Western scholars. In 2004 it became one of the few examples from Africa in The Phaidon Atlas Of Contemporary World Architecture. In 2005, this building again appeared in another international publication, "The New Modern House" by Will Jones published by Princeton University Architectural Press.

HIGHLIGHTING BEST PRACTICES

One of the main objectives of a global CoP portal should be the surveillance of recent professional activity that does not have easy access to international media (or does not have a determined urge to be publicized widely) and bringing those efforts to the attention of the global community. The exploration of local and individual efforts can provide a great impetus to the development of the professional discourse.

One major problem is the design of a mechanism through which quality can be recognized among the high quantity of mostly uninteresting submissions. Actually, democratization goes hand-in-hand with the devaluation of merit whether in works related to art, science, philosophy, or journalism. As we have explained elsewhere, "the modernist notion of the artistic genius evaporates in the mechanistic creativity of the multitude" (Aydin and Budak, 2005). The same is true for linguistic creativity, academic and scholarly authorship. Quantity and equality, by definition, override quality in egalitarian and popular social networks. The members' supporting votes or ratings for submissions by other members will provide a context:

- to identify and publicize those humble efforts of local practices that embody a remarkable mastery and creativity;

- to promote those individuals who may already be revered by a restricted community but whose work is not yet recognized by the international community;

- to choose from the work of promising young masters anywhere in the world who need a context for their experiments to be reviewed and criticized;

- to highlight specific projects and practices by well-established offices or individual professionals which might otherwise go unnoticed by the extraordinary abundance of information due to the acceleration and globalization in communication.

"Diversity plus freedom of choice creates inequality, and the greater the diversity, the more extreme the inequality. (...) power law distributions tend to arise in social systems where many people express their preferences among many options. We also know that as the number of options rise, the curve becomes more extreme." The established star system that reigns in any professional scene, especially in the creative industries, is inevitable and will be reproduced in an online rating system. "Freedom of Choice Makes Stars Inevitable (...) Reversing the star system would mean destroying the village in order to save it." (Shirky, 2003a)

The solution is simple: "David Sifry, creator of the Technorati.com, has created the Technorati Interesting Newcomers List, in part spurred by this article. The list is designed to flag people with low overall link numbers, but who have done something to merit a sharp increase in links, as a way of making the system more dynamic." (Shirky, 2003a) This is why a community portal should encourage the members to concentrate on the latent potential of controversial experiments in the ordinary, almost anonymous practice or production at every unexpected spot worldwide when they are nominating or rating.

Preparation (The Checklist)

A generic web address is a good starting point for a global initiative. Otherwise, you should manage to create a global brand name with an extraordinary product as YouTube did. In our specific case, for example, the web address <www.worldarchitecture.org> was first registered in March 2000. During the following years it was on-line as a static link directory referring to online resources on contemporary architectural practice in each country of the world. With this feature alone, where only 800 links could be provided, Encyclopedia Britannica Online mentioned the World Architecture website among "The Web's Best 10 Architectural Sites" during 2002, and this was the result of the policy that guided the selection of links at the start: namely a positive discrimination for the favor of peripheral positions.

The directories at a community portal that really aspires to become global should mainly function as a "Surfer's Digest and Guide", a directory providing links to websites representing the contemporary scene of all countries in the world. One of the tasks of the editorial team preparing the seed directory during the preliminary phase is critical as a reflection of the future direction for the portal. They have to collect basically links from each country to the main institutions, periodicals, and articles, and individual efforts that offer online material reflecting the contemporary practice in that country. Personal websites of professionals and commercial practices can be omitted if their sites do not contain valuable research material. An important advice related to this kind of preparation is not to neglect recording the contact e-mail addresses for each link during the initial search efforts. This database is the main tool for announcing and promoting when launching the website.

A thematic portal should be launched with a directory of initially prepared links and then ask the concerned contact persons and country editors to improve the content with original material. This process provides a continuously updated directory of annotated links arranged in an extensive catalogue of separate information pages.

INVITED EDITORIAL BOARD AT THE OUTSET

In order to accomplish its mission, a global community portal has to establish an editorial structure that allows the managing and control of the community participating in the various processes and providing the content. Through initial correspondence, a considerable group of "Associate editors" including leading critics, writers and academicians selected from every country should be determined from the start. They will join voluntarily upon invitation by the leading team and will have the privilege of nominating new members, and other editors to be invited. Editors are expected to comment on submissions and other issues, rate them, submit tidbits, news, links, articles and reviews. They should be systematically notified of the recent submissions, designs, articles, news, tidbits, best of the week and best of the month awards through a specialized interface. They should also be notified about the contributions from their native countries via e-mail.

INTERNATIONAL STARS

Personal pages for the most famous names, the celebrities in the profession, or internationally respected scholars can also be created in advance utilizing material already available online. Then, during the Beta-Phase, these stars can be invited to revise the content of their pages if they wish.

The Stars list should basically comprise contemporary masters of international reputation and with commissions from diverse countries. New names can eventually be added to this section upon the suggestions of the editors. Avancini and Straccia (2005) have developed related algorithms of "user recommendation for collaborative and personalised digital archives."

Toolkit (The Essentials)

The software integration and development of the Knowledge Management System (KMS) for a large portal can take several months. At the beginning, the project should be discussed with successive groups of programmers and designers integrating their suggestions. Detailed requirements of the system and the database architecture have to be articulated parallel to the graphic design of the various pages, which can require 3-5 months even for a dedicated team. Final integration requires one or two months. However, the KMS can be continually improved over a much longer period.

During the Beta-Phase the incompleteness of the design may be a virtue to make people get involved as concerned community members: "The application's lack of generality or completeness communicated something -We built this for you- that the impersonal facade of RateMyProfessors.com doesn't have and can't fake." (Shirky, 2004)

DIRECTORIES

Directories should provide a continuously updated directory of annotated links arranged in an extensive catalog of separate information pages about:

- contemporary professionals in ALL countries

- internationally famous masters of the profession (~200)

- Works / best practices submitted by members and arranged by various categories

- theoretical issues related to the discipline with reference to online resources / books / articles
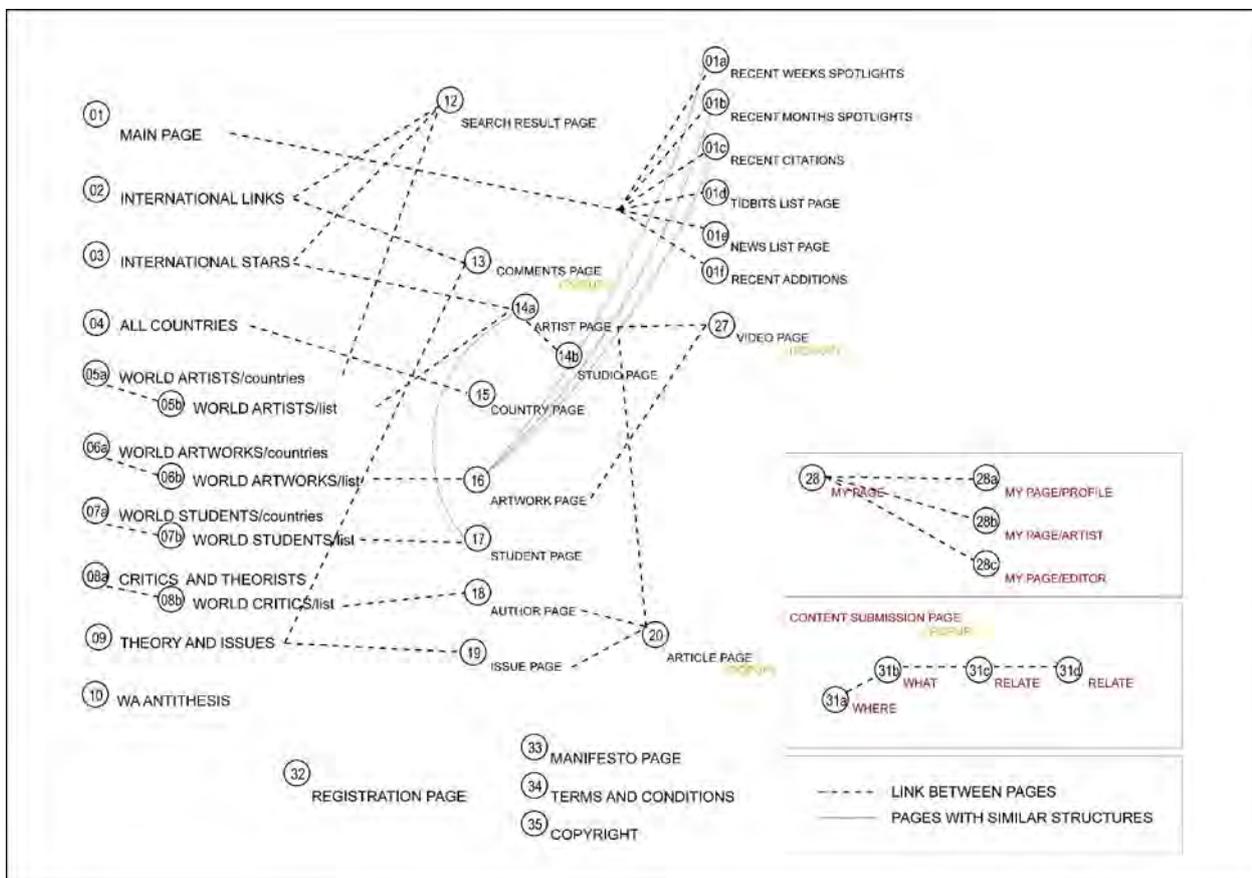
NEWS and TIDBITS

Editorial news in a community portal is a remnant of printed media habits: they can principally be in the form of links to other sites, each with a short description. It can be a useful feature if News can be browsed by various categories such as Design News, Competitions, New Books, International Events, etc.

Tidbits should be conceived as similarly selected links that are not news but resources that are of great interest to the majority of community members. Categories of Tidbits can include Design ideas, Theory related, Fun, Adversary - Opposition, and Convenience

A Bulletin that contains recent news and 1-3 most interesting Tidbits can be sent to the members with a variable periodicity of their own choice. This choice might range from daily to monthly.

All Visitors and Editors should be invited to submit News and Tidbits.

CONTENT PAGES

Information Pages for each item constituting the content of the directory (Country profile / member or master profile / artwork or project profile / theoretical or historical concept) should basically contain:

- Very short info (Keywords, place, date, explanation of significance, etc.)

- Hyperlinks to other items within our database

- Annotated off-site links

MEMBER PAGES and PROJECT PAGES: All professionals or amateurs can be invited to submit their work and create a portfolio at the community portal. Students / professionals can also be invited to submit unrealized projects (drawings, sketches of utopian or fantastic ideas, student projects and exercises, rejected proposals, competition entries, etc.)

COUNTRY PAGES: should be initially prepared by the portal's in-house team utilizing already available material of previous research. These pages provide a general framework for online resources that reflect the professional scene in every country.

THEORY & ISSUES PAGES: An interesting feature that can be developed for the discussion of most diverse issues related to the general theme of the portal is a growing collection of entries interlinked by cross-referencing among "related issues" that can be introduced and developed by voluntary members who will eventually become Issue Editors. This extensive "Thesaurus of Ideas" will easily guide the visitors to articles either in the portal's database or elsewhere on-line.

Theoretical issues, research areas and subjects can be discussed as encyclopedic entries in separate pages providing links to relevant online resources, recent books and other related issue pages in the portal's database. During the Beta-Phase, academicians can be invited to revise the content of their areas of interest.

Content pages for many entries can be created in advance, utilizing material that has been compiled by the portal's in-house team of editors. This section can be developed eventually with contributions from Members and Associated Editors.

HIGHLIGHTING SUBMITTED WORK

An editorially selected collection of "Recent Citations", "Spotlights of Recent Weeks" and "Earlier Months" featured on the main page can promote those works and projects that are short-listed by the Editorial Board regarding Members' supporting votes. Being selected to stay under the "Spotlights" on the main page for a long time means an opportunity to set the agenda for the Community to discuss and develop the ideas embodied in these works that would remain unnoticed in existing communication channels.

VIP LOUNGE: AN EXCLUSIVE FORUM (~150 MEMBERS)

Forums in community portals are usually spoiled by the multitude and heterogeneity of the participants. As an alternative to forums open to all community members an exclusive VIP group of invited members can be formed to commence a moderated and exciting forum. These members can be chosen as an exclusive group of famous professionals, acclaimed critics, academics and theoreticians, editors of professional magazines, curators and other experts from cultural centers and other organizations, authorities from various institutions and governmental bodies especially interested in issues related to the general theme of the portal. The VIP lounge can provide an arena in which VIP members may convene to discuss their shared interest in contemporary issues. The discussion can be stirred up through news edited by associate editors who are admitted to enter the lounge and bring up issues to discuss. This Forum is not accessible by other users; but every active community member has an opportunity to be assigned in the forum according to the intensity of his/her contribution to the portal. Polemics and hot debates from the VIP area can then be occasionally reported to the whole community as news stories.

Making it Happen (The Approach & the Action)

Bouras et al. (2005) have utilized for webbased communities a classical 4-tier user hierarchy (Visitor, Administrator, Member, and Group leader) and analyzed their roles and relationships in detail. Key roles and respective activities in effective CoPs and online forums has been differentiated as follows: Thought Leader, Facilitator, Mentor, Participant, Legitimate Peripheral Participant (LPP who are also described in the literature as 'vicarious learners' or 'lurkers,' (Thomson, et al. 2004: 3-4) Leuchter, et al. (2003: 960) have categorized the roles in an open software developing technical community as "anonymous (who can read), pseudonymous (anonymous identity, who can create, modify, rate), category moderator (who can structure) and super moderator (who will communicate)" and visualized them as concentric groups. In structuring the role models in a global community portal you have to empathize with the various kinds of potential users specific to the theme, aim, and context of your project. But research on the behaviour of users in substantially different types of communities can provide invaluable insight by analogy.

Protecting the privacy of registered members through pseudonymity is almost a naturalized tendency in web-based communities where balancing individual's privacy and society's security becomes a critical issue. (Perik, et al. 2005: 20) Demchak and Fenstermacher (2005) analyzed user modeling through a policy lens, known as the behavior-identity knowledge (BIK) framework and offered suggestions on how to protect user privacy. In the conception of a community portal for professionals where they can submit their work you have no other choice than requiring the real identities for registration and all members are expected to behave accordingly taking full responsibility of their contributions. This will also discourage excessive illegitimate activity.

Deciding on the details of registration membership procedures is an important policy matter. Grohol (2006) tried to summarize commonsense basics of registration and membership issues in six steps. His point regarding the absurdity of e-mail validation procedures is worth considering.

A community portal brings people together to build community-maintained artifacts of lasting value (CALVs). Motivating people to contribute is a key problem because the quantity and quality of contributions ultimately determine a CALV's value. Cosley, et al. (2006) posed "two related research questions: 1) How the intelligent task routing -matching people with work-affect the quantity of contributions? 2) How does reviewing contributions before accepting them affect the quality of contributions?" An extension of dynamic user modeling techniques (see also

Kobsa and Cranor, Eds. 2005),"Intelligent task routing" is a rather technical issue beyond our scope here but it is a tool that will define the future of online communities.

Questions related to "filtering" and "reviewing contributions", on the other hand, are vital in shaping the nature of contributions, hence, a major issue in design decisions: "Pre-Review systems may increase people's willingness to contribute or deter people from damaging the system compared to Wiki-Like. Here, the PreReview group had more editors and total contributons, while prior work showed that review before acceptance reduced antisocial behavior compared to a system with no review. Designers might use the model to reason about trade-offs between short-term speed and long-term quality. Fielding a Wiki-Like system until contributions taper off and then switching to a higher-equilibrium Pre-Review system may let designers have it both ways." (Cosley, et al. 2006) At a community portal, you have also developed a check point, where all postings will be checked and obviously irrelevant material is vetoed at inception.

 "One reason Wikipedia works is that it highlights recently changed pages so members can review others' contributions. However, Wikipedia gets thousands of contributions per day, making it hard for people to find contributions they might care about. By intelligently routing changes to people who are most likely to care about checking them, we can increase motivation to contribute and the quality of our database while reducing contributors' workload." (Cosley, 2005a) At a global community portal, Country editors and Associate Editors should be provided with personal message boards in their MyPage space where they can track recent postings concerning their specific tasks forwarded to them by administrators. This feature can further be enhanced by intelligent task routing.

MEMBERS AS EDITORS

 "A rather self-evident feature of virtual communities, which is still significant for understanding the potentials of mobilizing collective action, is that there is no practical limit on the size of the community. As a result, communities can grow very large in scale, and can enjoy input and feedback by many contributors (although, in all likelihood, as the scale goes up the cohesiveness of the community declines). For example, when a member posts a query to the community website or requires assistance, a large audience is available to supply an answer. Just due to the sheer number of members, it is likely that some 'experts' or members with private information would contribute comments or references. If the comments are made public but are deficient or incomplete, other members can provide corrections and feedback." (Lev-On, 2006) All registered members of an online community should be called "Editing Members." They can include professionals, students, and people from various occupations related to the discipline. They should be invited to comment on submitted works and introduced issues, rate them, submit their projects, designs, articles, tidbits, news and links. Their contributions, corrections and feedback should be considered essential for the community portal as a many-to-many medium.

"Abundance of user contributions does not necessarily indicate sustainability of an online community. On the contrary, excessive contributions in the systems may result in information overload and user withdrawal." Cheng and Vassileva (2005a) propose an adaptive rewards mechanism aiming to restrict the quantity of the contributions, elicit contributions with higher quality and simultaneously inhibit inferior ones. Cheng (2005b) developed this "incentive mechanism" to take into account the quality of user contributions, i.e. to reward the contributions with high quality, inhibit inferior ones and restrict the contributions. Such a mechanism should definitely be integrated to the portal of a large community because there are too many editorial tasks to be performed and members are expected to compete for higher editorial status.

Cosley, et al (2005), advises use oversight in helping members maintain their communities.

- Oversight improves outcomes and increases contributions. Use oversight mechanisms to improve quality, reduce antisocial behavior, and help reduce the risks of member-maintained communities.

- We found no differences between peer and expert oversight in quality or quantity of contributions. Take the burden off of community owners and share it with the members. Some of them really want to help.

- Major differences in quality can be attributed to individuals. Increase the quality of contributions by selecting for the best contributors, and by improving the capabilities of individual users, e.g., through training.

- Telling people about oversight may increase their motivation to contribute. Tell them about oversight to encourage good contributors and discourage bad ones. (We do not recommend lying about oversight. Users will find out.)

- A number of users surveyed said they did not see our invitation link. Make opportunities to contribute obvious. Do not assume that ignoring an offer is intentional."

When completing the registration form users can be asked to express their intention to become an Associated Editor. All contributions are then recorded and traced by in-house editors and members will be noticed when they are assigned to an editorial position of greater responsibility and privileges. There can be mainly two types of information pages that should be maintained by editors: Country Pages and Issue Pages. A third type that requires volunteers' care is a past Master's Page. There can be several editors representing each country or responsible of a issue or the page for a past master and the only measure to be chosen as a page editor will be the degree of the member's editorial activity. Below are details of the scenario:

COUNTRY EDITORS: Representing a country requires that the delegated editors should occasionally verify and edit all the recently submitted links to the respective Country Page. Your Names of these editors should appear at the header to that page. Country editors will also be expected to submit new names for invitation to membership and verify those names nominated by other members. All project or artwork submissions, news, tidbits and proposed links related to a country should be forwarded to the mailbox of responsible Country Editors who can check them for any fraud or misinformation, and edit or veto if necessary. Once checked by an Editor each entry will be published as edited by that name, except being vetoed by another Editor consequently. Otherwise, all Editors can comment or discuss all submissions on respective pages.

RECOGNIZED PROFESSIONALS OR MASTERS FEATURED IN COUNTRY PAGES: Country editors can be assigned to decide which masters should be highlighted as representing the professional scene in their country. Young talents could be nominated, too, but all members should be invited to create Content Pages for older masters of the profession and contribute to already created ones by simply providing relevant links or posting images of the specific works they admire. All such efforts should be honored at the header of respective pages.

ISSUE EDITORS: If a system of THEORY & ISSUES PAGES is provided, members will be invited to relate their submissions to already available Issue Pages or create pages for new issues when they are submitting articles or links. Eventually other community members will be referring to these entries from other issue pages, too.

Members will then recognize that there are many issue pages in draft form waiting to be developed by them when they are submitting links of related resources. They should be invited to begin editing these issue pages or creating new ones. A member should become the exclusive editor of a page if her contributions to it reach a certain level. For each member, her special areas of academic interest may be a good starting point to create and edit Issue Pages. Consequently each member's editing activities should also define her authority on specific subjects.

MOTIVATIONS FOR PARTICIPATION

The basic rationale of contributing to a global community is self-promotion either for academic or professional recognition worldwide. Professionals are usually too busy in their productive,

creative work and do not bother to struggle for publicity or do not like to spend time and energy for popular presentations. Most of them are too shy for that but they need to be recognized and criticized for personal development. If a global community portal can create a sense of community despite its large size, it will be a novel and exciting experience for professionals or artists in their solitary commitment to their discipline.

On the other hand, all professionals or artists like their works to be discovered, recognized, and appreciated by critics. If they are nominated for a global community and invited to submit their portfolio, it will be a honorary development to be included in a global database. This will definitely be a win-win situation rather than pure benevolence. This is also true for contributions to theoretical issues and essays that discuss submitted works because all of these efforts can create an international reputation or a wider appraisal for those who are already recognized in their relatively smaller circles.

Professionals or artists are also eager to criticize different approaches that may appear as an insult to their craft. This might cause heavy disputes and even flaming but all kinds of controversy will actually be useful for inciting further contributions.

Cheng (2005b) proposed a motivational strategy that might also encourage members' posting, reviewing, and rating activities. "The basic idea is to introduce a set of hierarchical memberships into the online community and assign different memberships to the users depending on their levels of participation in the system. Higher memberships are associated with certain rewards: higher visibility in the community, more power, or better quality of service. The underlying hypothesis is that such rewards would motivate users to actively participate and contribute to the community." The suggested mechanisms for citing and highlighting remarkable submissions at a Portal is based on the same line of reasoning, and can further be developed as an incentive for more sensitive nominations and ratings by the members.

A community portal should try to organize user contributions by assigning various levels of editorial roles to all visitors. Thus it is also essential to analyze the behaviour of ordinary users. Tamura, et al. (2003: 1015) have classified the users by the strength of their commitment to List-servers and suggested to restructure community space taking potential users as well as actual users into consideration. They differentiated between:

"Lead Users who lead the communities and play vital roles by providing information and by organizing such information,

Silent Users who regularly collect information in particular online communities and utilize such information for developing their own knowledge, but they rarely provide information

Bargain hunters who frequently use the internet but access online communities only when they need information in there. They are not accustomed to observing any particular community and rarely provide information." Tamura, et al. 2003:1015)

In all online communities the majority of visitors is and will always be the free riders or lurkers. This pattern in general is ultimately a social phenomenon that we inherit from the mass media of the twentieth century.

"However, not everyone free rides. Many experiments have shown that people contribute to public goods under some conditions. In other words, people sometimes do not maximize their own individual utility. Economists have responded by modeling factors in addition to the value and cost of a contribution. For example,

- Reciprocity: people make or withhold contributions to others based on how others treat them (Rabin 1993).

- Inequality aversion: people adjust their effort based on their perception of what others contribute on average.

- Increasing social welfare: people sometimes make decisions that increase the welfare of all, especially those who are worse off.

This line of research holds promise for building member-maintained communities." (Cosley, 2005a)

"One key insight from the collective effort model is that people will be more likely to contribute to a group task if they think their contribution does not duplicate what others can provide and is thus needed for accomplishing the group's goal. Many online communities provide feedback on the number or assessed quality of their contributions, like the "top reviewer" designations given to some contributors on the www.epinions.com website. However, we know of no online community that provides feedback to contributors about the uniqueness of their contributions. Similarly, the key insight from Locke's theory of goal-setting is that people work hard to achieve specific, challenging goals, but online communities rarely provide potential contributors with specific, challenging goals to reach" (Beenen, et al, 2004)

In a global community portal, the various tasks that are classically assigned to moderators in forums, will be performed by the administrators but also editors should be encouraged to share the excessive load of care-taking and safeguarding. "Having rules is fine but how should they be enforced? There is no point making rules if they are not enforced. Moderators perform one of the best known roles in online communities, but the extent of their roles may not be so well known. Moderators performed many different tasks including:

- Facilitating so that the group is kept focused and 'on-topic'.

- Managing the list, e.g. archiving, deleting and adding subscribers.

- Filtering messages and deciding which ones to post. Typically this involves removing flames, libelous posts, spam, inappropriate or distracting jokes and generally keeping the ratio of relevant messages high, which is often described as the 'signal/noise ratio.

- Being the expert, which involves answering frequently asked questions (FAQs) or directing people to online FAQs, and understanding the topics of discussion

- Editing text, digests or formatting messages.

- Promoter of questions which generate discussion.

- Marketing the list to others so that they join, which generally involves providing information about it.

- Helping people with general needs.

- Being a fireman by ensuring that flaming and ad hominem attacks are done off-line." (Preece and Maloney-Krichmar, 2003)

The work of Leuchter, et al. (2003: 960) supports many of the ideas that we try to advocate in our aproach. They proposed a novel framework for online communities, which could facilitate silent users, who have long been regarded as non-contributors to the conventional online communities, to turn into active information providers: "Special effort has to be made to motivate users to act as content producers. Online community building is addressed by social functions: registered users may adopt moderator roles; by design: rating is especially easy to fulfil and is graphically emphasized; by technical functions: an interface proxy permits for easy incorporation of new external web information into the catalogue; by organization: privacy and security are important factors that we paid special attention to."

The activity of free riders or lurkers, the time spent or the links clicked by non-contributing visitors is actually a measure of the usefulness or infotainment value for a knowledge-sharing website. If we succeed in inciting them to rating -and also commenting eventually- they will constitute an essential part for the functioning of the website and the existence of the community.

"The community success relies on activity of its users. They only engage if they gain a benefit. Their avail is the content offered by other users so they have to accept it and thus have to trust the content. Quality assurance is central because every registered user is allowed to place new information in public readable sections of the portal." (Leuchter, et al. 2003: 960)

In an experiment with controlled groups, Fontaine and Millen (2004) tested the "change in time spent" depending on intensity of use: "active members showed significantly more improvement then their less active counterparts. One interpretation of these results is that increased interaction and coordination time is the voluntary price that active members pay for the benefits of decreased information searching and processing time." These findings support our expectation that experienced members can be more effective in fulfilling editorial functions than more lazy Associated Editors.

Results & Next Steps (The Follow-Up)

An online community initiative is an open ended project that will not end but only start after launching the website. If it is cultivated on an original concept fertile and versatile enough it has a chance to evolve into an adaptive organism capable of taking into consideration the feedback from experimental action. This is why the Beta phase after launching the web portal should be regarded as very critical for the future success of an online community. Evaluation / criticism / advise / reflexive and reactive adaptation constitute a process that an online community initiative has to be prepared or even program beforehand.

- Response to initial invitations will be critical to measure the reaction of the international community to the project at large.

- The traffic after the targeted announcements, the trend in the number of registrations, contributions, uploads; views and comments will demonstrate the relevance of the scenarios underlying the design of the portal.

- The number of uploaded and linked articles as well as issue pages created by editing members will provide a measure for the credibility of the team and the effectiveness of initial statements.

- Analyzing the number of hits following various types of announcements and mailings will be instructive for their relative effectiveness.

Since the content is expected to be developed by the On-line Community the basic routes expected to function seamlessly and need to be observed are that:

- Preliminarily provided links are edited by related contact persons following invitation mails.

- Each visitor can easily upload content into the database (Easy registration - list of categories / keywords to select from)

- New entries are continuously tracked, evaluated (ranked / criticized) by an international group of committed editors.

- Recent citations are so interesting that they incite all visitors to engage in rating.

- Many articles are uploaded by invited scholars and viewed, read or downloaded by most of the visitors.

Stürmer (2005: 106-108) provides a very useful and extended table concerning the "promotion of community building" based on eight interviews with committed representatives of successful open source projects.

COLLABORATION WITH THEMATIC BLOGS

Thematic weblogs created and maintained by enthusiasts and amateurs in every field of study provide invaluable resources for news and tidbits. The problem is that they are too many and scattered in cyberspace. Global community portals that organize selected annotated links to their updated content can act as useful reference points for surfers looking for fresh content in a specific field.

If we again return to our specific case for an example, literally thousands of personal blogs can be found that are rich resources about local news and issues related to architecture. *Technorati Blog* Search Engine reports 847 Architecture blogs. *Google Blog* Search Engine reports 59,425 blogs that contain both the words "architecture" and "architect", 200 of them posted in the last week. A successfully global portal can collaborate with these blogs and ask them to announce interesting postings at their site as links at the portal to reach a wider audience. They can also be invited to place a Special Counter to their Blog page that will display how many times their blog has been mentioned by a popular portal.

Blogs are islands that are not interlinked. Our suggestion to organize them in a central portal through editorial intervention is a further step but "Ontologies and Semantic Web technologies offer an upgrade path to providing more complex services. Fusing information and inferring links between the various applications and types of information provides relevant insights that make the available information on the Internet more valuable." (Breslin, et al. 2005) Compiling RSS feed from carefully selected sites at thematic blogs was the primal form of automated semantic interlinking.

"Today the problem of semantic interoperability in information search on the Internet is solved mostly by means of centralization, both at a system and at a logical level. This approach has been successful to a certain extent. Peer-to-peer systems as a new brand of system architectures indicate that the principle of decentralization might offer new solutions to many problems that scale well to very large numbers of users. The peer-to-peer system architectures can be applied to tackle the problem of semantic interoperability in the large, driven in a bottom-up manner by the participating peers. Such a system can readily be used to study semantic interoperability as a global scale phenomenon taking place in a social network of information sharing peers." (Aberer, et al, 2004) But to exorcize this kind of networking we have to wait for the ripening of a further generation of Web applications.

COLLABORATION FOR IMPROVING THE PORTAL

The interactive architecture of a global portal can also be developed in collaboration with dedicated members who have the required skills and expertise as it is a usual practice in the development of Open Source Software: "The new developers can learn their skills and work practice by developing code that extends the system's functionality but does not interfere with its core functionality. Gradually, the novices can then earn a reputation as reliable developers, and become masters and gurus in the project communities. This process of social integration and skills development is closely related to the architecture of the technical system that is being developed." (Tuomi, 2005: 437, quoted in Bacon and Dillon, 2005)

Ontologies that are initially developed for the different parts of the portal can also be improved with the intervention of members. This can be very useful to construct a flexible ontology for the Theory and Issues Pages discussed above. Zhdanova (2006) in her Doctoral Dissertation developed "an approach to ontology construction and its application to community portals" (See also Zhdanova and Shvaiko, 2006)

Real Cases (As it has Happened)

Since the background for this study is constituted by the design of an architectural portal in particular, all the following cases are chosen from the same area of focus to compare their respective approaches and performances.

World Architecture Community (http://www.worldarchitecture.org)

The basic concept underlying The World Architecture (WA) Community Web Portal is to create an "Online Showcase of World Architectures." WA provides an opportunity for all architects to present their work globally. Projects that are highlighted through ratings draw the attention of the Associated Editors who are expected to write comments that stimulate further discussion on these projects.

WA expects to collaborate from the start with 150+ Associate Editors from all countries of the world and 150+ famous architects representing the international intelligentsia of architecture. Professional and educational institutions and grassroots organizations (3000 in total) already selected from each country and linked in the open directory will similarly be invited to contribute to the growth and development of this initiative.

WA will also provide a practical guide into theoretical resources online for researchers and students of architecture who feel perplexed in the growing body of globally available information. This is especially felt in issues related to architecture that reflect an enthusiasm for most diverse disciplines like philosophy and cultural studies.

ArchitectureWeek (http://www.architectureweek.com/media_kit.html)

is the leading architecture magazine online, covering new buildings worldwide and a spectrum of design, technical, and cultural issues, with 350,000 monthly unique visitors, plus a weekly email newsletter subscriber-ship of 100,000 and growing. This publication is completely designed as the online version of a printed magazine following the genre of professional magazines in the mass media notion without interactive features.

Emporis Buildings (http://www.emporis.com)

is the world's largest publicly available database on architectural and building data. The site is maintained by Emporis, a multinational real estate research company, and is designed as an open platform. It has succeeded to build an enthusiastic international community, but formerly being "skyscrapers.com" it focuses mainly on the construction sector as an international business area without any reference to theoretical, aesthetic, or academic issues.

Usage Statistics

Month	Pageviews	Unique	First Time Visitors
November 2005	11,513,909	1,168,948	1,067,291
December 2005	11,157,841	1,165,738	1,050,927
January 2006	12,127,563	1,365,648	1,225,556
February 2006	10,399,716	1,309,729	1,172,231
March 2006	14,234,567	1,972,433	1,763,674
April 2006	14,321,595	1,921,334	1,708,427

Arch Net (http://archnet.org/lobby.tcl)

ArchNet is an international Online community developed at the MIT School of Architecture and Planning and the University of Texas at Austin, School of Architecture, in close cooperation

with, and with the full support of The Aga Khan Trust for Culture, an agency of the Aga Khan Development Network. ArchNet is a growing global community of scholars, students, and professionals concerned with architecture, planning, and landscape design. (Images 47599; Publications & Files 3780; Members 38123)

Since its inception in 1977, the Aga Khan Awards for Architecture has been very influential in extending the established horizons of what we conceive as "architecture".

Primarily, it provided a context for architectural endeavors from the contemporary Muslim world to be recognized, evaluated, criticized and promoted as bearers of the universal qualities of architecture: being a prestigious institutional effort, the awards put an end to their exclusion. The program also initiated a major paradigm shift in architecture by awarding environmental upgrading projects or similar socially engaged efforts side-by-side with conventionally modernist performances.

The ArchNet website seems to extend the mission of the Awards to the Internet medium. The goal was to create an Internet community mutually sharing expertise, local experience, resources, and dialogue.

An important obstruction hindering the universalistic mission of the website seems to be its association with Islam, a major drawback especially in the present course of international affairs. If the international media excludes most of the world, the Aga Khan Awards had been excluding non-Muslims. Since it lacks an explicitly stated keynote discourse it is easily perceived as just another context of cultural studies in the established center/periphery pattern. Its geographical location at the MIT might be a last clue of this asymmetry, the project submits to the elitism of the Western academic outlook as reflected in many details. On the website, the detached tone of discourse and dialogue; the formalism pervading design, content and structure; the many procedures required to get involved; the perfectionist attitude in the selection and presentation of projects: all of them are details that would repel or shy away the participation of the not experienced, non-academic voices, instead of infecting excitement.

Tips & Tricks (To-Do)

ONLINE COMMUNITY GOVERNANCE CRITERIA

The main principles that should guide the design and management of a community portal:

þ Proactive
- provoke ambition & competition
- stimulate response
- encourage criticism & objection

þ Interactive
- provide for variable configurations
- respond to all reactions
- reward all contributions
- (by privileges and gifts)

þ Reactive
- improve usability
- consider all user expectations
- develop new innovative features

HELP FOR NEWCOMERS

Lampe, and Johnston (2005) examined three explanations for how new users learn to participate in a digital community: learning transfer from previous experiences, observation of other members, and feedback from other members. They find that new user behavior is affected by a combination of their viewing behavior, the moderation feedback they receive, and replies to their comments. Hence it advisable to invent and implement a liaison service organizing volunteer members to guide newcomers eager to communicate.

OCCASIONAL JAM SESSIONS

A global community portal can also organize a JAM event during a special date relevant to its theme and content. The Habitat JAM <http://www.habitatjam.com> can provide an exciting example: During December 1-3, 2005, the Habitat JAM gathered the inputs of thousands to turn ideas into actions for the Vancouver World Urban Forum agenda and influence the Forum's content.

On December 3, 2005 there were JAMMERs registered from all 191 UN-member countries. With a total of 459,402 page hits, the most popular forums were: Forum 1 ("Slums"), which remained in the lead with 2,842 posts. Forum 4 ("Environment") and Forum 7 ("The Future") continued to battle for the second spot. Forum 4 remained in second place with 2,710 posts and Forum 7 came in at 2,562 posts.

The most active countries in this reporting period were Canada, the United States, India, Kenya(!) and the United Kingdom.

The Habitat JAM was about adding your ideas into the global conversation about the future of our cities. It was about having your say on important issues that affect you. It is about building new global networks of people who would not have connected before.

Potholes (Not-to-Do)

We articulated the following points in another paper where we discuss "the editorial function" at Community Portals in detail (Aydin and Budak, 2007):

Ý Many features in Web 2.0 Portals still bear the potential of imposing the content to be contributed. The editor in online communities should only watch for the main theme to be followed, encourage alternative approaches, and highlight all new ideas. This requires "a new approach for understanding and applying effective leadership principles to large groups by leading from behind." (Storck and Storck, 2004: 243)

Ý Erickson (2005) draws our attention to an important point when he shifts "the focus from interactions between a human and a computer, to interactions amongst people that are mediated by a digital system." We should never let our mind forget that a community of real people requires delicate tactics when compared to the strategic decisions characteristic for interface design or system architecture.

Ý In a collective production process, famous "names" may become unexpectedly disastrous to the advent of uninhibited creativity. As being already established, "names" not only represent but also constitute the authority. Fame, like any indexing, easily distorts objective perception and causes the overestimation of any dull or diverting performance. This kind of misleading is often witnessed in the forking treads of discussion groups. Editors or older members of a group, well familiar with the sphere of issues around which the discussion rotates, may characteristically ignore the novel dimension in the elaborate message of a newcomer and divert the discussion to the good old and established issues.

Acknowledgements

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Social Software Tools for Personal Knowledge Management

Swaran Sandhu

Social Software Tools for Personal Knowledge Management

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Snapshot (Quick Learning)

Social Software Tools like Weblogs, Wikis and RSS are revolutionizing the way ICT can support knowledge management processes. Although ICT support is a regular feature for knowledge management processes the ease of use and implementation of social software tools – many open source out-of-the-box solutions are available – is the biggest advantage.

The use of social software tools is especially beneficial for distributed working groups but also for personal knowledge management. For this article I am focussing on the internal organizational usage of social software tools. Social software is a generic term to describe easy-to-use software tools that encourage the sharing of knowledge. These tools usually consist of Weblogs, Wikis and a Tagging service, often combined into one application. Additional integration of multimedia tools is widespread. Because of the over- and misuse of e-mail applications, these new technologies offer a road to a more holistic approach to sharing knowledge. The toolset is usually based on open-source technology can be easily implemented.

The benefits and impacts of the tools are covering most aspects of social software applications.

- Extremely easy implementation and usage
- Explosive learning curve
- Expandable with plug-ins and new tools.

Keywords: Social Software, Weblogs, Wikis, RSS, Tagging

Context (Where & What)

Some of the worlds largest companies like IBM or Microsoft are successfully employing social software toolkits, especially Weblogs, for their employees. One of the challenges of modern organizations is to utilize the knowledge of their employees. By delegating the process directly to the employees (bottom-up approach) knowledge can be activated and published. Some call this collaborative approach "Enterprise 2.0" (McAfee 2006).

Employing social software tools is a chance for every knowledge intensive industry that already has a computer network installed. There needs to be some backing by the computer department to install the basic packages if the tools are being used internally only. However, many applications can be streamlined for Intranet usage quite easily.

The best start for a roll-out is a rather small project team as a seeding bed for the technology. After an initial phase the technology can be made available for the whole organization. One of the most interesting aspects is that the technology is totally scalable; this means that the number of participants does not matter, since each participant can subscribe individually to the most interesting feeds and therefore reducing information overload.

Preparation (The Checklist)
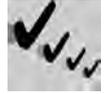
Most social software tools are readily available on the Internet as open-source software. Most software is hosted for free and can integrated into a personal knowledge network.

However, from an organizational point of view it makes sense to host those applications directly on an organizational platform. Most applications rely on readily available software packages like Apache (www.apache.org) for hosting purposes: MySQL (www.mysql.org) as a database and PHP (www.php.net/) as programming language. The IT department should be helpful for installation services.

Most applications like Wordpress (Weblogs, www.wordpress.org) or Mediawiki (http://sourceforge.net/projects/wikipedia) can run on standard servers with minor tweaks. Please ask your IT department for their specific usage scenarios.

For personal usage it is possible to install all software mentioned above on a personal PC or rely on readily available online solutions.

Toolkit (The Essentials)

Almost any organization with a computer network and Internet access can harness the power of social software tools. It is important to keep in mind that the systems you are choosing fits into the IT landscape of your organization. Most organizations rely on a strong server backbone with a strong open source platform. Make sure the necessary software is up and running before starting a rollout. The tools should be scalable and can be easily integrated into already existing Intranet solutions. Some specific knowledge management platforms do already offer the same functionality.

Basically Social Software tools consist of various components. The most common and best-known are Weblogs and Wikis.

Weblogs are instantly publishable websites that are continuously updated with a strong personal touch. The noun "Weblog" is a combination to "World Wide Web" and "Logbook". A person running a weblog is called a "blogger" and the process of updating a Weblog or writing for a Weblog is called "blogging". Weblogs are based on simple content management systems and are very easy to use and to implement. Since 2000 Weblogs are widely discussed in both practice and academia. Typical first usages were online diaries capturing snapshots of ideas, so a kind of personal knowledge management tool. However, others were able to read and comment on the entries and this made Weblogs so powerful. From a technical point of view Weblogs are very easy to implement and are lightweight content management systems. Having reached a more mature stage, Weblogs have become a multimedia tool, incorporating text, images, video and audio elements on every topic possible. This makes Weblogs perfect repositories for storing and sharing knowledge more easily.

Screenshot: Writing a Weblog (http://codex.wordpress.org/Image:write1.png)

Screenshot: Weblog at IBM (http://www-03.ibm.com/developerworks/blogs/page/Turbo)

Tagging

Each entry can be attributed a certain "tag". A "tag" describes the category the content belongs to. **Tagging** is the practice of assigning "tags" to content. The whole process is described as folksonomy as opposed to taxonomy. Taxonomy is the process how experts describe for example vertebrates and invertebrates and use a certain set of rules. So the experts define what belongs to a group and what not. In folksonomies ordinary people (folks) express their own categorization scheme. Therefore this bottom-up approach represents a new way on how knowledge is being represented without a large scale taxonomy or keywording process involved. All tags of one site combined can be visualized in a "tag cloud": the words of the tags are scaled in size proportionally to their usage on the site. This is a very easy way to map and illustrate complex knowledge. The best-known tagging service is called "del.ici.ous" (http://del.icio.us).

Screenshot: Tagcloud (http://www.jeffhester.net/photos/tagcloud.png)

Wikis are well-known by collaborative knowledge processes like the wikipedia. Basically wikis can be used in any open-ended knowledge structuring process. The word "Wiki" is Hawaian, means "fast" and describes a small shuttle that connects the islands. A wiki is a simple website that consists of various articles. As soon as an article contains a similar word the articles can be linked. Wikis use a specific syntax that is very easy to learn and very fast to implement. The most important aspect is however that every article can be edited by every participant. This means as soon as somebody can add his or her specific knowledge to a certain topic he or she can edit the site. All changes are being tracked. The concept relies on the benevolence of people working together in a certain setting. Destructive behaviour is very seldom and usually the rapid growth of wikis and their benefits outweigh potential dangers. However, the larger the project becomes the more important it is to secure the overall quality of the wiki.

Screenshot: Wiki
(http://ws2006.wikisym.org/space/Keynote%3e%3eHow+and+Why+Wikipedia+Works)

Finally, **RSS** is the abbreviation of Rich Site Summary or Really Simple Syndication (sources vary) but is a very simple subscription service to a certain website. This means by subscribing to a certain "feed" (this is how those services are called) we are moving away from the paradigm of "pulling" information to "pushing" the information to the user. In a very simple way this means that the raw content of the site can easily be customized to the specific needs of the audience. This method is extremely time-saving, because specifically the content you are interested in becomes delivered to you without the need to visit websites or wikis. The subscriptions are managed in a so-called "feed-reader", that is a little program – very much like any e-mail program that manages subscriptions and allows you to read the content. Modern E-Mail applications offer plug-ins for e.g. Microsoft Outlook to have a feed-reader installed right next to your E-mail. Most modern content management systems include RSS feeds already in their custom package.

Screenshot: RSS Reader (http://www.zdnet.de/i/et/sw/2006/05/office_2007/ms_office_2007_46-ig.jpg)
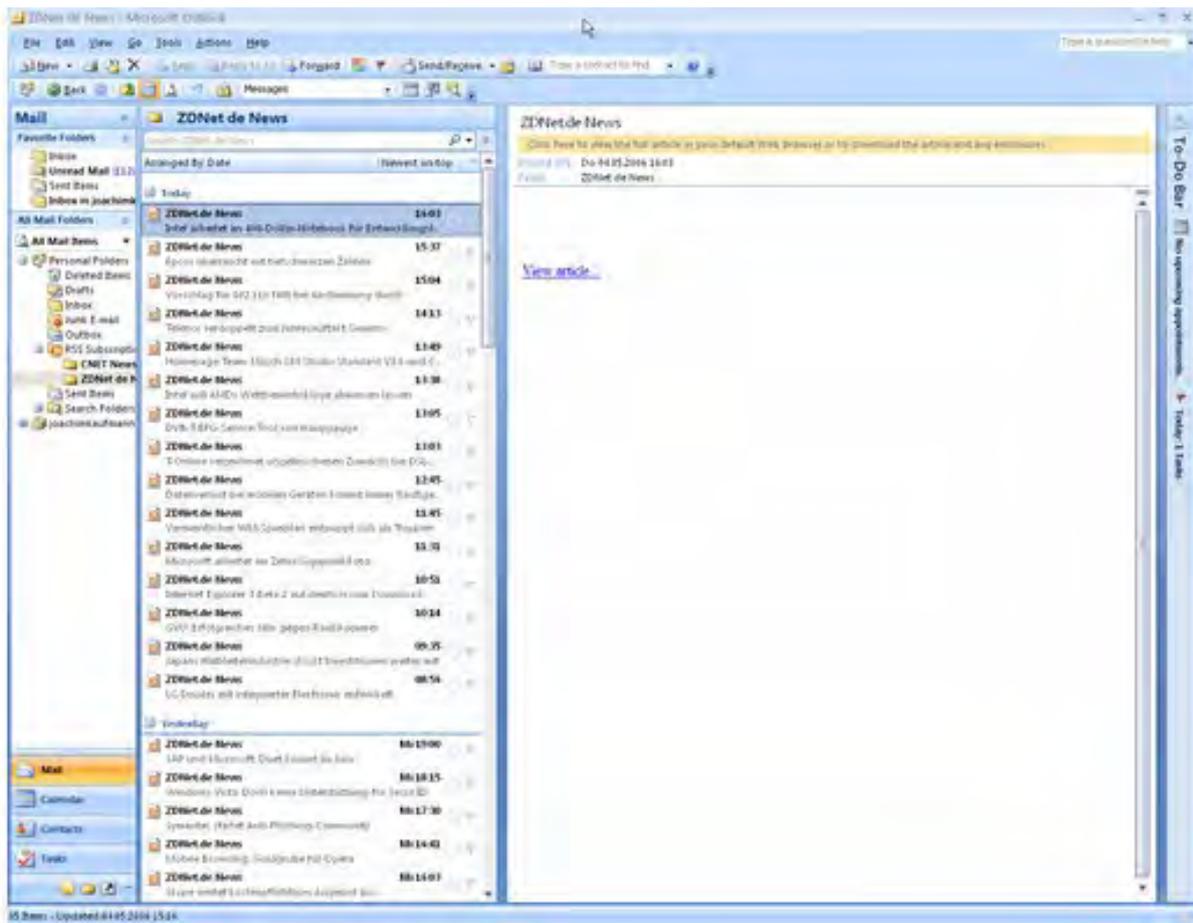
These tools individually or in combination allow an increased knowledge sharing without big technological hurdles. Most importantly they are very easy to implement. Additionally, there are some options to use these tools without any programming knowledge at all, because the basic tools like Weblogs and Wikis or Feedreaders are hosted by professional companies. That means you can create an account and use the service without further costs.

Making it Happen (The Approach & the Action)

There are several case studies on the implementation of social software tools in knowledge-intensive organizations. Most of them are based on anecdotal evidence. Obviously organizational culture is a key determinant for the success of the initiative.

Usually the implementation of social software tools starts with a small group. It is helpful to have top management support but also department or project group are good starting points. It is also beneficial to have the backing by the IT department and a tech-savvy person in the starting group. Otherwise it is also possible to use standard hosted software solutions with any tools described above – this approach however should be chosen only if you are dealing with non-sensitive data.

First of all it is important to motivate the seeding group. New technology is only as good as those persons working with it. It might be helpful to try to come up with a mission statement for the group and the technology that is being used. Secondly, leave enough leeway for experimentation.

If you have one or two drivers in the group who are selfstarters and push the project forward the benefits are easy to see.

After an initial introduction phase review the usage or the technology. What worked and did not work? What where the reasons for that? Best would be to form a small focus group of users and gauge their experiences with the systems.

As soon as you have a grasp of the potential of the system make your case for a next-level roll-out of the technology in your organization. Try to secure the support from the upper echelons and present some of the key facts and results in top management speak, e.g. hard numbers like: number of published articles, number of blogs, personal stories by participants, cut costs, etc.

Results & Next Steps (The Follow-Up)

Social software tools have the potential to turn an organization upside-down if fully accepted. But that also means that hierarchies might feel endangered and threatened. Try to show the benefits of the tools however. If the organizational culture stresses knowledge creation and sharing the tools will be accepted as well.

Make sure to evaluate the processes as you go along. Which tool works best? Why? Try to get satisfied users to tell their story with their experiences.

Real Cases (As it has Happened)

Case 1) Using social software tools in investment banking

Professor Andrew McAfee (2006) describes how the introduction of Social Software Tools changes the way the investment bank Dresdner Kleinwort Wasserstein (DKW) manages knowledge.

First of all, DKW has had already a reflective and adaptive culture with a strong commitment by its workforce towards the company. E.g. the CIO of the company remarks "I am not sure if wikis would work in a company that did not already do 360-degree performance reviews."

Second, the DKW team chose a common platform that integrated all aspects of collaboration mentioned above. Specific groups can have their own private space within the architecture, but basically everything I connected with each other.

The rollout of the new technology was informal and gradual, focussing on a few groups and individuals as catalysts for the whole organization.

Top managers did support the initiative. E.g. one of the managing directors, Darren Lennard, became an advocate of the technology when he saw a live demonstration of the Wiki: "I was getting 300 internal e-mail messages a day. The great majority of them were completely irrelevant to me, but I still spent hours each day going through them. I saw that Wikis were a better tool for a lot of our collaborative work, and I wanted my team to start using them." He put on a wiki with a mission statement and told his desk (specialized traders) that he will not read e-mails on a certain topic anymore.

Case 2) Introduction of Weblogs and Wikis at the Central Intelligence Agency

Calvin Andrus is the Chief Technology Officer of the Center for Mission Innovation at the Central Intelligence Agency and has introduced Weblogs and Wikis at the CIA.

The analysts business is information driven. But because of the rapid changes in computer and telecommunication real-time information sharing and knowledge building is important. The success of Weblogs and Wikis and their fast reaction time after events like 9/11, the Tsunami from Christmas 2004 or the London Bombings from 2005 motivated Andrus to implement the collaborative tools from the outside world *inside* the CIA. So the intelligence community must be able "to change rapidly in ways we cannot predict" (Andrus 2006). Most importantly for him is the fact that Weblogs and Wikis can working almost in real-time and "can adapt as fast as person can enter information".

The CIA created around 500 weblogs as testbed and a few-dozen remain actively maintained. But the internal wiki produced around 10.000 pages within a year. It is mostly used for note-taking, floating ideas, drafting papers and finishing pieces.

Technology can only be an enabler, culture is the main solution to sharing information.

Tips & Tricks (To-Do)

- ☑ Check IT-Governance
- ☑ Start with a small, interested group
- ☑ Create a sandbox, e.g. a place to try out things
- ☑ Concentrate on content, not technology
- ☑ Make sure the technology is easy to understand

Potholes (Not-to-Do)

- ☒ Talk only to the tech-savvy "geeks"
- ☒ Try to steer the process from top-down
- ☒ Bring in too many rules

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Finding the Fire between the Nodes: Contactivity Events

Ron Dvir, Ed Mitchell and Abdul Samad (Sami) Kazi
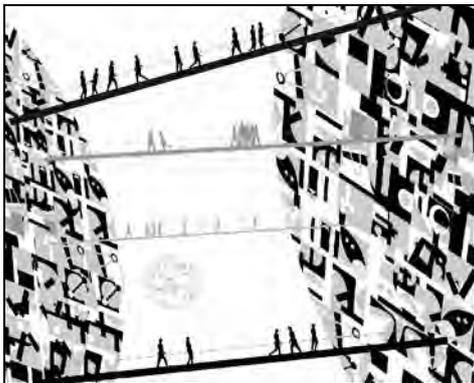
Finding the Fire between the Nodes: Contactivity Events

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Snapshot (Quick Learning)

In this chapter, we present a collaborative and constructivist alternative to the traditional conference model – which is based on many short broadcasted presentations, supported by PowerPoint slides with some informal networking eeked out in the corridors by the attendees, somehow rushed and guiltily. Does that sound familiar?

Our alternative method, which we call "Fringe" or "Contactivity" events can, and is being applied in many situations: e.g. a track in a large standard international conference, a method to organise a gathering for a Community of Practice, or a refreshing approach to internal company events looking to invent something, enhance connection, develop new, bottom up strategies.

The creative objective is presented in our Contactivity poster: these events nurture new connections between people, but also between concepts, disciplines and ideas. The fire of inspiration is the most important part of any gathering and that can only be found in the network. Therefore the network must be nurtured first and foremost; this method involves not only physical meetings – we suggest online pre and post event interactions, and will analyse those in this chapter.

We propose and continue to improve upon a process designed to co-plan with all stakeholders an event replete with a wide range of formal and informal interaction methods, colours, art, tastes, human moments – but also to dive deeply into rich content, theoretical and practical issues in real world contexts in such a way as to send participants home with not only solutions, but methods to solve future issues themselves; handing them the confidence and knowledge and network to improve their working and living lives.

The name "Fringe" implies that in such events the participants are expecting and invited to deal not only with mainstream subjects – but also (or perhaps mainly) with the emerging and controversial issues which relate to their professional world.

We believe that creating a welcoming and stimulating social and physical "Ecology for innovation" for the event space and time enables contactivity, deeper conversations and out of the box thinking. In this chapter we suggest how to create a JOY ZONE which is the prefect ground for fertile collaborations.

Keywords: contactivity, fringe event, wiki, joy zone, innovation ecology, networking, multi-domain facilitation

Context (Where & What)

The main goal of "Contactivity Events" is well manifested by the title of this method: to provide the environment and opportunities for meetings of minds, interaction and creation of new connections, knowledge, ideas and sometimes also joint initiatives which take these ideas into action.

The term "contactivity" was coined by Leif Edvinsson who explores various ways to enhance the intellectual capitals of organisations. We think that Contactivity event can enhance the intellectual capital of the group of participants, be it a Community of Practice, a group of employees from a specific organisation or any other loose of formal organisational form.

In some cases contactivity meetings are organized as "Fringe" events. This shows another objective of some of these events – to challenge the current mainstream thinking in a particular domain, to disrupt the existing concepts and explore emerging ones.

Thus, there are several good tangible and intangibles reasons to use the method:

1. New personal friendships as well as enhanced business/academic connections

2. Creation of tangible joint outcomes and initiatives – e.g. a layout for a new joint book of the community, a new joint research or business project.

3. Disruption of current thinking and creation of new concepts.

4. Prototyping new interaction methods.

5. Fun, joy, personal and group renewal, recharging the batteries of employees and teams.

The method can be used in many contexts, as an alternative to traditional conferences or internal company days:

❖ A contactivity track in the framework of a larger traditional conference (see the example of Amsterdam KM event, described in this chapter).

❖ An independent event of a Community of Practice specialising in a specific domain (see the example of Greenwich Contactivity event described in this chapter)

❖ An internal event (e.g. "company day") of a commercial or public organisation.

Preparation (The Checklist)

From our experience in organising several contactivity events, we are happy to report that the preparation phase is a creative and satisfactory period. The checklist is very long, therefore teamwork and responsibilities sharing is needed for this ambitious project.

The program

❖ Partner with some people you trust and value to collaborate with you on various aspects of the project.

❖ Define the specific theme of the event (avoid general theme like "Knowledge Management" – focus the event on specific dimensions or challenges or the general domain.

❖ Invite ideas for unique activities from the target participates group as well as from well known experts. Explore the expectations of the participants. Look at feedback reports from previous events – they are valuable!

❖ Set some design criteria, e.g.: "at least 60% of the sessions should be interactive", "at least 3 controversial issues should be dealt with", "at least two new facilitation methods should be prototyped".

❖ Based on the suggestions and the team imagination, create the program. Recruit facilitators for each session – most of them will be the people who suggested the session idea.

❖ Brand the event – copyright interesting title, visual representation (e.g. poster or logo).

Logistics

❖ Plan: accommodation, catering, registration process, accessories and supporting technologies, budget and fees.

The participants

❖ Publish an attractive invitation – it should clearly demonstrate the fringe-y and contactivity spirit of the event.

❖ In addition to the public invitation, invite personally particularly interesting participants.

❖ Involve the participants at the event planning – invite ideas for methods, suggestions for focus areas, material for the event web etc.

❖ Take active steps to ensure diversity – participants from different generations, cultures and disciplines will create more interesting event.

The Virtual Space

❖ Create a web space for the pre-event interactions between participants. It can be a wiki, discussion form or another virtual form (some event organisers are using Drupal). Provide continuous and active facilitation for the space, and ensure that activity in the virtual sphere is carried across to the physical meeting.

The Physical Space

❖ Explore the available space and its possibilities, unique features and constraints.

❖ Plan the event place –sitting configuration, decoration, the small things which will make the participants smile.

Prepare the accessories and art work according to the physical space plan.

Toolkit (The Essentials)

The following chart, based on a photo from the Amsterdam KM fringe event, provides a map for planning a contactivity event. It shows the four main dimensions of the event:

❖ The program – which should be rich, diverse, seriously interactive (examples follow). Focus on both stimulating methods and highly relevant content (big questions that matter). Try to include several sessions that generate concrete outcomes and follow-ups. A joint night activity is a must. Examples of methods that are used in contactivity events:

Open Space, Mapping the network and profiles of participants, Co-authoring of a book and journal paper, Simulation/Management games, Knowledge Café, Knowledge Safari, Art Safari. Always conclude with a "what are the next steps" session.

❖ The physical space – a rich, stimulating and colourful Joy Zone or Ecology for Innovation (Dvir et al., 2006).

❖ The virtual space – a pre and post event sessions, using technologies such as Wikis and Blogs. It would be interesting to use the technology to enlarge the circle of participants, and run some of the session during the event days also at the virtual space.

❖ And most importantly – the human dimension. Try to enhance diversity by inviting people from the three generations (very young, mature and seniors), professionals from different disciplines, diverse geographies different society sectors etc. Invite people that are already part of the community but also new comers.
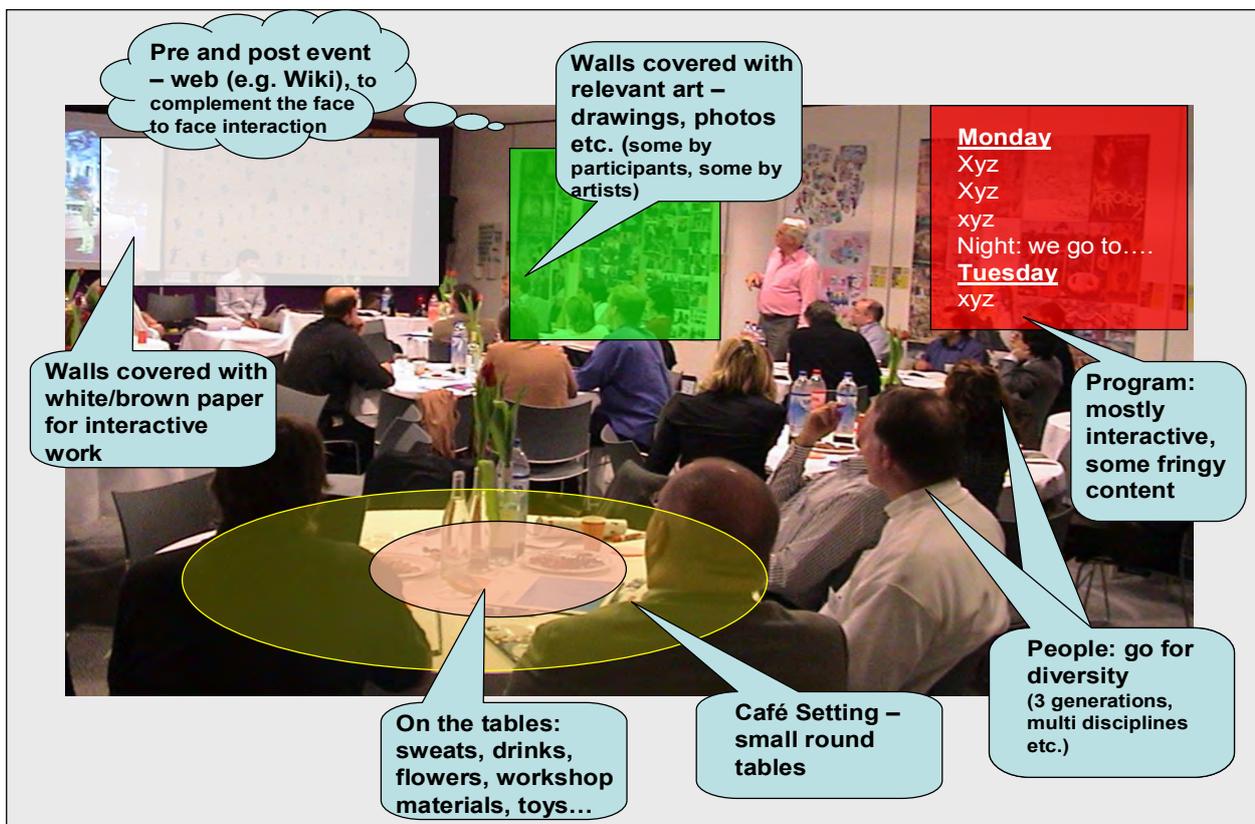
The two cases presented later in this chapter provide concrete examples of how these dimensions can be applied.

Making it Happen (The Approach & the Action)

The preparations phase and the physical and human setting of the contactivity events are described in the previous sections. Here we suggest a typical agenda for a contactivity event. You are invited to borrow ideas from it – but probably your own contactivity event will have a different agenda, length, style – based on the unique combination of the contextual and human aspects.

Pre-Event virtual activities (e.g. discussions at forums, wikis).

	Day 1	Day 2
09:00	No formal agenda	Workshop: e.g. co-authoring
	Human Encounters and introductions	Of a joint book, co– creation of
10:00	A facilitated session:	a new concept etc.
	Mapping the particpants profiles	
11:00	Drawing the community network map	Artistic Coffee break:
	Coffee networking session:	Co-creating an art gallery
12:00	exploring the community map, peer	1-2 Presentations by really
	and small group conversations	Interesting people
13:00	Lunch (e.g. picnic)	Lunch (e.g. brown bag lunch)
		with a local guest speaker
14:00	Workshop: e.g. knowledge café,	Next steps: exploring big
	Simulation game, etc.	question(s), identifying
15:00		opportunities for joint actions
		and kicking-off joint initiatives
16:00	Tea time	
	Guided tour:	Fair-well party – wine (or
17:00	Exploring the event area	champagne)+personal statements
	Attractions, stories etc.	
18:00	Free time	
	Or time for member-led groups	
19:00		
20:00	Social evening together, pub,	
	Dinner, pub, bowling etc.	
	Stop before midnight	

Post-Event virtual activities (e.g. reports, discussions at forums, wikis).

Results & Next Steps (The Follow-Up)
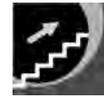
The outcomes of a contactivity event can be presented along a two dimensional continuum. The horizontal axis represents how much the outcomes are tangible. The vertical axis shows that while some of the outcomes relates to the individual participants, other applies the group of participants. We have seen all of these outcomes materialized in contactivity events.

```
Group
         New concepts                              Joint group
                                                   initiatives
   Sense of community                       Event
                                            documentation

                                                     Joint initiatives
                                                     (few members)
         New friendships          New collaborations

   New ideas
   Inspirations
Individuals                                  Learning
   Personal Renewal

         Intangible                                   Tangible
```
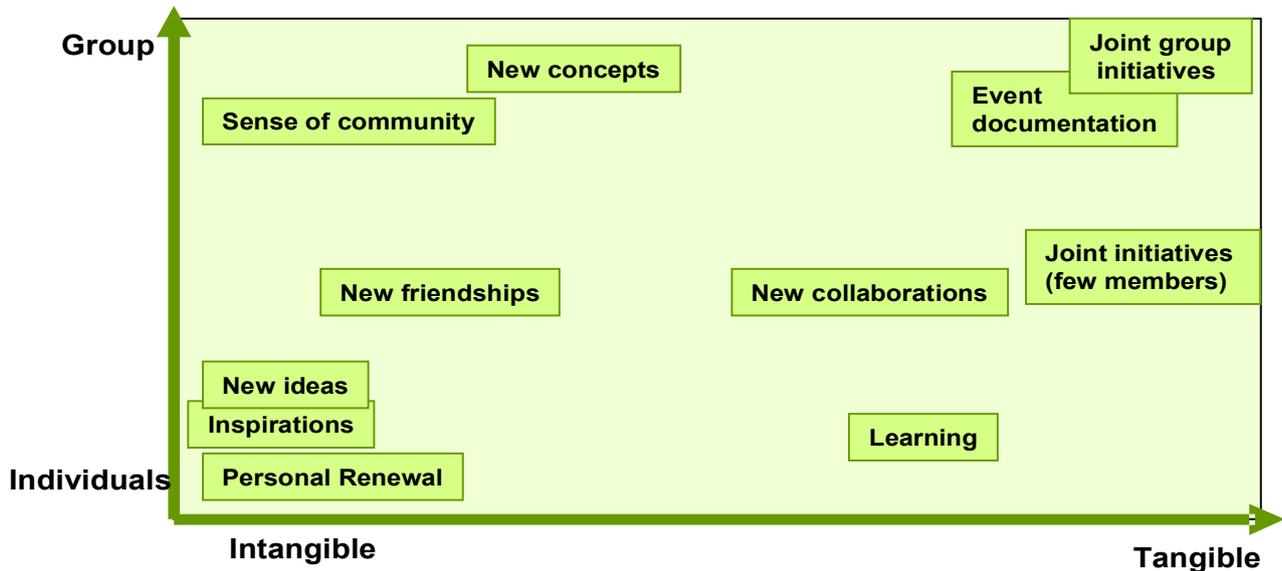
Using the theoretical model of intellectual capital (e.g. Edvinsson et al, 1998) a good contactivity event increases all four types of intangible capitals: the human capital of the participants, as well as the structural, renewal and the relationships capital of the group of participants – many times a Community of Practice.

The intangible outcomes listed above emerge naturally, as a result of the connections created between the participants during the sessions and at breaks and joint social evening activities. The diverse interaction methods as well as the stimulating environment catalyze their emergence. The more tangible outcomes such as joint research project or a joint book, are born at dedicated workshop (e.g. a "co-authoring" session) or at the final session of the event. This session is typically dedicated to an after action review and to a brainstorming about possible joint actions of the participants.

Other tangible results which document the experiences and knowledge created at the event are typically dependent on the commitment of individuals who agree to carry them forward at the weeks after the event. These might be a detailed event report, summary of new concepts, networking map or an electronic album of the event photos, for example.

Electronic event photo album (on flickr.com)	Electronic network map

Real Cases (As it has Happened)

Case I: The Knowledge Management *Fringe* Track, Amsterdam 2005

The annual central European Knowledge Management conference took place in November 2005 at Amsterdam. Hundreds of participants were exposed to the normal conferencing style – a large formal exhibition from which three doors led to three parallel tracks. Choosing the first and second would have take you to a large lecture room where you would meet perhaps 100 black suits professionals listening to 20 minutes PowerPoint presentations. However, the curious people who opened the third door entered a completely different world – full of colours, music, strange actions and intensive interaction, art and yes – also serious KM related content.

Six months earlier, when KnowledgeBoard was invited by Ark group to organize a track at the conference, we had only one condition – "we want to run it as a Fringe event. Nothing will resemble the normal way". A small group started to plan the event – involving at certain phases to potential participants, using the KnowledgeBoard website as a communication platform.

What was fringy?

Firstly, the event stage. we created for two days what we call "an ecology for innovation", i.e. designed the physical space as the most welcoming, warm, sensual and thought provoking as possible. It was in complete contrast to the traditional conference world outside the door. We thought that art would have interesting impact, and created the first Knowledge Management art gallery in the world, composing of some 150 relevant art works from the last 2,000 years, presented on 18 large posters. Some worked were created by artists like Dali, Rafael and Leonardo, others contributed by the participants responding to the "call of your KM art works" led from the website.

The following table shows some of the artefacts we used:

Preparing the KM Art gallery	**Preparing the KM Art gallery**	**Tulips on each table**
The third door – which led to the fringe world (left side – the visual agenda)	**A general view of the space**	**Tables covered with candies, drinks, cookies, workshop accessories**

Secondly, the program & methods: We designed a program which includes only one frontal presentation – leaving 90% of the available time for interactive sessions – each used a different method. We had some unplanned surprises. For example, a colleague from London Knowledge Network saw the big yellow Contactivity map and spontaneously created a statistical experience around it.

The agenda, like many other aspects of the event, tool a visual form as well (see figure).

The table below demonstrates some human moments at some of these sessions:

A workshop on outsourcing	**Building together the community network map**	**Knowledge Safari at the art gallery**
A simulation game	**An electronic version of the community network**	**Final session – discussing follow-ups and drinking Champagne.**

Thirdly, the content: At the pre-event online communication, we invited the participants to suggest the most controversial issues related to Knowledge Management. All of the workshops were from members' suggestions - we the organisers let them decide on what to talk about.

After the fringe event

Judging by the feedback from the participants as documented in the feedback forms, as well as by looking at their faces at the event photo album, show that they felt like "Alice at wonderland".

It became evident that the KM world need more – and six months afterwards the next KM fringe was organized, this time in Greenwich (see next case in this chapter). Indeed, the impact was strong enough to create a trend, and now the third contactivity event is planned in Tel Aviv (November 2006) and a fourth one in Luzern (UnBla conference, January 2006).

We know of new partnerships and friendships that were created, and assume that some joint initiatives were kicked off. And finally, at the co-authoring workshop, the group took the first steps towards a joint KM book (Real-Life Knowledge Management: Lessons from the Field). [Full event report: www.knowledgeboard.com/item/216]

Case II: The KnowledgeBoard *Contactivity* Event, Greenwich 2006

Contactivity was an experimental conference at The University of Greenwich Business School in March 2006. It was run by KnowledgeBoard and supported by Martyn Laycock, Jack Martin Leith, David Gurteen and The London Knowledge Network. There was neither an agenda, nor a theme. It was an exploration into the concept of multi-domain facilitation for community development, knowledge transformation, and trust building. We were also keen to learn how to use wikis and encouraged all potential attendees to take this attitude as well; a secondary learning opportunity.

It was designed around a multi-domain facilitation model created to explore how to best share knowledge between distributed groups. By considering a meeting as a process in three stages, and working with a multi-domain attitude, it is clear that we can optimise the knowledge-sharing opportunities afforded to us in the physical domain (which is the most expensive bit) by assessing the meeting's requirements in advance and applying a suitable social architecture from the beginning:
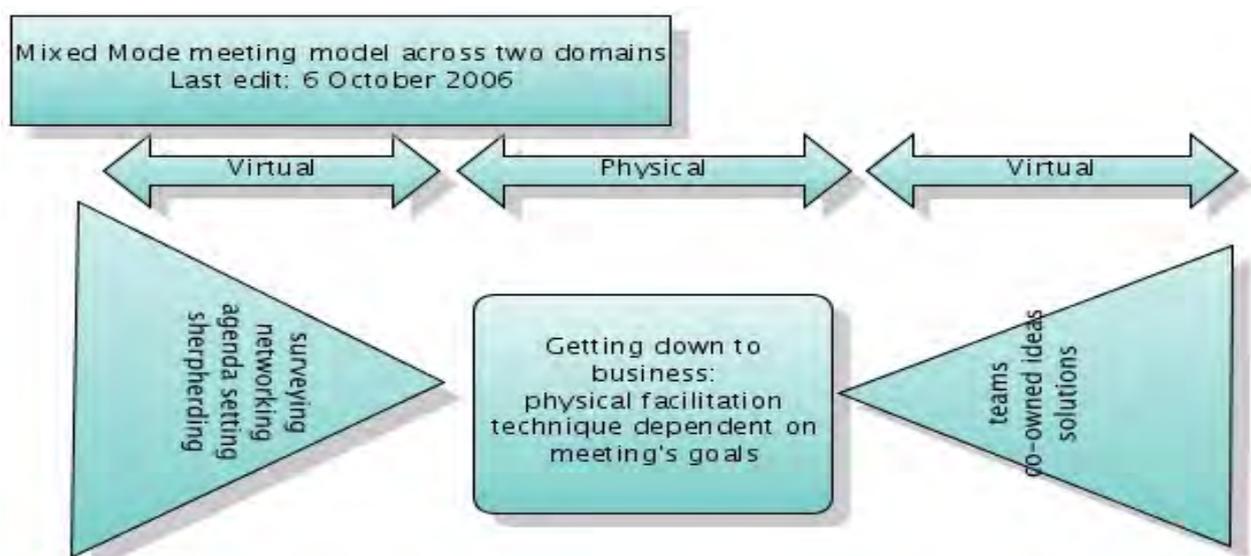
The first to the two days was a 'knowledge sink'; designed to help the attendees bond and build a shared understanding of the event, while launching the first KnowledgeBoard book, as well as experiment with some new facilitation techniques. The second day was free of theme (more on this below), and simply structured with three facilitation techniques:

- The structured approach of Narrative enquiry (Martyn Laycock)

- The inclusive approach of Open Space (Jack Martin Leith)

- The intimate approach of the Knowledge Café (David Gurteen)

Theoretically, having agreed a theme in advance, attendees could then 'workshop' said theme in three different ways. This would provide them with not only a broad understanding and actionable approach to the theme, but also a clear idea of the differences in facilitation techniques and how and when to use them in their own organisations.

Thus Contactivity was a deliberate excursion into exploring whether the early technical adopters' development of the 'unconference' (lesblogs, reboot etc.) could be translated across to the world of organisations in a 'constructivist' manner. We were not keen on the apparent reactionary feeling of the 'unconference' word, hence the peer approved references to proven facilitation techniques, facilitated by experts in their fields. It had a two loose research enquiries and one action based goal:

1. Pre and during event networking

With the support of Dan Dixon (senior lecturer, University of West England, working at Headshift at that time), we set up a free to access wiki. As well as the normal event organisation elements, we encouraged everyone to register themselves publicly and set up a page for them to provide the other participants with some background information about themselves.

Take up was very popular. Asides to some technical issues (logins, editing etc.), almost every attendee simply added a few paragraphs about themselves and their expectations for the event.

The first serious workshop at the physical event was a 'power networking' session run by Dr Wolf and Dr Troxler. All of the attendees' networking information from the wiki was pinned to a large board, and attendees were asked to find other attendees who would share interests.

The session was a great success. Like the more traditional networking sessions (e.g. Gurteen's Speed Networking) there was a great deal of high energy networking and conversation, but at Contactivity, people had already registered their interests so the noise and busy-ness was focused on directly relevant peer to peer knowledge sharing rather than the more round-about conversations one can experience in normal networking.

The formal launch of the book with a short presentation of each case study.

Case study signing and discussion on key learnings from case studies.

One of the salient features of the event was the long awaited launch of KnowledgeBoard's first book on "Real-Life Knowledge Management: Lessons from the Field". What differentiated the launch of this book of cases studies from others was that many of the case study contributors were present to not only autograph their case studies in the book, but to also discuss with participants the key learnings from the case studies.

2. Pre-event agenda setting

As well as the networking concept, the wiki supported our second stream of research - can a set of distributed attendees set the theme of a conference in advance? If so, they would have significantly more ownership of the debates and thus be more focused, generating a higher level of participation and optimised knowledge sharing.

In advance of the event, in line with many of the traditional consensus-focused facilitation techniques, we invited the attendees to enter keywords of issues they wished to discuss into the wiki. Having done that, we invited them to group the keywords into loosely banded subject headings for further development.

Take up of this was less popular than the networking; but there was some high quality input from a constructive minority. What emerged was that there were many possible routes the physical gathering could take - the attendees had hundreds of ideas, all of which were worthy of a full day. This happened a few days before the gathering, by which time we were in full event preparation mode and had to decide to discuss it at the event itself.

Thus, setting the agenda was not as successful as the networking; with no shared social architecture and experience of using new social software (wiki), creating the cohesion required to reach shared decisions, and thus co-ownership of the theme was not possible. In fact, there were so many issues for discussion that it was impossible to find a common thread and the physical facilitators were not given a theme to work around.

From conversations at Contactivity, we learnt that some Communities of Practice (e.g. our friends at Cogneon.de) had started reaching consensus on event themes, but only after three or four cycles of physical meetings. This was a critical moment in identifying the need for a multi-domain facilitator - to carry the community's experience from one domain into the other - and the concept of building trust within a group to help it reach pure self-organisation. [Full event report: www.knowledgeboard.com/item/2700]

Tips & Tricks (To-Do)

☑ Take risks – try new methods which were never done.

☑ Make the space welcoming – flowers and sweats on each table, for example, can make a difference.

☑ Use art – relevant pieces of art help to create a different state of mind and make new associations. Are can be used at the event web site, invitation, documentation, cover the walls and flours.

☑ Keep renewing, keep inventing – each event should introduce some surprises to people who predicated in the previous events.

☑ Balance serious conversations and fun activities. Content is critical – and the stimulating environment has to support knowledge sharing and creation.

☑ A major part of the event should be based on various forms of interactions – but it is OK to have few traditional frontal presentations – if they are of exceptional quality.

☑ Invite the participants to suggest interesting activities – this is the best way to ensure innovative agenda.

☑ Welcome your participants as they arrive - they are the most valuable part of the event

☑ Actively introduce your participants to each other - networking is the most important part of any gathering of people

☑ If you choose to pre-energise your event with virtual engagement tools (wikis, blogs) be prepared to facilitate them

☑ If you pre-energise your event with virtual tools make sure that the energy and knowledge gathered on the tool is carried over to the physical event - otherwise it is a waste of everyone's time

☑ Share the creative and logistic responsibility of the event and have regular team meetings during the event

Potholes (Not-to-Do)

☒ Avoid a too intensive agenda – fewer and longer sessions and activities as well as longer breaks will ensure better use of the participants' time.

☒ If you do not reach topic consensus virtually before an event - have a plan B!

☒ If you use new technologies (wiki), keep the necessary interactions as simple as possible - attendees will have a range of experience in the area and new users can be very intimidated by new technologies.

☒ Do not underestimate the amount of facilitation you may need to do in advance of the event - attendees are, as yet, not familiar with this emergent practice and may need significant support

☒ If you are using a pre-event virtual platform, ensure that there is only one sign-on procedure and it is exceptionally easy

Acknowledgements

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Author Biographies

Ron Dvir is the Founder and CEO of Innovation Ecology. Planner and integration of innovation system in general, and Innovation engines and Future Centers in particular. Ron has an engineering degree, M.Sc. in Computer Integrated Manufacturing, Ph.D. in Intellectual Capital Management. Before founding Innovation Ecology, Ron was Chief Knowledge Officer in a large high-tech organisation, and developer of quality infrastructures. Developer and implementer of innovation concepts, methods and tools. Likes to embed artwork in business and research work and to plan new forms of events and contactivity channels. Was member of the planning team of the future Center exploration tours. (www.innovationecology.com)

Ed Mitchell is a professional community analyst and multi-domain facilitator. This means that he specialises in helping groups optimise their knowledge sharing potential using both the internet and the physical world. He has been working in and around the internet since 1997 when he helped set up a community music webcasting outfit in a warehouse in Hackney, London. Ed was Editor of KnowledgeBoard from 2004-2006. Before that he completed his masters degree (distinction) in Information Systems and Knowledge Management, specialising in the strategic use of website metrics in organisational decision making. (www.edmitchell.co.uk)

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Measure and analyse

An Integrated Approach to Enabling More Effective Knowledge Flows in an Organisation

Christine van Winkelen and Jane McKenzie

An Integrated Approach to Enabling More Effective Knowledge Flows in an Organisation

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Snapshot (Quick Learning)

Value is generated when knowledge flows, in other words, when it is transferred from where it is generated to where it is needed to make a short or longer-term difference to something that matters to your organisation. Your organisation is only one element in an industry-wide system of knowledge-based activity that involves individual employees, customers, suppliers, competitors and other institutions. The value generated from knowledge depends on how well connected your organisation is within that system and how effectively nine critical knowledge flows within the system work together.

What follows is a method that allows you to build an integrated picture of these major knowledge flows affecting your organisation and to diagnose what enables them to be more effective. The approach is based on a two level framework. The top level outlines the knowledge flows that can contribute to business value (these describe the measurable objectives that can be achieved from adopting this approach). The second level outlines the common influences on each of the top-level flows. It is at this level that practical initiatives can be identified that will make the most difference.

Keywords: knowledge management, learning, collaboration, coherence, value

Context (Where & What)

This method was designed in conjunction with private sector multi-national organisations representing many industries, and major UK public sector organisations and it is intended to have widespread applicability. The principles underlying it are generic rather than sector specific.

The method is intended to be a diagnostic step within the process of developing and implementing a knowledge management strategy (see for example McKenzie and van Winkelen, 2004 for an approach to strategy formulation). It is primarily a way of gathering and structuring information.

Whether the method is used to structure interviews with a range of key managers and individuals across the organisation, or is used as part of a workshop format with groups of people depends on the situation. The objective of the method described here is to gather information. If there is also a need to engage groups of people to gain buy-in to change, then a workshop format is likely

to be best. Experience suggests that 15-20 people are about the right number for these workshops.

Whether you adopt an interview or workshop approach, you will need to ensure that a representative sample of people is involved. This should include people who have a strategic perspective on what knowledge makes a difference in the industry and how investment in knowledge-based activities can help organisational performance.

It is advisable to identify specific organisational groups or divisions which have their own clear purpose and outputs and work with each of these in turn, following this with an integrating review of all of the information collected to identify important knowledge flows across boundaries.

Preparation (The Checklist)

In addition to becoming familiar with the two-level framework, you will need to produce copies of the diagnostic survey (see table 2) for each group / division of interest.

Interviews or workshops will need to be arranged with managers, team leaders and individuals at the front line of the activities in each group / division.

It is helpful to have a clear understanding of the main processes undertaken in each part of the organisation of interest. Such process mapping is not the subject of this method and needs to be undertaken separately. Particularly in process-oriented organisations, it is expected that knowledge flows will need to be mapped onto these. The purpose of applying this method in these situations is to identify alternative sources of knowledge and to explore the blockages to effective knowledge flows in relation to key processes.

Toolkit (The Essentials)

The main requirements are time and attention from the interviewer and interviewee. At least an hour of uninterrupted time is needed for each interview. The survey (see next section) provides a checklist to structure the interview – the intention is to collect detailed information about how the nine key knowledge flows work in practice and to compare this with how they ought to work together to deliver maximum value to the organisation.

If workshops rather than interviews are being used to collect the data, then at least half a day should be allocated to each workshop.

Making it Happen (The Approach & the Action)

The method is based on developing an integrated picture of nine knowledge flows associated with the organisation and what enables these to be effective. It is a development of the model proposed by Karl-Erik Sveiby (2002) and consists of a two level framework corresponding to the two principles of coherence and alignment (McKenzie and van Winkelen, 2005). Coherence relates to how well nine knowledge flows work together to support performance in the first level, and alignment at the second level is about how to reduce inefficiency.

In the first level of the framework, nine different value generating routes along which knowledge can flow are identified within and between three knowledge domains: the individual people working for the organisation (sometimes called human capital), the systems and processes of the organisation (sometimes called structural capital), and the external relationships of the organisation (sometimes called relationship capital). This is illustrated in figure 1.
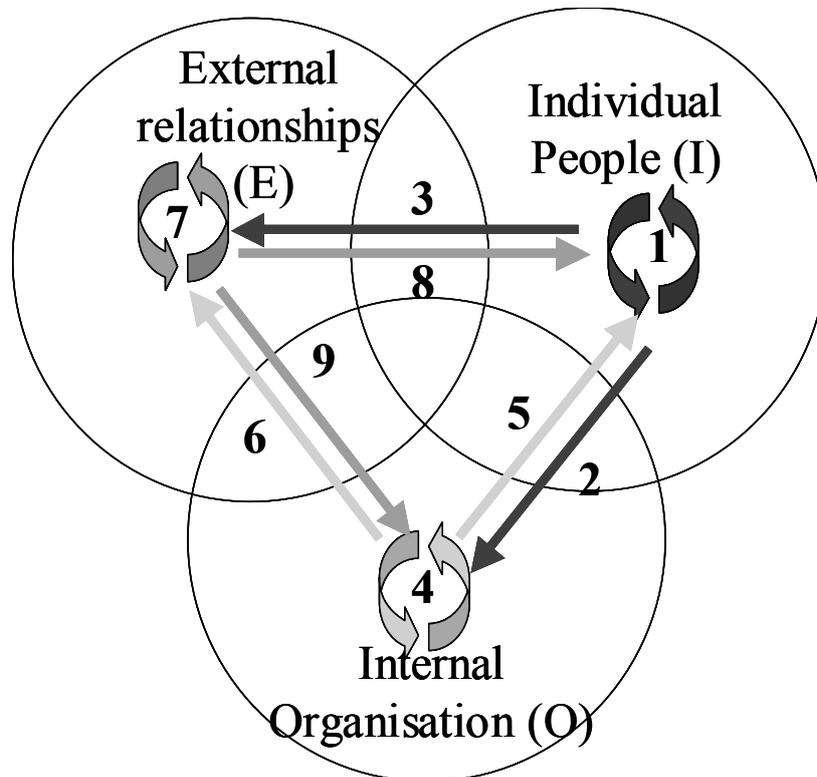
Figure 1: First level of the framework - value generating knowledge flows

The purpose of each flow and its potential to generate value for the organisation is explained in table 1. This can be used to create a common language about the knowledge flows during the interviews or workshops.

Table 1: Purpose and value of the nine value generating knowledge flows (first level of the framework)

Route of knowledge flow	Purpose of flow *Value to business*
1. Between Individuals	Conversations between individuals enable them to solve problems faster and more effectively *Stimulates individual learning, enables better use of existing knowledge, potential source of innovation*
2. From Individual to Organisation	Converting individual knowledge to resources everyone can use expands the IC of the business *Stops re-inventing the wheel. Builds the capabilities of the organisation that are hard to copy.*
3. From Individual to External stakeholders	Individuals share knowledge with customers and partners to strengthen value generating relationships *By improving quality, customer responsiveness, and loyalty, organisation protects competitive position*
4. Around the Organisation	Organisation saves time and money through integrated KM systems and processes *More efficient knowledge sharing extends use of investments in knowledge assets, organisational learning, cuts costs, encourages more informed decision making*
5. From Organisation to Individual	Making organisational knowledge accessible improves peoples' ability to learn more quickly and relevantly *Faster more focused individual learning improves productivity and increases the potential to innovate*
6. From Organisation to External stakeholders	Making knowledge available to customers suppliers and partners to improve competitive performance *Influences market conditions in favour of the business, protects existing competitive position*
7. Between External stakeholders	Knowledge sharing between players drives advances in the industry *An organisation that influences this process can be a first mover and gather more power in the industry*
8. From External stakeholders to Individuals	Individual employees access to knowledge from external partners keeps them abreast of market opportunities and ideas *Fuel for innovation. Provides early warning signals for external change*
9. From External stakeholders to the Organisation	Accessing knowledge through external partners helps the organization better exploit its current knowledge or innovate more quickly *Allows organisation to concentrate on what it does best, respond more quickly to market changes, or spread risk.*

At the second level of the framework, we rely on research that suggests that there are some basic factors that affect an individual's responses in a situation so that they work without confusion, internal conflict or unproductive stress (Bateson, 1972, Dilts, 1990). They need to be motivated to achieve the purpose (they understand why it matters), have the skills to do the task (they know how to do it), be comfortable with and able to take the necessary actions (they know what to do) and do so in an environment that is conducive to such action (where it takes place is appropriate). If these four factors are in alignment, the process of achieving the outcome tends to run smoothly and efficiently because there is nothing blocking it. For individuals, motivation comes from their beliefs and values. We have assumed this applies equally to organisations (through culture which is a set of collective beliefs and values) and external stakeholders (the industry expectations of what is acceptable and achievable).

These factors are illustrated in figure 2. Like a dam in a river, each factor can act as a blockage to the flow of knowledge (illustrated as obstructing the flow), or can allow the flow to proceed and generate value (illustrated as raised out of the flow). Value is generated most effectively when all four factors are raised out of the flow. This raised state is conceived here as representative of alignment. Understanding the nature of these four factors and whether they are blocking or enabling a knowledge flow requires four questions to be asked (why, how, what and where) in relation to that flow.

The interviews should be used to understand each flow in turn. There are three components to the gathering information from each interviewee (or in a workshop):

- Collecting detailed information to describe the nature of each flow from the perspective of that interviewee (or the participants).

- The interviewee's (or participants) rating of the effectiveness of each flow, both in terms of current practice and desirable performance. Table 2 is the survey template to be used to collect this data.

- The interviewee's (or participants) view of the enablers and blockages to each flow using the four questions shown on figure 2.

Why: why is this flow important, and do those involved understand that this knowledge is valuable?

Motivation

What: what do those involved actually need to do in practice and on a day to day basis?

Actions

Knowledge Flow

Value from Knowledge ££$$

Skills and Knowledge

Environment
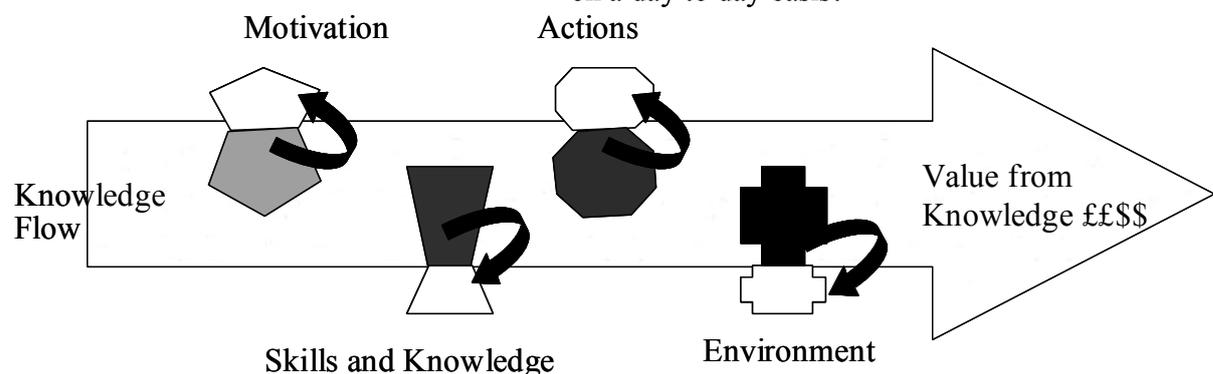
How: can those involved transfer this knowledge, do they know how to do this, do they have the necessary skills?

Where: is anything acting as a practical barrier to achieving the purpose of this flow – time pressures, geography, time zones, culture, incentives, access to technology?

Figure 2: Removing the blockages to each knowledge flow (second level of the framework)

Table 2: Template for a survey to collect information about the effectiveness of knowledge flows in the organisation

	Low			Medium			High	*Rating*
	1	2	3	4	5	6	7	
1. I-I Knowledge flows between individuals in my organization.	Little knowledge sharing due to insecurity, politics etc.			Knowledge mainly shared with local trusted colleagues.			Widespread and active participation in mentoring, coaching, communities etc. demonstrating a high level of trust between people.	*Desirable Rating:* *Actual Rating:*
2. I-O Practices that ensure that the knowledge / experience of individual employees flows to where it is needed internally.	Limited use made of mechanisms (like databases or communities) to access or share knowledge across the organization.			Local initiatives to spread individual knowledge becoming more evident. After-action reviews completed for major projects. Incomplete coordination.			Accessing and sharing knowledge is embedded in core processes and carried out as a matter of course.	*Desirable Rating:* *Actual Rating:*
3. I-E Knowledge flows from people employed by my organization to external customers / suppliers / alliance companies (all classed as partners here).	Employees are not able to build relationships externally due to lack of time or poor processes.			Increasing evidence of employees forming relationships with external partners, but this is incompletely coordinated rather than part of the knowledge strategy of the business.			Employees are expected to form trusting relationships with key partners and this is supported through the knowledge strategy. Participation in professional bodies and networks likely to be common practice.	*Desirable Rating:* *Actual Rating:*
4. O-O The systems, structures and processes in my organization that help knowledge flow from one place to another.	Isolated examples of knowledge sharing systems and process. No integration and much "reinventing the wheel."			Cultural initiatives starting to support infrastructure and process initiatives. Incomplete coordination though.			A fully integrated system with cultural initiatives supporting process and infrastructure investments.	*Desirable Rating:* *Actual Rating:*

	Low			Medium			High	Rating
	1	2	3	4	5	6	7	
5. O-I Practices that ensure that knowledge available in the organization improves the competence of individual employees.	Few supporting structures available to help individuals know what to do.			Some best practices and templates and other resources available for core activities. Incomplete coordination of investments in learning and development.			Developing employees is a business priority. Best practice guidance widely available and readily accessible. Learning encouraged, appropriate resources available.	*Desirable Rating:* *Actual Rating:*
6. O-E Systems and to make knowledge available to external customers / suppliers / alliance companies (all partners here).	No support for customers / suppliers / partners, eg. by providing access to update, status, diagnostic, delivery etc. information.			Increasing evidence of facilities for external organizations to access and use essential information from within your business.			Your business model drives the enhancement of secure systems to allow external partners to access all necessary supply / diagnostic / status etc information.	*Desirable Rating:* *Actual Rating:*
7. E-E Knowledge flows between other companies in my industry (including suppliers, customers and competitors).	No significant conversations evident between players in the industry.			Adhoc conversations and meaningful relationships becoming increasingly evident.			External relationships between players in the industry are vibrant and productive.	*Desirable Rating:* *Actual Rating:*
8. E-I Knowledge transfers from external customers / suppliers / alliance companies (all classed as partners here) to individual employees in my organization who need it.	Individuals isolated from external partners (customer/supplier or other partner) or professional knowledge networks.			Systems, processes and resources increasingly available to allow some key individuals to learn from external partners or professional networks, but activities are incompletely coordinated.			External liaison roles have been created and are coordinated effectively. Employee development includes participation in external professional knowledge networks.	*Desirable Rating:* *Actual Rating:*

	Low			Medium			High	*Rating*
	1	**2**	**3**	**4**	**5**	**6**	**7**	
9. E-O Knowledge flows from customers / suppliers / alliance companies (all classed as partners here) into the decision-making infrastructure of my organization**.**	No formal mechanisms exist to elicit or capture external feedback or use this to improving products, services or processes.			Increasing evidence that feedback is collected from key partners and taken into account in new / improved products, services and processes, although this is not a coordinated process.			External knowledge is actively sought and mechanisms are in place to feed this into improve products, services and processes in a coordinated way.	*Desirable Rating:* *Actual Rating:*

Results & Next Steps (The Follow-Up)
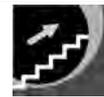
There are no right or wrong answers in this approach. Not all flows will have a desirable rating of 7: it depends on what is important to the performance of the organisation. The objective is to achieve consensus about the ratings for each knowledge flow. Significant differences between interviewees or within a workshop setting provide an opportunity to explore the reasons for the different perceptions: the four alignment factors provide the mechanism to understand the sources of the differences of opinion. Once approximate agreement has been reached, then transfer your desirable and actual ratings for each knowledge flow for each part of the organization of interest onto a radar chart like that shown in figure 3 by plotting each one against the appropriate axis.
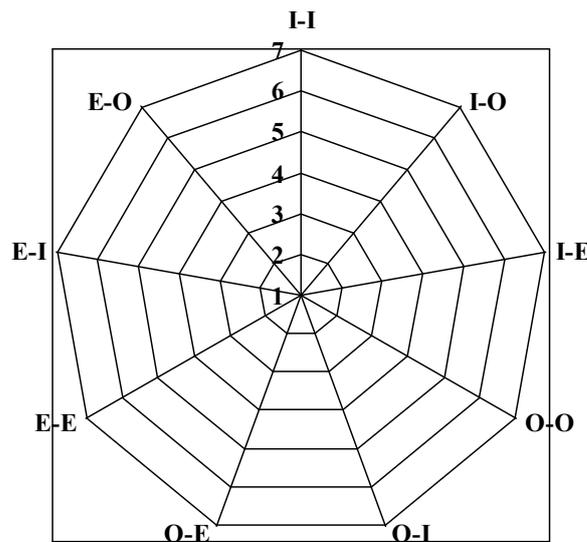
Figure 3: Plotting the knowledge flow ratings

The gap between desirable and actual ratings will be a useful pointer to areas where attention is required – the biggest gaps indicate the priorities. When all the knowledge flows work together the value creating potential is increased.   If the pattern is different for each part of the

organisation, then look for opportunities to understand why some flows work well in one place and not in others (again, the four alignment factors should be the starting point) and whether experience and good practice can be transferred.

We have found that the extent to which the nine knowledge flows work smoothly and efficiently together and operate coherently in support of the organisational objectives is a reflection of the knowledge management maturity of the organisation. As knowledge management develops within the organisation, flows within knowledge domains tend to become effective first, then flows back and forth between the "individual" and "organisational" domains become more effective. However, full knowledge value can't be released until knowledge flows to and from external partners, suppliers and customers are fully integrated with the other knowledge flows. This is illustrated in figure 4. The process is highly dynamic as the organisational context changes.

| Some flows working. Flows between domains weak showing low coherence across the system. | I-O and O-I stronger. External connections weak limiting adaptation of the organisation. | External connections building. Interlinkages limited, potentially creating confusion. | Stronger interlinkages between flows gives more coherence and efficiency. | All flows interwoven to support each other for maximum business value. High coherence. |

Figure 4: Moving towards knowledge management maturity.

Real Cases (As it has Happened)

Two illustrative examples are provided here in relation to flows that in our experience are most likely to be challenging to many organisations. The first is based on published material from Buckman Laboratories (Buckman, 2004), which is a well-known Most Admired Knowledge Enterprise winner. Table 3 summarises the alignment factors for the "I-E" knowledge flow, that is, *"individual employees sharing their knowledge with external customers, suppliers and partners."* Recognising the importance of the flows across the boundary of the organisation is a sign of knowledge management maturity and has clearly underpinned Buckman Laboratories' knowledge management successes.

Table 3: Alignment factors supporting the "I-E" knowledge flow at Buckman Laboratories

Motivation	The company set the goal that *"everyone in the organization must actively support the needs of the customers by as much direct contact as possible. No one can just sit back and leave that to those who deal with customers every day."*
Skills and Knowledge	All associates know how to participate in any discussion about the customer. People are trained to use the systems and empowered to use what is available. The Buckman Labs Learning Centre provides the means for individual employees to acquire the knowledge and skills they need – including typing skills and how to communicate in a networked organization.
Action Required	All associates have access to the same systems and are asked to be *"effectively engaged on the front line"*. Employee online discussions about what this means said " *it's about involvement, commitment, creativity, passion and ultimately the freedom to do everything we can to use all the knowledge we have to make sure that we have done our utmost to satisfy the customer in all areas."*
Environment	Collaborative systems have been put in place to allow each associate access to the necessary knowledge to deliver value to customers.

The second example is based on the mobile telephone network operator Orange. Orange is owned by France Telecom and is the brand name used for a number of mobile telephone network operators that have been acquired in recent years, predominantly in Europe. Table 4 summarises the alignment factors for the "E-E" knowledge flow, that is, *knowledge flows between other companies in the industry, including suppliers, customers and competitors."* Influencing the knowledge flows within an industry is particularly important in dynamic and rapidly evolving situations such as technology development.

Table 4: Alignment factors supporting the "E-E" knowledge flow at Orange

Motivation	Synergies between technologies and how these affect lifestyle choices are believed to be the basis for developing future products and services. Orange therefore needs to support and encourage the public debate about how people want to live their lives in order to refine their role in providing solutions in the future.
Skills and Knowledge	Knowledge of know to establish and maintain effective relationships with other players in the industry is important as no one company can drive this debate alone.
Action Required	Stimulating public and industry debate requires many techniques to be adopted. Visionary leadership, public relations initiatives and thought-leadership publications are elements of this.
Environment	The industry environment is relatively collaborative as it is driven by technology standards that need to be negotiated between leading players.

Tips & Tricks (To-Do)

☑ Depending on the nature of the organisation, it may not be possible to treat all external relationships in the same way. Be willing to repeat the process for each kind of relationship in turn if necessary (suppliers, partners, customer and "others").

☑ Use the nine knowledge flows to look for new sources of knowledge to add value, rather than simply looking to improve the effectiveness of existing flows.

☑ Remember to integrate all nine flows after you have looked at them individually. They really can't be considered in isolation to each other as one creates the environment in which another takes place.

☑ Revisit the process regularly. This isn't a one-off event. The organisational context is dynamic and therefore the factors underpinning the effectiveness of each flow will be continually changing, as will the relative importance of each flow.

☑ Look for patterns across the flows (using the alignment factors as a guide) and seek to influence these patterns for greatest impact.

Potholes (Not-to-Do)

☒ Don't allow interviewees to put the highest rating as "desirable" against all nine flows. It is important to think through what really matters.

☒ Don't rush thinking about the alignment factors. With some careful thought about what they really mean for each of the nine knowledge flows it is possible to design simple interventions with high impact.

☒ Don't be rigid about organisational boundaries – in today's networked organisations these can be fluid. Set the boundary that is appropriate for the situation you are trying to understand, but then apply it consistently.

Acknowledgements

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Author Biographies

Dr Christine van Winkelen has worked with the Knowledge Management Forum based at Henley Management College in the UK since its inception in 2000, project managing and directing research activities and special interest groups. In January 2004 she became the Director of the Knowledge Management Forum. She is actively involved in a number of KM-related research projects at Henley Management College and her focus is on forming a bridge between academic and practitioner aspects of knowledge management. As a freelance academic and writer, Christine also tutors strategy, knowledge management and people management courses on MBA programmes at three UK business schools.

Professor Jane McKenzie is a Professor of Management Knowledge and Learning at Henley Management College in the UK. She joined Henley in 1997, where a large part of her daily work centres on the contribution of knowledge and learning to management and organisational development. Currently she is Director of Executive and Distance Learning MBA Programmes. Her research interests focus on the connection between knowledge, learning and organisational value and the dilemmas managers face in today's complex business environment. Jane has written two books, the most recent called *Understanding the Knowledgeable Organization* was co-authored with Christine van Winkelen.

Successful Innovation from Effective Knowledge Management

D. W. Birchall and George Tovstiga

Successful Innovation from Effective Knowledge Management

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Snapshot (Quick Learning)

This chapter offers the reader assistance if their expertise is in knowledge management and they are engaging in innovation projects.

It has four main elements:-
1. An introduction into innovation management within organisations.
2. Case studies illustrating the interface between knowledge management and innovation at both the strategic and operational level.
3. Key knowledge management considerations in relation to innovation.
4. A check list for taking an overview of the degree to which the organisations knowledge management approach supports innovation initiative.

The four elements offer:
1. Briefings for people new to the area
2. Cases providing storylines for convincing innovation managers of the need to consider and integrate knowledge management into the innovation process
3. Cases for use in training knowledge management professionals
4. A diagnostic audit taking a high level view of knowledge management and innovation

Greater consideration to knowledge management enabling more effective innovation performance can result in more rapid progress in developing more innovative products and services to new and existing markets. A helicopter view, as provided here, is often lacking, resulting in lost opportunities.

> **Keywords:** innovation strategy, innovation process, knowledge management audits, innovation training

Context (Where & What)

Innovation is high on the agenda of many of the world's leading businesses. The challenge of globalisation, strong emerging competition for both manufactured goods and knowledge based services from China and India, demographic changes in developed countries along with talent shortages and the rising concern for corporates to behave responsibly are all factors making life more uncomfortable for business leaders. Without innovation they see little prospects for their businesses into the long term.

However innovation can take many forms; from the disruptive, such as the explosion of the Internet; to the incremental, such as improved braking systems on cars; from technology driven change (e.g. the all pervasive chip); and to changes in the way products and services are taken to market, e.g. selling direct from the web rather than the high street retailer.

So innovation is normally taken to mean something novel introduced into the business which adds value for customers or clients. This positions innovation at the cutting edge of new business development. Innovation occurs most frequently at the peripheries and at the interfaces of knowledge disciplines. Nonaka and Takeuchi (1995) describe how new knowledge is created through mechanisms that involve exchange of knowledge existing in tacit and explicit modes. They also go on to describe enabling conditions for innovation to occur under these circumstances.

Knowledge and innovation are thereby inextricably linked. The creation of new knowledge drives innovation and in turn, innovation leads to the creation of new knowledge through the learning that occurs when organisations engage in innovation. Knowledge in the organisation can take on a variety of forms, but it is *strategically relevant* knowledge that is the critical determining factor in the creation of value for customers through innovation.

The challenge facing leading businesses today is to develop the radically new products or services to be the basis of their long term prosperity, whilst at the same time maintaining a constant stream of the incremental innovations to keep their current offerings refreshed and attractive in today's market. Birchall and Tovstiga (2005) describe an evolutionary, hybrid form of innovation that seeks to capture the opportunities presented by the two ends of the innovation spectrum. This form of innovation often presents organisations with a dilemma since it demands reconciling potentially contradictory processes, structures, leadership styles, and ultimately, paradigms in the firm. One of the challenges facing firms opting for an innovation strategy of this type involves the measurement of the impact of innovation (Birchall et al, 2006). The more future-oriented the innovation effort, the less we can rely on traditional, quantitative measures of performance. Innovation is inherently future - oriented, hence the growing realisation amongst both innovation scholars and practitioners of the inadequacy of existing approaches in this area. For example, one of the key measures of the impact of strategic innovation relates to the *learning* impact of innovation on the organisation. Traditional approaches are inadequate for capturing this dimension.

Whilst it is possible to describe the innovation process, any description fails to capture the complexity. All innovation starts with an idea followed by the development of a concept. Moving to a prototype to be tested in the marketplace may then take years of R&D. The risks of failure at any stage are high, partly due to technical risks (it may not work) but also due to changing commercial realities in the marketplace, changing ambitions and aspirations of the business, financial and organisational barriers. Even as the new product is about to be launched, a competitor may beat the firm to market or, even worse, an unknown competitor may aggressively burst onto the scene with a radically different competing product or service.

Firms that are good at the more incremental type of innovation normally have a well-oiled New Product Development (NPD) process. This will take new product ideas through a series of stage-gates. Each of these will present a series of hurdles to the promoters as they move from prototype to full-scale production. The aim of these hurdles is to assess the overall viability and the risks of not achieving the return on investment sought. The outcome will be a 'go', 'no-go' or 'conditional proceed'.

Radical innovation in most firms calls for a much different approach to the standard NPD approach. Since radical innovation challenges the status quo, one or more of the many stakeholders likely to be impacted can act to freeze out the development. So skunk works, separate organisations, spin-offs are all used to develop the disruptive ensuring it is protected until proven viable.

Whether focused on the incremental or the radical, successful firms are those that can generate new knowledge, reuse existing knowledge and experience and learn more effectively than direct competitors. The learning gleaned from unsuccessful projects may well be as significant as that from the successful. This is only possible where there is a culture which is not heavily focused

on 'blame and shame'. So not only does the organisation need a clear innovation process, it also needs to create a culture conducive to innovation.

The materials that follow will help anyone devising an innovation process, advising innovation experts on knowledge management or auditing innovation systems. It provides case illustrations for illuminating innovation processes and knowledge management issues that can be used as training materials, for briefings. Managers can also use them as guides for their own personal reflections.

The Toolkit will assist in the design or review of knowledge management's adequacy in support of the innovation strategy and process.

Preparation (The Checklist)

It is an important first step for the principal consultant to discuss and agree with the organisational client the exact nature of the brief, the outcomes expected, the approach to be adopted and the communication process in the organisation prior to commencement.

The Toolkit can be used by either an individual investigator or a team. If a team is to be put together, the composition needs to be agreed with the client, authorisation for their release from other duties should be sought and any facilities required established and budgetary provision be made.

The team needs careful briefing. If their knowledge of innovation is limited, they may be asked to read the background information and attend a short (2 hours) seminar to discuss it. The aims for this would be to develop a common level of basic knowledge but also to establish the strengths of members in the field. A second session may be deemed necessary and further reading proposed subsequent to that meeting.

The people involved in the study overall also need careful briefing. This should come from the client or someone more senior. It is important that anyone involved, either directly or indirectly, is aware of the purpose and has the opportunity to get any queries answered. A positive outcome to this process is important for the investigators to be able to get open and frank answers to probing questions.

The investigation team may need to rehearse. There is an art in posing questions of expert witnesses and role-play or such can help the team appreciate sensitivities and develop skills. A 2-hour session should suffice.

Toolkit (The Essentials)

The Toolkit presented here is intended as a series of initial questions to be followed through with a search for evidence in support of claims being made. The Toolkit provides a helicopter view. Probing follow up questions will take the investigator into much more detail.

It is not intended to be prescriptive but rather a stimulus for interrogation and reflection. Also as part of good knowledge management practice we encourage the encapsulation of insights and the promulgation of new knowledge to improve overall innovation effectiveness.

The Toolkit: A series of questions for the investigator

1. In looking at innovation successes and failures what patterns in innovation process emerge?
2. How effectively has the knowledge management approach supported the diversity of approaches to innovation management?
3. What system is in place to review how knowledge management approaches support innovation and how have insights and lessons learnt been used, with what impact?
4. Innovation is really about new knowledge acquisition and its exploitation in new or refined products or services. Creativity, trial and error, model building and testing, rapid learning are important elements. In what ways does the firm's knowledge management approach support or hinder these activities?
5. What mechanisms are in place for identifying relevant external knowledge sources, and then capturing, filtering, sorting and integrating new knowledge from these external sources?
6. In what ways is the knowledge management system effective at environmental scanning and capturing competitor intelligence and promoting internal analysis?
7. What evidence exists that Communities of Practice are giving effective support in the innovation process? How can their effectiveness be improved?
8. How effective at moving forward the strategic innovation targets is knowledge sharing across departmental/organisational boundaries?
9. How well aligned are the information systems with the firm's knowledge management strategy and approach? What needs to be done to ensure they together support innovation initiatives?
10. In what ways are metrics for innovation and knowledge management aligned and appropriate?
11. Is the prevailing organisational paradigm and culture more in alignment with "perfecting the known", or with "imperfectly seizing the unknown"?
12. How are knowledge management strategy and approach aligned to innovation strategy?
13. What evidence is there that successes in innovation are recognised across the organisation and effectively promoted to other stakeholders e.g. clients and customers?

To make the best use of the Toolkit the person being questioned must be made to feel relaxed. Thought should be given to how this will be achieved. What sort of room is required? How will the seating be arranged? Is the lighting appropriate? How will the questioning be conducted?

It may be appropriate to run any information gathering as a meeting rather that as 'interrogation', with several functions represented. A flipchart or white board is useful. However, subgroups may work through issues by using post-its or other tools to collect and sort ideas. The Toolkit can be broken down into a series of tasks.

At the end of the day, it is important that participants are fully aware of the purpose, that they are kept on track, that they feel positive about their contribution and enthused for any next steps.

Making it Happen (The Approach & the Action)

Here we will explain how the Toolkit is used in order to investigate the adequacy of the organisation's knowledge management approach as a support to the innovation strategy and process, and how the results of the study should be reported.

The Toolkit can support a number of activities:
1. Alignment of the knowledge management strategy with the innovation strategy and, ultimately, the overall strategy of the firm.
2. Planning the knowledge management strategy so as to adequately support innovation.
3. Designing the knowledge management approach in relation to innovation.

First of all, it is essential to identify the client for the study and his/her position in relation to the follow-up work. The request may originate from an Executive Committee or Operational Board, although a senior manager might be authorised to report back the findings of any study. What is the brief? What form is any report to take? What are the expectations and how will the report be used? What authority will the investigator have?

Our preference is for a working group to be set up for the study so as to have input from a variety of functional areas, e.g. business development, R&D, operations, innovation services, information systems etc. This adds considerable richness to the study as well as preparing the ground for subsequent implementation. It should result in workable recommendations.

The Toolkit could also be used by a single investigator. In this case, it is advisable to interview representatives from the peripheral functions as well as the key players. Once the report is at drafting stage, the same respondents should be contacted again to test out the recommendations.

However, it is essential that the working group or single investigator have credibility and standing in the eyes of both the client and those being questioned. In part, this will come from hierarchical status, but background knowledge is also important. It may be necessary to do more than just brief members on both knowledge management and innovation. Training sessions may need to be designed. If so, there are some basic principles to follow:
1. Outcomes from any training need to be clearly specified. We would expect attendees to leave with an understanding at a basic level of the nature of innovation, the types of innovation strategy pursued by organisations and the basics of the approach in the organisation. We have assumed that the level of knowledge management understanding is adequate – something that may influence the choice of group members. Also, finally, they have to be prepared in the use of the Toolkit.
2. The process for establishing the desired outcomes should be specified. All too often the line taken is that of presentation of the information with the learner being relatively inactive. Given the small numbers involved and the varying levels of knowledge, we would usually adopt a workshop format. Here participants are actively engaged throughout – by asking them to do a moderate amount of pre-reading we would expect them to be prepared for a series of group tasks. Each task will be carefully designed so as to ensure coverage of the terminology, strategic approaches to innovation and the innovation process. The more general background material can be used to identify specific innovation approaches used by the organisation. The latter does require that the consultant has a good understanding of internal aspects. Tasks also need to be designed covering the approach to the investigation and the use of the Toolkit. The working group should be asked to identify key points recording them on flipcharts or other projection means. These flipcharts should then be drawn together and distributed to group members as an aide memoir.

3. The final aspect of any training is its review and evaluation. Do group members feel adequately prepared for the investigatory work? Does anything else need to be done? What lessons can be taken from the process for any subsequent groups?

As pointed out earlier, there are some basic needs for the questioning process to run smoothly and achieve the desired outcomes. The working group may decide to split into pairs for interviewing or studying together. They may decide on one-to-one interviews or group sessions in workshop format. However, one essential element is that the questioning achieves an understanding of current practice, its strengths and weaknesses and what is actually felt necessary to improve. Evidence should be sought to support claims by interviewees and, if possible, the assumptions being made. Interviewees will inevitably move between innovation and knowledge management, as well as associating the two. The investigators will need time together to sort out the data and put it together into a coherent form for a report. This might start as a 'messy' process. The lead investigator should come to any meeting prepared with ideas as to how to structure the data and enable the group to move forward if the process seems stuck.

The culmination of this stage is the actual report. The format should have been agreed and outlined at the outset. We usually recommend the following headings:

1. The executive summary.
2. The brief.
3. The process.
4. The results.
5. The recommendations.

However, different organisations look for different styles of reporting. These range from the very detailed to a short and snappy presentation. But given the limited time executives have available for each and every issue they challenge, the report must have quick impact so the executive summary is a key element. Having clear recommendations for further actions is essential. But the investigators need to also indicate the implications of the actions proposed. The detail in the report is likely to prove useful for implementations and should be written bearing this in mind.

The final stage, and one which is surprisingly often overlooked, is closure to the activity. We always emphasise the need of group members for feedback, which they deserve given their contributions. Also, good management practice would suggest the need to establish 'lessons learned' and make them available to other studies.

Results & Next Steps (The Follow-Up)

The outcome of this exercise is a report for consideration by the ultimate client. If this is the Executive or Operational Board, one can expect questioning of the outcomes and recommendations. Often the quality of interrogation appears disappointing. However, in our experience, clarification is frequently called for before a decision with a further submission responding to questions posed. In such cases it appears that, due to unspoken disagreement, blocking behaviours emerge. The working group are unlikely to be able to influence this, unless they appreciate the political environment in which they are working. If they do, the executive summary and its recommendations can be designed to increase the chances of success. But this assumes unanimity within the working group. If this does not exist, members are unlikely to try and sell the outputs to their own functional head. Any residual doubts are likely to undermine the process.

Recommendations may be for the long term but with short-term actions; to be acceptable they have to be seen as bringing business benefits. One test we find useful is to ask whether they are technically feasible, economically viable and organisationally acceptable. Clearly, the more they

appear disruptive to the enterprise the more the client is going to see warning lights and risks. Also, economic viability will tax executives. A business case may be called for in order to justify any investment. Lessons learned from earlier studies of this type may assist in preparing the report to maximise its chance of success.

Of course, the recommendations may not make any suggestions for significant change. If the status quo is satisfactory but some minor tweaking would produce improvements, this is an acceptable outcome, so long as supported by evidence.

The working group may have a role in the implementation of changes. This may well be one of monitoring progress but members may be expected to be more active. In any case, again, there is the need for negotiation in order to agree the brief and other aspects identified earlier.

Real Cases (As it has Happened)

We now go on to look at three cases which illustrate innovation. We have limited our cases to one area in which innovation is taking place – a specific group of technologies. This enables readers to see some of the diversity of approach to innovation within a single sector. However, our main purpose is to draw out lessons in relation to the management of knowledge and learning.

High Throughput Technologies (HTTs) have been around for many years. In practise, what they do is automate laboratory processes replacing traditional wet chemistry deploying test tubes and manual processing of experiments with highly sophisticated automated procedures in order to produce different formulations at rates undreamed of twenty years ago. Their applications are varied and used by many industrial sectors from drug development to household cleaners to testing the purity of water. Our particular interest is in how HTT can impact the company's innovation performance.

Case 1: A pharmaceutical giant

Pharmaceutical companies have to constantly refresh their drug portfolios in order to compensate for highly profitable long-standing products which are reaching the end of their intellectual protection. Drug development takes many years from discovery to availability in the drug store. Many potential compounds fail to make it and this may be after years of development and extremely high investment.
In the early 1990s, two developments offered considerable hope. In addition to HTT, which enables the more rapid development of target compounds, the science of genomics was enabling a better understanding of the nature of ailments. This led to considerable investment by this company in HTT.

Initial results appeared promising. Within 5 years the number of candidate compounds being produced rose from 2 per annum to 32. However, at this stage it was unclear whether the candidates were actually going to meet the criteria for final application. It was recognised, though, that the processes and procedures in place for managing the early stage development could be improved. *6-Sigma* and *Lean Sigma* were introduced to try and overcome bottlenecks arising as a result of the vast increase in testing of candidates and improve process efficiency.

One issue not confronted related to the metrics used to manage the process. The executives, under pressure from stakeholders and in an industry subject to rapid consolidation, were eager to demonstrate superior performance. The new processes were seen as the way forward. But gradually it began to dawn on the executives that the measurements based on candidate discovery were inadequate as a measure of performance. What transpired was that the actual success rate in drug development had only moved from 1 per annum to 2. Also, the time taken to

develop candidates had increased significantly. Compared to former approaches based around co-located interdisciplinary teams, the new processes separated the key scientists from activities formerly carried out by one team. These processes appeared not only to result in a loss of momentum but also to restrict the experimentation and learning.

But with considerable investment in new ways of doing things, where would the challenge come which would lead to a questioning of assumptions and a re-think? In effect, a small skunk works type of operation was set up to determine how the best of the traditional methods could be combined with HTT. Initially protected from all the vested interests and resistant forces within the organisation, this trial proved itself fairly rapidly. It did then lead to a major rethink of the global R&D organisation.

Several aspects of knowledge management stand out in this case:
1. Along with the rest of the industry, the rate of investment in R&D was significantly increased. But along with the rest of the industry, a new process driven approach was adopted for new product development. This cut across the traditional approach of manageable interdisciplinary teams working in focused areas. The result appears to have been a loss of rapid knowledge generation due to fragmentation, delays in the system due to unanticipated work overload and, ultimately, no improvement in output.
2. At a strategic level the programme was monitored using inappropriate metrics. These reinforced the newly adopted processes. Questioning of this approach, whilst raised at an operational level, remained unheard. Learning was slow due to a lack of openness and tunnel thinking.
3. A process-driven organisation was put in place to improve efficiency. However this overlooked the benefits of creating a knowledge sharing and learning organisation.
4. The later organisation aimed to connect staff who are potentially significant contributors to the process in diverse, multi-skilled teams.

Case 2: A chemicals company with a range of globally branded household products.

The appointment to the lab of an analytical chemist with prior expertise in HTT led to the setting up of several small-scale facilities. Difficulties were experienced in the early days in working with the technology provider due to a lack of experience outside pharmaceuticals. Further specific applications were identified and university partners introduced to enable technical problems to be overcome. This eventually led to a central HTT unit being created within the R&D facility so as to encourage project managers to consider HTT for new projects and offer a central service to support individual projects.

Other labs within the global operation were also trialling HTT and eventually connections were made so as to form a Community of Practice. The scientist who worked on the initial project was seconded part time as a technology translator to a national initiative in the UK. This enabled her to develop a good appreciation of developments in the technologies and applications in other businesses. Something she could share through the internal Community of Practice.

Innovation is seen as important to the company. Its website has a statement "Innovation is right at the heart of [the company], and our dynamic R&D environment attracts top-class scientists who enjoy the best of both worlds - being at the cutting edge of technology and seeing their work deliver real benefits daily."[1]

One manifestation of this has been the setting up of an advanced technology unit to serve R&D across the business. This includes HTT.

To date HTT has been used to improve the efficiency of R&D being adopted on projects where there are clear benefits. Its use has also been extended into engineering where it can eliminate the

need for pilot plants prior to scaling up operations. However, the focus has been very much on the R&D function rather than the development of innovative new products. The business development function in each business unit is located physically at some distance from the R&D function and unlikely to have any understanding of the potential for HTT. This probably restricts its application in new product development.

Looking at issues relating to knowledge management we observe:

1. Several parallel initiatives started in R&D departments across the world. It took some time for these to become connected. A community of practice as eventually formed to enable experience sharing, joint problem solving and the building of a case for further development.
2. The bottom-up approach enabled capability development but progress was hampered by the lack of a clear champion well connected across the business unit and, ultimately, the organisation overall.
3. There appears to be little exchange of information and knowledge across the organisational stovepipes. E.g. business development and R&D. This did not seem to be an issue for management.
4. The community of practice crossed organisational boundaries but focussed exclusively on R&D. It was self-organising.
5. The importance of technological advances in R&D has now been recognised at a strategic level. The result is the bringing together of HTT with other developments. This should provide a platform for capabilities development and formalises the community of practice into a more powerful unit. The outcome should be project acceleration.

Case 3: A chemical giant operating in business-to-business and consumer market.

In this firm HTT started life in the company's Strategic Technology Group. The business is challenged by the possibility that, at some stage, its materials suppliers may change the business model by leapfrogging the intermediary and deliver direct to the end user. As a result, there is strong pressure to identify ways in which the company can add value for its customers beyond that of any alternative supply model.

When the company initiated its entry into HTT, the supply base of technology providers was inadequate to meet the demands of the type of project being undertaken. As a consequence, a decision was taken to develop internal capabilities. External providers are used but the principal emphasis is on in-house development. A centralised approach offered an affordable entry into HTT. Developing applications internally has led to the early surfacing of problems and the acquisition of resources to overcome them. One of the key problems identified was that of finding meaningful methods to analyse the vast quantity of data. In particular, this requires a different disciplinary basis to that used traditionally in new compound development. There initial explorations with HTT enabled these problems to be resolved prior to a roll out to the labs of operating companies. Whilst the use of HTT for catalysis is well established, it has limited application. Understanding how HTT might improve other processes was seen as important prior to any rollout to operating companies.

Also, issues of competence development in order to increase the flexible application of HTT requiring reconfiguration by a multi-disciplinary team needed. Also issues of competence development in order to increase the flexible application of HTT requiring reconfiguration by a multi-disciplinary team needed exploration. Another advantage of internal development is the control it offers over the firm's intellectual property. In adopting a strategic approach the firm has taken advantage of HTT in building relationships with key clients. The firm sees clear advantage in being able to offer customers the capability of HTT to more quickly tackle product deficiencies or work on new product development. This helps lock out the suppliers of raw materials from the firm's position in the supply chain.

The company's Technology Board is responsible for identifying projects to be pursued by internal R&D. Investment on HTT is also determined at this level. This results in a top-level review of HTT applications, and to investment linked to the firm's technology strategy. But to some degree, the business development function has driven the adoption of HTT. They have recognised the potential of the latter to impact on new product development, both in terms of product formulations and in speed and cost to market.

There are examples of where HTT has had an impact either in terms of speedier progress through stage gates or improved through processes in the lab. These stories are used to promote HTT throughout the firm. However, the impact of HTT is not easily measured since the technology enables the scientist to be more effective but the outcome is heavily dependent upon scientists and the quality of their experimental design

It is recognised that for technology to be really successful, everything must be fully integrated from experimental design through to data storage on fully searchable databases. The knowledge management system has to support extensive searches.

The following observations are offered relating to knowledge management in this case:
1. Centralised development enabled a small core group working closely together to achieve a high level of mastery in a rapidly developing technical field.
2. Tightly managed trial applications exposed a key knowledge management issue, namely the production and subsequent management of vast amounts of data. If the data cannot be translated into information, and then, through skilled analysis, to new knowledge, there will be no benefit from HTT. Also, if it cannot be stored in a way, which enables meaningful searches at some later date, it loses effectiveness. A holistic approach is needed in order to integrate all elements into an effective system.
3. Linkages are in place across the firm which enable key decision makers to monitor potential impact.
4. The use of the technology is not confined to improving R&D effectiveness but supports key customers in the generation of new knowledge in timely fashion.
5. Early stories of successful applications have been used to create technology pull from operating divisions but any new investment is against a strong business case.

Tips & Tricks (To-Do)

þ Plan, plan, plan! For the consultant it is essential that good planning be carried out at each step. This involves reflection on lessons learned and the exploration of alternative next steps.

þ Ensure a well-articulated brief and process is agreed at the outset.

þ Make sure that the findings in the report have strong evidential support.

þ Maintain good communication with interested stakeholders.

þ Practice good principles of knowledge management.

Potholes (Not-to-Do)

Ý Avoid non-participation within the working group. Good facilitation will ensure measured contributions from members, as well as making people feel good about their involvement.

Ý Avoid the working group jumping to premature conclusions and perpetuating their entrenched views on a way forward. Again, good facilitation is key.

Ý Do not rush the final report. Get comments from others to test out ideas and respond where appropriate.

Ý Do not terminate the working group without getting closure. You might need their input later!

Acknowledgements

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Co-Creation Methodologies to Set and Measure Knowledge Value Indicators

Paolo Petrucciani
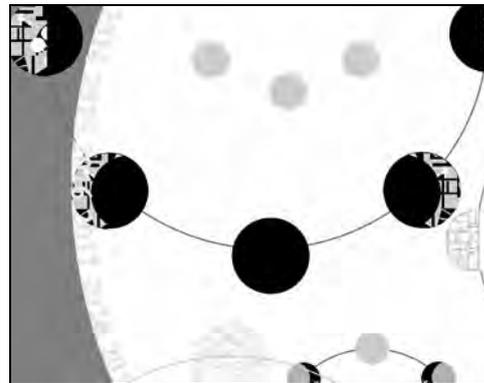
Co-Creation Methodologies to Set and Measure Knowledge Value Indicators

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Snapshot (Quick Learning)

The objective of the paper is to illustrate **a working protocol**, composed of some mixed, cascaded and linked workpaths or phases, utilizing different techniques, tools and methodologies, in order to promote **widespread/collective awareness of** extrinsic or intrinsic **knowledge assets value**.

The methodologies presented are based on collaborative and shared identification criteria of a knowledge value indicators' system, for their subsequent measuring, evaluating and monitoring over time. In this sense the **value of knowledge for a company or organization** is a relative, evolutionary and semi-stable one and may depend mainly on the part of the organization involved in these topical decisions (Sveiby, 2006): top management, experts and/or professionals who each have their own perception of how to measure knowledge (e.g. revenue, profit, quality, culture, organizational alignment, etc.).

The **knowledge value indicators (KVI)** identified make it possible to measure periodically the exchange of experiences and knowledge that take place within a company (Petrucciani, 1990) and to consider at the same time their trend/situation over time to foster mainly:

- knowledge creation, utilization, re-use and their adjustments and alignments for a company's benefit and to increase its value;

- direct organizational initiatives to facilitate knowledge exchange on the job;

- the creation of communities of practices (CoP) and working groups (Dalkir, 2005), also on a semi-permanent basis, based on critical knowledge-sharing;

- organizational and cultural alignment;

- education and training initiatives.

One of the problems you may encounter when starting a KM (knowledge management) project is to achieve agreement about the specific objectives of such a study. There is no simple solution to this issue due to the existence of a multiplicity of possibilities that you can range from, and to the roles and attitudes/behaviour adopted by different sponsors, protagonists and players within a team. Some instruments are outlined below which may facilitate the project workpath, on the grounds of a **consensual and co-created roadmap**, developed step by step, in which continuous insights by participants are focussed on 'what KM processes may imply for the company' and on 'how some knowledge indicators may be explained and utilized for an organization's benefit'.

Keywords: co-creation roadmap, consensus techniques, relevant knowledge mapping, knowledge asset valorization, new knowledge building, KM and balanced scorecard

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Context (Where & What)

The general context in which you can use this protocol, using specific methodologies and tools outlined, relates to some company/organization goals to produce rapidly and soundly a clear vision of :

1) which is the relevant core knowledge;

2) how to reach a shared and consensual knowledge asset measurement scale, based on importance, significance or value for the specific organizational context;

3) which are the ways of establishing specific KVI to collect and measure over time;

4) how to track knowledge exchange trends and new knowledge creation/building.

Typical situations, encountered several times and with different clients, prompted me to try to answer, from a KM consulting perspective, the following issues and questions, working on approximations and the continuous improvement of tentative methods. These include:

- **issue-question 1**: the evaluation of knowledge value is initially not clear and/or needs to be stated precisely, at least in terms of benefits deriving from its measurement (e.g. impact on budget or balance sheets, costs, revenues, investments [extrinsic value], its impact on culture/motivation of human resources, as well as its impact on organizational effectiveness [intrinsic value], etc.);

- **issue-question 2**: the absence/scarcity of flexible and hybrid project workpaths necessary to reach more rapidly an awareness of knowledge value in a company or organization, based on co-creation and consensus;

- **issue-question 3**: the scarcity of methodological solutions which are able to permit simple maintenance of the system, with a possibility of introducing various scalable approaches (e.g. measurement scales, rankings reviews, output interpretation, etc.) to ensure the wider solidity of the protocol, even safeguarding necessary adaptability.

While you can use tools and techniques separately to reach a degree of consensus about any of the goals previously outlined , with times and ways to be agreed upon, the **complete four phase joint protocol for an ICT client case**, illustrated in the '*Make it Happen'* section lasted about four months for all the KM project and produced different sessions and timeframes. The number of people involved in the project team and committed to producing expected results were 15-20 (mainly of organizational technical units - sw applications and customer service professional community).

These methodologies and instruments are also applicable, either jointly or separately, in every social or profit/non profit organizational environments in which explicit or tacit knowledge exist, within humans or other assets, and where there is a need to better understand mechanisms to identify, create, maintain and nurture **knowledge value indicators (KVI).** In this sense the number of participants in the situation may vary from 3-4 to 15-30, depending on the complexity and final aim of the project and the required consensus about the issue.

Preparation (The Checklist)

Typical background information for the use of the tools may be various company knowledge databases (e.g. company values, company objectives, core competencies, skill inventory, service

level agreement [SLA], drivers for development strategies, quality indicators, production measures, financial/economic indicators, etc.).

The participants in the project must prepare the set or subsets of the items that need to be investigated and analyzed in various phases. The organization of these data and information is very critical for the success of KM project as is the **selection** of the **knowledge items** in which the project team or top management wants to be engaged. The commitment to produce and share a final vision or relative importance of company knowledge value is essential, and must be applied within the specific context.

In the case of the ICT client illustrated later in this paper, the preparation of material by the project team essentially amounted to a series of dedicated meetings and some back-office preparations beforehand which were assigned to team members and involved:

- the selection of eligible company experts/facilitators, either because of their importance within the organizational, or technical competencies and in-depth knowledge of organization's functioning, from both internal and its institutional clients' perspectives. The objective of the selection process was to identify correctly the best/and most significant knowledge indicators which have a direct impact on generable value by their monitoring over time (e.g. productivity gains, service quality improvements, costs savings linked to larger company know-how diffusion and circulation, system maintenance efficiency, cheapness of collection and monitoring, etc.) (one meeting with top management);

- the selection of basic indicators regarding production processes, quality systems and quality service levels, by type, by identifying the main critical success factors (two meetings of 2 hours, in team).

Toolkit (The Essentials)

In this section there is a summary and brief description of the significance, scope and necessary human interaction for three of the five tools/techniques utilized in the four phase protocol for the identification of **knowledge value indicators (KVI), while the** remaining two are described in terms of their significance only.

critical success factors (CSF) – These are useful indicators and data for top management, initially introduced by Rockart (1979), to evaluate which activities of an organization must be monitored and which characteristics/performance must be reached to ensure robust competition on the market (key business activities). **CSF** are very useful to identify, normally by senior expert panels or directors, which are the critical issues that an organization deals with and wants to track over time. A typical CSF session may take a couple of intensive hours with open discussion in a meeting room, with whiteboard and flip charts, supported by personal insights prepared beforehand . Groups or experts may range from 4 to 10 individuals. Larger numbers require a laptop for collecting and keeping a score of individual points of view (see Table 1, forward).

paired comparison – This technique makes it possible to compare and assess in pairs elements of a square matrix that has same elements on x and y axes and an empty diagonal (David, 1988, Armstrong and Murlis, 1991). **Paired comparison** is normally utilized for clarifying priorities and the relative importance of a sample or complete set to be investigated (e.g. roles, values, competencies, know-how, etc.). Any expert may work on a personal separate sheet to investigate which item is more significant than another using a square matrix. A typical paired comparison session, compiled electronically, may take up to 15-30 minutes, depending on the items to be compared. Managers, professionals or experts may range, in average, from 2 to 30 individuals.

This technique requires a laptop with a pre-compiled worksheet with 'complement to 2 formulae' (see Table 2, forward, instructions at the bottom).

collaboration matrix – This concerns a company organizational units or offices square matrix through the identification of information, knowledge and consulting requests and typical offers between various units/offices, about different issues. **Collaboration matrix** is normally utilized for clarifying, within company organizational units, 'who exchanges what with who' (others units), and makes it possible to track relevant knowledge demand-supply or exchange. A typical compilation for this matrix requires 3-4 hours of individual work by each head/person responsible for the organizational unit, to produce at the end a comprehensive organizational map (normally this compilation is done by PC or laptop with electronic sheets) (see Table 5, forward, instructions at the bottom).

While for **CSF** and **paired comparison** you may use different co-creation facilities, either paper or electronic ones (e.g. expert panels, electronic expert panels using wikis or e-mail, normal open space or small rooms with use of flip-charts or post-it, etc.), the **collaboration matrix** requires an in-depth knowledge of the organizational structure and detailed information about all organizational units under investigation (minimum at first and second layers) and needs to be filled out by paper and pencil or with specific pre-prepared worksheets, with contributions from consultants and all internal managers that know exactly 'which units utilizes which other units' for specific collaborative organizational purposes, from a knowledge demand-supply perspective (e.g. internal procedures, exchange of practice/know-how, internal technical or mutual assistance, etc.).

KPI - key performance indicators – This is a set of quantifiable measures for a company or a sector, utilized to gauge and compare strategic and/or operational performance (variable, both within the company and the industrial sector) (utilized also to measure company critical processes performance).

balanced scorecard – framework and methodology introduced last decade (Kaplan and Norton, 1992, 1996) to represent company result areas and to link strategic company objectives to operational ones, following some predefined classification and/or perspectives (economical-financial, customers, internal business processes, learning and growth)

Making it Happen (The Approach & the Action)

The overall approach outlined below for the ICT client case is basically 'an open source methodology' and adopts a specific protocol, in four phases (Petrucciani, 2006). The tools are described in this section and are also described from a technical perspective in the '*Toolkit*' section. Tangible and measurable objectives of the four phases are summarized.

Deployment and timing of the four phase joint protocol

First phase (knowledge recognition)

The first objective was to extract relevant knowledge items in collaboration with people involved in creating, using and exchanging specific knowledge. So the aim was to select rapidly some factors-indicators that would have made it possible to measure "knowledge value" for the company, both from economic, professional and specialised perspectives.

The activities of this part of the project involved an internal survey to identify which **critical success factors (CSF)** (Rockart, 1979) should be considered that have a direct impact on company services towards core clients focussing specifically on both the company performance profile and internal/external know-how circulation as "principal drivers for investigation". The

methodology utilized to identify these critical factors, subsequently transformed in knowledge value indicators, is the **balanced scorecard (BS)** (Kaplan and Norton, 1996).

Some of the principal **knowledge critical factors (KCF)** were identified in this part of the survey (the overall project team amounted to initially 49 knowledge items, subsequently reduced to 19 knowledge critical factors, of which, 8 were finally selected (for company value and impact), as well as quality system indicators of the company (certification ISO UNI EN 9001: 2002, productive processes) and 4 balanced scorecard perspectives were applied and include:

- economic-financial perspective: company value generation linked to innovative contracts content with existing clients and to traditional/innovative contracts with new clients (where innovative contracts content stands for new or more efficient technological solutions offered)

- customer perspective: applications effectiveness [defectiveness of sw applications under guarantee or not]; average delay of intervention for maintenance of sw applications running; no. of successful solutions vs customer claims inbound calls to first level call center; no. of internal users served by company knowledge base

- internal business processes' perspective: time to market [speed to release new sw products/applications]; tools for sw quality measurement

- learning and growth perspective: quantity of existing technical documentation on running applications; overall active participative level of the specialised forum (under intranet); amount of investments in specific education/training seminars which have the aim of increasing specialised and technologies-methodologies knowledge

A preliminary measurement system and periodical timeframes were then identified for each factor-indicator (Table 1).

Facilities and human interaction: The first phase involved about three meetings of 3-4 hours to produce, using **CSF technique**, a shared and co-created vision of relevant company core knowledge, named temporarily by the team knowledge critical factors (KCF). Facilitation was supported by a room for brainstorming and flipcharts.

Second phase (knowledge ranking)

The second ojective was to rank knowledge items along a shared scale or metrics in a way that there will be general agreed consensus on the final ranking.

In this phase the project team produced a system to validate, evaluate and graduate (rank) selected KCF by means of 'democratic sharing mechanisms', on the basis of 'paired comparison methodology' (David, 1988, Armstrong and Murlis, 1991) that makes it possible to vote the relative internal importance among them.

The team investigated also some **key-criteria** to facilitate the task of collecting and measuring these indicators over time, using the same 'paired comparison' methodology presented before. So the project team produced evaluations and rankings. Individual paired comparison (Table 2) and the two final templates (Table 3, Table 4) are illustrated below as well as report votes-graduations individually and collectively produced by five internal experts. Instructions for compiling the sheet are outlined at the bottom of Table 2. The sheet uses internal formulae for 'complementing to 2' the diagonal bottom-left part of the matrix, following individual choices on the diagonal upper-right part.

Table 1 – First selection of Knowledge critical factors (KCF)

FIRST SELECTION OF KNOWLEDGE CRITICAL FACTORS (KCF)

Balanced Scorecard perspectives	Sw production and assistance	Measurement unit	Periodicity
Internal business processes	time to market: speed to release new products	no. of elapsed working days/produced function points (team work)	yearly
Internal business processes	sw quality	no. of sw corrective interventions on sw applications installed on central systems	quarterly
	Sw application effectiveness	**Measurement unit**	
Customer perspective	defectiveness under guarantee	erros/function points	quarterly
Customer perspective	defectiveness not under guarantee	erros/function points	quarterly
Customer perspective	average delay of intervention on sw applications installed on central systems	time (h)	quarterly
	Documentation system	**Measurement unit**	
Customer (internal) perspective	overall audience served	no. of unique "users" that consult documentation system	monthly
Internal business processes	authors/publishers audience	no. of unique "users" that publish into documentation system	monthly
Internal business processes	quantity of produced documentation	no. of archived and/or published documents into documentation system	monthly
Internal business processes	quality/quantity of thematic archives produced and their increment in time	no. of new thematic folders introduced into documentation system	monthly
Learning and growth	quality/quantity of individual consultation needs	no. of "thematic requests" addressed by internal documentation engine (clustering)	monthly
	Forum	**Measurement unit**	
Learning and growth	active overall participative level	no. of messages and/or active users	monthly
Learning and growth	participative level to overall growth of forum knowledge (FAQ)	no. of significative FAQ (extracted by Forum)	monthly
Learning and growth	collaborative level/dynamic growth of specialistic knowledge exchange	no. of active/stable/permanent communities of professional (CoP)) (experts)	monthly
	Education	**Measurement unit**	
Learning and growth	qualitative (thematic) and total gain of company specialistic knowledge investment	no. of seminars and/or no. of total education/training days and/or no. of total participants	monthly
	Communication/Information	**Measurement unit**	
Learning and growth	general explicit collaboration	no. of meetings/presentations of internal/external experts (tacit knowledge transfer), organized monthly	monthly
Learning and growth	explicit collaboration about defined issues	no. of internal presentations/monthly regarding actual/new projects/initiatives	monthly
	Intranet	**Measurement unit**	
Customer (internal) perspective	general interest to intranet contents	no. of total average users linked to intranet daily	monthly
Customer (internal) perspective	interest rate to intranet thematic contents	no. of daily average accesses/logs to various internal web sites	monthly
Customer (internal) perspective	internal KM customer satisfaction	sending and % of replies (internal KM customer satisfaction questionnaire)	quarterly

Table 2 – Individual paired comparison – Selected KCF

INDIVIDUAL PAIRED COMPARISON - KNOWLEDGE CRITICAL FACTORS

ASSESSOR: EXPERT 5

DATE: 24 OCTOBER 2003

SELECTED KNOWLEDGE CRITICAL FACTORS (KCF)	KCF 1	KCF 2	KCF 3	KCF 4	KCF 5	KCF 6	KCF 7	KCF 8	TOTAL	INDIV. RANK
KCF 1: Time to market: speed to release products	X	0	2	1	1	2	1	1	8	3
KCF 2: Tools for measuring sw quality	2	X	0	0	1	2	1	2	8	3
KCF 3: Application effectiveness	0	2	X	2	2	2	2	1	11	1
KCF 4: Audience served by company knowledge base	1	2	0	X	2	1	1	2	9	2
KCF 5: Quantity of technical documentation produced (increment in %)	1	1	0	0	X	2	0	0	4	7
KCF 6: Overall active participation level to Company Forum	0	0	0	1	0	X	1	0	2	8
KCF 7: Qualitative (content-thematic) and overall (costs-economic-days) investment increase in specialistic, methodological and managerial knowledge	1	1	0	1	2	1	X	2	8	3
KCF 8: Interest rate to intranet thematic content	1	0	1	0	2	2	0	X	6	6

Votes for filling the sheet:
Reading from left to right:
If the indicator X (in row) **is more important** than the indicator Y (in column) then **vote 2**
If the indicator X (in row) **is less important** than the indicator Y (in column) then **vote 0**
If the indicator X (in row) **is equally important** than the indicator Y (in column) then **vote 1**

Table 3 – Collective/co-created paired comparison – Selected KCF

COLLECTIVE - CO-CREATED FINAL RANKING - KCF							
DATE: 24 OCTOBER 2003							
SELECTED KNOWLEDGE CRITICAL FACTORS (KCF)	EXPERT 1	EXPERT 2	EXPERT 3	EXPERT 4	EXPERT 5	TOTAL	COLLAB. RANK
KCF 1: Time to market: speed to release products	11	10	4	12	8	45	2
KCF 2: Tools for measuring sw quality	11	9	4	8	8	40	3
KCF 3: Application effectiveness	11	8	14	7	11	51	1
KCF 4: Audience served by company knowledge base	3	8	11	4	9	35	5
KCF 5: Quantity of technical documentation produced (increment in %)	1	5	11	4	4	25	7
KCF 6: Overall active participation level to Company Forum	4	5	2	4	2	17	8
KCF 7: Qualitative (content-thematic) and overall (costs-economic-days) investment increase in specialistic, methodological and managerial knowledge	10	5	5	8	8	36	4
KCF 8: Interest rate to intranet thematic content	5	6	5	9	6	31	6
	56	56	56	56	56	280	280
Note (*): Expert 5 voted as in Table 2					(*)		

Table 4 – Collective/co-created paired comparison – key-criteria for measuring KCF

COLLECTIVE - CO-CREATED FINAL RANKING - KEY-CRITERIA FOR MEASURING KCF							
DATE: 24 OCTOBER 2003							
Key-Criteria for measuring KCF	EXPERT 1	EXPERT 2	EXPERT 3	EXPERT 4	EXPERT 5	TOTAL	COLLAB. RANK
Criterion 1 = Measurement simplicity (calculation complexity)	14	0	8	10	7	39	5
Criterion 2 = Comprehension simplicity (clarity)	8	9	8	10	8	43	4
Criterion 3 = Social acceptability (at company level)	0	9	10	0	14	33	7
Criterion 4 = Measurableness over time (duration, permanence, stability)	6	14	9	10	7	46	2
Criterion 5 = Company strategicity (value added or value creation)	16	12	7	9	13	57	1
Criterion 6 = Comparability (with other diverse indicators)	9	4	10	8	7	38	6
Criterion 7 = General validity (improvements/worsening evaluation easiness)	3	10	10	5	2	30	8
Criterion 8 = Re-usability over time (as well for building up new indicators)	7	8	2	10	3	30	8
Criterion 9 = Easiness to collect information/data	9	6	8	10	11	44	3
	72	72	72	72	72	360	360

A **collaboration matrix** was developed parallelly to highlight and track relevant internal demand/offer processes, or the most important interactions between more critical knowledge intensive organizational units. This was done asking the heads of 12 relevant technical organizational units what knowledge was required and by which of the other 39 interested organizational units, producing in this way a simplified knowledge demand-supply organizational matrix. In other words, which technical offices were involved in internal specialised knowledge/consultancy demands/requests (customers) and offers (suppliers), based on work needs. This task was done first by paper (e.g. recording and filing of e-mail requests), and subsequently by electronic automation (Table 5).

Table 5 – Collaboration matrix (filled)

Collaboration Matrix

Technology & Know-How Area - Company organization

Systems, Networks and Data Processing | Competencies Centers

OU = Organizational Units (internal supply)

Company Organizational Units (OU)
- Clients Area (internal demand)
and
- Technology & Know-how Area (internal supply)

Column headers (Technology & Know-How Area):
- Technical assistance - OU 1
- Technical hw-sw activation - OU 2
- Innovation and Architectures - OU 3
- Systems & Networks - OU 4
- Data processing-management - OU 5
- Logical security - OU 6
- Data warehouse - OU 7
- Quality and standard - OU 8
- Sw engineering - OU 9
- Telematics - OU 10
- Work flow and documentation - OU 11
- Web technologies- OU 12

Clients Area - Company organization / OU = Organization Units (internal demand)

collaboration for external customers

Market 1
- Logistics and application activation - OU 13
- Sw application 1 - OU 14
- Operation planning - OU 15
- Sw application 2 - OU 16
- Sw application 3 - OU 17
- Sw application 4 - OU 18

Market 2
- Sw application 5 - OU 19
- Office application - OU 20
- Sw applications assistance - OU 21
- Sw application 6 - OU 22
- Sw application 7 - OU 23
- Logistics and application activation - OU 24
- Operation planning - OU 25
- Sw application 8 - OU 26
- Sw application 9 - OU 27

Market 3
- Sw applications assistance - OU 28
- Sw application 10 - OU 29
- Sw application 11 - OU 30
- Sw application 12 - OU 31
- Sw application 13 - OU 32
- Sw application 14 - OU 33
- Logistics and application activation - OU 34
- Sw application 15 - OU 35
- Operation planning - OU 36

Support
- Service center - OU 37
- New and special projects - OU 38
- External partnerships - OU 39

Technology & Know-How Area

core internal technical collaboration

Systems, Netw…
- Technical assistance - OU 1
- Technical hw-sw activation - OU 2
- Innovation and Architectures - OU 3
- Systems & Networks - OU 4
- Data processing-management - OU 5
- Logical security - OU 6

Competencies …
- Data warehouse - OU 7
- Quality and standard - OU 8
- Sw engineering - OU 9
- Telematics - OU 10
- Work flow and documentation - OU 11
- Web technologies- OU 12

Legend: OU= Organizational Unit

Indicate, at crossroads, with a shading, Clients Area Organizational Units (OU) serving institutional clients, that require (internal demand) skills, competencies and specialistic know-how from Technology & Know-How Area Organizational Units (OU) (internal suppliers).
Follow also other subsequent detailed format for the specific issue-items required

Note:

The light green zone represents demand-supply processes/activities for institutional clients (i.e when Clients Area OU require specific competencies/skills from Technology & Know-How Area OU)
The light azure zone represents demand-supply processes/activities within Technology & Know-How Area OU

<u>Facilities and human interaction</u>: The second phase required 3 weeks and was divided in two meetings of 2 hours to share and select measurement scales and selection criteria for knowledge critical factors (implicit and explicit knowledge value), and four meetings of 3-4 hours to produce, using **paired comparison**, individual and collective rankings and priorities to fine tune and make a final selection of factors-indicators, which were later transformed into **knowledge value indicators (KVI)**. The 12 matrixes required for the **collaboration matrix**, working individually and asynchronously with sheets, required a week and produced a comprehensive collective map of internal knowledge demand-supply.

economic/financial perspective   *customer perspective*

Objective 1 **Find and evaluate KM indicators to measure services performance for institutional clients**	**Objective 2** **Find and evaluate KM indicators to measure internal/external users usability (utilization, benefits)**
Objective 4 **Find and evaluate KM indicators to measure acquisition, formalization and exchange rate of new strategic company knowledge**	**Objective 3** **Find and evaluate KM indicators to measure access, diffusion, share and re-use of existing knowledge in core processes of the organization**

learning and growth perspective   *internal business processes perspective*

Template 1 – Initial objectives of company BS-KM performance management system

Third phase (knowledge performance indicators setting)

As soon as the first two phases were completed the project rapidly addressed the identification of a more analytical series of indicators, which were opportunely linked to company production processes, and made it possible to measure periodically both experiences/knowledge exchange, and progressive know-how capitalization by means of data base feeding (Petrucciani, 1986) and other internal expert systems appropriately prepared (Petrucciani, 1988).

During this phase the project mainly followed a typical performance management methodology, oriented to identify **KPI (key performance indicators)** (Kaydos, 1999).

The client, with the support of a consultancy firm, specialized in this sector, built up some basic assumptions and target representation templates showing the logical framework of the final

phases of the project. The whole setting of the work put in place is described later in this paper, linking the 4 **balanced scorecard (BS)** perspectives, **knowledge management (KM)** and **performance management** assumptions and initial objectives (Template 1).

Starting from the whole design illustrated, the project team carried out an analytical knowledge mapping in following weeks which subsequently produced several analyses concerning:

- existing/necessary knowledge typologies/maps to sustain specific core corporate processes (e.g. institutional clients contract satisfaction, overall services satisfaction, etc.)

- existing/necessary tools/instruments/calculations to measure the increase in knowledge (e.g. ratio, data, surveys, statistics, trends, etc.)

- tentative initial standard targets, expressed as specific 'units of measurement' for each indicator, mapping them all on existing core corporate productive business processes and taking into account general internal procedures of KM governance processes.

Facilities and human interaction: The third phase envisaged a more intensive and different type of teamworking. Indeed in this part, which lasted about one month and a half, the main activities involved separate analyses of the impact of any knowledge factors-indicators from economic-financial perspectives for the company [extrinsic value]. In this part of the project the client utilized a specialized performance management consulting firm to support it in identifying and setting, through previous experience, more useful indicators for the specific situation. The project involved carrying out a simplified analysis of core company processes, which were represented in terms of the most significant **KPI - key performance indicators** to be measured, which were expressed, as can be seen, also from the 4 **balanced scorecard** perspectives and were later transformed in **knowledge value indicators (KVI).** This last part required 6 meetings of 4 hours, with intense collaborative interaction with project team members to select best knowledge value indicators (KVI) for the company and deploy them with different hypothesis for collection and calculation.

Fourth phase (knowledge value indicators tracking)

The fourth objective was to produce a practical dashboard to track change (e.g. improvements, increases, decreases, trends, etc.) in these knowledge value indicators (KVI) over time within organizational units and their constituents utilizing them.

The project team rationalized the overall results attained during previous weeks and months through the:

1. final identification of objectives for balanced scorecard-performance management systems for measuring company knowledge value;

2. analytical build up of architecture of company knowledge value system and scope. The structure of the architecture represents **three organizational observations/dimensions of company knowledge value system: overall company, core production business processes, tools and systems;**

3. model/framework for company knowledge value indicators, segmented in 3 layer levels: first level-dashboard (6 items), second level-synthetic (18 items) and third level-detailed (40 items).

4. final fine tuning of the executive dashboard and other two levels KVI, for their evaluation and monitoring over time;

5. setting of a data model (for subsequent recovery and calculation);

6. procedures for collecting and processing statistical data relative to each indicator;

7. setting and creation of calculation algorithms for each indicator.

The following pages outline the last steps of the project, namely, point 1., with an explanation of final objectives of the company performance knowledge value assumptions (Template 2), point 3., with an explanation of normalized and weighed sums (Template 3), and an example of a third level-detailed indicator for the **overall company** dimensions (Template 4), and, finally for point 4., the illustration of the executive dashboard overview (Template 5) and the complete illustration of one the 6 indicators of the executive dashboard, related to **tools and systems** (Template 6), including the cascading of first, second and third level indicators.

In the last Template 6, the numbers included in green and red boxes indicate complements to 100% (delta %) in the event of not achieving (red) or achieving/over-achieving (green) established targets, as result of calculation formula for each relative indicator.

Facilities and human interaction: The fourth phase required 3 weeks and 6 meetings to produce all necessary calculations for any specific KVI. Two meetings of 4 hours were held to produce and fine tune the executive dashboard for monitoring selected KVI and introduce an initial procedure to collect internal company data.

The knowledge value indicators measurement activities started in the company during winter 2004. During that period the project team helped to find initial standards to measure and compare over pre-established periodical timeframes. In this way any subsequent measurement served to monitor improvement/worsening in any KVI (whichever dimension) and to take necessary corrective actions, including the calculation formulae.

Subsequently, in spring 2004, the knowledge management project team produced a survey based on a perceptive questionnaire about the state of the art of KM in the company, in which the participants made clear points about the improvement of the KM measurement system designed.

Template 2 – Final objectives of company BS-KM Performance Management system

For any of the 3 dimensions: 1) overall company, 2) core production business processes, 3) tools and instruments, the structure of knowledge value indicators (KVI) is articulated in 3 levels.

At the bottom there are detailed KVI, linked with operative facts.

At the middle level there are synthetic KVI, linked with managerial facts/actions, obtained as normalized weighed sum of KM detailed ones.

At the top level there is the executive dashboard, linked with company strategy and policies, obtained as normalized weighed sum of KVI synthetic ones.

The weight of each indicator (in %) express degree of importance, following and internal survey with company Directors, finalized to identify priorities for knowledge value.

Overall were defined in the project:
o 6 indicators of first level (executive dashboard)
o 18 KVI of second level (synthetic)
o 40 KVI of third level (detailed)

3 DIMENSIONS FOR KNOWLEDGE VALUE INDICATORS (KVI)

Overall company
Core production business processes
Tools and instruments

Top Management — First level – executive dashboard

Directors — Second level – synthetic KVI

Technical Managers — Third level – detailed KVI

Template 3 – Model/framework of knowledge value indicators (KVI)

Overall company

First level – dashboard
Second level – synthetic
Third level - detailed

Final objective 2 - "Make knowledge usable"

Executive dashboard – FIRST LEVEL "Make knowledge usable – at Company level"

Synthetic KVI – SECOND LEVEL 3.2 Degree of encouraging KM tools utilization

Customer perspective

third level - detailed

INDICATOR TITLE/NAME + FORMULA	INDICATOR DESCRIPTION AND RATIONALE
3.2.2 **KM accessibility degree (1)** **Width of intersection subset**: employees allowed to any specific KM driver (with a min of education: 5 days/year) ────────────────────────── total company employees $\times 100$	This indicator expresses the percentage of company employees which is allowed complete access to all "KM drivers" in the company (education, documentation system, internet, intranet, extranet, forum, press review) vs total employees. Increase in this indicator stays for a larger accessibility to KM tools within company employees..

elementary data	organizational zoom	feeding source	survey periodicity
NUMERATOR • employees registered allowed to any specific service (KM driver) with a minimum of 5 days of education in the year **DENOMINATOR** • all company employees	• all company • first layer departments	• HR data • internet, intranet, extranet users list • documentation system users list • employees activities sheets • press review users list	• half-yearly

Template 4 – Model/framework of knowledge value indicators (KVI)

EXECUTIVE DASHBOARD OVERVIEW – 6 KM Indicators – FIRST LEVEL

First level

Second level

Third level - detailed

OBJECTIVES and BALANCED SCORECARD PERSPECTIVES

OBSERVATIONS/DIMENSIONS

OVERALL COMPANY

CORE PRODUCTION BUSINESS PROCESSES

TOOLS AND SYSTEMS

economic/financial

customer

internal business processes

learning and growth

"Improve capability to satisfy institutional clients and perform better services"

1. Improve capability to fulfil company mission and relative coherences

"Make knowledge usable"

2. Make knowledge usable – at Company level

3. Make knowledge usable – at core production business processes level

"Create new processes to enhance existing knowledge diffusion and exchange"

4. Evaluate organizational levers and solutions to support KM diffusion and re-use

"Manage the knowledge life cycle"

5. Generate, accumulate and develop knowledge – at Company level

6. Generate, accumulate and develop knowledge – at core production business processes level

Template 5 – Executive dashboard for company KVI (overview)

TOOLS AND SYSTEMS DIMENSION - KNOWLEDGE VALUE INDICATORS (KVI)

Final Objective 3

"Create new processes to enhance existing knowledge diffusion and exchange"

EXECUTIVE DASHBOARD - FIRST LEVEL

code	KVI TITLE/NAME	ACHIEVED	TARGET	Δ
4	Evaluate organizational levers and solutions to support KM diffusion and re-use	50%	50%	0%

SYNTHETIC KVI - SECOND LEVEL

WEIGHT %	code	KVI TITLE/NAME	ACHIEVED	TARGET	Δ	WEIGHT %	code	KVI TITLE/NAME	ACHIEVED	TARGET	Δ
25%	4.1	Diffusion of company documentation system	38%	39%	-1%	25%	4.3	Diffusion of internan education and training	75%	77%	-2%
25%	4.2	Diffusion of company intranet system	27%	24%	3%	25%	4.4	Diffusion of competencies centers company	63%	63%	0%

DETAILED KVI - THIRD LEVEL

WEIGHT %	code	KVI TITLE/NAME	ACHIEVED	TARGET	Δ	WEIGHT %	code	KVI TITLE/NAME	ACHIEVED	TARGET	Δ
15%	4.1.1	Public publishing of new documents (into documentation system)	20%	30%	-10%	40%	4.3.1	Average intense education/training (minimum of 5 days/year)	76%	80%	-4%
20%	4.1.2	Public publishing of new documents vs all documents (in documentation system)	75%	75%	0%	60%	4.3.2	Average education/training days/year for employee	75%	75%	0%
30%	4.1.3	Degree of utilization of company documentation system	40%	35%	5%	50%	4.4.1	Degree of utilization of company competencies centers organizational units by other units	40%	50%	-10%
25%	4.1.4	Average of documents downloaded by documentation system (same department)	10%	10%	0%	50%	4.4.2	Billing days by company competencies centers organizational units for institutional clients	85%	75%	10%
10%	4.1.5	Average of documents downloaded by documentation system (different department)	50%	60%	-10%						
55%	4.2.1	Degree of utilization of company intranet system	40%	35%	5%						
45%	4.2.2	Average pages downloaded from company intranet systems	10%	10%	0%						

Template 6 – Executive dashboard for company KVI (overview)

Results & Next Steps (The Follow-Up)
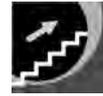
The project highlighted that the **KVI selected** are flexible, evolutionary and open to dynamic adaptation, following technological and sw application development implemented by the ICT company. The project cascading workpath adopted was, ex-ante, pre-determined and dynamically re-oriented, within the professional community involved, by means of periodical re-assessing of intermediate results.

The four phase joint protocol produced different and useful "within walls" awareness about:

- where primary and core knowledge is created, linked to products/services offered to institutional clients

- which relative value can be associated with different knowledge items

- ways of identifying specific indicators and critical criteria to measure knowledge items over time

- practical tools to discover any useful characteristic associated with knowledge items

- linking the performance management of the company to knowledge management issues and indicators

- establishing a set of knowledge performance indicators linked to core processes

- ways of and technologies for collecting data associated to these knowledge performance indicators

- building practical dashboard to monitor trends and tracking for these indicators

- useful follow-up initiatives to facilitate knowledge exchange/share on the job (education, culture, possible reward, etc.)

The type of results that can be achieved by these tools and methodologies include:

a) the degree of consensus about 'which critical knowledge is present in the environment or organization'

b) the level of soundness (either profit/non profit, social, individual, etc.) of knowledge measurement scale adopted

c) the level of depth in identifying knowledge value indicators (KVI) and their typologies (e.g. more economic-performance oriented [profit/non profit] vs more organizational-social oriented [individual/personal or collective])

d) the level of simplicity in designing the final dashboard of relevant knowledge value indicators (KVI) to monitor over time

e) the level of commitment in studying trends in knowledge exchange, creation and re-use, to produce better organizational or context effectiveness

Real Cases (As it has Happened)

Case 1 – large ICT public company

The overall protocol and specific workpath adopted in this paper were applied in a large ICT public company involved in supporting Government agencies to handle and manage a large mass of public data (sw production and technical/assistance services, including contact centers and web facilities). The primary mission of the company is to create and implement sw management applications mainly based on mainframes and on clusters of servers (more than one thousand) and PCs, with both central and local data processing and on line systems, in order to meet its own customers requests and requirements, as well as providing assistance and customer service (contact centers, web channels, knowledge base, etc.) to a large mass of users utilizing its applications. The company employs about 1600 people in various functions, and the technical staff are about 1200. The project, entitled "KM Indicators", started during summer 2003, and was launched and promoted by the Managing Director to investigate and better understand: a) how much, its own professionals, "know", "know how to do things" and "how much knowledge and how many solutions are shared" to facilitate either productive internal efficiency and capitalization of experiences acquired on the field, and b) how to set and orientate internal collaboration themes on exchange, feeding and diffusion of internal know-how, both technical and application-oriented, to foster internal growth and support institutional clients.

Shortly before this project, a preliminary survey was carried out, based on interviews and a questionnaire, commissioned by top management, aimed at investigating the state-of-the-art of KM in the company, and assessing the diffusion of already implemented internal tools (i.e, intranet, technical websites, forums, experts map, competencies centres, etc.) to enable the dissemination and circulation of specialised company know-how. The processing of data and the final report with highlights lasted one month and a half.

Activities begun immediately after to determine what the company needed for the **start-up of a KVI study**, aimed at identifying ways of measuring and evaluating the company's capability of:

- identifying the critical knowledge present in its tech population, with reference to some core specialised sectors (application sw, system and telecommunications sw, data base management, applications and technical assistance for customers, etc.)

- rendering explicit the critical tacit knowledge present within company professionals

- facilitating and optimizing internal collaboration and knowledge exchange, feeding and diffusion about technical and application-oriented matters between various professionals, mainly to foster internal growth and services to institutional clients

- producing a more efficient knowledge asset governance process, in terms of capitalization of acquired experiences and relative solutions engineering

The scope of the company project, driven forward during autumn 2003–winter 2004, also had the aim of improving the efficiency of existing knowledge governance processes (development, formalisation, sharing, re-use) to capitalize experiences acquired on the field with clients and users (Petrucciani, 2005).

A detailed workpath was put in place to identify KVI and fine tune subsequent measurement instruments (Template 7), which included:

1. an internal survey to identify critical success factors (CSF) that have direct impact on services/performances provided by the company to its customers, subsequently transformed in indicators of company knowledge value

2. the translation and attribution of these factors to 4 Balanced Scorecard perspectives (economic-financial, customer, internal business processes, learning and growth)

3. an internal survey to identify key-criteria for collecting and measuring over time knowledge indicators-factors

4. the ranking of the relative importance of knowledge indicators-factors

5. the ranking of relative importance of key-criteria, to measure them over time

6. the creation of attributes/characteristics for every knowledge indicator-factor linked to relevant organizational units knowledge demand-supply

7. the setting up of map: company business processes-phases of creation, formalization, sharing and re-use of knowledge created within the company

8. the recognition of company key-knowledge[ables] (or core competencies) linked to each business process

9. the structured identification of analytical knowledge performance indicators linked on one hand to typical company knowledge associated with each business process, and, on the other to relative objectives of same processes, to measure their value

10. the creation of top management dashboard related to selected company knowledge assets, for monitoring and assessing knowledge indicators periodically, as in a stock exchange oscillation, mainly to present the company's value and image in an innovative way.
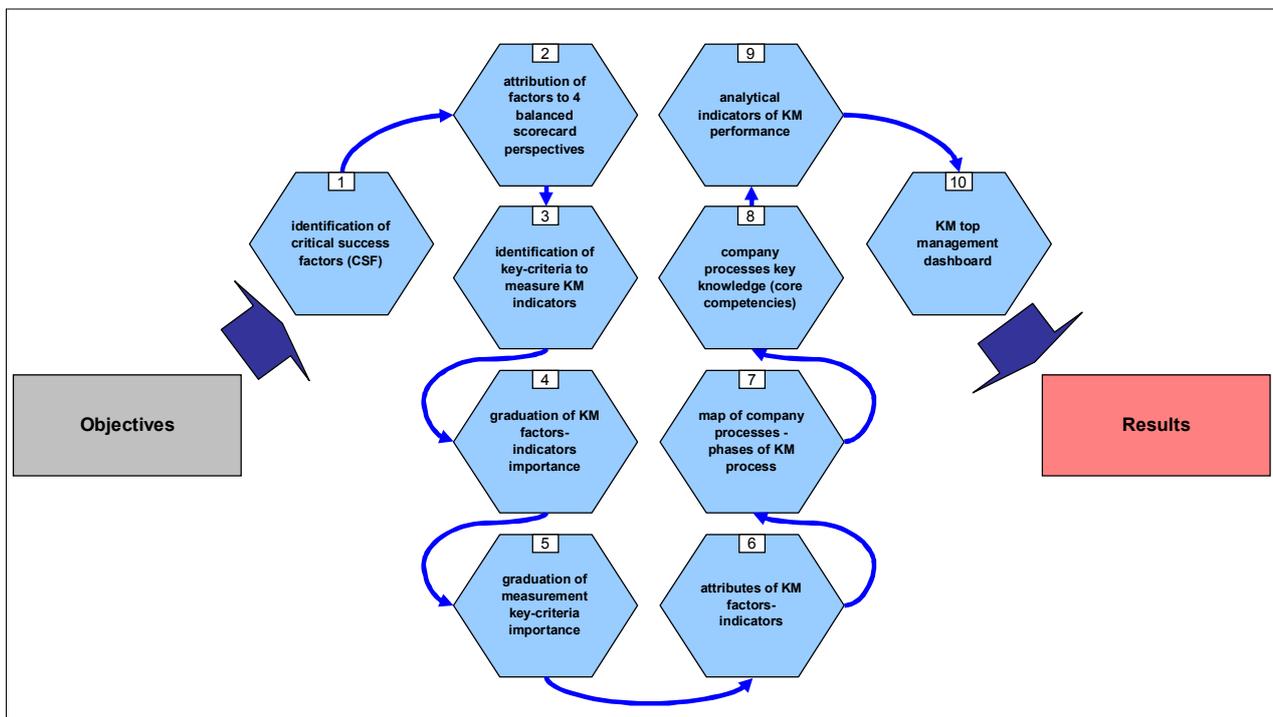
Template 7 – Workpath for ICT client case

Other cases – independent cascaded workpaths or the separate use of tools and techniques

You can work with separate tools and techniques to produce a slighter or deeper understanding of knowledge value in a company or organization. In this way you can choose to follow different workpaths, also heuristically, depending on specific company priorities and this will work rapidly or reflectively for the task. In these cases you will use an '**open approach**' with different tools for different aims and you can re-arrange subsequent ones dinamically, or stop on the way, depending on the points or milestones you want to achieve or you are satisfied with.
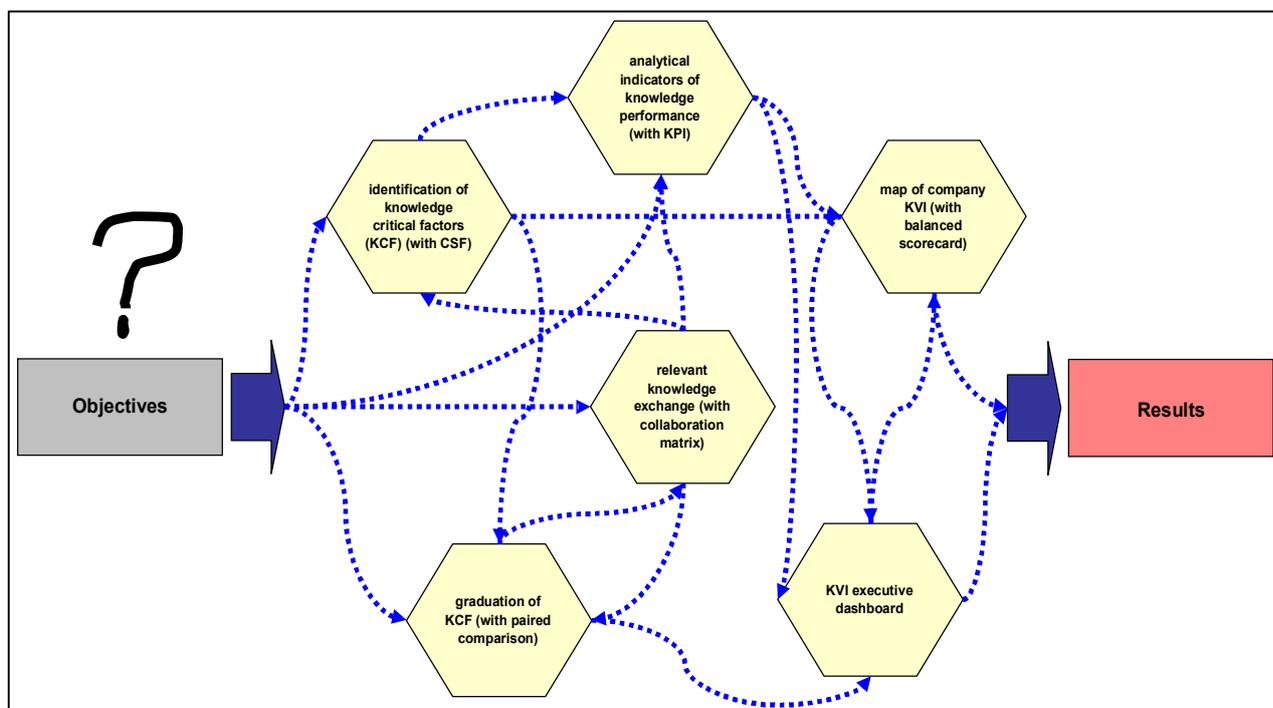
Template 8 – Independent cascaded workpaths

Tips & Tricks (To-Do)

Some practical tips are outlined that may be used to maintain the energy of the group.

☑ ensure strong commitment to achieve objectives related to giving significant added value in sharing company knowledge assets (sourcing, feeding, creating)

☑ establish a clear ex-ante project planning, specifying that any subsequent adjustments will be shared and co-created in progress by team members (democratic approach)

☑ fix precise deadlines to present results of milestones and track cumulative progress of the project, fine tuning subsequently the timeframes vs final delivery (forward-backward approach), by team members or leader

☑ enable, facilitate and foster individual point of views about the problem/phase, mainly related to personal work experiences and competencies, as a way of contributing to any innovative idea regarding company knowledge use/exploitation (dialogues/interactions)

☑ create a personal and team tension about the results of the knowledge project (e.g. reward/premium/quality policies, return on company value or company image, reputation of product/process brand, new organizational opportunities/roles, etc.)

Potholes (Not-to-Do)

- avoid any excessive personal leadership in navigating the project, it should remain the authors/members property till the end (except for top management)

- do not use fixed ways of exchanging info or tools (e.g. e-mail or knowledge repository), but on the contrary promote any large synchronous (e.g. meeting, expert panels, front-office collective interviews, etc.) or asynchronous contributions (e.g. via e-mail, wikis or other electronic tools)

Acknowledgements

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Author Biography

Paolo Petrucciani, 55, has worked in the management consultancy sector since 1988. His most recent projects concern knowledge management and change management applications. He has run his own management consultancy firm, Epistema, working mainly for large private and public companies since 2000. He obtained his first certification as CMC (Certified Management Consultants) from APCO in 1994, the Italian professional body of ICMCI (The International Council of Management Consulting Institutes). After taking a degree in Mathematics - Rome (1975), and specialising in behavioural cybernetics in UK under the supervision of Prof. Gordon Pask (Brunel University, Open University) (Richmond, 1977), he worked for 11 years in the ENI group, and later in an engineering company, as information technologist, sw analyst and system engineer (decision support systems and modeling, techniques and tools), and afterwards in a large data processing company (managerial education in ICT and innovative projects on distance learning and computer based training). He joined HayGoup in Italy in December 1988, where he climbed the professional ladder moving from consultant to senior consultant, practice leader and finally senior director, contributing to all HR and organizational issues (organization analysis and evaluation, compensation and development systems, culture, innovative projects, etc.)

Social Network Analysis: A Practical Method to Improve Knowledge Sharing
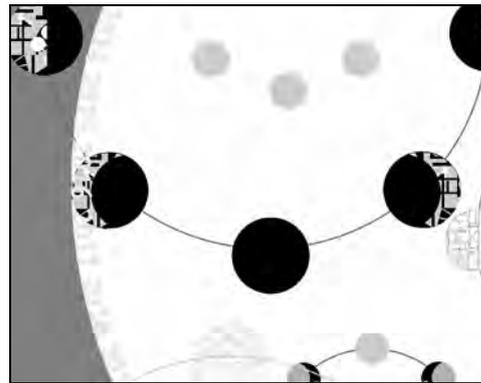
Tobias Müller-Prothmann

Social Network Analysis:
A Practical Method to Improve Knowledge Sharing

Tobias Müller-Prothmann, Pumacy Technologies AG (tobias.mueller-prothmann@pumacy.de)

Snapshot (Quick Learning)

Social network analysis is a sociological paradigm to analyse structural patterns of social relationships (e.g., Scott, 1991, Wasserman and Faust, 1994, Wellman and Berkowitz, 1988). It provides a set of methods and measures to identify, visualise, and analyse the informal personal networks within and between organisations. Thus, social network analysis provides a systematic method to identify, examine and support processes of knowledge sharing in social networks (Müller-Prothmann, 2006).

According to the literature, organisations that develop networks both internal and external to their organisation are supposed to be able to deal with knowledge more effectively (e.g., Kanter, 2001). Discussions of the role of networks in knowledge management primarily stress the importance of informal networks (as opposed to formalised networks). Furthermore, networks are often emphasised as result of an activity, i.e. "networking" (Seufert et al., 1999).

Social network analysis can help support knowledge sharing by focusing on various core applications of knowledge management, for example (Müller-Prothmann, 2005):

- identification of personal expertise and knowledge,
- research into the transfer and sustainable conservation of tacit knowledge, and
- discovery of opportunities to improve communication processes and efficiency.

While social network analysis as a method of academic research remains mostly on a descriptive level, its use and application as a knowledge management tool goes beyond a merely descriptive-analytical focus. Thus, the steps and applications outlined below provide suggestions for practical interventions and follow-up activities to influence network actors, their relationships, and network structure to improve knowledge sharing between individuals, groups, and organisational units or whole organisations.

Especially with regard to processes of inter-organisational knowledge community building, social network analysis provides a powerful tool. Based on the insights of a social network analysis, interventions can be derived to facilitate communication processes and community activities, to strengthen boundary-spanning knowledge exchange and to increase the informal inter-organisational relationships for better knowledge sharing. Therefore, social network analysis should become an integral method of organisational design and strategy to support processes of inter-organisational community building, communication and knowledge sharing.

Keywords: communities, knowledge management, innovation, social network analysis

Context (Where & What)

Knowledge, communication and their social organisation constitute the central dimensions of knowledge management. Taking this position as a starting point, the paradigm of social networks and the method of social network analysis is widely recognised as a potential approach to analyse, evaluate, and influence communication processes. Here, it is argued that social network analysis is a highly effective tool for the analysis of knowledge sharing in networks as well as for the identification and implementation of practical methods in knowledge management.

With regard to purposes of knowledge management, social network analysis may help to evaluate availability and distribution of critical knowledge and thus facilitates

- strategic development of organisational knowledge,
- transfer and sustainable conservation of implicit knowledge,
- development of core competencies (like leadership development),
- creation of opportunities to improve communication processes,
- identification and support of communities of practice,
- harmonisation of knowledge networks (after mergers and acquisitions),
- sustainable management of external relationships.

Particularly in research and service organisations, where the members' innovative potentials, creativity, and abilities for self-organisation play an important role, it is of primary interest to pool individual competencies and resources and to create synergetic effects and co-operations. Therefore, knowledge about potential core competencies and individual resources, facilitation of existing personal relationships, as well as development of new personal relationships and co-operations, are necessary prerequisites. This is where social network analysis provides a powerful tool for measuring and increasing performance of knowledge sharing.

The number of participants surveyed through methods of social network analysis may range from small groups of 10 or 20 people to large networks consisting of several thousands (or even millions) actors. Limits are not set by methods of social network analysis itself, but only by empirical conditions and available resources to observe network actors and their relationships.

Social network analysis can help to gain useful insights into network structures and roles using simple patterns of relationships (like who talks to whom) based on a single event of data collection (questionnaire, email analysis, document analysis) with a minimum effort in terms of time and money. A more sophisticated analysis could include various dimensions of relationships, data collection from different resources, and longitudinal studies with continuous data collection (e.g., email traffic) or multiple surveys (e.g., monthly, weekly). Implementation of results from social network analysis would need follow-up activities, e.g., workshops and team development, and thus involve more personal involvement and additional resources.

Preparation (The Checklist)
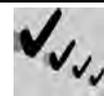
Social network analysis uses various techniques to empirically identify underlying patterns of social structure. It compares the existing patterns and their influence on specific network behaviour variables and performance outcomes. From the perspective of knowledge management, social network analysis helps us identify basic network properties, positions of network members, characteristics of relations, cohesive sub-groups, and bottlenecks of knowledge flows.

The application of social network analysis for the examination of organisational knowledge sharing as proposed here is divided into seven steps:

1. clarifying objectives and defining the scope of analysis (knowledge domain),
2. developing the survey methodology and designing the questionnaire,
3. identifying the network members,
4. collecting the survey data and gathering further information from other resources,
5. analysing the data through formal methods of social network analysis,
6. interpreting the results of analysis,
7. designing interventions and taking actions.

Preparation of the network analysis should focus on steps 1-3.

First, for purposeful examination of networks, the scope of analysis must clearly be defined. The analytical scope might be defined by existing problems within a concrete domain of knowledge. Needs for doing a social network analysis could also be identified through means of knowledge audits within one or a selection of various knowledge domains that is of critical importance for success or failure of an organisation.

Second, a methodology must be developed that meets the specific need to reach the goals defined in the previous step. In the majority of cases, application of social network analysis in knowledge management uses surveys for the collection of data. But analysis of knowledge communication should also make use of all other available resources that are suitable to identify social relationships with regard to the defined scope. Basically, these could include expert interviews, email tracking, observations, and other relevant documents (e.g., meeting protocols, publications). As a result of the second step, a survey method (questionnaire) should be at hand.

Third, for the analysis of whole networks, all network participants must be identified. Identification of network members makes use of specific attributes like organisational membership, specific expertise, or participation in teams and projects. Identification of network members is closely related to the defined scope of analysis. For analytical purposes, this step also defines the network's boundaries for empirical study. Nevertheless, the real network relationships may go beyond these boundaries. While this so-called positional approach seems to be most useful for organisational network studies, another method to identify network members is the reputational approach, where a list of nominees is produced by knowledgeable informants ("snowballing"). This approach is useful for the analysis of networks across organisational boundaries when there are no positional inclusion methods available, but boundary specification remains an empirically unsolved problem.

Finally, all participants should be provided with background information about the goal of the social network analysis and its importance. Communication activities should create personal involvement and organisational openness for the social network analysis (see also Tips & Tricks and Pot-holes).

Toolkit (The Essentials)

As outlined for the methodology conceptualisation above, in the majority of cases, social network analysis as a knowledge management tool uses surveys for data collection.

Data collection through surveys must be scheduled within an appropriate period of time. Calls for participation should individually address each network member.

Data analysis of social networks needs coding of the collected data and application of formal methods. Using graph theory, a sociogram visualises networks and their structures (see figure 3). It consists of nodes, representing individual network members, and ties, representing the

connections between the members (relations). Formally, graphs are defined as a set of actors (g - nodes) and a set of of their relations (l - lines). The set of actors N is defined by the nodes {n_1, n_2, n_3, … n_g}.

Another advocated means to represent information about social networks is in matrices. In their simplest form, network data consist of a square matrix, the rows of the array represent the network actors, the columns of the array represent the same set of network actors, and the elements represent the ties between them (so-called "adjacency matrix"). Ties can exist or not, and they can be dichotomous (0 or 1) or valued (e.g., 0, 1, 2, 3 or 4 – see figure 1). These matrices are also used as data input for social network analysis processing (for an introduction to graph theory and the use of matrices in social network analysis see, e.g., Scott 1991).

Commonly, data processing is done through software tools for social network analysis as provided by the popular UCINET package (Borgattie et al., 2002), for example, including the additional tools NetDraw for network visualisation, Mage for 3D visualisation, and pajek for large networks, or other similar software applications.

UCINET Spreadsheet -- D:\Privat\TMP_DISS20050319\FHGD3\NW\r2_nfre...

File   Edit   Transform   Fill   Labels   Options   Help

	281	272	271	263	262	261	254	253	252	251	250	249
281	0	0	1	0	0	0	0	0	1	1	0	
272	0	0	4	0	0	1	0	1	0	1	0	
271	1	4	0	0	0	0	0	0	1	1	0	
263	0	0	0	0	4	4	0	0	0	0	0	
262	0	0	0	4	0	4	0	0	0	0	0	
261	0	1	0	4	4	0	0	0	0	0	0	
254	0	0	0	0	0	0	0	0	0	0	0	
253	0	1	0	0	0	0	0	0	0	3	0	
252	1	0	1	0	0	0	0	0	0	2	0	
251	1	1	1	0	0	0	0	3	2	0	0	
250	0	0	0	0	0	0	0	0	0	0	0	
249	0	0	0	0	0	0	0	0	0	0	0	4
248	0	0	0	0	0	0	0	0	0	0	0	2
247	0	0	0	0	0	0	0	0	0	0	1	3
246	0	1	0	0	0	0	0	0	0	0	0	3
245	0	0	0	0	0	0	0	0	0	0	0	4
244	0	0	0	0	0	0	0	0	0	0	0	0
243	0	1	1	0	0	0	0	0	0	0	0	3
242	0	1	1	0	0	0	0	0	0	0	0	3
241	0	1	1	0	0	3	0	0	1	2	1	
234	0	0	0	0	0	1	0	0	0	0	0	
233	0	0	1	0	0	1	0	0	0	1	0	
232	0	0	0	0	0	0	0	0	0	0	0	
231	1	2	1	1	0	4	0	0	0	0	0	
224	0	0	0	0	0	0	0	0	0	0	0	
223	0	0	2	0	0	1	0	0	0	2	1	
222	0	1	0	0	0	1	0	0	0	0	0	

Current cell:
Row: 0   Col: 0

Dimensions
Rows: 56   Cols: 56

Mode
● Normal
○ Symmetric

1

Figure 1: Adjacency Matrix in the UCINET Spreadsheet Editor

Making it Happen (The Approach & the Action)

Social network analysis, as understood here, is a method to improve knowledge sharing through analysis of positions and structures between people, i.e. their relationships. From an analytical point of view, it remains on a descriptive level. Nevertheless, the methodical steps and applications presented here go beyond a merely descriptive position of a neutral passive observer in that they provide suggestions for practical interventions and follow-up activities to influence network actors, their relationships, and network structure to improve communication of knowledge within and between individuals and organisations.

Network data is commonly analysed by use of software tools as mentioned above. Data analysis itself is complex and its explanation in detail goes far beyond the scope of this chapter. Here, only those network concepts and metrics are explained that play a central role for knowledge sharing in social networks within and between organisations.

The interpretation of results of a network analysis can be distinguished according to three different analytical levels:

1. interpretation of the whole network;
2. interpretation of clusters and components;
3. interpretation of individual positions.

For the case of knowledge sharing within social networks, three whole-network measures should be taken into account due to their basic relevance:

The *size* of a network is defined by counting its members (nodes). It is a basic property of a network – directly sharing knowledge between all members of a large network (e.g., between 100.000 employees of a multinational enterprise) would be extremely difficult compared to sharing knowledge between all members of a small network (e.g., within a research team).

Network centralisation is the global centrality of a network and measures the degree to which relationships within a network are focused around one or a few central network members. High network centrality means that knowledge flows within a network are dependent on few single nodes, i.e. removal of these network members means corruption of knowledge flows.

Density is defined as the total number of ties divided by the total number of possible ties. As a measure that is especially relevant for knowledge community building within and between organisations, density describes the overall linkage between network members.

Three basic types of network structures have been found in the literature and in the case study presented below to be central for processes of knowledge sharing:

Sub-groups and *clusters of expertise* are build through dense connections between sub-sets of network members. They are important for understanding the behavior of the whole network. For example, organisational sub-groups or cliques can develop their own culture toward knowledge sharing and their own attitude toward other groups.

Cut-points build bottlenecks for free flows of knowledge. They emerge when networks are split into loosely coupled components. Network members of pivotal significance in holding components together are also called bridges. While bottlenecks are critical to knowledge sharing within a network, too many links can lead to inefficiency of knowledge exchange. Therefore, links between sub-groups must be coordinated effectively and efficiently.

Hubs are enablers of effective knowledge transfer. As networks are clustered, some members are important as simultaneous actors in many clusters. These are known as hubs. They can effectively link different sub-groups of the network and facilitate knowledge flows, e.g.,

between different departments or to external resources. On the other hand, network efficiency can be strongly dependent on hubs, i.e. they provide a potential risk to the overall functioning of the network.

On the level of individual positions, the following roles and positional models of social network analysis are of primary importance with regard to knowledge sharing (see also figure 2):

Degree centrality is an indicator of expertise and power of network members. It measures the incoming and outgoing connections held by an individual network member. For non-symmetric data, incoming connections (in-degree) define the popularity of a member; those with many ties are members who are considered particularly prominent or have high levels of expertise. Out-degree defines the number of outgoing connections; a person with a high out-degree is considered particularly influential in the network. Thus, degree centrality is a measure that helps to purposefully support individual members in a knowledge network.

Closeness centrality shows the integration or isolation of network members. It measures the reachability of members by including indirect ties. Closeness centrality focuses on the distance of a member to all others in the network through means of geodesic distance and thus, determines a member's integration within the network. High closeness centrality indicates the greater autonomy of an individual person, since he or she is able to reach the other members easily (and vice versa). Low closeness centrality indicates higher individual member dependency on the other members, i.e. the willingness of other members to give access to the network's resources.

Betweenness centrality helps identify knowledge brokers and gatekeepers within a network. It is a measure of the extent that a network member's position falls on the geodesic paths between other members of a network. Thus, it determines whether an actor plays a (relatively) important role as a broker or gatekeeper of knowledge flows with a high potential of control on the indirect relations of the other members. In innovation and knowledge management literature, the role of brokers and gatekeepers is always stressed as being of overall importance and it is considered advantageous to identify gatekeepers, since they are performing a vital role in knowledge communication processes.

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UCINET 6 for Windows -- Version 6.104
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How to cite UCINET:

Output Log #1

File  Edit

Log File Number 1

MULTIPLE CENTRALITY MEASURES
--------------------------------------------------------------------

Input dataset:                  D:\Privat\cfp\kb_handsonknowledge\r2_nfreq
Output centrality measures:     D:\Privat\TMP_DISS20050319\FHGD3\NW\Centrality

Important note:
This routine automatically symmetrizes and binarizes.


Normalized Centrality Measures

                        1          2          3          4
             Degree  Closeness  Betweenness  Eigenvector
          ------------- ------------- ------------- -------------
 1  281     9.091     16.616      0.024       6.669
 2  272    29.091     17.350      0.434      24.090
 3  271    40.000     17.857      2.532      28.737
 4  263     9.091     16.566      0.033       7.141
 5  262     7.273     16.369      0.000       5.676
 6  261    36.364     17.857      3.003      25.892
 7  254     0.000                 0.000      -0.000
 8  253     7.273     16.517      0.000       6.154
 9  252    16.364     16.975      0.611      11.970
10  251    25.455     17.296      1.132      17.940
11  250    18.182     16.667      0.298      11.744
12  249    20.000     17.028      0.245      15.242
13  248    16.364     16.616      0.106      11.531
14  247     9.091     16.224      0.063       5.735
```

Figure 2: UCINET Screenshot of Centrality Measures

Strength and *multiplexity* of ties: Strength (or intensity) of communication relationships between members is commonly measured in terms of frequency of contacts. Focusing on the nature of linkages more closely, network members may maintain a tie based on one single type of relationship only or they may maintain a variety of relations. The latter is known as multiplexity of ties. Network multiplexity is the relation between the number of actual multiplex ties and the number of possible multiplex ties in a network. On the one hand, multiplex (strong) relationships share more intimate, voluntary, supportive and durable ties and thus, form a solid basis for trust. On the other hand, most people only share a small number of strong relationships, so that especially weak ties are a warranty for access to a large variety of resources (see the popular study about "strength of weak ties" by Granovetter 1973). With regard to communities of practice, the importance of multiplex relationships gives reason for various kinds of community building activities that are a prerequisite for shared identity, trust, and mutual understanding.

In addition, measuring the boundary-spanning character is of primary interest when analysing knowledge sharing within inter-organisational networks. As applied in the case study below, this can be done very easily by means of social network analysis. The *E-I index*, as formulated by Krackhardt and Stern (1988), simply measures the ratios between external ties (between different organisational units) and internal ties (within organisational units) and normalises them to a value with a range of -1.0 to +1.0. An E-I index of -1.0 would indicate that only internal relationships exist, while all relationships would be external for an E-I index of +1.0. The E-I

index provides not only a measure for the boundary-spanning character of inter-organisational networks (or of networks between organisational sub-units), moreover it can be used as an indicator of the identity of the network members, i.e. their internal or external orientation. It must be noted that there is no optimum value of the E-I index. The desirable relation between internal and external links is always dependent on the circumstances of a specific situation.

Results & Next Steps (The Follow-Up)

The method of knowledge network analysis as presented here aims at the analysis of network structures and positions within a clearly defined scope of analysis, i.e. a specific domain of knowledge. The interpretation of results based on the basic measures of social network analysis as outlined above must include the existing organisational conditions.

With a focus on knowledge sharing, interpretation of individual network members is of primary importance. Here, four different roles can be considered as being essential (Müller-Prothmann, 2006):

- *Experts* who have detailed and specific knowledge and experience within the domain of analysis. They have a central network position, mostly with a high number of external linkages.
- *Knowledge brokers* who have some knowledge of who knows what. They build bridges between different clusters of otherwise unconnected sub-parts of the network.
- *Contact persons* (or agents) who take a brokerage position in that they provide the contact with the experts without actively communicating the relevant knowledge themselves. They have an intermediary position between central (experts) and peripheral (consumers) network members.
- *Knowledge consumers* who ask for knowledge from the experts. They have a peripheral network position.

Given the positional and structural network metrics as well as the subsequent validation of the results and interpretation through the network members themselves, interventions and activities to improve network structures and relations for better knowledge communications can be derived and conceptualised.

As a result of a social network analysis that aims at leveraging knowledge sharing, interventions and follow-up activities may focus on

- development of personal competencies and expertise;
- integration of hidden expertise;
- exploitation of marginally connected members;
- promotion of cross-departmental knowledge transfer.

The examples outlined in the case study below will give some illustrative examples for interventions and follow-up activities.

Real Cases (As it has Happened)

Here, a real case illustrates the application of social network analysis as a method to support inter-organisational knowledge community building between research institutes of the Fraunhofer-Gesellschaft, a large German organisation for contract research in all fields of the applied engineering sciences. The study was undertaken due to concrete organisational needs and its results were used to provide practical solutions for interventions and follow-up activities (Müller-Prothmann et al., 2005).

Institutionalisation of knowledge transfer was studied with regard to the development of the informal contacts between the community members and the inter-organisational linkages on an aggregated level. The main focus was put on the relationships of knowledge exchange between the formal organisational boundaries and the informal inter-organisational network structures.

The Fraunhofer-Gesellschaft started activities for the sharing of expert knowledge by establishing a Knowledge Management (KM) Community with experts from all the different research institutes. Data for the network study was collected through two on-line surveys at different points in time, the first shortly after a community meeting in October 2004 (=t1), and the second at the end of February 2005 (=t2). 38 of 56 people answered the questionnaire in the first network survey (t1), which equals a high return rate of 67.9 per cent. In the second network survey (t2), 35 of 56 people participated, which amounts to a return rate of 62.5 per cent. Names of network members have been replaced by numbers, grouped by affiliation to the different research institutes (headquarters and 17 research institutes).

Expert knowledge communication and networking processes were evaluated by a multi-level approach. The patterns of communication structures between the community members were studied with regard to the following dimensions: (1) intensity and relevance of contacts between the members, (2) domain-related communication patterns, (3) use of information and communication tools, (4) importance of community activities with regard to general information exchange, transfer of specialised knowledge and expertise, joint projects and cooperation, and (5) relevance of community activities with regard to individual tasks of the community members and with regard to networking activities across organisational boundaries.
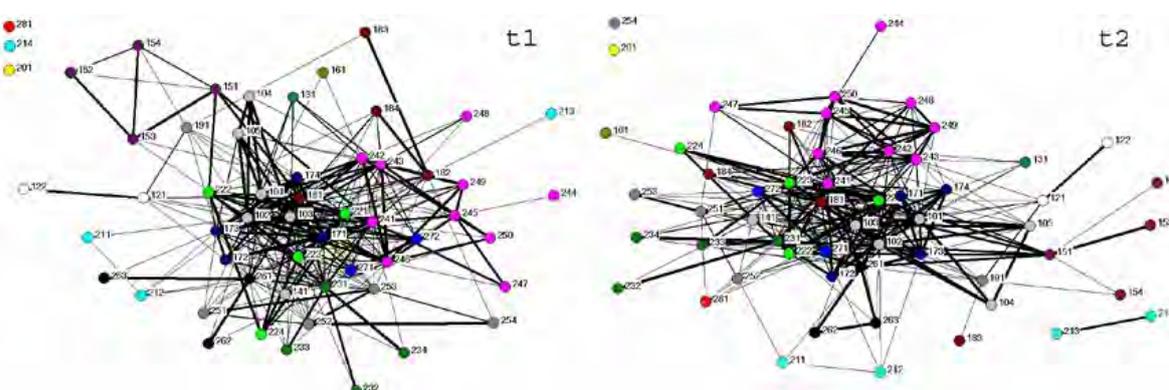
Figure 3: NetDraw Visualisation of Communication Networks in t1 and t2

The general communication network in t1 integrates all actors, except for three isolates. In t2, we can find a dyadic component and two isolates besides the main component (see figure 1). Network centralisation of the main component marginally decreases from 0.4672 in t1 to 0.4282 in t2 and density marginally increases from 0.4311 in t1 to 0.4585 in t2, both on a medium level. Indicated by the measure of the E-I index, internal linkages within the research institutes clearly dominate the external linkages between the different institutes, with a marginal shift to more

inter-organisational relationships from t1 to t2 (see table 1). The networks related to a specific domain include different actors and vary in size, density, and centralisation.

Table 1: E-I Index in t1 and t2 (isolates excluded)

	t1	t2
E-I index	0.532	0.546
expected value	0.856	0.862
re-scaled E-I index*	-0.455	-0.434

* For given network density and group size the range of the E-I index may be restricted and therefore it is re-scaled to a range from -1 to +1.

Findings suggest that community building may prove to be an effective measure to overcome organisational boundaries. The overall communication network integrates almost all members and specific domain-related network activities especially gained importance during the period of observation of approximately four months. Results of the network analysis can contribute to the development of clearly focused interventions to further facilitate the network relationships and strengthen the community building process across organisational boundaries.

Based on these insights, suggested interventions include

- better integration (or exit) of isolated and marginally involved members – or, alternatively, their exploitation in their role as "lurkers";
- promotion of central members within the community and with regard to specialised topics as coordinators or moderators;
- putting a stronger focus on topics of primary relevance;
- strengthening domain-related core-groups by providing additional resources.

Various follow-up activities, based on the results of the analysis, were undertaken to further leverage the boundary-spanning knowledge community building process. The first very basic but nevertheless extremely useful kind of intervention was to present the results at a follow-up meeting and discuss them with the community members themselves. As Cross et al. (2002) wrote, simply ask people to spend five minutes on their network visualisations and "to identify what they 'see' in the map, the structural issues impeding or facilitating group effectiveness, and the performance implications for the group". The presentation of results impressively demonstrated the integration of almost all community members, the primary role of a few central actors, and the strong connections established through a project of joint research, integrating a large number of members from different institutes.

The primary importance of joint projects as a driver to strengthen inter-organisational relationships, as highlighted by the results of social network analysis, led to the initiation of follow-up projects and extended acquisition activities. In addition, joint efforts were made to improve marketing instruments for the specification of the community's profile.

The future agenda of follow-up activities based on the social network analysis could include developing rules of inclusion and exclusion. Results of the social network analysis also showed a prominent role of the headquarters for coordination and facilitation tasks of the community organisation. Since the community should become more self-sustained, members of the headquarters made efforts to successively withdraw their engagement as community coordinators. Selected community members from the various research institutes were encouraged to take more initiative on their own. Results of the social network analysis could help identify the key players from the research institutes within the community and to promote them as coordinators or moderators with regard to their specialised domains of knowledge.

Tips & Tricks (To-Do)

☑ Create personal involvement and organisational openness! Internal communication between involved people, involved departments, and other third parties during an early stage of the process is highly important to reach successful results of social network analysis.

☑ Provide information and make all involved people sensible for social network analysis! The target group, which is subject to study, and all other involved parties should be informed about the next steps and should be provided with basic background information and goals of analysis.

☑ Articulate the relevance and importance of social network analysis! Management on the middle and top level should clearly communicate strategic relevance of the network analysis for the whole organisation (or the organisational unit that is concerned).

☑ Facilitate straightforward actions! When personal involvement and the willingness to participate in the social network analysis is reached, it must be ensured that there are no other organisational or technical barriers that hinder straightforward actions. For instance, these include a questionnaire that is easily accessible in terms of technical aspects.

Potholes (Not-to-Do)

☒ Privacy issues: It is of primary importance to assure confidential handling of all data and to clearly communicate this confidentiality through the publication of privacy guidelines, for example. Confidential handling of data includes:

- anonymisation of all personal data and analysis of de-personalised data only,
- security of stored data,
- authorisation and control for data access,
- data analysis through confidential persons only.

☒ Existing concerns about exploitation of knowledge and expertise or negative sanctions: Social network analysis includes the description of the characteristics of individual network members like social behavior, influence, expertise, control, and power. Since the network analysis aims at improving knowledge sharing, the evaluation and assessment of the individual member and his or her preferences is definitely not the subject of analysis. Therefore,

- Social network analysis should not be abused as a tool for evaluation and assessment of employees,
- imposition of sanctions as a direct result from network analysis must be avoided,
- communications should highlight (positive) outcomes and not individual mistakes.

☒ All concerns should be taken very seriously and met by means of active communication so that barriers can be gradually removed. Guarantee of anonymity, careful use of collected data, as well as privacy agreements are necessary preconditions to reach successful results.

☒ Finally, it always has to be considered that social networks dynamically evolve over time. Network structures and positions may rapidly change and, often, a social network analysis is nothing more than a snapshot. Nevertheless, it is a powerful tool to gain useful insights into social structures and processes of knowledge sharing.

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To Know What You Know At the Right Time:
Knowledge Visualisation and Sharing Via a Cartographic Process-Oriented Approach

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Robert Neumann
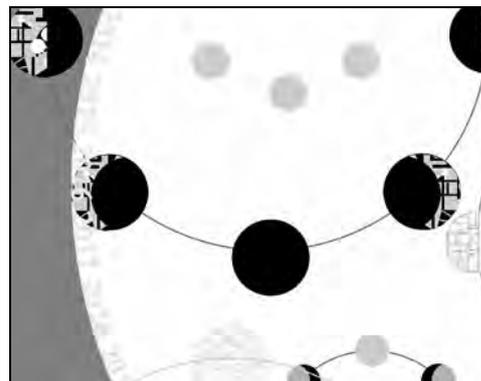
To Know What You Know At the Right Time: Knowledge Visualisation and Sharing Via a Cartographic Process-Oriented Approach

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Snapshot (Quick Learning)

The visualisation of knowledge gives transparency about the individual competences of the organisational members and about collective knowledge in the company. For this reason it makes sense to transfer this knowledge to external knowledge owners (following secure paths and creating a win-win situation), to integrate external knowledge via cooperations. (Probst/Raub/Romhart 1997)

Competence Centers (CC), as a special kind of cooperation, offer the ability to specify the competencies and the transfer of experience, knowledge and know how between institutions (representation of science) and companies (representation of economy). Through the multidisciplinary position of CCs different areas of conflict (operational duality) arise. The following article demonstrates the relevance of the different kinds of visualisation and the preceding incentive systems to transfer knowledge, together with the abilities and barriers of the system.

First the different contexts in which the method can be used are discussed and analysed, giving background knowledge about the importance of CCs and their special focus. Second the important contextual framework which is needed before the official initiative (in this sense the visualisation of knowledge via a knowledge map using the five-step cartographic process) are listed, followed by the actual process-oriented method and an explanation of the five different levels. The results are summarised and visualised by the real case. Concluding we present "do's and don'ts" to generate best practices and learnings which can be used in different settings and contexts.

Context (Where & What)

Tough intentions of federal and local governments, municipality and the private, more and more centres are developed that have to fulfil intense, coordinative, intra- and extra-organisational knowledge management tasks. These, so called, Competence Centres (CC) can be seen as a kind of knowledge communities on a long-term and more formalised basis with different tasks, topics and responsibilities. They can consist of a variety of sub-communities working on special knowledge fields. The hopes and expectations on communities of knowledge are set on very high and diverse levels. Communities of knowledge should be able to create expertise in important strategic fields and help to speed up innovation and improve internal processes. They should help to implement knowledge strategies in organisations as well as share, develop, create and transfer knowledge. They should enable a way of measuring knowledge and be able to institutionalise and support knowledge management trough convincing projects and sharing "best practices" and "lessons learned". (Romhart 2002) These expectations underline the importance of an efficient and effective internal knowledge management system.

CCs as parallel and complementary concepts are a stage for communication and knowledge which favour the processes of learning, knowledge transfer, knowledge (re)generation, distribution and integration through network-activities. This means that they develop and foster networks among experts to enable the formation of knowledge on individual, team, organisational and inter-organisational level (Seufert/Seufert, 1998). Additionally they are benchmarking and are collecting best practices internally and externally. So they become a qualified partner for internal questions as well as for the transfer of knowledge in inter-organisational relationships.

Especially CCs need a well-defined process for knowledge transfer and allocation which can be fostered through a knowledge network, which is accessible for internal members and employees and external company representatives, sponsors and promoters. The goal is that CCs become a source of accumulated know-how and expertise that are processed and are accessible for all partners of the CC. Their respective duties are for example to support settlement and foundation of companies in the region, development of education and training programmes, generation of knowledge, databases for one ore more companies, the coordination of projects among partners, intensive research and development activities, the marketing and selling of products and services of cooperating companies.

The knowledge and expertise clusters link the participating companies and are assembled by their representatives. The multi-disciplinary of this community is creating internally a "productive tenseness" or "creative friction" (Leonard-Barton/Straus, 1998) which develops and enlarges knowledge. Primarily these multi-disciplinary teams have a service role. They should collect and generate knowledge, best practices and lessons learned, transfer them to partners and external knowledge units ("leading-edge-bodies", external companies, consulting companies, education and training units, research and development bodies etc.) and to ensure storage and diffusion within the respective organisation. To fulfil these tasks the knowledge and expertise centres have to work as knowledge-generating learning communities ("learning laboratories" consisting of practitioners, scientists, consultants/trainers) with the use of their common work fields and experiences to learn and to create a system for knowledge-generation (Senge/Scharmer, 1997). Potential knowledge and individual presumptions in groups and teams are detected, individual knowledge and experiences are activated and communicated which leads to constructive discussions, collective awareness and a learning culture.

Communicative connections and sense-making coherences are created among the system, sub-systems and the environment (research and development centres, cooperating companies, competence centres etc.). To fulfil these tasks the knowledge and expertise centres have to work

as knowledge-generating learning communities ("learning laboratories" consisting of practitioners, scientists, consultants/trainers) with the use of their common work fields and experiences to learn and to create a system for knowledge-generation (Senge/Scharmer, 1997).

These knowledge or expertise clusters coordinate their internal knowledge markets through an overview of knowledge demand and supply and through organised appropriate sharing and transfer methods. They do not only survey external knowledge markets but as well explore and document (e.g. via intranet) self-organised knowledge generation processes in the existing management and the core and support proceedings of companies. Potential knowledge and individual presumptions in groups and teams are detected, individual knowledge and experiences are activated and communicated which leads to constructive discussions, collective awareness and a learning culture.

Preparation (The Checklist)

Before starting an attempt to develop, design and conceptually integrate a knowledge map in the organisational contextual framework it is essential to check whether the preliminary conditions are already fit:

- Definition of the needs and requirements to start a planning as a kind of anticipatory learning process to pro-actively foresee and structure trouble areas and initiates creative thinking (Ehrmann, 2006)

- Detect free resources and define the preparation of the involved employees (identify potential for development)

- "Bring the right people together"- who are the ones that possibly promote the initiative and have the right position, role and standing for it

- Consider the timing and spacing of the project – are the company, its culture and the people ready for this attempt

- Find a suitable project-team – individuals who have experience, know how and know what and who are companywide accepted, The project-team should be heterogeneous – use synergies and complement one another in their competences

- Kick-off meeting – inform employees about the project to avoid rumours, fear and accompanying negative effects within the organisation

- Technical system – should be browser compatible, accessible from outside the company (if necessary worldwide). Existing IT-resources need to be examined; maybe there are already existing in-house solutions. If not a market screening is important to check possible solutions (freeware/shareware, etc.)

Accompanying to the above mentioned points ongoing plausibility checks and stop or go decisions are necessary to ensure a smooth process (Olfert, 2004).

Toolkit (The Essentials)

Knowledge maps serve the purpose to visualize knowledge and consequently create a company- or organisation-wide knowledge-transparency. Knowledge maps are classifications of knowledge-owners, -portfolios, -sources, -structures ore –applications, which make a reference to expert-knowledge, team-knowledge, knowledge development stations as well as organisational workflows and capabilities. Following they refer to explicit and tacit knowledge which can be located in internal and external documents, databases or in the "expert's brains".

Knowledge maps define knowledge construction sites and foster the ability to compare the defined knowledge targets and the state of the art realisation, show the direction of a company-wide knowledge development. (Guretzky, 2002)

A roadmap shows an overview about the single steps and the proceeding of the knowledge map realisation (see: Figure 1 on the next page). The roadmap represents a possible structure for a cartographic approach. First the needs of the user groups have to be defined and accordingly the structure and the design of the knowledge map are designed. The existing knowledge has to be interpreted, selected and transformed into storable knowledge units. In the realisation a special focus is put on the representation. Accompanying and simultaneous processes support the realisation and include information and communication systems as well as updating processes, reflection and a feedback system.

From the structure-theoretical point of view an integration and use of knowledge result only if the involved actors ("knowledge agents") reproduce their knowledge enriched actions, they have to use "lessons learned" and "best practices" in daily work. Furthermore they refer in their interactions to changing structures, sets of rules and resources. Through the spontaneous, in a way self-organised creation of rules, the locally existing knowledge of the knowledge agents is used in the best way. In rules about learning- and selection processes, the knowledge and the experiences of the different experts are integrated. Only through the possibility of relating to knowledge in a current action, knowledge is effective as an "accurate or valid awareness" (c.f. Giddens 1984, p. 114 ff.) about a situation or problem. In the collective reflection of activities/projects the problem solving potential is activated. New or improved solutions can be found which leads in our case to process innovation. These collective activities lead to a self-referential circle and act as a starting point for further actions, which finally shape the identity of the system. Everyone should feel responsible for "sparking ideas" and their transformation into "useful innovation" (Mauzy/Harriman, 2003). Important influence factors for good results in companies' performance as well as in KM initiatives are nurture relationships among people, result-based leadership, communication and teamwork (cf. Longenecker/Simonetti, 2001).

Therefore an accompanying essential factor for success is to look at the organisation in a diagnostic way, following the MTO (Mensch-Technik-Organisation – Human-Technique-Organisation) structure (Westermayer, 2005): meaning that only the three of them and the consideration of all three areas in their counteractions lead to a successful attempt, followed by a fruitful implementation and integration in the organisational cultural framework. This means that each organisation needs an individually designed knowledge map, following the benefits for the users (analysis of the individual level), the organisational framework that is needed to implement and realise the map (analysis of the organisational level) and techniques – processes and a technical system (analysis of the technical system) which is accustomed to the organisation and their members.
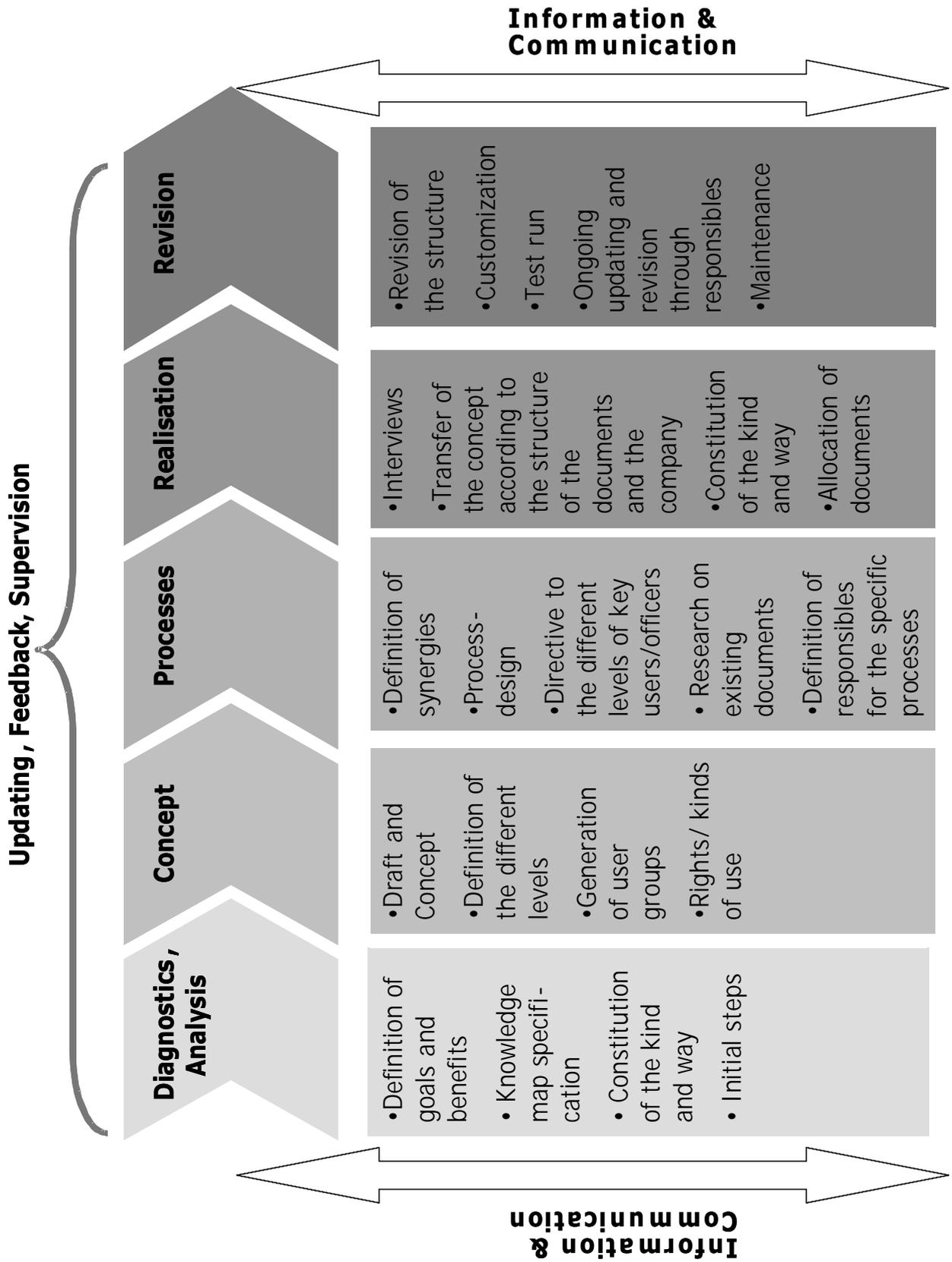
Figure 1: Concept and Design of the Knowledge Map

Making it Happen (The Approach & the Action)
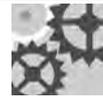
Before you start the visualisation attempt it is necessary to identify „one"schema of order – a clear visual structure, a project plan together with milestone (don't forget about the quick hits - success stories which hold the members on the line and give a certain amount of satisfaction, motivation and identification).

In the five levels of the conceptual visualisation methods you start with:

Level 1: It is necessary to define where the journey should go to – what are the benefits, the targets, and the vision behind it. Which kind of knowledge map should be realised (picturing knowledge owners, knowledge units, work flows, process diagrams, etc.)! What is the best way for the company and fits to the company culture (analysing the budget, time, spacing, motivation, innovative and creative potential, etc.)! It is essential that the leaders understand themselves as the first ones who are responsible for knowledge picturing and sharing – function as idols, which is pictured in an actual living of these values (motivational function for the employees)! The project-team is constituted and the first steps (kick off, information and communication about the attempt) are initialised.

Level 2: The actual conceptual model for the company is design – different user groups are clustered with their specific needs which leads to an easier integration of "useable" information and knowledge and which can also be considered in the design itself. Definition of the different levels (broadness, depth of the map; individual, collective, organisational; personal – common). In defining the different user groups and their needs and benefits it is necessary to develop a role/status/function/ task structure, which is accompanied by a process structure – this leads to the next level.

Level 3: In this level the main work depends on the process structure and the development of a process-oriented project management with clear roles (project leaders, promoter, etc.) and responsibilities. The analysis of existing data/information starts together with an ongoing review process about what will be used in the future (needs to be visualised), what is obsolete (needs to be depleted) and what is not needed now but might be fruitful in the future (archive).

Level 4: Allocation of all necessary documents. Interpretation, selection and transformation of knowledge to saveable knowledge units. Story Telling, interviews for the allocation and transfer of implicit knowledge.

Level 5: Integration in the system, possible revision of the structure, the different levels, user groups before the test run starts – after the test run – clearance of "Bugs" (form the organisational side:-process, tasks, responsibilities, etc; and from the technical side).

Together with this five-level concept it is always necessary to think about accompanying information-, communication- and feedback-systems to give transparency for all users of the knowledge map about the actual steps and the targets and visions (keep the motivation high and the rumours low).

Results & Next Steps (The Follow-Up)

For a strategic development of knowledge, knowledge units have to be analysed as well as the relevance of different knowledge fields and an appropriate visualisation to ensure an effective and efficient use of knowledge has to be designed and developed. Following some advantages for a visualisation of knowledge are listed:

- Exploration of the existing knowledge: Who are knowledge owners, which knowledge is relevant for future development?

- Creation of factors for success and competitiveness: Knowledge Maps should focus on core competences and core work to increase competitiveness of the organisation.

- Transparency: The process has to be transparent to all the users as well as the desired outcome of the project.

- Identification of knowledge gaps and weak points: Awareness is important to know where to foster further development, reflection and learning of the institute and its partners.

- Eradication of gaps: Takes place trough development, learning, and education of internal resources or trough the integration of external ones.

- Improvement of the storage and access to knowledge: Employees of the institute as well as external partners have access to important data and documents via an internet connection.

- Encouragement of the knowledge usability: The most important characteristic of used IT-system is usability, which means being user friendly according structures, indices, access, user interface and functionality.

- Development of skills for successful companies: Partners have to find useful content for their daily business regarding the cooperation with the institute.

- Generation of applicable knowledge: Projects and processes have to be documented in an understandable and standardised way that important knowledge is found easily.

- Core competencies: The knowledge map has to focus on core areas to provide useful information instead of an information overflow.

- Optimisation of processes and procedures: Communication ways and flows become faster and more efficient, documents for operative and strategic tasks are available in the knowledge map.

The majority of these criteria try to enable an assessment and measurement of knowledge to optimise internal and external processes companywide. Furthermore access rates as well as down-and upload-rates can be considered to measure the performance of the knowledge map whereby qualitative performance indicators such as benefits for the users, usability (a tool that is understandable and easy to use) and transparency should not be forgotten.

The appropriate way of visualisation is dependent on the internal and external organisational environment (context-sensitivity). The tool depends on the requirements of the respective company, its structure, design and application field regarding knowledge visualisation. There are individual and collective knowledge maps whereby individual maps are slightly relevant in organisational contexts. A combination of concept and competence maps has to be created to enlarge the usability of knowledge maps to enable a personalised, high quality and dynamic "knowledge visualisation architecture". The requirements for a visualisation of knowledge are a detailed analysis of knowledge flows and the connections in the organisational context as well as a concept and design of a process for a specified application of the knowledge map.

Knowledge maps need ongoing actuality checks and an ongoing actualisation of content and data. Users are not prepared to work with the tool if they find old, useless information or contact details of people who have already left the company or have other positions and responsibilities in the meantime. Old, irrelevant and useless information has to be found and erasured – in terms of knowledge management this process is called "selective oblivion". Regarding readiness to learn and differentiation of knowledge owners and know-it-alls is essential (Schmitz/Zucker, 2003). Readiness to learn forces the development of the knowledge development and helps to transform passive knowledge into active, practical actions.

Real Cases (As it has Happened)

The case is about an industry funded university research group, combining expertise of business administration and information technologies as both organisational and technological aspects are important for Knowledge Management and Customer Relationship Management projects. The department focuses on research, education and teaching as well as practical projects with partner companies. Cooperations between university and industry benefit from a direct exchange of knowledge. The university gets access to practical challenges or cases and can align the university's research interests or validate sophisticated research results in practice. The industry receives knowledge and expertise about new developments and results directly and can use these within the operative and strategic business.

Cooperating companies have the following benefits from a visualisation of knowledge units and owners:

- Transparency of the knowledge and expertise of employees
- Access to best practices and lessons learned
- Keep the knowledge even if employees leave
- Faster overview and integration if experts change
- Use the network of the participants
- Check the current state of the projects
- Accumulation of knowledge in all work fields (research, projects, education, planning, events etc.)
- Documentation and processing of relevant/recent topics in the field of knowledge (conferences and editing gained knowledge)
- Structure of important documents
- Free mailbox (problem of crapped mailboxes regarding huge attachments is solved)

The benefit for the cooperating companies, their experts and decision makers is to foster the realisation and application of knowledge management projects as well as to get the current states of the processed projects and the relevant research fields. University-industry cooperations are intensified and the sharing of knowledge as well as the transfer of research results becomes more easy and efficient. Industry partners are able to search for content which is relevant for them at a specific moment or situation.

The visualisation provides the knowledge of the individual knowledge worker (employees, internal and external contributors) on a long-term and structured basis for the other employees, the contributors and the experts of the cooperating companies. This fosters an extensive, flexible and process-oriented management of the CC and its knowledge and enables an easy and

structured access for the diverse user groups. As visualisation-tool a knowledge map was chosen that shows the knowledge owners as well as knowledge units, segmented into the specific project groups and support units. For an easier overview it is necessary to guarantee the extraction of different areas concerning employees (personalisation) and the areas regarding knowledge (codification). This means a splitting into skills: project, scientific and common interest part with a special focus on human capital (as knowledge, social and emotional capital).

Especially in this context a visualisation of knowledge, the knowledge owners and the knowledge units is highly significant. The advantages for the participants are the following:

- Easy to handle, concise and transparent
- Moderates the transfer of knowledge
- Helps to explore core competencies
- Visualises important knowledge
- Assists to find new knowledge resources
- Accessible for specific user groups

In this context the knowledge map aimed to integrate knowledge owners (internal members) and knowledge units which are accessible for internal and external users (the external users are partners with a specific role and status regarding the system). The roles and process owners and their tasks and abilities are listed in the table.

Table 1: The knowledge map and its owners, tasks and abilities

Owners	Tasks	Abilities
External users (partners)	Identify/evaluate knowledge units through use	Read only
General internal users	Identify/evaluate knowledge units through use Keep it "Vivid"	Read Download Upload Suggest changes
Administrator	Avoid redundancies Technical expert	Read Download Upload Review changes Implement anew
Project leaders	Design structure Define rules	Read Download Upload Review changes Conceptual overview

Tips & Tricks (To-Do)

According to our experience the following tips and tricks are helpful to plan, implement and use knowledge maps within an organisation:

☑ Acceptance: On the one hand the structure, system and content of the knowledge map has to be accepted (ongoing coordination with the participants and users), on the other hand the project team and promoters for the knowledge map need a good standing.

☑ Trust: The ongoing participation and information of the users helps to establish trust and commitment.

☑ Structure: A clear, logic and transparent structure ensures easy search and retrieval within the system. Participants should have the chance to see the structure beforehand and give feedback and advice.

☑ Customer focus: Main concerns are requirements and needs of the user groups regarding the knowledge map and the IT-system. The knowledge map and the system should be user friendly, comprehensible and self explicatory.

☑ Situation and context specific knowledge map: As knowledge maps can not map knowledge on a 1:1 level and have to focus on a specific order they can only show paths to knowledge themes and owners. Therefore knowledge maps need to be designed context and situation specific (see "customer focus").

☑ Motivation: Participants must be informed about the sense, target and concept of a knowledge map and users should be integrated within the process as they can give very helpful information and feedback.

☑ Company's culture and leadership: An open, innovative company culture with responsible employees and a "spiritual" leader (role model) foster knowledge transfer, communication and information flows within the company.

☑ Willingness to exchange: This point is associated with a promoting company culture and leadership. Furthermore benefits for the individual, teams and the organisation must be communicated among and seen by the participants.

☑ Milestone plan: A precise action plan with a specific project structure base and defined responsibilities facilitates a smooth project workflow (see Illustration 1: Concept and Design of the Knowledge Map in the chapter "Toolkit").

These points mentioned above help to avoid and overcome barriers and struggles against the project and have to be considered already in the "diagnosis and analysis"-phase of the project as well as in all the following project phases (learning loops and proactivity).

Potholes (Not-to-Do)

The following items describe potholes to a successful knowledge map and have to be categorically avoided:

☒ Data cemetery: Knowledge maps with old and irrelevant information are not used in practice and in the course of time less and less people use the system.

☒ Black holes: Interesting and important information is missing but data and information which is well known is documented in detail.

☒ Hyperbolical system: Decision makers decide for a highly sophisticated system for untrained or "narrow minded" users and are not prepared to give time and resources for the development of competent users.

☒ Information overload: Users upload everything to show their commitment (e.g. the IT-system is related with a kind of reward system for content) and the content is not evaluated and checked by an expert.

☒ Lack of a clear definition of content, user and owner roles: Users do not know what the system really can do for them and what each individual can contribute or retrieve. Furthermore participants are unsure about data security as there is no differentiation e. g. among internal vs. external user groups (different information and security levels required).

☒ Unclear process flows: Lead to chaotic project steps and a high amount of improvisation and the whole project seems to be quite unprofessional to the future users.

☒ No specific target: Maybe knowledge maps seem to be modern and trendy to the company but responsibles do not think about a clear focus and according individual benefits.

☒ "Spy-ware": Leaders use the knowledge map according the motto "Big brother is watching you", they trace and comment each single step of the users. The users are afraid to make mistakes or to be too inactive in the system – this can lead to information overload.

☒ Poor search function: Participants find it hard to discover what they need and what already exists in the system. As people are not sure what is already in the system some users may upload specific information again (double data).

☒ Redundant data, data inconsistency: This point is closely linked to a poor search function. Users are frustrated because of inconsistent and redundant information on the one hand but on the other hand a lot of important information is missing in the system.

☒ Strive for virtual communication: An excessive belief regarding knowledge maps is that personal contact can be reduced to a minimum. Knowledge maps can only show ways to knowledge owners and knowledge assets but they are no substitute for face-to-face communication.

The avoidance of these potholes, the appliance of our tips and tricks as well of as the concept and design of a knowledge map facilitates a successful planning, implementation and usage of knowledge maps within companies, institutes and organisations. This leads to a more open and flexible transfer of knowledge, the development of core competences and helps to increases competitiveness on the long run.

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Redesigning Communities of Practice using Knowledge Network Analysis
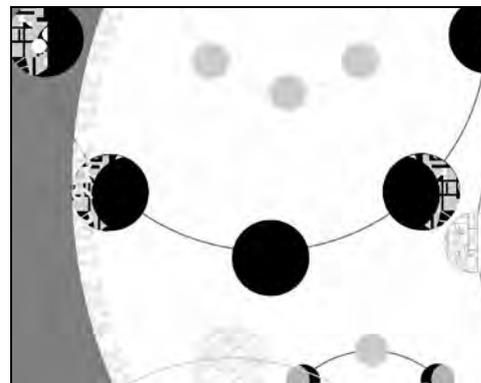
Remko Helms

Redesigning Communities of Practice using Knowledge Network Analysis

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Snapshot (Quick Learning)

The performance of many companies in today's knowledge economy relies on informal networks. Such networks promote the lateral sharing of knowledge between employees, which results in sharing best practices and innovations. Informal networks have received a lot of attention in literature and they are referred to as *communities of practice*. Several authors agree that communities make employees more effective in dealing with knowledge and contribute to the performance of the organization (Epple, Argote & Murphy, 1996; Cross & Parker, 2004). Therefore, also the effective and efficient implementation of communities of practice received much attention.

There are several handbooks available on how to create and develop communities, such as the approach described by Wenger, McDermott & Snyder (2000) and the Seduce, Engage and Sustain (SES) model from Dignum & Van Eeden (2003). Typically, these approaches have a process focus because they describe the phases and activities required to implement a community of practice. The Knowledge Network Analysis technique, which is described in this chapter, is complementary to such approaches because it makes it possible to make a *snapshot* of a community of practice. A snapshot is a representation of a community of practice from a network perspective. It views a community as a network of connected people, where the nodes in the network represent the people and the lines between the nodes represent knowledge exchanges between the people. Using a network perspective it is possible to study the structural properties of a network. These properties tell something about the soundness of the community and whether the structure enables or disables the community to achieve its goals. In Knowledge Network Analysis these structural properties are used to detect knowledge sharing bottlenecks in communities of practice. Furthermore, they form the basis for (re)designing a community of practice in order to improve its performance.

The Knowledge Network Analysis technique is intended for practitioners responsible for the development and support of communities of practice. It is typically applied to the members of a single community. There is not really a maximum with respect to the number of people in a community. Although, in later chapters it becomes clear that for large communities (>50-75 people) the data collection becomes rather labour intensive. If the number of people is limited to 50-75 people the Knowledge Network Analysis can be completed in a 3-4 week period.

Keywords: Knowledge Networks, Knowledge Network Analysis, Social Network Analysis, Communities of Practice

Context (Where & What)

Push networks: Developing professional skills

Communities of practice are: *"groups of people informally bound together by shared expertise and passion for a joint enterprise"* (Wenger & Snyder, 2000). Simply stated, it is an informal network of people that share knowledge in a particular domain or knowledge area: *"a coherent clusters of insights, experiences, theories, and heuristics"* (Schreiber, Akkermans et al., 2002). An example of a knowledge area in an engineering firm is for instance knowledge concerning the design of railroads or jetties. The people that exchange this kind of knowledge with each other form the community of practice. Knowledge in such a community is shared through a variety of channels such as meetings, personal discussions, teleconferences, e-mail, discussion groups etc. Moreover, there contacts do not follow an explicit agenda and there are no formal deliverables defined that should be completed before a certain deadline.

In practice several types of communities of practice can be distinguished by looking at how they add value to a company (Wenger & Snyder, 2000). Knowledge Network Analysis focuses on one type of community. This type of community is called a *push network* (Helms & Buysrogge, 2006) and aims to develop the professional skills of its members. The professional skills of an employee are also referred to as *"deep smarts"* (Leonard & Swap, 2005). Deep smarts enable a person to quickly analyze a situation and come up with a smart solution. An example is a computer engineer that is able to quickly identify a hardware problem without having to go systematically through all the possible failure options. In practice, organizations often describe such deep smarts in terms of expertise levels of their employees. An example of commonly used expertise levels involves: trainee, novice, and expert.

When the job performance of an employee with deep smarts is compared to an employee without deep smarts, the first will come up with a better solution, within a shorter time (Leonard et al., 2005). Therefore, it is in the interest of the organization that employees with these deep smarts share their knowledge with their colleagues that have not developed the same level of deep smarts yet. Furthermore, an organization cannot leave it to chance that employees share their deep smarts. They should stimulate their experts to share knowledge with their less knowledgeable colleagues. We refer to this sharing as the pushing of knowledge from the experts to their colleagues, because the people that posses the knowledge take the initiative in sharing their knowledge (Helms & Buysrogge, 2006).

Knowledge that is referred to as deep smarts is typically stored in the employees' heads and hands. This makes this knowledge difficult to share and therefore not every type of knowledge exchange is as effective as another. For example, the exchange of knowledge by means of a presentation is very superficial while the exchange by means of a master – apprentice relationship is very rich. There are several techniques for sharing deep smarts (Leonard et al., 2005), which differ in terms of the *viscosity* of the knowledge that is exchanged. Viscosity is a measure for the richness of the knowledge (Davenport et al., 1998). The different techniques for knowledge transfer that Leonard et al. (2005) distinguish range from *passive reception* to *active learning* and are shown in figure 1. From left to right in figure 1, there is an increase in the viscosity of the knowledge that is exchanged.

1	2	3	4	5	6	7	8
Passive reception							**Active learning**
Directives, Presentations. Lectures	Rules of Thumb	Stories with a Moral	Socratic Questioning	Guided Practice	Guided Observation	Guided Problem Solving	Guided Experimentation
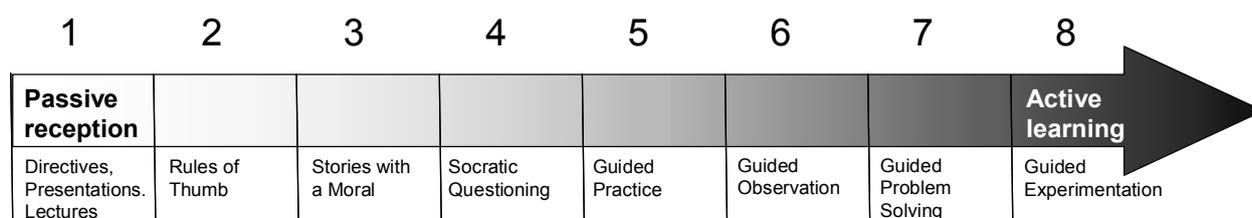
Figure 1: Scale for measuring the viscosity of knowledge

We assume that the knowledge of an employee increases more when more viscous knowledge exchanges take place. Consequently, only a rich exchange of knowledge will substantially contribute to an increase of the expertise level of the receiver.

Summarizing, a push network is a community of people with different expertise levels and the aim to exchange deep smarts from people with a high expertise level to people with a low expertise level such that the expertise level of the latter increases. In the following sections, potential knowledge sharing bottlenecks in these push networks are presented.

Master-apprentice relationships

In a push network it is important that all experts share their knowledge. However, if low viscosity knowledge transfers are used, only superficial knowledge is transferred. Hence, the receiver of the knowledge lacks a deep understanding of the received knowledge and cannot easily apply it. Therefore, we only consider high viscous knowledge transfers suitable for the development of professional skills. In figure 1 it involves the active learning approaches that are labeled 5 till 8. These types of knowledge transfer are very similar to master-apprentice relationships and are characterized by long-term relationship between a master and its apprentice.

From a network perspective an effective push network requires that people with a high expertise level should be connected, i.e. transfer their knowledge to, to one or more people with a lower expertise level. Moreover, this knowledge transfer should be of high viscosity in order to truly transfer deep smarts. If there is no such connection there is no knowledge transfer. Vice versa, people with a low expertise level should have connections, i.e. receive knowledge from, to one or more people with a high expertise level. If there is no such connection they do not receive knowledge and are not developing their professional skills. Preferably, people with a low expertise level should have several connections to people with a high expertise level. Otherwise, they depend on only one person for the development of their professional skills. Because transferring deep smarts takes time it is not very likely that people with high expertise levels can have many high viscous connections to people with lower expertise levels and vice versa. Therefore, the number of high viscous connections should be limited to 3 or 4. The above can be summarized in the following potential bottlenecks:

Bottleneck 01	People with a high expertise level do not transfer their knowledge with high viscosity to one or more people with a lower expertise level.
Bottleneck 02	People with an expertise level below the highest expertise level do not receive knowledge with high viscosity from at least two people with a higher expertise level.
Bottleneck 03	People with a high expertise level transfer their knowledge with high viscosity to more than four people with a lower expertise level.
Bottleneck 04	People with an expertise level below the highest expertise level receive knowledge with high viscosity from more than four people with a higher expertise level.

Sub-communities

Potentially, it should be possible that any member from a community can be connected to any other member in the community. However, from literature it is known that homophily (Zenger & Lawrence, 1989; Sparrowe, Liden, Wayne, and Kraimer 2001) and geographical spread (Allen, 1977) can be potential barriers for knowledge transfer between people. Homophily refers to the fact that people more easily hook up with people with similar backgrounds. Conversely, people from different backgrounds do not easily connect which constrains the free flow of knowledge in a community. Geographical spread is another barrier for knowledge transfer. Research showed that the probability of knowledge exchange is highest when people are in close proximity to each other. The further people are away, the lower the probability of knowledge exchange. Both homophily and geographical spread can lead to the formation of loosely or disconnected sub communities within in a community.

Sub communities are in itself unwanted because it limits or rules out the transfer of deep smarts between people in different sub communities. To determine the impact of the existence of sub communities, the composition of and the connection between the sub communities should be taken into account. The distribution of expertise over the different sub communities determines whether people with lower expertise levels have easy access to people with higher expertise levels. If there are no people with high expertise levels in a sub community, people rely on high viscous connections to people with high expertise levels in other sub communities for the development of their professional skills. If a sub community lacks experts and also does not have high viscous connections to experts in other sub communities the development of professional skills is in jeopardy. The above can be summarized in the following potential bottlenecks:

Bottleneck 05	Unbalanced distribution of expertise over sub communities.
Bottleneck 06	Lack of high viscous knowledge transfers between sub communities.

Knowledge drain and knowledge brokers

In every company, employees leave the organization after a certain time. For example, they get a better job elsewhere or because they retire. When an employee leaves the organization this might lead to a potential loss of valuable expertise, something also referred to as 'knowledge drain' (Zhuge, 2002; Kiger, 2005), or to disconnectedness of the network. Both can have a negative influence on the development of professional skills in the community.

Whether the departure of a person indeed results in a knowledge drain depends on several factors. First of all, it is obvious that it depends on the expertise level of a person, the higher the expertise level the higher the chance of knowledge drain for the organization. Secondly, it is important to know whether the person transferred his knowledge to other people in the community. If high viscous connections to other people exist, the potential knowledge drain is limited because he transferred his deep smarts to other members in the community. Finally, the influence of a person is also an indicator of the value of a particular employee. Influence involves the number of people that a person reaches in total, either by direct or indirect connections. The more persons are reached the more influential that person is. Hence, one could say that this person's knowledge and ideas strongly influences the way of working in an organization.

Another effect of people leaving the organization concerns disconnectedness. When a person leaves the organization it does not only lead to a loss of knowledge, but also in a hole in the network. If the person that leaves the organization fulfils a brokerage role between different sub communities, this can potentially lead to the formation of loosely or disconnected sub communities. The types of brokerage roles that can be distinguished include: liaison, gatekeeper,

and representative (Fernandez & Gould, 1994). Because a person can have many connections he can fulfill different roles at the same time and can fulfill the same role several times. Consequently, if a broker leaves the organization it does not automatically lead to the disconnection of sub communities because other persons can have similar brokerage with respect to the same sub communities. However, a special case is when the departure of a person leads to the total disconnection of two sub-communities. In that case the brokerage relation is called a *network bridge* (Burt, 1992), i.e. the only connection that exists between two sub communities. The above can be summarized in the following potential bottlenecks:

Bottleneck 07	Departure of people with a high expertise level with few or none high viscous connections to other people.
Bottleneck 08	Departure of people that influence many people (directly and indirectly) with their knowledge and thinking.
Bottleneck 09	Departure of people that fulfill a brokerage role in the network.

Preparation (The Checklist)

Knowledge Network Analysis is a rather straightforward technique. Nevertheless, some preparation is required to use the technique to its full potential. Several aspects of preparation are discussed below.

Basics of network analysis

Although this chapter describes how to apply Knolwedge Network Analysis, it is not a complete guide in to the basics of network analysis. Therefore, it is recommended that the people who apply the technique read an introduction to social network analysis, which is the foundation of Knowledge Network Analysis. A good introduction to social network analysis can be found at: http://faculty.ucr.edu/~hanneman/nettext/ (Hanneman & Riddle, 2005). Reading chapter 1 thru 5 will provide the reader with the basics of network analysis while chapter 7 thru 17 provide a quick reference to a wide range of different network measures available. Reading this introduction will provide a deeper understanding of social network analysis and hence Knowledge Network Analysis. Furthermore, it can also be used as a quick reference guide during the interpretation of the results. For a complete textbook on Social Network Analysis, however, is referred to Wasserman & Faust (1994).

Survey

The basis for the analysis is network data concerning a community of practice. This data is collected by means of a survey, either on-line, via e-mail or on paper. Although the survey consists of a number of standard questions some customization of the questionnaire is required. The questions itself can be used in any organization. However, it is the answer categories that require some customisation because it concerns a list of people with whom a respondent exchanges knowledge. This list of names is of course different for each organization and needs to be customized.

Communication to the respondents

Members of a community mainly play a role during the data collection phase, i.e. they are the respondents that provide the network data. To ensure the willingness of the respondents to participate in the survey, communication around the project is rather important. There are several ways to announce the Knowledge Network Analysis project, such as company newsletters, community events, or a cover letter that is attached to the survey. In the communication it is also

important to address the issue of confidentiality. The analysis reveals the position of employees in a community of practice and this is often considered as sensitive data. Every organization should therefore consider whether it is required to keep data confidential. Of course, the data needs to be disclosed to the project team that analyzes the data. Otherwise it will be impossible to suggest concrete improvements regarding the structure of a community.

Toolkit (The Essentials)

There are two tools required to conduct a Knowledge Network Analysis: a *survey tool* and a *network analysis tool*. A survey tool is required to collect the network data. Although it is possible to collect the data using a paper-based survey, there are several advantages to sending a digital questionnaire via e-mail or using an on-line survey tool. First of all, an digital questionnaire or on-line survey is easier to distribute and secondly it is easier to integrate the results in the format required by a network analysis tool. There are several tools available for conducting an on-line survey. Some suggestions include: SurveyMonkey (www.surveymonkey.com), Free Online Surveys (freeware; freeonlinesurveys.com), and Php Surveyor (open source; www.phpsurveyor.org). In our own practice we are using a digital survey form that was created in Excel.

The network analysis tool is used for quantitative and qualitative analysis of a network. Quantitative analysis involves the application of graph theory to determine certain structural properties of networks that are known from the field social network analysis. A simple example is the shortest path between two people in the network. Qualitative analysis involves the analysis of a visual representation of the network structure and is used to support quantitative analysis. Figure 2 contains a visual representation of a simple network. The nodes represent the people in the network while the lines represent the knowledge transfers between the people. In knowledge transfer there is always a sender and receiver. Therefore, the arrows indicate the direction of the transfer.
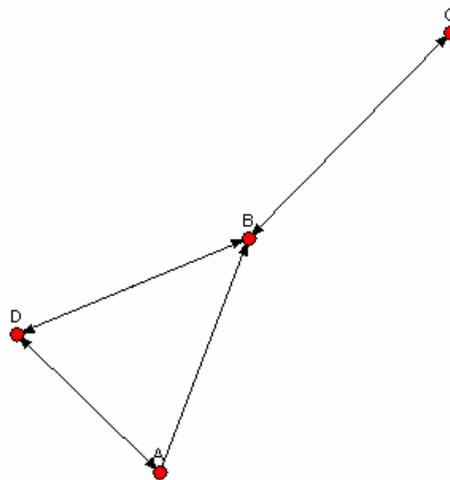
Figure 2: Visual representation of a network.

There are several tools available for network analysis. Some suggestions include: NetMiner (www.netminer.com), UCINET (www.analytictech.com/ucinet/ucinet.htm), and Pajek (vlado.fmf.uni-lj.si/pub/networks/pajek/). We prefer to use NetMiner because of its user friendliness and its visualization capabilities.

Making it Happen (The Approach & the Action)

Data collection and preparation

The data concerning a push network is collected using a survey that is send to each member of the community. Typically, such a survey consists of two parts. The first part focuses on collecting data about the connections between people. The perspective that is chosen is that of the receiver of the knowledge. Hence, the respondent should only indicate from whom he is receiving knowledge. The respondent does not have to indicate to whom he transfers knowledge, because this data becomes automatically available when everybody completes the questionnaire. Besides collecting data about the existence of the connection, data is also collected about the viscosity of the knowledge transfer. An example of how this question looks like in a survey is shown in figure 3.

Name: <enter name>

1. Please indicate how and from which colleagues you receive new knowledge in a structural and organized manner, i.e. not ad-hoc, to develop professional your skills

Options:

1- Presentaties van collega's of externen, richtlijnen, standaarden:
Bij welke van de hiernaast genoemde collega('s) doe je nieuwe kennis op door het volgen van een presentatie of volgen van door hem /haar aangedragen beschreven richtlijnen of standaarden?

2- Rules of thumb:
Welke van de hiernaast genoemde collega('s) vertelt je de vuistregels die gelden voor jouw vakgebied?

3- Stories with a moral:
Van welke van de hiernaast genoemde collega('s) krijg je advies doordat hij /zij een vergelijkbare situatie beschrijft?

4- Socratic questioning (Luisteren, Samenvatten, Doorvragen):
Met welke van de hiernaast genoemde collega('s) doe je nieuwe kennis op door naar hem /haar te luisteren, samen te vatten, en door te vragen?

5- Guided practice:
Met welke van de hiernaast genoemde collega('s) doe je nieuwe kennis op door je werk te doen en dit later met door met hem /haar door te spreken?

6- Guided observation:
Met welke van de hiernaast genoemde collega('s) doe je nieuwe kennis op door met hem /haar mee te kijken en achteraf te bespreken wat hij /zij heeft gedaan?

7- Guided problem solving:
Met welke van de hiernaast genoemde collega('s) doe je nieuwe kennis op door samen met hem /haar problemen op te lossen?

8- Guided experimentation:
Met welke van de hiernaast genoemde collega('s) doe je nieuwe kennis op door eerst zelf na te denken over hoe je bestaande methoden kan verbeteren en dit vervolgens met hem /haar te doen?

1. Please indicate how and from which colleagues you receive new knowledge in a structural and organized manner, i.e. not ad-hoc, to develop professional your skills
Multiple answers for one person are possible. If you do not receive knowledge from a person leave the question open.

A description of the options can be found in the left column!

x1 □1 □2 □3 □4 □5 □6 □7 □8
x2 □1 □2 □3 □4 □5 □6 □7 □8
x3 □1 □2 □3 □4 □5 □6 □7 □8
x4 □1 □2 □3 □4 □5 □6 □7 □8
x5 □1 □2 □3 □4 □5 □6 □7 □8
x6 □1 □2 □3 □4 □5 □6 □7 □8
x7 □1 □2 □3 □4 □5 □6 □7 □8
x8 □1 □2 □3 □4 □5 □6 □7 □8
x9 □1 □2 □3 □4 □5 □6 □7 □8
x10 □1 □2 □3 □4 □5 □6 □7 □8
x11 □1 □2 □3 □4 □5 □6 □7 □8
x12 □1 □2 □3 □4 □5 □6 □7 □8
x13 □1 □2 □3 □4 □5 □6 □7 □8
x14 □1 □2 □3 □4 □5 □6 □7 □8
x15 □1 □2 □3 □4 □5 □6 □7 □8

Figure 3: Example of survey question (some text in Dutch)

The second part of the questionnaire consists of questions to collect demographic data about the respondent. Examples include the name, function, expertise level, and office location of the respondent. Together with the data on the connection this data is required to identify the bottlenecks as presented in the previous section. Bottleneck 01, for example, can only be identified if data is collected about the expertise level of the community members. Some of this data can also be collected from other sources such as the Human Resources Department. It is even preferred to use alternative data sources because it reduces the amount of time that a respondent needs to complete the survey.

After collecting the network data, it should be translated into a matrix representation to make it suitable for network analysis. This is illustrated using the network that was presented in figure 2. This network consists of four members: A, B, C and D, which are referred to as *actors* in KNA. Furthermore, there are six connections between these actors that are referred to as *links*. Figure 4 shows the matrix representation of this network. The names of the actors are shown in the rows and columns of the matrix. Rows indicate the senders of the knowledge and the columns the receivers of the knowledge[1]. Numbers in a cell indicate the weight of a link, i.e. viscosity, between two actors. If the weight of a link is zero there is no link between two actors. The diagonal of the matrix does not contain any numbers because an actor can not have a link to itself. Following this logic, cell (1,2) in the matrix indicates that there is a link <u>from</u> actor A <u>to</u> actor B with a weight 2.

	A	B	C	D
A	-	2	0	4
B	0	-	6	3
C	0	5	-	0
D	2	3	0	-

Figure 4: Matrix representation of network data

The demographic data of the actors are called *attributes* and are stored in a separate table. The rows of this table contain the names of the actors while the columns contain the attributes. Once the network data is collected and prepared it can be entered into a tool which supports network analysis.

Network analysis

The analysis starts with making a visualisation of the network, an example is provided in figure 7 in the Real Cases section. It gives an impression of the structure of the network and helps to interpret the results from the quantitative analysis. After exploring the visual representation of the network, the analysis focuses on the identification of bottlenecks 01 till 09. The identification of these bottlenecks using qualitative and quantitative analysis is discussed in the remainder of this section.

Bottleneck 01: People with a high expertise level do not transfer their knowledge with high viscosity to two or more people with a lower expertise level.

To detect this bottleneck the *out-degrees* of actors is analyzed. The out-degree is a relatively simple measure that counts the number of outgoing links of an actor. To identify bottleneck 01 only out-degrees to actors with a lower expertise level should be counted. Those actors that have an out-degree of zero or one are potential bottlenecks.

Bottleneck 02: People with an expertise level below the highest expertise level do not receive knowledge with high viscosity from at least two people with a higher expertise level.

For detecting this bottleneck the *in-degree* of actors is used. This measure counts the number of incoming links of an actor. To identify bottleneck 02 only in-degrees from actors with a higher expertise level should be counted. Those actors that have an in-degree of zero or one are

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[1] It should be noted here that each column in the matrix represents the survey results of a single respondent.

potential bottlenecks. The results of bottleneck analysis 01 and 02 can also be verified in the visualization of the network by counting an actor's outgoing and incoming links respectively.

Bottleneck 03: People with a high expertise level transfer their knowledge with high viscosity to more than four people with a lower expertise level.

To determine these bottlenecks, the out-degree measures from bottleneck analysis 01 can be used again. Those actors that have an out-degree higher than four are potential bottlenecks.

Bottleneck 04: People with an expertise level below the highest expertise level receive knowledge with high viscosity from more than four people with a higher expertise level.

Here we can use the in-degree measures from bottleneck analysis 02 to detect any bottlenecks. Those actors that have an in-degree higher than four are considered potential bottlenecks.

Identification of sub communities

Before starting the analysis concerning bottleneck 05 and 06, the network data should be tested for the possible existence of sub communities. For this purpose the Girvan Newman algorithm is used, which is based on cluster analysis using the *link betweenness* as a clustering function. The link betweenness of a link counts how many times a particular link lies on the shortest path between all other pairs of actors in the network. The clustering process starts by putting all actors in one cluster. Then the link betweenness of all links is calculated and the one with the highest link betweenness is removed. If a link has a high link betweenness this is a possible indication that this link serves as a network bridge between groups of actors. Removing such a link could lead to the separation of a large cluster into one or more smaller clusters. This step is repeated till there are as many clusters as there are actors.
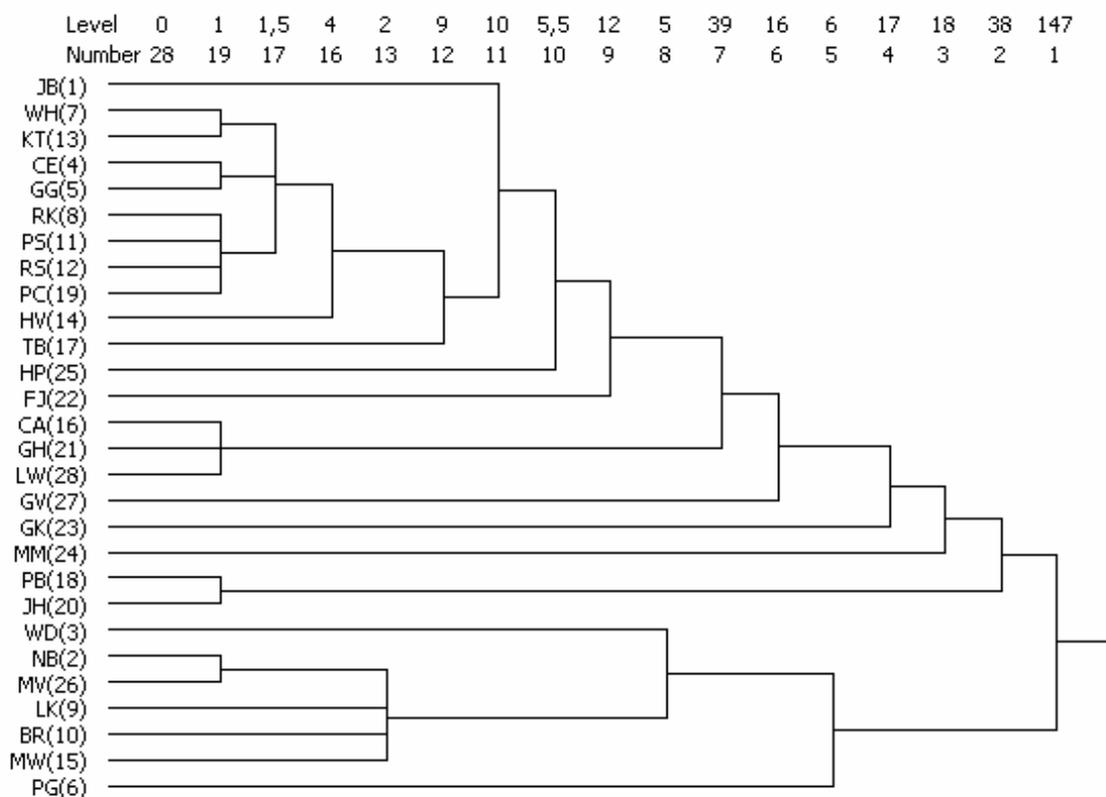
Figure 5: Dendrogram of the push network

The output of cluster analysis is typically displayed in a dendrogram, an example of such a dendrogram is shown in figure 5. On the vertical axis a dendrogram displays the actors and on

the horizontal axis it displays the steps in the clustering process. For each step in the clustering process it displays the link betweenness value that lead to the separation of the clusters (level) and the number of communities that exists after the separation (number). The clustering process is shown from right to left in figure 5, the splitting of branches represents the splitting of larger clusters into smaller clusters. In the example, application of the Girvan New algorithm results in 17 alternatives for clustering the actors in sub communities (as many as there as clustering steps). It then comes to picking out the right clustering, which is done using the significance level for each step using statistical analysis. Next, the step with the highest significance level is selected for further analysis. NetMiner supports the Girvan Newman algorithm and is also capable of creating a visualization of the results in which the sub communities are indicated, an example is shown in figure 8.

By examining the function, location and expertise level of each actor in the sub communities it can be verified whether one of these attributes is responsible for the formation of sub communities. This can also be cross checked by calculating the External/Internal (E/I) index of different groups of actors. The E/I index measures the orientation of a pre-defined group of actors and its value can range from -1 (actors only have connections inside the group) to +1 (actors only have connections outside the group). If the value of the E/I index of a group is lower than 0 this group might be a sub community.

Bottleneck 05: Unbalanced distribution of expertise over sub communities.

This bottleneck is detected by a visual inspection of the push network in which the sub communities are indicated. The goal is to determine whether the experts are distributed evenly over the number of sub communities while also taking into account the number of actors in a sub community. If two sub communities are equal in size, both communities are expected to contain approximately the same number of experts.

Bottleneck 06: Lack of high viscous knowledge transfers of experts across the sub communities.

This bottleneck can be detected by calculating the out-degree of experts and to count how many of these links cross the community boundary. In case the links of an expert do not cross the boundary of its sub community, the actors in the other sub communities can not benefits from his expertise. It is of course possible that knowledge of experts is indirectly exchanged to other sub communities via the specialists. Therefore, also the out-degree of specialists should be examined.

Bottleneck 07: Departure of people with a high expertise level with few or none high viscous connections to other people.

Locating experts with few links is done using the out-degree of actors, which already has been calculated for the analysis of bottleneck 01. The departure of experts with zero or one link might result in a knowledge drain.

Bottleneck 08: Departure of people that influence many people (directly and indirectly) with their knowledge and thinking.

The influence of actors is determined by looking at the *reachability* and the *average shortest path* of an actor. The reachability of an actor indicates the number of other actors in the network that this actor can reach directly or indirectly. But if two actors can reach the same amount of actors in the network their influence is not necessarily the same. Their influence is said to be stronger if the distances to these actors are shorter. A good indicator of an actor's average distance to the other actors is the average shortest path. If the average shortest path is high an actor needs many steps and if it is low an actor only needs a few steps to reach other actors in the network. Dividing reachability by the average shortest path leads to an indicator of an actor's influence that takes into account the number of actors an actor can reach as well as its distance from these actors. The indicator is high when the reachability is high and the shortest path is low.

Therefore, the departure of experts with a high score on this indicator is a potential loss for the organization.

<u>Bottleneck 09</u>: Departure of people that fulfill a brokerage role in the network

Brokerage roles of actors are determined by their position in the network. The roles that are determined include: liaison, gatekeeper, and representative. A person acts as *liaison* when he connects people in two different groups while he is not a member of either group (figure 6.1). Often a person that connects two groups is part of one of these groups; in that case we speak of a gatekeeper or representative. A person is a *representative* if he is transferring knowledge from members of his sub community to members of other sub communities (figure 6.2). In other words, he is acting as a representative or as a 'spokesman' for his sub community. Finally, a person is a *gatekeeper* if he receives knowledge from other sub communities and transfers that knowledge to members of his own sub community (figure 6.3). As a gatekeeper this person controls the flow of knowledge from other sub communities to the members of his own sub community.
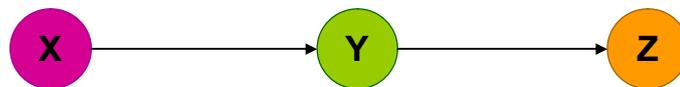
6.1: Person Y as Liaison

6.2: Person Y as Representative
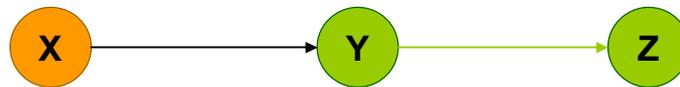
6.3: Person Y as Gatekeeper

-> Different colors of the nodes indicate the
   membership of different sub communities

Figure 6: Explanation of different brokerage roles

Because an actor can have many links to different actors, he can fulfill different roles at the same time and can also fulfill the same role several times but for different actors. In NetMiner it is possible to determine the brokerage roles for each actor. Actors that fulfill many brokerage roles can play an important role in the connection between sub communities. The departure of these actors is therefore a potential risk for the organization.

Results & Next Steps (The Follow-Up)

Application of Knowledge Network Analysis results in an indication of possible bottlenecks with respect to knowledge sharing in communities. To validate these results it is important to check if the bottlenecks that are found, match with personal observations and experiences of the community members. After validation of the results, the project team should discuss which interventions are suitable to overcome the observed bottlenecks. Examples of interventions

include: changing the organization structure or introducing new reward systems. There is not a simple recipe, meaning that there is a standard intervention for every observed bottleneck, because the selected interventions often depend on the specific context of the organization. Moreover, there is not always a single best solution. Since the possible consequences of the interventions can be quite substantial, the interventions should be approved by management before they can be effectuated.

Results from the interventions can be expected after several months or later because changing the behaviour of people and organizations takes time. To measure if the interventions have been effective one can conduct a second Knowledge Network Analysis. Consequently, it is possible to compare the situation before the interventions with the situation after the interventions. If the desired results have not been achieved the project team has to consider additional interventions.

Real Cases (As it has Happened)

Case study context

The case study discussed in this section concerns a knowledge-driven consulting and engineering firm that is active in the following fields: Infrastructure, Facilities and Environment. Worldwide the organization employs approximately 10,000 people. The regional office involved in the Knowledge Network Analysis is located in the Netherlands and employs a total of 65 people. Employees of the regional office are typical knowledge workers with a master's degree in Architecture, Engineering and Construction. Their main job is the design of and advice on structures in the aforementioned fields of infrastructure, facilities and environment. In the regional office, Knowledge Network Analysis has been applied to analyze the Civil Engineering community. There are 31 people working in this knowledge area, 28 of them filled out the network survey. These 28 people are located in 3 offices in three different cities in the Netherlands, with 18, 9 and 1 people in each office respectively. Furthermore, the community consists of 14 engineers, 11 project leaders, and 3 consultants.

The network data has been collected using a survey, while the required demographic data has been collected with the help of the HRM department. The demographic data involves the: *function*, *location* and *expertise level* of each actor in the community. After collecting the network data it was entered into a network matrix, created in Microsoft Excel, and then imported into NetMiner for further analysis. Additionally, we defined 3 attributes for actors in NetMiner to store information about their function, location and expertise level. The possible values for each of the attributes are shown in table 1.

Table 1: Functions, locations and expertise level at case study company

Functions	Location (# people)	Expertise level
Engineer	Office A (18)	Trainee
Project leader	Office B (9)	Specialist
Consultant	Office C (1)	Expert

After entering all the data in NetMiner we are ready to analyze the effectiveness of the push network. The next section shows how qualitative and quantitative analysis has been used to identify bottlenecks that constrain the effectiveness of the push network at the engineering and consulting firm.

Analysis of push network

The first thing to do is creating a visualization of the network to get an impression of the structure of the network. Figure 7 shows the visualization for the push network of the consulting and engineering firm[2]. The visualization shows the actors and the links between the actors. As mentioned before the focus is on highly viscous knowledge transfers. Therefore, only knowledge transfers with a viscosity of 5, 6, 7 or 8 are shown (i.e. the right side of the scale). Moreover, the visualization also contains information concerning the function, location and expertise level of an actor. This data is coded using the color, size and shape of the actors (see legend of figure 7).
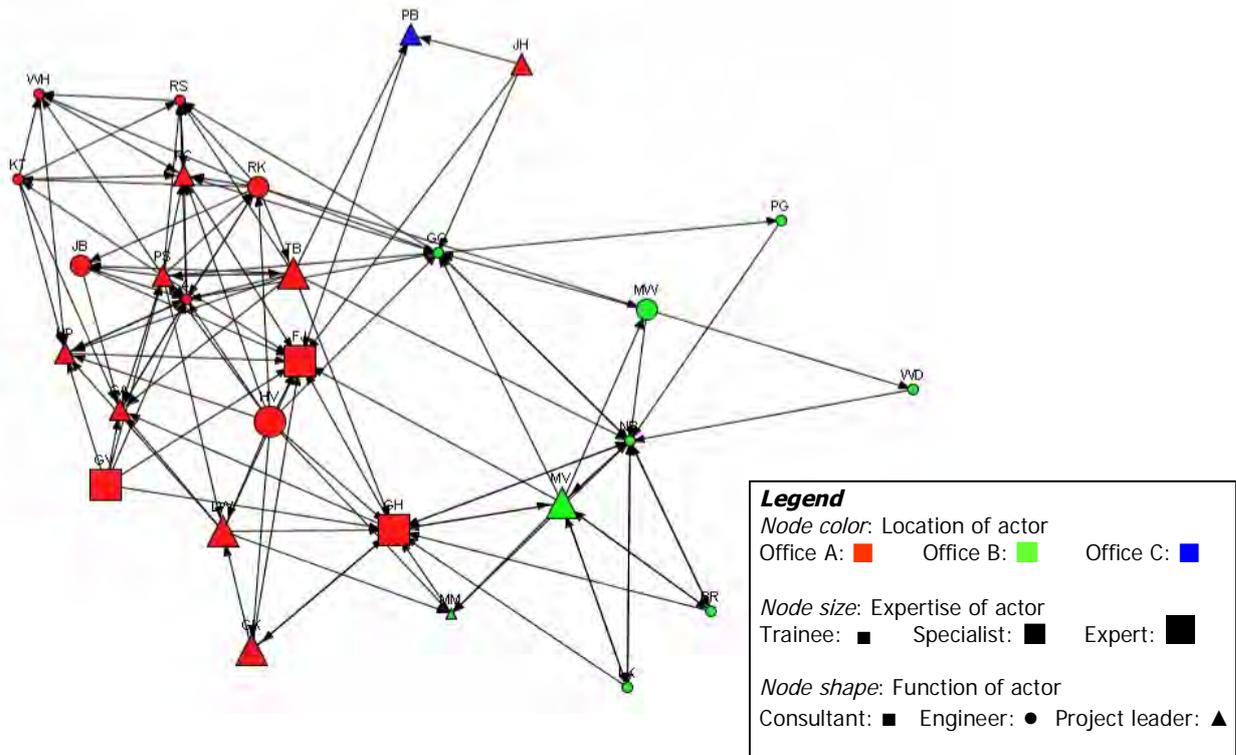
Figure 7 – Visual representation of the push network

In the following each bottleneck is identified individually. After identification of all the bottlenecks the overall conclusions regarding the effectiveness of the push network are presented.

Bottleneck 01: People with a high expertise level do not transfer their knowledge with high viscosity to two or more people with a lower expertise level.

In the case study context this bottleneck implies that knowledge should be transferred from experts to specialists and/or trainees and from specialists to trainees. The results of the out-degree analysis are shown in table 2 and reveal that there are 6 specialists with zero or one outgoing links to a trainee and that there are 2 experts with zero or one outgoing link to a trainee or specialist. In other words, 8 out of 17 actors do not sufficiently transfer their knowledge to less experienced colleagues.

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[2] The placement of nodes in the visualization is determined by the SpringEd algorithm, which is a fairly straightforward implementation of Eades' Spring Embedder (Eades, 1984). Fundamentally, repelling forces are given to every pair of non-adjacent nodes, and attractive forces are given to every pair of adjacent nodes. Following this spring model, non-adjacent nodes are spread well one the plane and adjacent nodes are placed near each other.

Table 2: Out-degree of actors (only to actors with lower level of expertise)

Actor	CA	HP	JB	JH	MW	PB	PC	PS	RK	FJ	GH	GK	GV	HV	LW	MV	TB
Out-degree	1	1	1	1	3	0	1	5	5	0	2	0	4	7	3	6	8
Expertise level	S	S	S	S	S	S	S	S	S	E	E	E	E	E	E	E	E

Bottleneck 02: People with an expertise level below the highest expertise level do not receive knowledge with high viscosity from at least two people with a higher expertise level.

This bottleneck implies that trainees should receive knowledge from more than one specialist and/or expert, and that specialists should receive knowledge from more than one expert. The results from the in-degree analysis are presented in table 3. It shows that there are 4 trainees with zero or one incoming link from a specialist or expert and that there are 6 specialists with zero or one incoming link from an expert. Consequently, 10 out of 20 actors are not able to fully develop their professional skills.

Table 3: In-degree of actors (only from actors with higher level of expertise)

Actor	BR	CE	GG	KT	LK	MM	NB	PG	RS	WD	WH	CA	HP	JB	JH	MW	PB	PC	PS	RK
Out-degree	1	8	6	2	1	3	4	0	4	1	2	4	4	1	0	1	1	1	3	1
Expertise level	T	T	T	T	T	T	T	T	T	T	T	S	S	S	S	S	S	S	S	S

Bottleneck 03: People with a high expertise level transfer their knowledge with high viscosity to more than four people with a lower expertise level.

Here we are looking for experts and specialists with too many outgoing links. The out-degree measures in table 2 show that there are 2 specialists and 3 experts with too many outgoing links. One expert even has 8 outgoing links, which might imply that he spends too much time on high viscous knowledge transfer to other actors.

Bottleneck 04: People with an expertise level below the highest expertise level receive knowledge with high viscosity from more than four people with a higher expertise level.

In this case, the bottleneck involves those trainees and specialists that receive knowledge from more than 4 actors with a higher expertise level. The in-degree measures in table 3 again show that there are 2 trainees and 0 specialists with too many incoming links. There is one trainee with 8 incoming links; he is spending too much time on developing his professional skills.

Figure 8: Identification of communities in the push network

Before analyzing bottleneck 05 and 06 it is required to identify any sub communities in the push network. For this purpose, the *Community* function in NetMiner has been used. This resulted in the identification of 3 communities (see figure 8). The communities are labeled G1, G2, and G3, and are indicated by putting a red box around the actors of the community. By looking at the colors one can see that almost all red actors are part of community G1, almost all green actors are part of community G2, and that two actors with very few connections form community G3. The color indicates the office location of the actors, which implies that the spread of actors over the different offices severely limits the knowledge transfer between the actors in these offices.

Furthermore, it implies that the other attributes such as expertise level and function are not a barrier for knowledge exchange. This assumption can be verified by checking the External/Internal (E/I) index of different groups of actors. Figure 9 shows the results of applying the E/I index to different groupings based on location, function, and expertise level. The results clearly show that only the location leads to an internal focus of the actors (i.e. E/I index <0) and is therefore a possible indication for sub community formation.
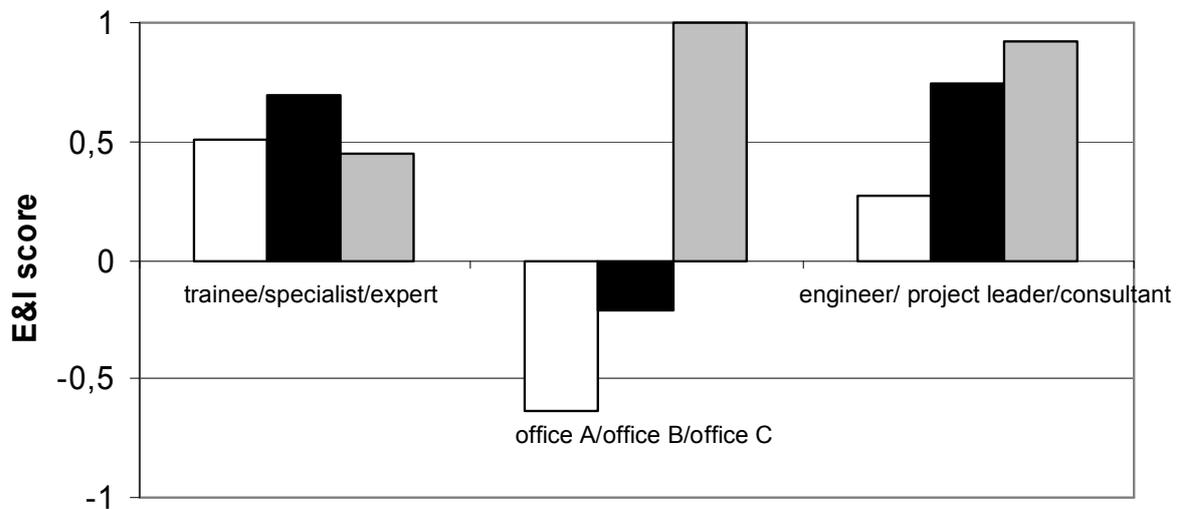
Figure 9: E/I index for different groups of the push network

Bottleneck 05: Unbalanced distribution of expertise over sub communities.

The sub communities become a problem when it results in an unbalanced distribution of expertise over the sub communities. A visual analysis of the network in figure 8 reveals that there is an uneven distribution of expertise, because 7 out of 8 experts are part of community G1. Community G2 has a total of 7 actors but only one expert and one specialist. Finally, community G3 is composed of two specialists. The lack of experts in group G2 and G3 implies that these groups do not receive much knowledge from experts and therefore there is a potential risk that they do not receive valuable knowledge from other communities.

Bottleneck 06: Lack of high viscous knowledge transfers of experts across sub communities.

The unbalanced distribution of experts over the sub communities is only a problem if the outgoing links of experts do not cross the boundaries of their community. The results from the cross boundary out-degree analysis in table 4 show that five experts in sub community G1 do not have high viscous exchanges outside their own sub community. Therefore, actors in other sub communities are cut off from the deep smarts of these experts. Another interesting result is the fact that expert GH only transfers his knowledge to actors outside his own sub community. Consequently, actors from the same sub community do not benefit from the deep smarts of their colleague.

Table 4: Out-degree of experts across community boundaries

Com-munity	Actor	Out-degree	Out-degree across boundary
G1	FJ	0	0
G1	GH	2	2
G1	GK	0	0
G1	GV	4	0
G1	HV	7	0
G1	LW	3	0
G1	TB	8	2
G2	MV	6	4

Summarizing, from the 8 experts there are only 2 experts exchange knowledge outside their own community. On basis of this analysis it can be concluded that the sub communication results in the isolation of the knowledge of experts. It is of course possible that knowledge of experts is indirectly exchanged to other communities via the specialists. However, a similar analysis on the out-degree of specialists revealed that only 1 specialist out of 9 has links that cross the boundary of their sub community.

Bottleneck 07: Departure of people with a high expertise level with few or none high viscous connections to other people.

The analysis of bottleneck 01 revealed that 2 experts and 6 specialists do not transfers their knowledge or transfer their knowledge to just one other actor. Because they do not transfer their knowledge to colleagues, the departure of these actors might result in a knowledge drain.

Bottleneck 08: Departure of people that influence many people (directly and indirectly) with their knowledge and thinking.

The departure of people that are very influential can also be a potential loss for an organization. Table 5 shows the influence of the experts based on their reachability and average shortest path. All experts, except one, reach the majority of their colleagues, i.e. 24 or 25 out of 27. However, only three experts can reach every other actor in two to three steps. Therefore, they are said to be the most influential experts and the possible departure of these experts is a potential loss for the organization.

Table 5: Influence of experts in the network

Actor	Reach (out) to others	Average shortest path	col 2/ col 3
FJ	0	0,0	0,0
GH	24	3,2	7,5
GK	24	3,8	6,3
GV	25	2,5	10,0
HV	25	2,2	11,5
LW	24	3,4	7,1
MV	24	3,3	7,4
TB	24	2,5	9,6

Bottleneck 09: Departure of people that fulfill a brokerage role in the network

The brokerage roles of each actor are determined using the *Brokerage* function in NetMiner. Table 6 shows the number of Gatekeeper, Representative and Liaison roles for each actor. Actors that do not fulfill any of these roles are left out of the table.

Table 6: Brokerage roles of actors in the push network

	GG	RK	TB	GH	NB	MW	MV
Gatekeeper	8	0	0	11	8	2	3
Representative	8	3	4	11	12	0	7
Liaison	2	0	0	0	0	0	0

There are various actors that act as Gatekeepers and Representatives and that there is just one actor that acts as a liaison: GG. Logically, actors that fulfil many brokerage roles are positioned along the border of the communities in figure 8. However, one should be careful with visual analysis because one might easily overlook RK and GG, for instance, which are not located along the border of there community but still act as a broker. Therefore, it is important to support visual analysis always with quantitative analysis.

Communities only become disconnected if there are network bridges between the sub communities. This is only applies to actor TB, when leaves community G3 will not receive knowledge from community G1 anymore. However, conversely community G1 is not disconnected from G3 in case TB leaves because he is not the only Gatekeeper with respect to G3. In the other situations, two or more actors have to leave before sub communities become disconnected. Therefore, from a brokerage point of view the organization is not very sensitive to the departure of only one of the actors in table 6.

Conclusions and recommendations

The bottleneck analysis regarding the effectiveness of the master-apprentice relationships (bottleneck 01 -04) revealed some structural problems in the push network. There are too many experts and specialists that do not or hardly transfer their deep smarts to colleagues. Consequently, too many trainees and specialist do not have enough high viscous relations in order to properly develop their professional skills. The company should address this issue because there is a structural problem in the development of professional skills. It can be easily solved by stimulating more experts and specialists to transfer their knowledge (assuming that their knowledge is relevant and valuable for the organization), because the ratio between trainees and specialists that should receive knowledge and the experts and specialists that can provide

this knowledge is almost 1 to 1. Therefore, the constraints posed by bottleneck 01 till 04, with respect to the minimum and maximum number of links, is not a problem in this organization.

Another structural problem was revealed by the bottleneck analysis concerning the existence of sub communities (bottleneck 05-06). The analysis showed that the geographical spread of actors over different office locations is causing the formation sub communities, which is a potential barrier for knowledge exchange. Therefore, we looked more closely to both office locations. The distribution of experts over the sub communities is unbalanced because the majority (7 out of 8) is located in Office A. This is a problem because the experts (and also the specialists) in office A hardly share their knowledge across the boundary of their sub community. Furthermore, visual analysis also reveals that there is a nice mix of functions and expertise levels in office A. While in office B, there is only one expert project leader, one specialist engineer and six trainee engineers. The low level of expertise might be an explanation why employees at office A do not have a need to receive knowledge from their colleagues in office B. Vice versa, office B is very dependent on office A for acquiring new knowledge, which it does not receive. It is recommended that the organization increases the variety of functions and expertise levels at office A and B and at the same time increase the amount of high viscous knowledge transfers between the offices. Both can be realized at the same time by switching employees between office A and B.

The third and last bottleneck analysis focused on the possible risk of the departure of employees which might result in knowledge drain and disconnectedness (bottleneck 07-09). The highest risk is posed by employees that do not transfer their knowledge to colleagues. Because there are 8 employees, 2 experts and 6 specialists, that hardly transfer their knowledge. To determine if their departure will actually lead to a knowledge drain, it is recommended that the organization investigates the relevance and value of the knowledge of these employees before undertaking any action. In case they have valuable knowledge that needs to be shared there are two options. First, the organization can create challenging career tracks and a stimulating work environment so that employees do not want to leave. Secondly, the organization can make sure that these employees have viscous knowledge exchanges with potential successors.

The impact of the departure of influential employees or employees that hold brokerage roles is rather low. Analysis of the influence showed that almost all experts are rather influential. Therefore, the impact of the departure of a single expert is rather low. Furthermore, the risk of disconnectedness is also rather low, because of the redundancy in the brokerage roles between the communities. If one employee leaves this does not immediately lead to disconnectedness, except for actor TB because he acts as a network bridge between sub communities G1 and G3.

Tips & Tricks (To-Do)

☑ Get management support for the Knowledge Network Analysis and let management invite/urge community to participate in the survey. This assures high response rates for the survey (higher than 90% is required)

☑ Check the conclusions with the actual situation within the organization and personal experience of community members. Contextual information is often required to draw the right conclusions from the findings.

☑ Include e-learning systems as actors in the network to study the contribution/dependency of information technology in developing professional skills.

Potholes (Not-to-Do)

☒ Do not depend on the visual analysis alone, you easily overlook something. Always support visual analysis with quantitative analysis.

☒ Do not draw conclusions on networks if there is a low participation rate of community members in the Knowledge Network Analysis. If too many people are not participating you easily get a distorted snapshot of the situation.

☒ Do not use the type of survey questions, as presented in this chapter, in case of large networks (say larger than 75 people). For larger groups alternative data collection strategies should be used.

☒ Do not use results of Knowledge Network Analysis to evaluate the performance of employees. A snapshot of the push network does not provide an overall picture of a person's performance and it only shows the situation at a certain point in time.

Acknowledgements

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Getting Stakeholders Involved in Regional Strategy Development: Basis-SWOT-Workshops

Simone Schweikert, Patricia Wolf and Christoph Hauser

Getting Stakeholders Involved in Regional Strategy Development: Basis-SWOT-Workshops

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Snapshot (Quick Learning)

Basis-SWOT-Workshops are standardized workshops with a predefined length (2.5 to 3 hours), following a specific agenda, with specific materials (presentations, context information, templates, etc.), questions to be discussed and documentation formats.

The objective of the Basis-SWOT-Workshops is to integrate the knowledge and perspectives of multiple stakeholders of a regional innovation system into a highly complex strategy development process. The objective behind the high involvement of all stakeholders in the strategy development process is to build a broad commitment for the future strategy among stakeholder groups very early on.

The design of the Basis-SWOT-Workshops allows collecting, documenting and discussion perspectives of different stakeholder groups on perceived strength, weaknesses, opportunities and threats of the innovation system. These perspectives serve as a basis for the further elaboration of
a) strategic goals and activities based on the internal S & W of the actors of a larger system, and
b) scenario building on external O&T relevant for potential futures of the respective context.

Due to the specific design, a concrete result of the Basis-SWOT-Workshops is a collection of strengths, weaknesses, opportunities and threats of the 'researched' region. In addition, participants define objectives and impacts that should be reached by the future strategy and describe concrete single actions each participant is willing and able to contribute to the achievement of these objectives or impacts.

Keywords: Facilitating of meetings and workshops, Interaction modalities, Knowledge identification, collection, organization, sharing, adaptation, use, recreation (also Information visualization searching and finding), Strategic road mapping, Innovation management

Context (Where & What)

The SWOT analysis methodology generally helps to collect and visualise data that describe the actual situation of a group, an organisation/institution or a system. Both internal and external factors that determine the actual situation can be identified. Internal factors are strengths and weaknesses that can be addressed and changed by the actors themselves, external factors have a strong potential influence on the future development of the situation but can not be addressed by

the actors themselves – they describe what opportunities and what threats might occur. Beside the simple identification of actually visible opportunities and threats, the SWOT analysis provides a methodology for strategy development as it helps to identify potential patterns for the future development (Senn, 2001).

The Basis-SWOT-Workshop methodology presented in this paper can be used in bottom-up strategy development processes with different and heterogeneous stakeholder groups. This applies especially to contexts like regional or municipality strategy development.

A Basis-SWOT-Workshop usually takes 2.5 to 3 hours. Workshops are conducted generally in groups that should be not bigger than ten and not smaller than five people. Groups have to be homogenous concerning a major characteristic, i.e. all participants in the group are members of the same trade association or party, alumni of the same school, CEOs of companies located in the same town etc. At the same time they have to be heterogeneous enough that different perspectives on strengths, weaknesses, opportunities and threats can occur and stimulate discussion among the workshop participants.

Beside the collection of the SWOT elements from different perspectives, the objective of the Basis-SWOT-Workshops is to stimulate among the participants mutual discussions on objectives for the future development of their innovation system and to enable them to take over responsibility for activities that help their region to develop into the direction where participants want it to move. The Basis-SWOT-Workshop methodology is based on the experience that participation of important stakeholders from very early on in the strategy development process has an important influence on the degree of strategy implementation later on. The word "Basis" indicates an understanding that a good strategy should be grounded in the system it aims to bring forward (Lombriser & Abplanalp, 2004).

Preparation (The Checklist)

Background information (moderator):
- Moderator has to find out beforehand what kind of people are going to participate in the workshop. Therefore, she should use available background information i.e. provided at the website of the group as well as talk to other people who already have been in contact with these groups.
- Moderator has to study the slides and the moderation handbook some days before the workshop. Ideally, new moderators should participate beforehand in at least one workshop that is moderated by an experienced moderator.

Organisation (back office):
- The back office has to contact workshop host organisations, agree a date that is convenient to both the group and the moderator and reserve the necessary facilities (appropriate group rooms, beamer and flipchart). Then, back office should send out invitations to the workshop participants.
- Back office has to prepare the necessary workshop material (see toolkit).

Toolkit (The Essentials)

Facilities and general material:

For each group, a group room for up to 12 people is required. Tables and chairs should form a 'U', so that participants face each other. The room needs to be equipped with pin walls (or walls suitable for sticky tape), beamer, laptop and a flipchart. It is crucial that pin walls are large enough, one square meter per person reasonable.

Further general material needed for conducting the workshop are pens/markers (one per participant, same colour for everybody), pins (or sticky tape) and board marker for the moderator. The moderator should bring a digital camera with him.

Print outs and templates:

The following print outs are needed by the moderator for his own information: A printout of the presentation including including instructions on slide content to be told, overhead projector slides as back up and the list of participants (name, organisation, professional background).

For the workshop, the moderator and the participants need the following material:
- Colour print out of the slide showing the different roles concerning knowledge transfer in the innovation system, one per participant
- Templates for writing down strengths (yellow), weaknesses (blue), opportunities (green) and threats (red), 10 per participant and SWOT element
- sticky points, 12 per participants
- SWOT-Poster (A1-Format)
- Templates for writing down three objectives for the regional innovation strategy, one per participant
- Template for writing down personal actions, one per participant

Making it Happen (The Approach & the Action)

The agenda of a typical Basis-SWOT-Workshop looks as follows:

What & how long	Details
Introduction 30 Minutes	A typical Basis-SWOT-Workshop starts with an introduction into the context and the clarification of the homogeneous characteristic of the participants and their relation to the wider (innovation) system. Therefore, the moderator presents a graphic describing how knowledge transfer works in the innovation system as well as the different roles of system members in this process (see figure 1 below): **Figure 1: Knowledge transfer in the innovation system** The participants are then asked to position themselves in this picture. This step helps them to define the homogenous characteristic of the group. As a next step, the moderator provides a short explication of the strategy development process and the role of the SWOT-analysis inside this process. Thereafter, he explains the methodology the SWOT workshops are based upon and the agenda of today. **Figure 2: SWOT Workshop participants are listening to the moderators'**

	explanations
Collection of strengths, weaknesses, opportunities and threats 30 Minutes	The next workshop phase is dedicated to the collection of strengths, weaknesses, opportunities and threats. Here, it is important that the moderator describes very clearly the difference between the internal strengths and weaknesses that can be addressed by the participants themselves and the external opportunities and threats that participants can not influence but have to deal with once they occur. To distinguish well between internal and external is critical because the object of the Basis-SWOT-Workshop is not a company, as some participants may know it, but rather an entire region. Hence, internal strengths and weaknesses refer to all actors within that region, and most of them do not participate in a given Basis-SWOT-Workshop. A further point that has to be made very clear is that this is neither a personal SWOT nor a SWOT analysis of the group the participants belong to. The aim of the actual workshop is to gather the perspective of the respective group and its members on strengths, weaknesses, opportunities and threats of the innovation system they are members of. After these explanations, participants start to write down strengths, weaknesses, opportunities and threats of the innovation system individually. Because of the regional scope of Basis-Swots and as a variation to the normal SWOT analysis procedure, the workshop participants are asked to indicate who they consider being the "owner" of each single strength, weakness, opportunity and threat (e.g. god father can change the weather, the government can lower taxes and parents can teach their children, etc.) and to which topic (economy, people, administration, technology, education etc.) it belongs. Therefore, they use the card template presented below in figure 3: **Figure 3: SWOT template used for Basis SWOT workshops in Central Switzerland** The moderator collects the cards that have been filled in and pins them on the wall. He roughly clusters them.
Break	The collection of strengths, weaknesses, opportunities and threats is followed by a short coffee break for the participants.

15 Minutes	
	Figure 4: Participants add their inputs to the walls
	In the meantime, the moderator finishes his task of pining cards on the wall and clustering them.
Selection of most important SWOT categories 20 Minutes	At the beginning of the next phase, the moderator asks the participants to walk with him along the wall and describes the topic clusters he has developed out of the participants inputs in the different categories (strengths, weaknesses, opportunities and threats) shortly. Participants get a last possibility to add something to the existing SWOT clusters. **Figure 5: Moderator explaining SWOT clusters to the participants** The moderator than asks the participants to vote in each category for the three most important topic clusters. Each participant is allowed to vote for three clusters in each category. For voting, participants use 12 coloured adhesive dots. After the three most important topics per category have been identified, the moderator visualises them in the SWOT matrix template. He than roughly explains the options for strategy development (see SWOT matrix presented in table 1).

Table 1: SWOT matrix including strategy development options		
	Strength 1: innovative companies Strength 2: attractive offerings for tourists Strength 3: strong personal networks	Weakness 1: conservative mindset Weakness 2: political coordination between cantons Weakness 3: limited number of jobs for young people
Opportunity 1: EU policy Opportunity 2: orientation towards Zurich Opportunity 3: intact landscapes	Which strengths can we use to benefit from opportunities?	How can we overcome weaknesses that hinder us to address opportunities?
Thread 1: getting the 'transit region' of Europe: pollution Thread 2: earthquake Thread 3: EU policy	Which strengths will help us to stave off threads?	How can we overcome weaknesses that expose us to threads?

In a next step, the moderator points out that strategy development that is not based on objectives does not make any sense. Thus, the next workshop phase will be dedicated to the development of objectives for the regional innovation strategy.

Potential objectives of the regional strategy 30 Minutes	In a next step, participants are asked to think about potential objectives this specific regional innovation strategy should address. The moderator visualises these objectives and the way they are related in a mind map. **Figure 6: Example of how a mind map for the regional innovation strategy for Central Switzerland could look like** After the collection of these general objectives, participants get provided with a template for writing down the three concrete objectives that should be reached with the help of the regional innovation strategy that are for them individually most important. Each participant reads the own objectives out to the other participants.

Personal action sheets 25 Minutes	In the final phase, participants are asked to come up with at least one action they themselves could and would take on in order to use a personal/organizational strength to take advantage of a certain opportunity or to tackle with a potential thread. For this task, they get another template where they fill in what they are ready to do concretely, what kind of help they would need from whom for this action and what the results of their activity will be. As a last step, the moderator thanks the group members for their engagement; he explains again how results will be used and closes the session.

The SWOT workshop takes according to the presented workshop design 2.5 hours.

Results & Next Steps (The Follow-Up)

The results of each Basis-SWOT-Workshop are documented during the workshop by the participants with the help of the dedicated templates. After the workshop, they are photographed and collected by the moderator. The moderator hands all data from his workshop over to the back office. The back office then has to do two important things:

1. Data are brought into an adequate format (most of them are typed up) and distributed among the workshop participants.

2. The core data from all Basis-SWOT-Workshops of the innovation system in question – strengths, weaknesses, opportunities, threats, objectives of the regional innovation strategy and personal actions - are integrated into a common file. They serve as basis for the next steps in the strategy development process.

The core data file is than analysed with a qualitative cluster analysis method (Lament 1988) by qualified researchers, technically Atlas.ti is used. In this step, for each category and question, answer clusters are developed. It will be indicated how often each answer cluster has been nominated as this might give a hint on the importance of the answer cluster.

However, the number of nominations can not be treated as the ultimate indicator for importance of the answer clusters as only a number of groups within the innovation system – those who were able and willing - have been involved into the Basis-SWOT-Workshops. Thus, the data are not representative in a quantitative, statistical sense. However, collecting a representative sample is even not the objective of the Basis-SWOT-Workshops: As an action research approach KROMEY (1990, p. 330)., the objective is to foster commitment and feeling of ownership for the strategy among the participants as the Basis-SWOT-Workshops facilitate the development of a common understanding about strategy development process and about the role participants can play within it.

For the analysis of the data, this does mean that all answer clusters have to be presented to the workshop participants in a final meeting where the workshop participants can than vote for the most important answer clusters for each category and question. Alternatively, this could be done with the help of a survey.

Real Cases (As it has Happened)

The described method is currently used by the EU funded project 'Regional Innovation Strategy for Central Switzerland' (RISforCCH). The objective of the project is to enable all important stakeholders of the six cantons that form Central Switzerland (Lucerne, Obwalden, Nidwalden, Zug, Uri, and Schwyz) to develop together a regional innovation strategy. Except the canton Schwyz, all central Swiss cantons participate in the strategy development process as the project is fostering very important activities in regional development: It aims at uniting the innovative players of the whole region through building up transparency on who is doing what and stimulating meaningful conversations among the actors of the innovation system. In a next step, these innovative key players should be enabled to plan and realise common projects that will make the region an even more innovative and better place to live in.

Starting from autumn 2006 and finishing in February 2007, the RISforCCH project is actually conducting about 30 Basis-SWOT-Workshops in Central Switzerland. This section is presenting two different real cases:

A first pilot Basis SWOT workshop was been conducted with the Advisory Group of the RISforCCH project. This group is a relatively heterogeneous one: It includes some of the European partners of the project (region Abbruzzo and Tirol) and important regional key players from Central Switzerland as the rector of Lucerne Business School, representatives of the administration of the cantons Lucerne and Nidwalden and of an important Business Association in the canton Zug. Overall, eleven people participated in the workshop.

Figure 7: Basis SWOT workshop with the AG group members, 01.09.2006

This workshop lasted three hours. As the group was relatively big, especially the collection, clustering and presentation of strengths, weaknesses, opportunities and treats took some time. In addition, for this pilot workshop templates for the documentation were not ready yet. This caused the problem that some of the workshop participants did not always indicate owner and/or topic of strengths, weaknesses, opportunities or treats. However, a big variety of different answers has been collected and fruitful discussions have been stimulated.

The perspectives of the participants were strongly reflected in their answers: They argued rather on a meta- perspective from a political point of view. From this perspective, several opportunities can be seen as threats at the same time (e.g. the development of Swiss-EU-relationships); a lot of interesting discussions around controvers political topics have been stimulated. However, at the end of the workshop participants where able to formulate personal activities they would like to do in order to make Central Switzerland more innovative.

Another workshop has been hold with a rather homogenous group of people, the CEO and the two employees of the Innovation Transfer Centre Central Switzerland (ITZ). For this workshop, all templates have been prepared already and the collection and documentation of the answers to the different questions went very well. This group has been working together for years, so compared to the first real case these workshop participants knew each other very well. Thus, they were able to discuss more concrete topics and did not need much time to develop a common understanding on terms used etc.

This workshop lasted 2.5 hours. The group collected a big number of strengths, weaknesses, opportunities and threats. However, it was easy for the participants to identify the three most important issues in each category. The SWOT matrix enabled them to easily combine opportunities and strengths in a way that enabled them to formulate objectives for the region. For this group, the issue of demographic change (people are getting older and older) was a very important one. They combined it with the fact that the region suffers a bit from brain drain as Zurich is quite close and a very attractive city. What they came up with was a strategic concept that was aiming at supporting people during their whole life through providing them with the right services in the areas of education, leisure, business, politics, infrastructure ect. The idea was to create strong ties that would enable people to leave the region and explore the world but to bring thereafter their brilliant ideas back to the region.

Figure 8: Basis SWOT workshop with the ITZ employees, 08.11.2006

For the project team, the lesson learned from this group was that the very small number of participants would have caused a problem in the process of voting for the most important answer clusters among strengths, weaknesses and threats if there was somebody aiming at influencing the result of the voting. Thus, the RIS team decided that four people would be the minimum of participants.

The participants of the ITZ workshop felt that this workshop did provide a certain value to them: It enabled them to develop an understanding on the companies' own position within the regional innovation system and on the impact even small own activities can have for the development of the whole region.

Tips & Tricks (To-Do)

þ Present examples for strengths, weaknesses, opportunities and threats that make the difference between internal factors that people can address and change themselves (strengths and weaknesses) and external factors they can't influence (opportunities and threats) very clear.

þ Create templates for the documentation of answers during the workshops: They help that participants document their answers in the requested manner and do not forget several points. The standardisation of the form of the answers does help in addition during the phase of the analysis.

þ Back office has to make sure that each moderator gets all workshop material at least one day before the workshop. This helps the moderator to prepare for the workshop.

þ Check during the whole workshop whether you are still in time. There are two things you can do to get back to the schedule:

1. In case you are late in the beginning of the process, skip coffee break: Send people out to get coffee and food but ask them to return intermediately. Participants can have their coffee while the moderator presents them the SWOT answer clusters.

2. In case you have long and fruitful discussions on the objectives of the regional innovation strategy that you don't want to interrupt, skip the task where participants are asked to write down three concrete objectives that should be reached with the help of the regional innovation strategy. Just go directly to the personal action sheets – and ask participants to indicate there a concrete objective they are going to support with their action.

Potholes (Not-to-Do)

Ý Do not underestimate the need of moderators for information on the workshop and training. It would be good to train all moderators together at the beginning of the SWOT workshop process.

Ý Do not give too much room for discussions at the beginning of the workshop as this would take time away from the end when participants formulate personal actions to support the region. Stick to the time plan. Especially discussions on the basic assumptions of the workshop - type 'we do not feel like one region, so why do we need a regional innovation strategy' - don't lead to any result but can be useful if documented as a weakness of the innovation system. Discussions out of this line may be postponed to coffee break.

Ý Do not allow more than ten and less than three participants per workshop.

Ý Never skip the last task at the end of the workshops where participants have to fill in personal action sheets. This is the step where people have to commit themselves to the regional innovation strategy and formulate concrete personal actions to support the envisioned development of the existing regional innovation system.

Acknowledgements

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Author Biographies

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Dr. **Patricia Wolf** is leading and co- leading several workpackages of the RISforCCH project. Since summer 2005, she is in addition lecturer and project manager at Lucerne Business School. Before that, Patricia worked for three years as researcher and consultant at the Institute for Human Factors and Technology Management at the University of Stuttgart as well as at the Fraunhofer Institute for Industrial Engineering in Stuttgart. There, she was leading and participating in several EU projects in the area of Knowledge and innovation Management. Patricia wrote her doctor thesis on success measurement of Communities of Practice while working with a project team that was introducing 100 CoPs into the Mercedes-Benz Passenger Car development department.

Dr. **Christoph Hauser** is leading the Basis-SWOT-Workpackage of the RISforCCH projects. In addition, he teaches political and regional economics and negotiation techniques at the Lucerne School of Business where he also holds responsibility for various research and consulting projects in the field of regional economics and politics. Before joining Lucerne School of Business, Christoph worked for the Swiss State Secretariate of Economic Affairs where he held negotiation mandates for the WTO/GATS negotiations. His doctoral thesis explains "an economic theory of mediation" and builds on negotiation theories, economic models and empirical studies at the Florida Mediation Group and in political preparation processes for mergers of municipalities in the Canton of Lucerne, Switzerland.

Multi-stage Analysis for Knowledge Reflection
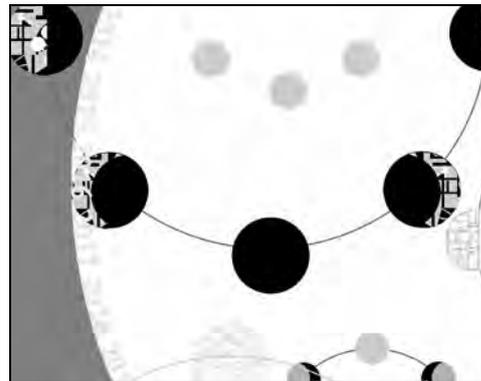
Jens O. Meissner

Multi-stage Analysis for Knowledge Reflection

Jens O. Meissner, Lucerne School of Business (jens.meissner@hsw.fhz.ch)

Snapshot (Quick Learning)

The technique presented here focuses on the cultural meaning that human narrations enclose. From this method, the applicant can expect the visualisation of partly hidden and implicit knowledge of the organisation and its members. This technique enables the user to visualise the knowledge practices that unfold during daily interactions. It is adequate to identify and reflect upon problems that are deeply rooted in organisational culture like organisational learning, innovation, collaboration and communication, to name only a few.

The technique consists of a series of narrative interviews conducted with a relevant selection of concerned actors in the field of interest. The analysis is performed by a group with more than two members (herein after referred to as 'participants') and runs through various stages: 1. individual analysis, 2. tandem analysis, 3. group verification, 4. mirroring the results, 5. aggregation of the results and 6. the feedback of the aggregated results to the interviewees as well as other concerned people. The technique enables practitioners to reflect themselves, the relational dynamics and the cultural conditions under which they interact. Because of its dialogue oriented style and the strong focus on the transcribed utterances of the interviewees the multi-stage analysis slows down the process of looking on how social reality is enacted. By this, everyday practices as well as the according social constructions and dynamics becomes visible which otherwise easily would be overlooked or ignored.

In the presented case studies, we were able to identify central determinants in the fields of Swiss company's virtual communication and Swiss leadership culture. In both studies, the impact of visualisation by landscapes was obvious for the project participants. When cultural determinants and everyday practices were identified, the actors started to deal with them, argue about them, introduced new technologies or developed routines to solve problems concerned with the field of interest. Thus, the technique provides a powerful tool to visualise and reflect upon cultural knowledge, to solve locked situations in organisations and to change social reality. The multi-stage analysis technique is a tool to foster sustainable cultural learning and to increase the learning capacity of small collectives and should be taken into account when

- the field of interest is related to social and cultural aspects

- participants are willing to spend enough time (approximately one day per interview excluding transcription)

- the number of interviewees does not exceed ten persons and the number of group participants does not exceed five

- interviewees agree to open up for the process of narrating and to spend the required time for the whole reflection process

Keywords: narrations, qualitative interview, social construction, cultural learning, landscape

Context (Where & What)

The core of the technique bases upon communication. The target is to create knowledge artefacts (interview transcripts, topic lists and thematic maps) and to discuss them dialogically. Thus, one major effect of the technique takes place during the whole process of group reflection. Subordinate goals for this technique are to develop a topic list and a thematic map for each interview as well as an aggregated topic list and a thematic landscape for the whole interview sample – the latter herein after will be referred to as "landscape".

In the case studies presented later on, we used the technique for reflecting complex social situations, in our case for the visualisation of leadership culture and virtual communication culture in Swiss companies. Related projects focused on the character of consulting relationships (Müller, Nagel & Zirkler, 2006), the social reality that HR managers in highly dynamic environments create (Kaudela-Baum, 2006) and the analysis of reform processes in public management institutions (Nagel, 2002), to name only a few.

The technique requires a lot of time (approximately 20 h per interview, excluding 6-10 h for the verbatim transcription of the interview) but is highly promising in terms of sustainable cultural learning. For applying this method, participants need to find conditions under which they can discuss freely and in an open atmosphere.

The number of conducted interviews should correlate to the number of the participants. In our projects, we had an average ratio of 6:1 (six interviewees per participant) with a maximum of thirty interviews. A recommendation would be to keep the number of interviews between ten and twenty, depending on the complexity and size of the topic. The ratio of 3:1 seems to be desirable for reflecting organisational knowledge practices efficiently.

At a later stage in the process of analysis, all interview results will be aggregated into an overall list of topics and a respective landscape. Usually, this step evokes extended discussions within the participant group and takes a lot of synchronised time (i.e. working at the same time at the same task). Depending on the number of interviews and the degree of preparation of all participants, the aggregation phase may take up to multiple days. It is recommendable to organise this step in form of an "aggregation workshop".

Preparation (The Checklist)

You should prepare the following to bring the analysis process into action:

1. Define the field of interest: Which section, branch, topic or aspect stands in the focus of the investigation? The field of interest determines the introducing question of the interview as well as the opportunities how to mirror the results into the field of interest.

2. Define the group of participants: Who is member of the group? It is necessary that the participant group remains stable during the process. Each change within the group requires new social norms and discussion routines. This team building process is time consuming and slows down the process efficiency significantly.

3. Define the roles in the group: Who is the coordinator? Who is responsible for protocols of group meetings and the documentation of results? Which two persons build a tandem? Which tandem takes the 'process ownership' for which interview?

4. Dates and deadlines: Define the dates for group sessions for the whole process. Schedule at least two hours for each interview. After the kick-off meeting, the fixation of interview dates is the most important as well as a very tricky task.

5. Technological infrastructure: Who manages a shared virtual workspace? The amount of simultaneously processed documents (different versions of multiple interviews, topic lists and thematic maps) will increase during the process. Thus, the tracking of the interview processing as well as the coordination of the group sessions will be complicated. A shared workspace would be a big support to handle this problem.

6. Interview technology: Take care that enough recording devices are available and distribute them among the participants.

7. Support services: Find people who transcribe the interviews verbatim. It is not recommendable to transcribe them within the participant group. This would be a tedious process and would slow down the whole engagement as well as decreases the motivation of all participants. Additionally, it is hardly possible to process the topics of the respective interviewee simultaneously during the process of transcription.

8. Identify a date for a feedback event: You may organise this event as a mini-conference or 'reflection workshop'. Prepare in which form the results should be presented and discussed. It makes sense to develop an idea about the documentation of the event results. Maybe the results can be kept in some management guidelines or in a concrete action plan e.g. to reorganise work processes.

Toolkit (The Essentials)

Important physical resources for the whole process are:

- A secluded meeting room that is appropriate to discuss confidential issues in a trusted atmosphere. The room seating should be arranged for open discussions.

- Visualisation support (flipchart, pin board with large sheets of paper, carton cards, pins, paper markers).

- A shared virtual workspace where project documents and results can be stored. This workspace should be accessible for all participants.

Making it Happen (The Approach & the Action)

The multi-stage analysis technique bases upon a social constructionist perspective on social phenomena (Gergen, 2003; Burr, 1995; Dachler & Hosking, 1995). From this stance, relationships are the source of social reality and all knowledge, too. Thus the question is how to assess relationship quality from a social constructionist perspective?

The description of a social constructionist perspective on relationships shows that the knowledge reflection process has to be adequately designed as social constructionists gather insights about the studied phenomena by trying to "look through the eyes of the other" (Bryman, 1988). We chose a narrative approach to generate stories about the research topic which we interpreted later on. But most interviewees found it hard to tell their experiences about everyday practices in autobiographic form as the narrative interview technique proposes it. Routinised interactions are deeply anchored in everyday work life. As a consequence, they are hard to reflect in a narration. We chose the technique of the 'problem-centered interview' (Witzel, 2000) as method to access the narrated everyday practices of the participants. This approach of knowledge reflection is based on multiple main principles and will be briefly presented in the following paragraphs.

The inteview technique is problem-centered and wants the interviewee to tell his or her own experiences with the topic – the 'problem' which lies within the field of interest. The interviewer is interested to gather descriptions of human behavior as well as on subjective perceptions as ways of exploring social reality. As its name suggest, this type of interview focuses on a societal relevant problem, that provides a structure for both interviewee and interviewer, as they can refer to the problem as an anchor point throughout the interview. The problem-centered interview subordinates methodological variations to the necessities of the investigated topic. Any methodological variation which helps to understand the investigated problem is of use for the reflection process. Finally, the problem-centered interview is process oriented and intends to establish a trusted atmosphere in which affectation is prevented: "If the communication process is focussed reasonably and acceptably on the reconstruction of orientations and actions, the interviewees respond with trust and thus open up: they feel that they are being taken seriously." (Witzel, 2000:3).

Hence, when listening to the interviewee the interviewer has to reduce his own influences to the minimum. Direct interventions are allowed, when the interviewee loses the thread of his discourse or when he remains in trivial philosophy of everyday life. The interview is basically interested in generating narrative parts (for narrative interivews, see Schütze, 1976; Müller & Endrissat, 2005) as well as exact descriptions or ideological stances towards the problem. The interview begins by asking an open question to 'invite' the interview partner to elaborate on his experience: "When you reflect about your experiences with [the topic] in this organisation, which stories do you think of?" The aim is to gain verbalised experiences because they provide valuable clues for how the interviewee sees and constructs his world, thus revealing his or her 'theories-in-use' (Argyris & Schön, 1978). Afterwards, the interview is fully transcribed in the sense that the researcher can focus on the meaning of the spoken words.

For each interview you should consider the following proceeding:

1. Arrange the appointments with the interview partners as soon as possible. This point sounds trivial, but it is not. Especially when you intend to interview decision makers on a higher hierarchy level, the scheduling of a date will be rather difficult.

2. Conduct the interviews using the technique that was described in the section above. During the interview, it is helpful to assure confidentiality right from the start. All interviews should begin with the same question.

3. Transcribe the interviews quickly. Replace names and places in the transcript if you have assured anonymity to the interviewee. Create a PDF file with numbered lines and a broad page border as space for notes and remarks. This PDF is the 'leading document' and builds the basis for all subsequent discussions. The process of transcription may be outsourced to a reliable person outside the participant group.

4. Individual analysis: Analyse the interview by yourself. Throughout the analysis you should be guided by the following questions: How does the interviewee see the field of interest and what concepts, ideas and practices does he or she describe? Presumably, you will discover aspects in the interview which you are very familiar with. But this effect has to be neglected as much as possible. Looking through the eyes of the other one does not mean to look *at* the other one. The main difference of this method to other well-known techniques of content analysis (like those used by Glaser and Strauss, for example) is that there are no pre-formulated coding scheme which can be used by the analyzer in order to process the interview. The coding scheme consists of the issues and topics which are addressed by the interviewee itself. The analysis will result in a list of topics supported by quotations from the interview material. Additionally, you should draw a thematic map of the topics and their relations to each other.

5. Tandem analysis: Meet with the tandem partner and discuss the results. He or she has made an own interpretation of the main topics. Try to identify which topics are equal and which are not. Start to argue and discuss the different interpretations. When the differences appear as indissoluble, put the topic aside until the end of the session. Mostly, the differences casually resolve during the proceeding discussion.

6. In the end of the tandem analysis session, try to develop a consolidated thematic map that shows the topics of the interviewee as well as their relations to each other. This map will be a good vehicle of generating an aggregated landscape later on.

7. When the tandem analysis is finished, document the results in a new thematic map and with a list of topics, including quotations from the transcript. A topic should be documented at least with three quotations from different parts of the interview. Send your results to the other participants as preparation for the upcoming group meeting.

8. Group verification: Each participant of the group should read the whole interview and identify the central topics. Additionally, each participant has to read and verify the tandem analysis. This step differs from the tandem results in the point that the participants rather focus on the analysis of the tandem instead of completely re-analysing the interview. Previous projects showed that it is effective to especially review the prepared landscape (the topics and their correlations) and revise it conjointly. Afterwards, the ownership tandem of the interview can adopt the topic list according to the changes in the landscape.

9. Mirroring the results: When an interview was analysed and verified by the participants the results have to be sent to the respective interviewee. Ask the interviewee whether the participants interpreted his or her topics adequately or not. The release of the analysis by the interviewee means that the results are validated. Thus, the results have reached their final status. This step is also known as 'communicative validation'.

For the aggregation of all interview results, the proceeding should be as follows:

1. At the last stage of the process, all interview results have to be aggregated into one landscape. For this, the thematic maps of all interviews are compared in a group session. Try to ask which issues are very common and which are not? Try to identify topics with the same meaning (which can have different titles) and their relations to other topics. In the end, a landscape has formed that shows the reconstruction of the social reality according to the field of interest. This landscape is a typical knowledge artefact – a very important outcome of the whole process.

2. In a subsequent stage, the participants should create an aggregated topic list that contains the most fitting quotations of the whole interview sample for each topic shown on the landscape. This list of topics presents a comprehensive knowledge repository for the field of interest and thus provides helpful insights into its contemporary social construction.

3. In the end, different levels of aggregation (individual interview, organisational interviews, overall sample) and different perspectives of aggregation (culture, knowledge, innovation, gender etc.) enable the participants to identify typical common traits and thus generate practice-based knowledge about the field of interest.

The following graphic (see Figure 1) shows a sketch of the project schedule:
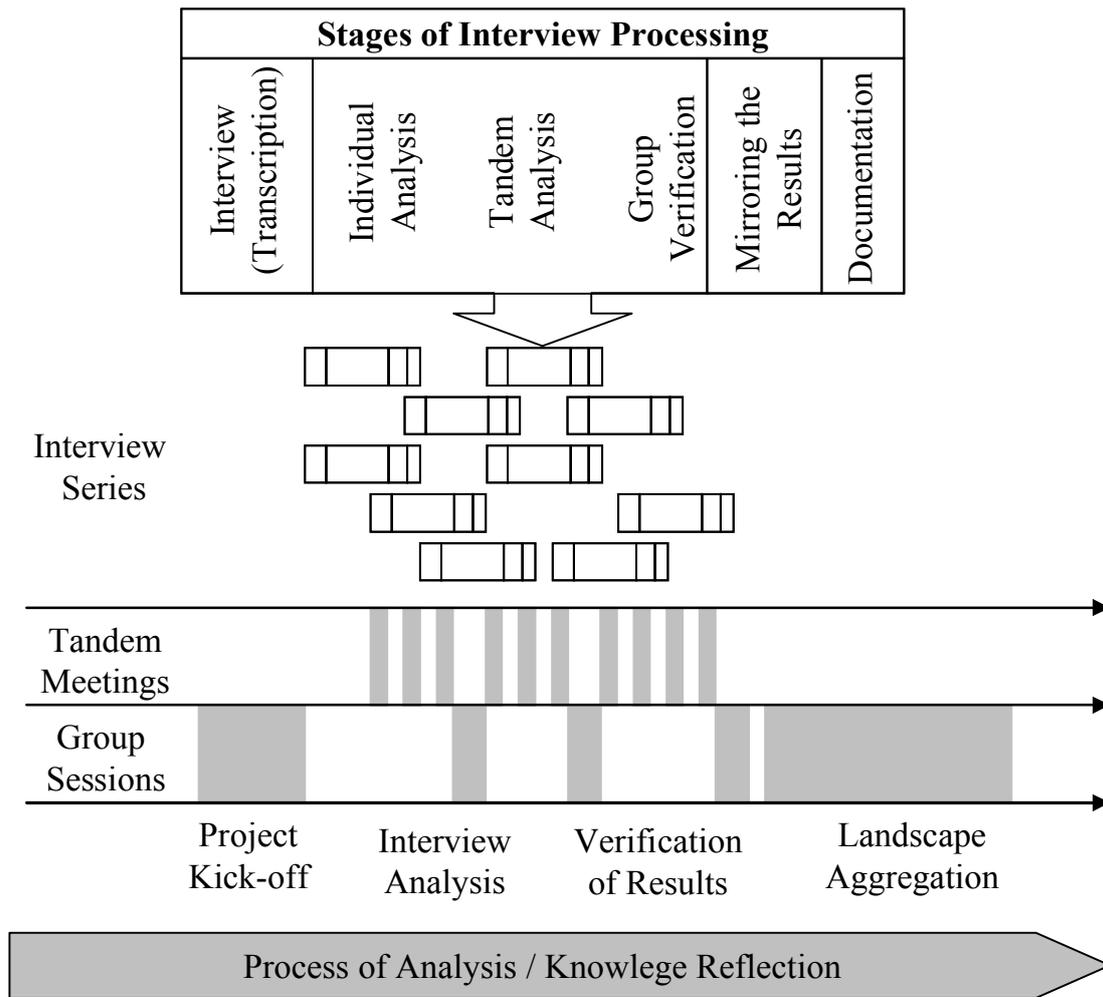
Figure 1: Draft of the project schedule

Results & Next Steps (The Follow-Up)

Results and their functions of this knowledge reflection process are:

- Topic lists of each interview: This list builds the basis for individual and tandem analysis as well as the source for quotations that are transferred into the overall topic list in the end.

- Thematic maps: These maps are the counterparts of the topic lists and serve as a visualisation vehicle for the individual and the tandem analyses as well as the group verification and the mirroring process. The maps are the main tool to intellectually 'grasp' the contents of one interview very quickly.

- Aggregated topic list: This list is the knowledge repository regarding the field of interest. Different strategies, collective behaviours as well as common traits regarding knowledge creation and generation can easily be extracted from this list.

- Aggregated landscape: This landscape functions as a 'generalised picture' that has emerged in the whole analysis and thus is a knowledge artefact by itself. It usually shows 'hot spots' of the organisation and gives hints to static, dynamic and balanced areas in it. The landscape provides good reasons to start discussions about 'blind spots' whithin the field of interest.

- Feedback workshop: The workshop is the last validation step in the whole process. It serves two functions: Firstly, it is the common ground for mirroring the results when the aggregated results are presented. The workshop members will provide worthful hints and comments on the design and comprehensibility of the landscape. Secondly, the workshop will function as a catalyser for further discussions. It is very likely that the workshop members start to spin new thoughts that are informed by the presented results as well as they are oriented to future actions.

- Follow-Ups: Possilbe follow-ups might exist in the development of some guidelines or a manual to deal with special problems within the field of interest. For example, it may be the first step for a strategising process or for reflecting the established leadership culture. It can also provide a basis for reflecting on knowledge processes because it shows whether traditionally priorities are adequate for the actual process design or not.

Real Cases (As it has Happened)

Real cases of knowledge reflection can be found in the fields of leadership culture, strategic human resource management, public management culture, the self-understanding of hospital professionals and consulting culture. This chapter shows a choice of results. The first case bases on the practice-based research project "Social Capital in Digital Context?", the second case stems from the project "Mirroring Swiss-German Leadership". Both projects involved practitioners of companies located in the German-speaking part of Switzerland. In both projects, the participants of the project group stem from industry as well as from university and consulting companies.

Case 1: Social Capital in Digital Context?

In this project, we were interested in the emergence of relationship qualities in the context of computer-mediated communication (CMC) in Swiss companies. Thus, this project focused on collaboration issues in virtual communication settings in organisations. The project comprised five participants.

We selected interviewees from four companies in order to assure a certain degree of diversity in the sample:

- The services department of a document imaging service provider,

- a holding of an insurance company,

- a global pharmaceutical producer, and

- an expert conculting company.

In each organisation, four to seven interviews were conducted. The selected interviewees from the companies had to fulfill two minimum requirements: Firstly, they should have access to a variety of seperated communication technologies in their working context. Secondly, their everyday work life should be predominantly related to communication activities. With these pre-conditions, we defined our field of interest. Overall, the whole sample consists of 21 interviewees, working in aidee and management positions to the largest part. The interviews took about one to one and a half hours each.

Usually, we explain each singular topic and underpin it by several quotations, which illustrate and reflect the meaning of each topic. Due to space limitations we will restrict the subsequent presentation of results to one single part of the overall "landscape of collaboration in CMC-context" (see Figure 2).
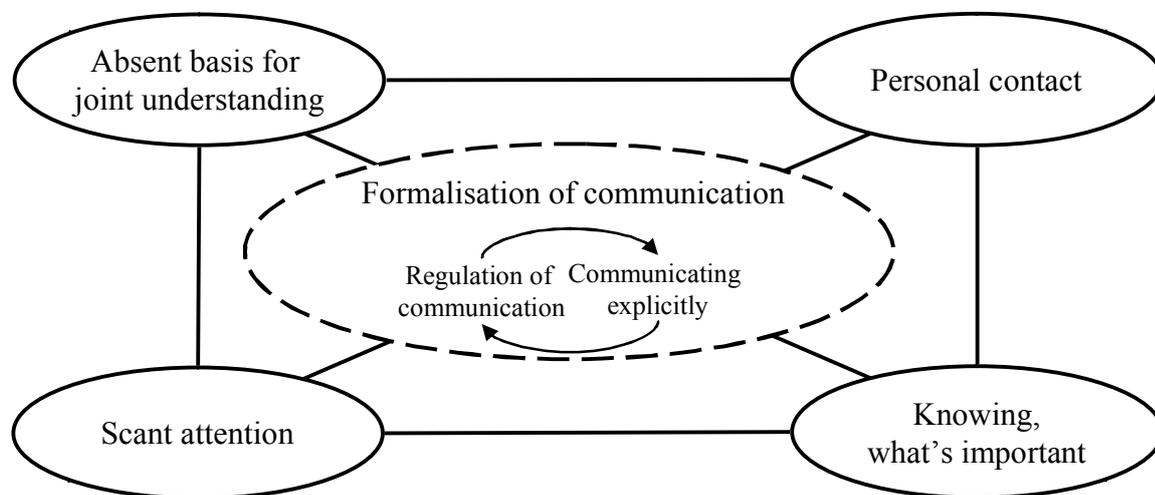
Figure 2: Landscape of collaboration in CMC-context

The landscape is divided into five regions. Each region is characterised by a different term that equals the identified topic. The single region "Absent basis for joint understanding" that will be presented here is located in the upper left corner of the landscape. The topic will be briefly explained and illustrated by quotations:

Interviewees express, that a joint understanding demands the creation of a common basis which is delicate as it often demands to explicate taken-for-granted issues. The "informal level which saves face" (interview partner 3 = ip3) is missing and thus an important element to create intimacy. The consequence is increased ambiguity, at least an increased feeling of uncertainty

that is absolutely normal when strangers get to know each other. But in virtual settings this increase often prevents the creation of a shared basis.

The absence of a basis for joint understanding is especially serious when the cooperation with a customer is affected. For one project the team leader reports the following narration concerning the workout of a handbook that in the end led to the delivery of a wrong service:

> "*We had to shorten texts in order to fit them into the layout. And the way this was done was not very well adapted to the customer's wishes: Special expressions which the customer uses regularly were not adopted in the customer's sense because the people didn't know the culture of the customer. We failed to send one or two chapters to the customer to ask him: 'Is that it? Are we working in the right direction? Is this what we had agreed upon?' All the communications were made via e-mail and phone. The people had never seen each other before.*" (ip1)

One cause of an absent basis for joint understanding is very simple. The people treat computer media in different manners.

> "*Here [at the company] it is treated very individually. There are colleagues who claim to be set on the to-list for reading mails generally. Others define automatic rules that forward all 'cc:'-mails into a special folder. And they only read them, when it is required [...] I think there are different strategies. What is problematic for me is that I have to know all these individual practices to be assured that they get my information. This is what I am interested in: when I communicate information to someone else, I want it to be perceived.*" (ip2)

A basis for a joint understanding would be in this case to know all the individual habits. But a second cause comes along with the media use: Very often it is said that CMC alters manners in communication negatively in the sense that these become more impolite in character:

> "*This e-mail-pingpong was not possible in earlier days when mail was delivered by the postman. You had to consider carefully: What do I want to say, how do I want to say it and what is the correct form? Besides, what is the common standard concerning behaviour and courtesy? Today, these elements are lost to a high degree.*" (ip9)

Especially in e-mail-communication very often it is not clear whether a mail is a 'written conversation' or a 'verbalised letter'. Mixing the standards of the used medium with the standards of another medium (e.g. being too casual in formal e-mails) creates confusion for all participants and reduces the probability that joint understanding is generated. Besides this effect on shared understanding, media use has consequences for mutual commitment, too:

> "*You don't reach [the colleague] and so you quickly write an e-mail to her. So your task is shifted to some one else's desk. This is about rearrangement of the workload – a very important area (laughs). This happens quite often, especially right before holidays. Then people try to clear their desks and start writing e-mails.*" (ip15)

In this case commitment is reduced because of the easiness to forward electronic messages. In the perception of this woman, tasks that are submitted via electronic media are accompanied by a slight feeling of arbitrariness. This is also connected to the fact that 'fine signals' are absent in the communication. Thus, the possibility to listen to nuances and to demand immediate feedback is limited. As will be shown later on, the personal contact is seen as sensing the other one and shows the grade of mutual commitment on the one hand and is a source of generating commitment on the other hand.

The absent basis for joint understanding is corelated with the central aspect of formalisation of communication that takes place in the context of CMC. Because of its high degree of standardisation the formalised communication is a main cause for misunderstandings. By the

absence of personalised information and social cues the formalised communication fosters the information flood (for expample in the form of e-mails). Both, information flood and the missing social cues lead to 'scant attention' in virtual communication. When attention is distracted, it's getting harder to set priorities and to 'know, what is important'. To know, what's important is related to the importance of the 'personal contact' because the personalised information usually contains a broad range of social cues and thus reduces misunderstandings in CMC and thus enables a joint understanding. In this way the landscape describes a web of topics that are of central relevance in the field of interest. At this point, we shall quit the description of the project results. A complete description can be found in Meissner (2005).

The project results were mirrored in a one-day-workshop to the interviewed practitioners as well as concerned people in the periphery of the project. During the workshop, the five topics of the landscape were discussed in subgroups. Different insights, lock-in situations, additional practices as well as rather general questions and answers were able to be illustrated and discussed in the subgroups. In the second half of the workshop the members developed guidelines of 'good virtual communication behaviour'. Until today, these guidelines serve the participants as helpful orientation. Thus, they incorporate insights of the project, create new process knowledge in their practices and increase the efficiency of communcative actions.

The multi-stage analysis technique worked very well in this project. The only thing that has to be criticised was the rather broad field of interest. CMC can be described as virtual communication, online communication or hybrid communication. It can also be reflected for organisations, civil society, for global virtual teams as well as for virtual conferences or blended learning structures. As a consequence, the diversity of topics was extremely high and it has been rather difficult to identify the central topics of all interviews for the aggregation and the development of the landscape. Finally, it turned out successful but it could have been a too difficult challenge especially for methodologically un-experienced participants.

Case 2: Mirroring Swiss-German Leadership

In this project, interviews with 26 managers in German-speaking part of Switzerland were conducted. The aim was to identify the meaning of leadership for this group (Endrissat, Müller & Meissner, 2005). The project comprised six participants.

As in the first case, we constructed an overall landscape that summarises the most relevant topics concering the leadership understanding of the managers (see Figure 3).
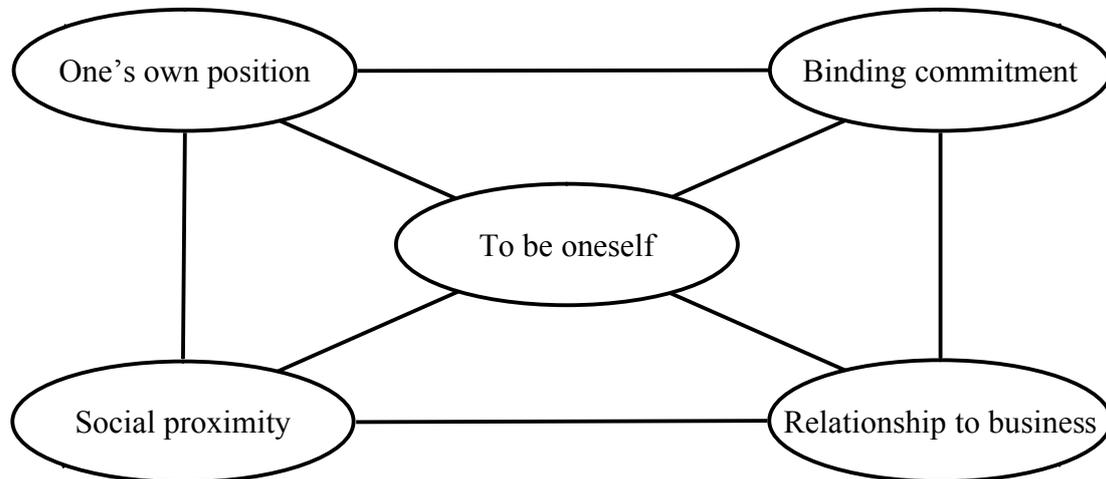
Figure 3: The Swiss-German leadership landscape

As the landscape shows, leadership is mainly evolving in the contradictory context of five topics. Leadership centres mainly about the preservation of autheticity, here indicated by the topic "to be oneself" in the middle of the landscape. On the one hand, a Swiss-German leader has to find an own position that has to be convincingly lived and argued by the leader to ensure a mutually binding commitment. On the other hand, a leader has to maintain a close relationship to the professional affordances and conditions of the business. This proximity to the culture of the business is a main source for pofessional ethics and a crucial point of sustaining the leader's identity. This relationship to the business has a link to social proximity. It is obviously a strong need for the leader to stay in touch with the sourrounding social groups and individuals. One part of these stakeholders are business partners, another part consists of the company's employees. Social proximity indicates the strong value that is inherent to social relations. Especially when the business requires decision making that affects social relations negatively (e.g. layoffs or outsourcing), the leader has to find or to adjust his own position to maintain his personality and integrity (to 'walk his talk'). Both, social proximity as well as relationship to business are preconditions for the attribution of legitimate authority.

The landscape illustrates that the authenticity tension is causing a painful ambivalence between loyalty to the collective where a leader is located in and the strong need for individual coherence that is dictated by the needs of the business. In really tough situations, the leader has to consider the business conditions or otherwise lose his legitimation of being a member of the business. In such a situation, authenticity is very difficult to sustain.

In the following paragraph, the topic 'social proximity' serves as the showcase for this landscape (and is cited from Endrissat, Müller & Meissner, 2005):

"Social proximity is a particularly prominent theme among Swiss managers who recount their careers as leaders. Most of the interviewed managers would agree with a statement made by a CEO of a worldwide operating company:

> *"Every leader, of course, wants to be loved. I think that is normal. You want that theothers like you and consider you a good boss"*. (ip6)

In many narrations the managers are concerned with how much social proximity is possible, allowed, and functional in a leadership relationship. This also relates to the challenge of establishing a personal relationship in the context of formal organisational structures. The CEO notices:

> *"Now today, I am in the upper echelon. Does that mean I have to say hello to the people differently or that I have to behave in another way – like, am I not allowed to go and have a beer with them anymore?"* (ip6)

'To have a drink/a beer' is an often used expression that reflects the search for a personal relationship and emotional closeness in different spontaneous or organised encounters beyond formal connectedness. These encounters are supposed to establish a 'direct line', to understand what 'the real problems' are, and to avoid the danger of being 'aloof' and above the people's reality. It implies remaining approachable and not losing touch with the base. Leaders receive high appreciation if they appear not to demonstrate ostentatiously their status power" (Endrissat, Müller & Meissner, 2005:5).

This case shows that the multi-stage analysis technique is adaptable to different fields of interests. In opposite to case one, we interviewed persons from absolutely diverse organisations. Additionally, we interviewed them in a pure narrative style, whereas in case one we applied a problem-centered interview-style. Nevertheless, both cases illustrate that the results can be aggregated in a landscape that is useful for knowledge reflection.

As in case one, we mirrored the aggregated results in a workshop and discussed different topics in multiple subgroups. But for some reasons we did not document the results of this workshop in a protocol or something compareable. However, the workshop was accidentally the first impetus for the institutionalisation of the 'Basler Management-Dialog' – a series of dialogue sessions about management and leadership in the Northwestern part of Switzerland. In these dialogues, current isssues about management are presented, discussed and reflected. New insights from the practice field as well form university research build the central impulses for each event. We know that many practical impulses emerged from this dialogue series, for example for the development and review of leadership guidelines and leadership development in some German-Swiss companies.

In this project the time management could have been improved. The interview series took almost two years. We learnt that a strict project management is needed when the sample is very diverse and the interviewees work in leading posititions and are chronically short in time. Though the high diversity was a cruicial value-added for the whole project. By this, some very broad but very concise topics could be identified. We suspect this diversity as the main reason for the success of the subsequent management dialogue series.

This section only shows an example of how the topics of the aggregated landscapes can be used for knowledge reflection. However, the suggested multi-stage analysis-technique needs a lot of time and a high degree of participation. But in this investment lies the cruicial key for success. By involving the concerned people in the dialogues on multiple stages of analysis, the technique provides insights about the field of interest as well as it creates a cultural space in which knwoledge reflection directly happens. By this convergance of theorising and practising the chances are high that the reflecting group has a high learning effect regarding the field of interest.

Tips & Tricks (To-Do)

☑ Slow down interaction dynamics in the interviews: Problem-centered interviews very often reach points of silence. In these moments, the challenge for the interviewer is not to intervene in the process of narration of the interviewee. Mostly, the interview partner thinks about something and reflects upon a side aspect or something else that relates to the interview. When the silence stays, you should point to the lost thread of the interview and stimulate the interview again. Remember, the spoken words in the interviews are your raw material for analysis and the key to create comprehensive practice-based knowledge.

☑ Process orientation: Knowledge artefacts (interviews, topic lists and thematic maps, aggregated topic list, landscape) often have the character of intermediate products. Consider them as more or less perishable references for social constructions. Sometimes, the topic of an interviewee looses its concision during the process of analysis. The other way around, the topics of the interviewees may become increasingly clearer the more interview results you take into account. Be conscious about the fact that all these knowledge artefacts serve as vehicles for improving the shared understanding in the participant group.

☑ Moderate group dynamics: Very often, a group debate about one single topic of an interviewee results in disaccord and the situation seems to be deadlocked. In such a moment, take the topic with its different interpretations and note it on a flipchart or a piece of paper so that everyone can see it. Then invite the participants that the group will discuss this topic at the end of the group session again. Mostly, the differences resolve casually during the proceeding discussion, because the subject has become clearer or one or both interpretations have become obsolete. Most project delays stem from these lock-in situations and the nonexistent knowledge how to deal with it.

Potholes (Not-to-Do)

☒ Avoid time pressure during the stages of analysis: The social process of analyzing and discussing on individual, tandem and group level should not be pressurised. Creating shared understanding – and thus the emergence of shared knowledge – takes it time and has to grow. However, pressurizing the process is a favour of those who very often do not agree with the process of knowledge generation itself. You should address this topic by means of meta communication at the beginning of a group session.

☒ Be aware of hierarchical limitations: The group discussions very often are characterised by phases of dialogue, thoughtfulness and cogitation of all participants. Then the group usually tries to change its perspective and to identify or create alternative definitions for the analysis. In these phases, the group is massively vulnerable to hierarchical power. You should take an eye on potential hierarchical influences and eventually make them explicit. This claim is sometimes difficult to realise.

☒ Do not claim the social reality of the interviewees as 'the' reality: The method aims at looking 'through the eyes of the interviewees' and – when condensed in an aggregated landscape – to reconstruct their collective social reality. This might be in accordance with your own perspective on the phenomenon. Nevertheless, this convergence is only partially and makes your own efforts vulnerable to methodological criticism. Usually, methodological doubts question the process as a whole. You should emphasise that the results reflect the topics of the interview partners (and not your own) and thus give a clue about their perspective regarding the problem.

Acknowledgements

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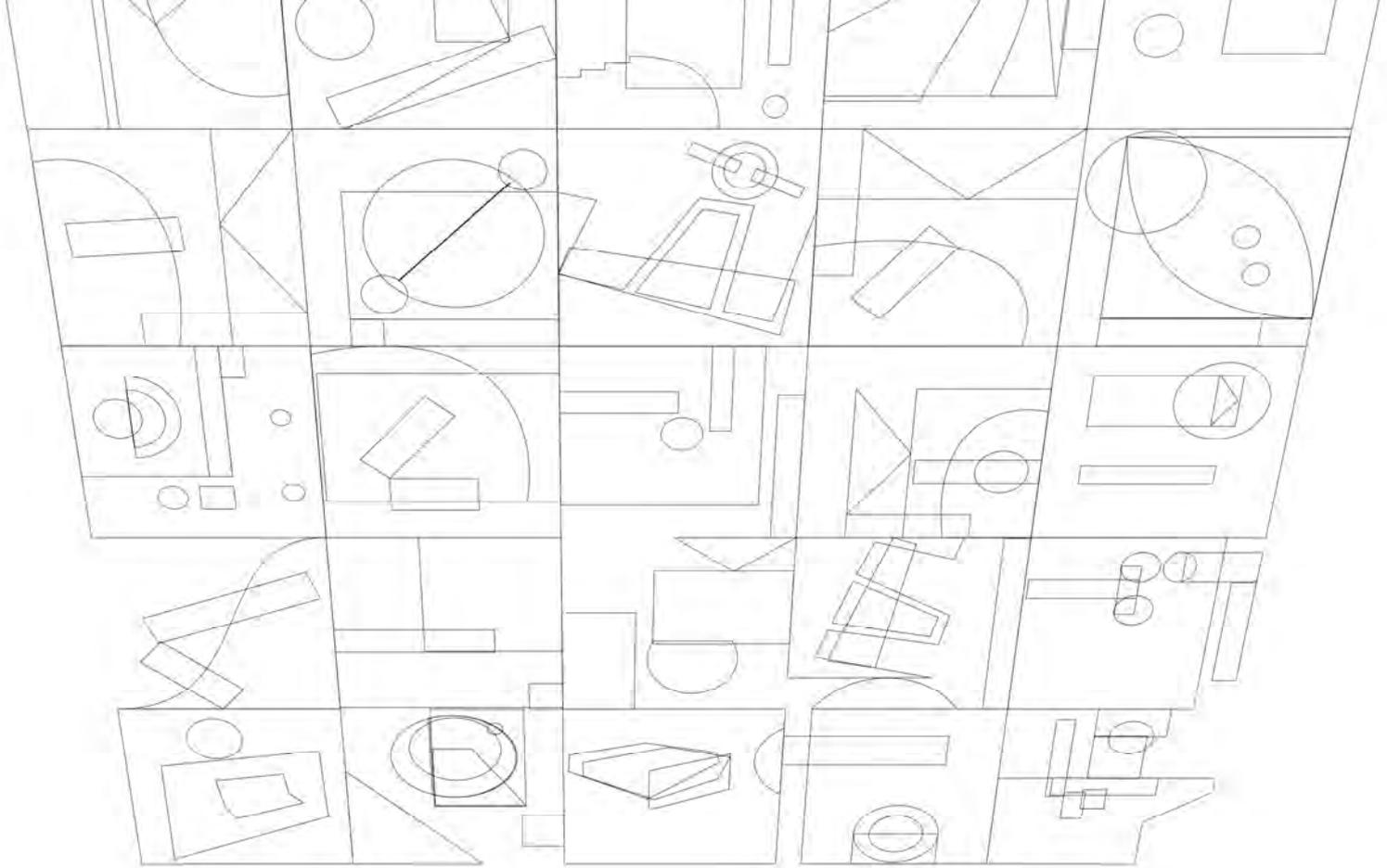
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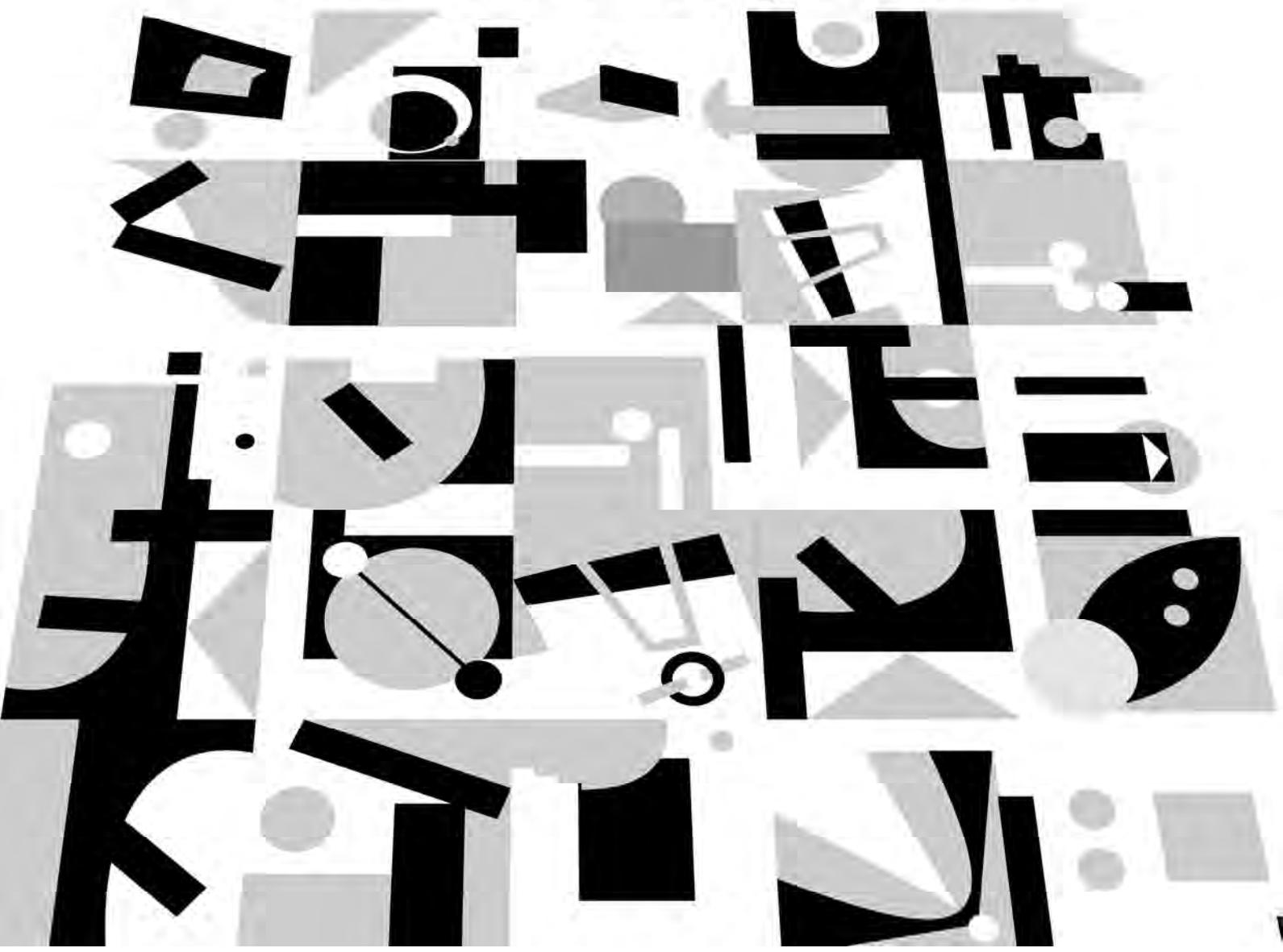
Improving the Facilitation of Organisational Knowledge Creation

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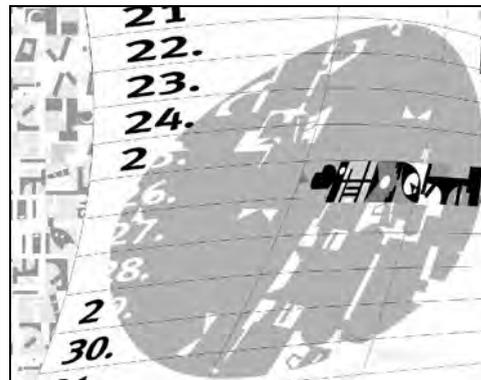
Improving the Facilitation of Organisational Knowledge Creation

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Snapshot (Quick Learning)

This chapter is aimed at those engaged in the facilitation of knowledge management initiatives; either as facilitators or as commissioners of facilitation.

This chapter offers guidance for people seeking to develop or improve their understanding and skills in facilitation, including checklists to increase the impact of facilitation pre-planning and review. Research findings and reflections from experienced facilitators are used to put the facilitation of knowledge management into a broader organisational context.

The chapter includes:

1. An introduction to facilitation in its many forms.

2. A four stage model of the facilitation process with checklists

3. An overview of the competencies needed for effective facilitation.

4. Stories and personal reflections from experienced facilitators

5. An overview of recent research findings on the key challenges and issues facing experienced facilitators.

The effective facilitation of group processes, including task groups, management teams and large group meetings, is increasingly recognised as a key organisational competence. Effectiveness can mean better quality decisions and better quality decision-making processes resulting in cost and time reductions and increased client satisfaction. Where knowledge management and organisational learning initiatives are concerned, facilitation has a particularly important role to play in developing project review meetings, creativity sessions, communities of practice and knowledge management across the supply chain.

> **Keywords:** facilitation, group processes, competency, communities of practice, organisational learning

Context (Where & What)

Typically, organisations are facing increased demands for change and collaboration such as:

- a desire to respond more rapidly to environmental changes;

- the experience of time compression in getting new products and services to market;

- organisational forms which are increasingly de-layered, networked and project-based;

- involvement in projects with multiple business partners;

- the need for diversity in project teams to match the variety of the environment and stakeholders;

- a growing complexity in decision-making.

All these factors are leading to a growth in the use of facilitation in and between organisations. Our research suggests that few organisations possess the necessary internal capacity to meet this growing demand and that help with developing this capability would be welcomed. Before we look at how to develop and improve this organisational capacity, what do we mean by facilitation?

A dictionary definition: to make easier, promote and help move forward.

Facilitation has become core to managerial work. Modern employees do not respond well to command and control, and the role of the manager of professionals and knowledge workers is increasingly that of practical helper:

"Facilitation is a process through which a person helps others complete their work and improve the way they work together." (Weaver & Farrell, 1997: 3)

To this definition of managerial facilitation, we need to add the important element of learning: facilitation is about helping groups, communities and organisations to take action on their goals *and to learn from this process*. It is this ability to learn, not only at individual level, but also at group, network, community and organisational levels that makes the crucial difference in terms of organisational responsiveness and innovation.

Facilitation is distinct from coaching, mentoring or counselling, mainly by its focus upon group, network and organisational processes, whether face-to-face or virtual. Typically, facilitation in organisations takes place in settings such as:

- small groups, ranging in number from, say 4 to 10 people e.g. team meetings, action learning sets etc

- larger face-to-face groups, say from 10 to 25 people e.g. project teams, management groups etc

- network and community meetings, from 30 people upwards which may be face-to face or virtual e.g. communities of practice, web-enabled networks etc

- big events and meetings, possibly up to several hundred people, e.g. divisional or functional conferences, multi-party "search conferences" etc

Within any of these categories, there are multiple approaches to facilitation, many of which have differing purposes, different traditions and distinct procedures. For example, facilitating small syndicate groups and advising action learning sets; or running a typical business conference and holding a stakeholder planning event.

There are many specialist forms of facilitation that share the common concern to make easier, to improve and to learn. There are also many synonyms for the facilitator role including adviser, consultant, animateur, moderator, counsellor, broker, rapporteur - depending upon the context.

Preparation (The Checklist)

In the context of face-to-face groups, Elspeth McFadzean (1998) has suggested five distinct forms of facilitation, 'The Attention Pyramid' depending on the degree of emphasis on the task in hand or on people-related issues:

> **Level 1 – Optimising the group's objectives**: Here the facilitator is focused on completing the task within the shortest possible time. Clear aims and goals need to be established, understood and agreed by the group. The facilitator might deploy short, concise and simple exercises to aid the group process. If disruptive behaviours occur, the facilitator will attempt rapidly to neutralise the problem.

> **Level 2 – Optimising the group's problem-solving process**: The facilitator is focused not only on the way the meeting is organised but also on the problem-solving process. Techniques may be introduced to help with the identification and assessment of novel ideas. The facilitator needs to know how the group wishes to fulfil its objectives and an agenda and time-plan covering ground rules, warm-up exercises, tools and techniques to be used and a contingency allowance. Again, the facilitator will not focus attention on interpersonal relationships.

> **Level 3 – Optimising the group's characteristics**: Here a particular concern is to form a group with the appropriate diversity to achieve the task. Pre-meeting planning has to address this. In addition, group members will be assigned roles.

> **Level 4 – Optimising the group's dynamics**: The main focus here is on developing a high performing group by addressing team member behaviours and relationships. Conflict, unequal contribution and disruptive behaviour will be confronted. This may take considerable time before the group starts to really work on the group's primary task.

> **Level 5 – Optimising the group's emotions**: Here the facilitator will deal with issues of individual and team identity in building team effectiveness. Emphasis will be placed on building trust and confidence between team members and an environment of honesty, frankness and safety. The feelings, attitudes and perceptions of members for each other as well as personal contributions, identity and existence will be addressed.

We need to understand what skills are needed for effective facilitation and the processes involved. Needless to say, the key to successful facilitation is the selection of an appropriate facilitator. Hence the importance of the following dimensions.

The competencies needed of the facilitator will differ depending upon the nature of the group, the task and the expectations for the process. McFadzean suggests that Level 1 facilitators will need objective, task-related competencies so as to keep the group progressing to the timetable. The Level 4/5 facilitators, in contrast, will need the softer, subjective skills in order to support the group's emotions, behaviours and sensitivities.

In a significant study of the competencies of experienced facilitators, Jean-Anne Stewart developed a framework of high-performing competencies. She identified five clusters of competence:

1. Interpersonal communication skills.

2. Further interpersonal skills.

3. Management process competence.

4. Knowledge competence.

5. Personal characteristics.

The management process competencies are core for all forms of facilitation. This includes planning/organising, time management, managing the physical environment, pulling information together, giving and receiving feedback and managing contracts.

The communication skills include the ability to read non-verbal signals, perceptive listening, summarising and paraphrasing. The broader interpersonal skills include sensitivity to group and underlying emotions, negotiating, conflict management and relationship building. It is the latter competencies that are particularly in demand at Levels 4 and 5.

There are two key knowledge domains. These are: firstly, knowledge and understanding of group facilitation; secondly, competency in gaining a rapid understanding of the specific organisational context in which the intervention is taking place. Finally, high-performing facilitators will exhibit a set of personal characteristics including adaptability, emotional resilience, self-awareness and trustworthiness. They will also be more empathetic and sensitive, providing stretching challenges. They will be flexible and able to think on their feet, can take a helicopter view and act confidently.

Toolkit (The Essentials)

Facilitation may be viewed as a process intervention rather than a tool. No two groups will be the same, their process will be impeded by different factors and the facilitator will react differently to each situation. However, some general principles can be identified and aids used as aide memoirs.

One important aspect of successful facilitation is the planning of the facilities. For smaller group sessions, the group may need only one room. If the group is to split into two for some activities, this rather complicates the facilitator's task, unless two facilitators are present. Assuming one room is to be used, it should be equipped with a flipchart or other device for displaying key points as well as plenty of wall space to display outputs. Post-its may also be useful to help the group sort ideas and organise information.

The seating arrangements need care and attention. Some firms have developed rooms specially designed to encourage creativity. Unlike most meeting rooms, these are often very informal and may look more like a lounge than a meeting room. This may be a problem for the facilitator if she/he wants to detach her/himself from the group activity and sit on the edge of the group.

It is easier when the group is sitting around a table for the facilitator to stay in the background, but if the group members are not used to being facilitated, they really need an explanation of the role and rationale.

Planning who sits where may not be a good idea as the group, ideally, will make their own decisions. Nonetheless, the persons facilitating and chairing need to be clear about where they will sit.

The facilitator may act as a scribe for the group, although this might cause some discomfort. The facilitator may be seen as editing or being selective in reporting and hence biasing the outcome. This is clearly to be avoided.

The facilitator should try and sit so that all members are clearly visible. This makes it possible to see who is contributing and also the reactions of other group members to what is said. It is important that the group is not distracted. Activities, whether internal or external to the building, may disrupt the flow or impede hearing. Also, mobile phones and the delivery of refreshments can interrupt at key moments.

However, it is important that refreshments are available and that the chair shows due consideration to the needs of the group. This should include regular breaks which often provide an incentive to get to a stage in progress to the final goal, e.g. completion of discussions around a topic.

In preparing for the meeting(s) it is important to be clear on how disagreement will be handled. Groups will not necessarily get to consensus on all issues. Members may have to live with disagreements and accept compromise. But what action will the chair take in such situations? How should the facilitator respond or intervene?

The facilitator needs to plan the approach to feedback. How will evidence be collected? Will there be reliance on the feelings of members? Often, particularly at the early stages, the contributions are unbalanced and some people appear to be excluded and feel ignored. The facilitator needs to think about how such situations should be dealt with.

Making it Happen (The Approach & the Action)

The facilitation of a group or meeting process can be described in four distinct phases:

1. Planning, including contracting.

2. The group session(s).

3. A post-session(s) review.

4. A post-session(s) report.

N.B.: This model applies most obviously to small and larger face-to-face groups; bigger events, networks and conferences may often require a more specialised process, as will distributed groups.

We will now elaborate the four stages in the process of group facilitation. Two checklists are presented to provide guidance for the facilitator. Moreover, throughout the section we provide guidance to make sure that the facilitation process results in a good experience.

1. Planning. The importance of the planning before the first meeting with the group cannot be overstressed. As a facilitator, it is important to ensure that you are comfortable with the assignment. Not all facilitators have the competencies to cover all five forms of facilitation identified earlier, and it may become apparent that the context does not fit with the values and style of the facilitator. Some aspects may become clear at the outset e.g. the facilitator may refuse to work with arms manufacturers, fast food companies, cigarette manufacturers and so on. However, other aspects are more subtle e.g. the presence of unacceptable 'hidden' agendas; for example the client might be seeking 'facipulation' where the facilitator is being expected to manipulate the group to accept management's existing solutions. The facilitator may be wise to decline this invitation.

The initial meeting with the client is in part a negotiation about the expectations from the process to ensure a fit between client, task, process, group and facilitator. It is also an opportunity for the facilitator's credibility to be checked out by the client and to begin the process of building trust.

The importance of trust explains why many clients prefer to use facilitators that they have worked with before.

Table 1 provides a checklist of questions to be covered at the pre-planning stage:

Table 1: The planning phase checklist

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a. With the client
1. **Is there a clear agreement with the client about the terms of reference, including role and responsibilities of the facilitator?**
2. **Has the client agreed the process to be followed?**
3. **Is the purpose of the group's activity clear?**
4. **Has the facilitator been fully briefed about the context?**
5. **Has the make up of the group been determined?**
6. **Have the terms of reference been agreed and the overall agenda structured?**
7. **Have location, dates and times been agreed?**
8. **Have a briefing document and pre-meeting activities been agreed?**
9. **Have potential problems/difficulties been discussed and strategies for coping identified?**

b. For the group/organisation
1. **Have members been briefed and queries/concerns dealt with?**
2. **Are ground rules appropriate for the process?**
3. **If appropriate, is there a plan for wider communication within the organisation?**
4. **Is there agreement about the issuing to members of background papers with clear instructions about requirements prior to the first meeting?**

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2. The group session(s). It is always important that the group gets off to a good start. If there is a meeting chair or leader (usually the client), discussions between this person and the facilitator should have identified the first steps aimed at creating a good working atmosphere by addressing any member's concerns and issues at an early stage. One purpose of the first meeting is usually to agree the agenda/process, the role of the facilitator and any ground rules needed. "Ice-breakers" or warm-up exercises may be used.

It is not unusual in the early stages of the workings of task forces or project groups for members to want to 'say their piece'. This is useful in several ways: if handled well, it establishes the identity of members, assures they feel they are being listened to, particularly if points are being clarified and captured on a flip chart, and it can form the basis of discussion about how to move on. If this stage is rushed, members may well not engage in the later process.

However, after some time in this mode, the group will feel the need to move on, so it is important that a momentum is built and kept up. But it is the role of the leader or chair to keep the group to the agenda. The facilitator is a neutral party offering guidance, support and encouragement, at times suggesting different approaches but not undermining the chair. The facilitator may act as a scribe and, at times, offer summaries of group progress. It may be decided to assign roles to group members, e.g. scribe, information collection, report drafter. The facilitator would normally hold a review of the meeting before it breaks up.

3. A post-session(s) review. At the end of each meeting the facilitator may seek feedback from the group and then the leader or client separately. In the discussions with the client, the facilitator may be able to call on past experiences and insights gained to assist in guiding future meetings. This may particularly be needed where the client is unused to handling undercurrents and

conflict. However, if the facilitator finds the group dysfunctional (Levels 4 and 5) there will be the need to reassess the way of working.

The post-session review is the culmination of the process and is often neglected. Yet time devoted to this is vital from a knowledge management point of view, because it is here that the learning from the experience is captured. The post-session review is so important for learning that many organisations, ranging from the BBC to the US Army make "After Action Reviews" a key component of their operational practice.

The post-session review should cover:

1. Whether goals and outputs were met.

2. A review of the process: what happened and who did what.

3. The group's views on the process and outcomes and suggestions for improvement.

4. Lessons learnt and recommendations for future similar tasks.

4. A post-session(s) report. The post-session(s) report will include the key findings from the previous review(s). The nature of this report depends upon the context, the needs of client and the stakeholders involved. A checklist for the post-session report is presented in Table 2:

Table 2: Post-session report checklist

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a. The progress report
1. **A consolidation of outputs from the group session**
2. **A review of progress against overall aims and objectives**
3. **Any agreed changes to the overall aims and objectives with justification**
4. **Actions to be undertaken before any future meeting with those responsible**

b. With the client
1. **Review of group progress**
2. **Review of performance of the chair and facilitator**
3. **Identification of problems and development of approaches for addressing them**
4. **Review of timescales, agenda for next meeting and other aspects of the process**

The final step is to discuss how the post-session review can be used to help future groups perform well when presented with a difficult task.

Results & Next Steps (The Follow-Up)

In this section we look beyond the facilitation of a group activity to consider the wider steps needed in organisations to ensure ongoing good practice facilitation to be considered in seeking an expanded use of facilitation in the organisation.

Following a successful project where facilitation has clearly added value, this success is not necessarily recognised more widely in the enterprise and hence no further use of a facilitator may result. However, it is clear that many groups can derive benefit in both improving the quality of decisions and compressing the time taken. So, in this section, we report some recent research with experienced facilitators at Henley Management College which revealed a number of common issues and key concerns (Birchall et al., 2006).

Greater understanding of facilitation processes. There is the need to develop a greater understanding of facilitation processes in a range of organisational contexts. Making explicit the process adopted by effective facilitators would prove useful in gaining a better understanding of practice. Particular here is the collection of data, its interpretation and the resulting tactical choices; working with groups where convergent thinking is dominant; suspending power relationships.

Facilitator intervention can improve team effectiveness but unless practiced well, the process will lose credibility. Although the process of facilitation has clearly identified steps – plan, design, execute and review - observation suggests that practice often falls short. A better grasp of the factors that prevent facilitation from being effective can form the basis of improved practice. Where it becomes seen as 'facipulation' - another tool to aid management achievement of their own preconceived outcomes - those being facilitated are unlikely to support the process.

Selling facilitation internally. The professional facilitators identified facilitation services as being difficult to sell internally. The requirement to sell services internally as a part of being a central department is often a source of tension for facilitators.

One aspect of this is getting the client/sponsor to agree just what they want and to get them to accept the process in full: "(they are) always wanting to cut corners on time and environment". A key question is 'when to use facilitation and, more importantly, when not'. Managing customer expectations is a key element in success, as is exceeding client expectations particularly as in many cases the facilitator is looking to move from 'one-off' to a series of interventions.

Working with managerial power. In the context of organisation change initiatives, a particular issue arises in working out "how to combine programme led intervention with facilitated change within the organisation There is often, in practice, reluctance on the part of the manager to give up power and the issue of 'facipulation' is ever-present. The facilitator needs to understand, and be confident in, working with power and power-relations in any such intervention.

An unsupportive organisational culture. Many organisational cultures do not support facilitation as an alternative or enhancement of managerial processes. There may be a 'bias towards action and distrust of reflection'. The basic culture may well be risk averse. A facilitator intervention may be seen as additional risk that puts desired outcomes less under control. The degree to which the organisation is complex and adaptive will impact on the need for facilitation. In such circumstances the role of facilitation may be counter-cultural and likely to lead to the role not being clearly understood or legitimised.

Measuring the return on investment (ROI) of facilitation. One key challenge is that of getting recognition in the organisation for the achievements of facilitation. Given the foregoing issues, it is perhaps unsurprising that these professional facilitators were concerned to establish the impact of facilitation via appropriate assessment criteria and processes. Change processes are complex and many features interact in leading to acceptable outcomes. Measurement is often focused on the short term whereas the real impact of facilitation may only be seen in the medium to longer term.

Measuring the effectiveness of facilitation. Establishing the return on investment of facilitation is problematic but there are also issues at a more micro level. How do we recognise quality in the facilitation process? How can we assess facilitator competence? What impact does the make up of a group including individual personalities have on effectiveness? There are many unanswered questions here that require further study.

For facilitation skills to prosper in a business context there must be professionalism and professional skills in its practice and promotion. Several key challenges were identified for the improvement of the overall quality of facilitation. These included working in adverse circumstances "(where we are asked to) facilitate groups that don't want to be there' or 'facilitating the unwilling', 'situations where there is a low level of goodwill or (even) hostility'.

Being able to handle these situations takes high levels of skill and personal confidence. Getting feedback from experienced colleagues can greatly assist in this skills development and opportunities to develop skills in using tools and techniques and exploring applications in a 'safe environment' are seen as valuable. Being part of active networks can also assist the development of professionalism.

There is the recognition amongst professional facilitators of the need for training and development. One aspect of this is preparing people to work at senior levels in organisations in situations where complex issues have to be responded to and personal risks are high. Experiential learning is a vital element in achieving such high-level competence. Professionals who desire a continuous learning from experience will benefit from on-going 'supervision' and reviews with fellow professionals. Finally, whilst the development of these high-level skills is not be achieved merely through attendance at courses, programmes providing some of these opportunities can provide a valuable basis on which to build.

We are experiencing a growing need for the facilitation of groups and meetings of all sizes in organisational, business and community contexts. However, as this study has shown, there is much uncertainty surrounding this emerging field and many issues regarding the use, definition and negotiation of the role in practice. The measurement of effective facilitation and the characteristics of successful facilitators are not well understood. This creates obvious difficulties for the development and support of organisational capacity and capability. Of particular concern is a perceived lack of general organisational readiness and the recognition on the part of many managers of the potential of facilitation for performance improvement.

Real Cases (As it has Happened)

In order to give an idea of results, follow-up actions and next steps, we present some stories from other facilitators which also illustrate the impact of facilitation.

These stories go under the following headings:

1. CC-COM
2. Facilitating Creativity in a Virtual Team Environment

1. CC-COM[1]

CC-COM is a group of consultants who wholeheartedly believe that professional facilitation increases the subject's (team, group, department) focus on performance. The activity provides value via its structure and the provision of external guidance by the facilitator. It provides a way of dealing with some of the things that get in the way of clear thinking like politics and power plays.

This group have some sound advice based on their vast experience of facilitating groups of all types.

The facilitator needs to set clear expectations with regard to the preferred output from the group. Ground rules need to be established in order that the boundaries are understood by participants. The group needs to be made up of the right participants, skills and experience in order to achieve the preferred outcome. There needs to be a balance of analytic and creative thinking that is fostered by the facilitator. The logistics (facilities, equipment, materials, information, etc.) need to be thought through in order to achieve high quality outputs from the group. The facilitator

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[1] Courtesy of Patrick Harper-Smith, Director, CC-COM, patrick.harper-smith@cc-com.com

needs to provide the correct level of reward and recognition to participants in order to foster positive behaviour. Feedback is important in order that participants understand how they are contributing to the overall goals of the group.

Also, the facilitator needs to be aware of cultural differences and mores within teams and across teams and geographies. For example, some teams are more open to the use of technology in facilitated sessions. Virtual teams need a heightened degree of facilitation and use of technology.

Some stories!

When facilitating a senior development group at Nokia in the area of Innovation, Mike Butler – Head of R & D introduced the session by setting some Ground Rules for the team which were "We are not going to discuss Time Travel or Space Exploration – have a good session"

As a foundation for a structured Situation Appraisal with a client team, we spent an entire day identifying issues and concerns from the team and we captured all of these on 15 flip charts at a hotel chain, which will remain nameless. On arrival at the function room the next morning, we discovered that the cleaning staff had removed all flip charts and we spent the first hour searching through the rubbish bins of the hotel to try and retrieve them! You only make that mistake once!

As part of a Year2K project, I was facilitating a team from an international bank in London to identify activities connected with Y2K and the transfer of a major accounting system from New York to London. We covered a very long wall with *Post Its* to chart the major deliverables and their associated sub-deliverables within this large project. Whilst the activity clarified the scope, I think it had the effect of frightening the team as to the extent of the project!

When working with a client team, the client manager thought that it would be a great idea if the team worked outside in the sunshine and that the environment could well stimulate the thoughts of the team. The only problem was that there was a strong wind blowing and so every time we tore a flip chart off the stand the group had to go and find large stones to tie them down in order to view them.

2. Facilitating Creativity in a Virtual Team Environment[2]

a. The Situation

Henley Management College offers a distance learning MBA which is undertaken in an asynchronous learning environment. Here, the students are asked to complete a variety of application questions and to post their answers into the online database. The creative problem solving elective takes this process one step further. Three times a year I work with about forty-five part-time MBA students from a variety of different nations who participate in this course. The course encourages the students to work as a team in order to enhance their experiential learning. They are asked to present and discuss practical examples of creativity within their own organisations and they are required to undertake virtual group creative problem solving sessions. Facilitating creative problem solving with this type of virtual learning group can have its problems. For instance, I set out tasks to develop the team's interaction, communication and cohesion quickly due to the shortened timeframes of the course. In addition, the participants need to be encouraged to think creatively without feeling uncomfortable or anxious.

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[2] Courtesy of Dr. Elspeth McFadzean, elspeth.mcfadzean@henleymc.ac.uk

b. The Process

In order to help participants to get to know one another at the beginning of the course, I ask the group to complete their own coat of arms[3]. Here, each individual draws a shield in PowerPoint which provides the following information: the participant's name, a description of their job, their hobbies and their family and the narration of a funny work story. In addition, I ask them to make their shields as creative as possible. Photographs, poems, stories, drawings and clipart are all encouraged. They are also invited to discuss their shields with the rest of the group.

c. The Outcome

The participants are given the time to introduce themselves and get to know one another. This is an important activity in a virtual environment where there are no social or verbal cues and the potential for anxiety and misunderstandings is greater. This is particularly the case with a heterogeneous group made up of a variety of different nationalities, cultures and experiences. The coat of arms exercise helps the group develop its own norms, beliefs and values. Furthermore, it stimulates the group and gives them permission to be as creative as they can and to have fun.

d. The Process

Once the group has become more cohesive, I can start to introduce a more novel form of problem solving. Usually this involves using techniques such as Images or Picture Stimulation. Here, they are asked to generate descriptions of specified pictures or settings. To date, the course has used such stimuli as Hollywood and Fairy Land as well as pictures of Playmobil toys such as a pirate ship, a dolls house, a farm and a royal palace. I ask participants to describe these images and to use these descriptions as unrelated stimuli in order to generate ideas for improving creativity within business organisations.

e. The Outcome

The results of these creativity exercises are many. First, the participants develop close cohesion and trust very quickly. Second, they experience first hand the processes involved in an asynchronous virtual creative problem solving exercise. Third, the members always express their surprise at the power of the creativity techniques for developing solutions in such a short space of time. Fourth, it is usually an enjoyable exercise and the group has fun. Fifth, the numbers of ideas that are generated are extensive and highly imaginative. On average, each group produces 125 unique ideas that are feasible to implement within a business environment. Sixth, at the end of the exercise, I ask participants to devise an implementation plan for improving creativity in their own organisation. This is something tangible that they can take away and put into practice.

f. Practical Tips

- Plan and develop the session effectively before it starts. Ensure the group can use the technology, that they have goal congruence and are keen to utilise the chosen creativity techniques.

- Encourage the participants to get to know one another by using introductory and/or warm up exercises.
- Communicate ground rules for effective behaviour.

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[3] According to the Cambridge Advances Learner's Dictionary, a coat of arms is 'a special shield or shield-shaped pattern which is the sign of a family, university or city'.

- Present clear instructions for each activity to be undertaken by the group.
- Divide longer creativity activities into stages such as a problem definition stage, an idea generation stage and so on. Run one stage at a time and provide dates for the completion of each stage.
- Ensure adequate time for each activity. Online communication takes longer than face-to-face communication in most instances.
- Develop a safe environment for the participants. Do not allow group members to criticise, bully or exhibit any form of behaviour that is detrimental to the group.
- Summarise the work undertaken at each stage in the exercise and complement the group participants for their efforts.
- Ensure that the creativity exercises meet the needs of the group. The techniques that are utilised should encourage creativity and help to fulfil the group's objectives. They should not make the team feel uncomfortable or waste their time.
- Above all, enjoy the experience and ensure that the group enjoys it too.

Tips & Tricks (To-Do)

☑ Assist the client in thinking through how to quickly develop good working relationships between group members.

☑ Be clear about your role as a facilitator, make sure the group understands and be consistent in your behaviour.

☑ Endeavour to make sure group members feel good about their contribution.

☑ Expect every situation to be different and be willing to respond differently but within accepted good practice.

Potholes (Not-to-Do)

☒ Do not lose sight of the overall objectives or let the group drift.

☒ Do not show personal preferences for people or outcomes.

☒ Do not be judgemental.

☒ Do not take shortcuts in the process.

☒ Do not allow review sessions to be squeezed out by poor time management.

Acknowledgements

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Dr. Jean-Anne Stewart is Director of Studies at Henley Management College. Recent research projects have included SME learning needs, SME leadership model, action learning programmes and the development of a group facilitation competency model.

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The Power of Disruption: Understanding the Unexpected

Patricia Wolf, Albert Vollmer,
Peter Troxler and
Abdul Samad (Sami) Kazi
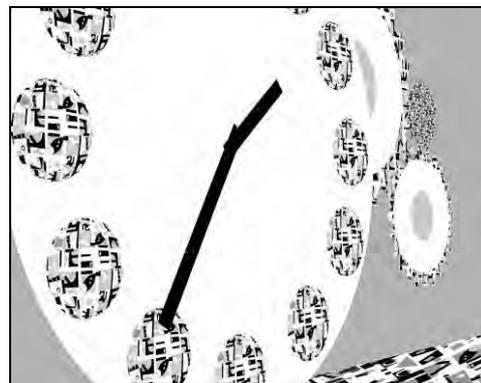
The Power of Disruption: Understanding the Unexpected

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Snapshot (Quick Learning)

This workshop technique introduces the *power of disruption* to help understand the unexpected. There are different groups of people that might profit from this workshop.

The beginners: people who feel that they would like to improve their innovative performance and reduce failures in their innovation process. They are not aware about different types of innovations nor do they talk about failures as something positive.

The knowledgeables: people who are aware that there are different types of innovation and now would like to understand how to change their incremental way of innovation.

The advanced: people responsible for innovation in different fields or companies who are keen to learn what 'the Unexpected' in their innovation processes can tell them as well as to learn from the interpretations of others in their group.

'Power of Disruption' is an approach that helps to understand the power of disturbances in innovation processes and that stimulates the productive use of unexpected events in the innovation process.
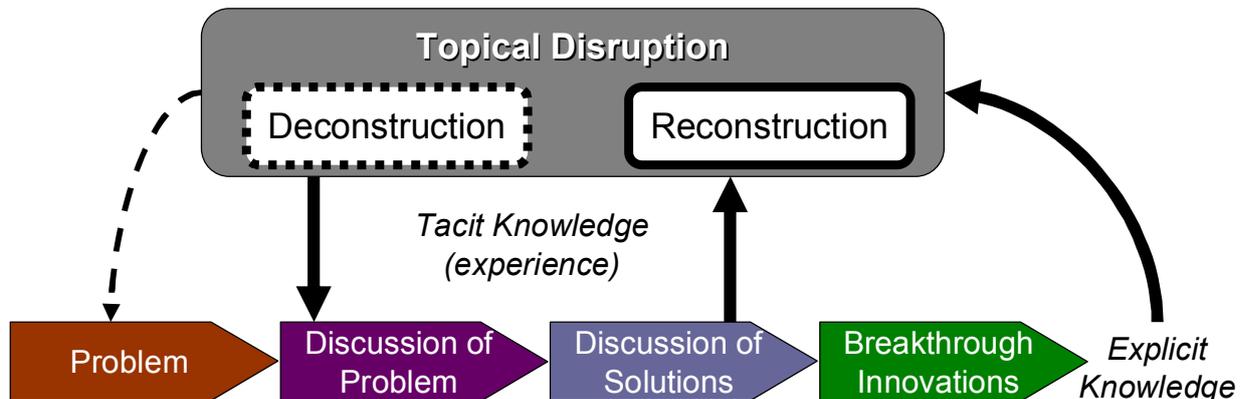
Figure 1: Topical Disruption

The approach creates awareness among participants that innovation usually does not happen in a planned standardised manner. It enables them to see the characteristics and the different 'faces' of the 'Unexpected' in innovation processes – such as conflicts, surprises, failures, misunderstandings, barriers etc. It provides participants with a method that helps them to reflect on the topic: What can the 'Unexpected' tell about the innovation process? 'Power of Disruption' supports participants to define actions that might stimulate the occurrence of unexpected elements in their daily work and to utilise the 'Unexpected' in a productive way for developing innovations.

Context (Where & What)

All processes in organisations, even the most standardised ones, have the potential to leave the standardised action patterns and to run in another way than the plan foresees. This is especially true for innovation processes. Innovation can be planned only to a minor degree, because the definition of which knowledge would incorporate new products and how the new product as a materialisation of this knowledge will look like is rarely possible (Vollmer & Wehner, accepted). The development of new products often seems to be, at least partly, a fortunate coincidence (Schneider, 2002). Here, we argue that innovation processes thus often run in a different way than they were planed; however, these discrepancies must not be labelled only as breakdowns but should be interpreted to a certain extent as 'useful and sense making disturbances'. These disturbances point at contradictions between target and actual situation and often comprise learning opportunities.

The aim of the method described here is to intentionally turn the attention to possible sources of (unexpected) incidents in order to open up their potential for improvement and innovation. Vollmer, Lehmann, Ostendorp & Wehner (2003), Wehner & Waibel (1997) and Weick (2001) understand incidents (disturbances, mistakes, conflicts, misunderstandings, etc.) as sources of knowledge and deep insights into organisational structures and processes. Incidents trigger processes of subjective and intersubjective interpretations and interpersonal co-operation. Through studying such incidents, actions for designing innovation processes can be derived. Thus, we are not presenting only a facilitation method but also a meta-process of innovation processes that permanently enables the processes that form the basis of reflection. This meta-process can be conducted either related to specific situations or continuously.

The main objectives are

- to reach an awareness among the participants of the characteristics and potentials of innovation processes, the social constellations involved and the related knowledge flows,

- to develop and improve innovation processes based on learning from experience through the means of reflection and conclusions and

- to pave the way for prospective design and optimisation of innovation processes.

The minimum time needed for a 'Power of Disruption' workshop is around 2.5 hours, maximum time one day.

As participants will be split into groups of 7-10 people, the total number of participants depends on the number of facilitators available.

Preparation (The Checklist)

If a company's innovation processes are to be the topic, these should be prepared to be presented and visualised. It is advisable that participants reflect on their own innovation processes beforehand, especially on 'what usually goes wrong'.

The moderators should prepare the visualisation of a standard innovation process. Additionally, they should be prepared to tell anecdotes about innovation processes that resulted from unexpected situations.

Figure 2: Innovation Process Model (Herstatt & Verworen, 2003)

Toolkit (The Essentials)

For this session a large room or several group rooms are needed. Removable chairs are a must.

As far as material is concerned, Metaplan cards, pins and several Metaplan pin boards as well as a pen for every participant are needed.

To facilitate the content:

- Content posters (for visualising theoretical input: innovation process, types of unexpected incidents)

- Definitions and examples of causes for unexpected situations: mistake, disturbance etc.

- Anecdotes on innovations that developed out of unexpected incidents.

- Reflection template.

Making it Happen (The Approach & the Action)

The group will be divided into an even number of subgroups (not more than 12 people per group), i.e. at least two groups. The two groups will have a different workshop design: While group 1 is following a prospective design (deconstruction), group 2 will act upon a retrospective design (reconstruction).

1. Prospective Design (Deconstruction)

The session proper

Step	Duration	Activity
Introduction	10 min	The facilitator opens the session and gives a general overview on agenda, timing and aim of the session.
		For the prospective design, one of the participants will be asked to present the innovation process of their own company. This presentation should be short and supported by a visualisation of the innovation process.

Step one – Worst Cases

Introduction	5 min	The facilitator introduces the task: Participants are asked to reflect on the following questions:

- What do you think could go wrong in this process?

- Where in the process are points at which unexpected situations are likely to occur?

- What can cause unexpected situations, e.g. disturbances, conflicts, misunderstandings etc.? Here, facilitators present some possible causes for unexpected situations as examples: 'a disturbance is an act of delaying or interrupting the continuity of a process' or 'a conflict is a state of disharmony between incompatible or antithetical persons, ideas, or interests' (Editors of The American Heritage Dictionaries, 2006) etc. Participants then are free to define further causes in the next sub step.

- What could happen in the worst case?

Collection of worst cases	20 min	The participants write the worst cases they could imagine on Metaplan cards and indicate the cause type for each of them. Subsequently they present their cards to the whole group. The facilitators pin the cards to a pin board and cluster them thematically with support from the participants.
Headlines	5 min	The participants collectively define headlines for the thematic clusters.

Step two - Intentional Sabotage

Introduction	5 min	The facilitator introduces the task: The participants are asked to suggest actions that would cause the worst cases. In addition, they will have to indicate the role or position a person needs in order to be able to perform that kind of action, e.g. customer, CEO, etc.
Collection of sabotage actions	15 min	The actions are written down on Metaplan cards and pinned on a pin board in a matrix arrangement that shows the relation of actions to roles and worst cases: The sabotage action matrix (see table 1).

Table 1: Sabotage action matrix

	role 1: customer	role 2: CEO	….	role n
worst case 1		action 1		action n
worst case 2			action 2	
worst case 3	action 3	action 4		

Step three – Inversion		
Introduction	5 min	The facilitator gives a short overview of the effect of disturbances in innovation processes, e.g. by using a poster with the definition of disturbances.

> *Disturbances in innovation processes are events that don't fit existing organisational processes and (if successful) change them dramatically.*

Equally, one could argue that the sabotage actions do have the potential for radical or even disruptive innovation as they are developing and using new action patterns instead of reproducing old ones.

The facilitator presents two anecdotes on so called mistakes that lead to innovation. Example anecdotes are:

The vulcanization of rubber
In the middle of the 18th century, Charles Goodyear made experiments with rubber. He wanted to manufacture rubber boots. The problem was that rubber changed its viscosity according to temperature. In summer the boots lost their shape because the rubber melted. In winter you couldn't put the boots on because the rubber became stiff. Goodyear made experiments, mixing different substances (sulphur, magnesium, nitric acid) with the rubber, but without success. One day in winter a little piece of rubber fell on the hotplate. It didn't melt but got another consistency (it looked like tanned leather). Goodyear was astonished and nailed it on the wall outside his house. The next day he could see that the piece of rubber was as flexible in the cold outside as in the warmth inside the house. This little mistake lead him to building equipment for vulcanizing rubber by steaming it. Rubber as we know it today was born.

In search of a refrigerator coolant Teflon was found

At the end of the 1930ies, a young chemist of a big American chemical plant was tasked to create a new coolant for refrigerators. For his experiments he needed a great amount of tetraflourethylen, a gas he wanted to combine with hydrochloric acid to develop the coolant. He stored it at a temperature of -80° C, and under great pressure in small metal bottles. One day he wanted to use the gas but the bottle seemed to contain no gas. However, the weight of the bottle indicated that it wasn't empty. He opened the bottle. A strange white powder trickled out and the whole inside wall of the bottle was coated with the white substance. He examined this substance and found out that it had specific characteristics, for example it did not react with any other substances. The researcher didn't know what to do with the substance, it was deposed in the archive of the company. Some years later, the leaders of the Manhattan Project needed a substance to protect their technical equipment against galvanic corrosion. They searched for a so-called inert substance and found Teflon, the substance in the archive of the chemical plant nobody knew what to do with – until that moment. The use of Teflon for pans followed years later.

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		A retractable pencil gives birth to a vibrating toothbrush
		In 1998, a developer of electronic components approached the Swiss company Trisa AG and proposed to develop a vibrating toothpick. They disliked the idea, as this would have been a product for a niche market. However, they came up with the analogous idea of a vibrating toothbrush that does not only rotate but additionally would provide a certain pressure through vibration – a product for the mass market.
Group work	15 min	During the product development phase, the problematic point was to find a solution on how to integrate the motor into the toothbrush. Several ideas were tried, without success. One day, all engineers where sitting desperately around the table and thought about possible solutions. One of the engineers was playing around with a retractable pencil and the motor samples on the table. He plugged one motor on the tip of the pencil, and suddenly he was saying: 'I can not remove it anymore!' This was the key to the solution. Schneider (2006) presents further examples of such unplanned innovations. The group is then split up into smaller groups of two to three people. The groups will work with the rows or columns of the sabotage action matrix, e.g. group 1 cold focus on • all sabotage actions customers could do or alternatively • on all actions that are related to worst case 1. The subgroups discuss, how the sabotage actions could be productive for the innovation process. Productive here means 'making innovation more innovative'. The question is not 'how can I get rid of disturbances' but 'how can I use these incidents in a productive way for innovation?' The results of the work of the sub groups are presented in the plenary.

Step three – Take Home Message

Reflection	10 min	Participants reflect on lessons learnt using a template. They write down: • The five most important lessons learnt. • Two actions for their professional work that result from this session. Concerning these actions, participants make explicit which resources they could use, what barriers and resistances they might face, and what would be indicators that they did achieve the objective of these actions.
Presentation	20 min	At least the owner of the innovation process that has been deconstructed, but ideally everybody, will be asked to present their reflection results shortly.

The prospective design process takes 2 hours.

2. Retrospective Design (Reconstruction)

The session proper

Step	Duration	Activity
Introduction	10 min	After a short general overview on agenda, timing and aim of the session, the facilitator introduces a general model of an innovation process as the basis for the discussion. It is not determined which model from theory should be used. Such a model should be a generic one, so that participants can relate it to heir companies' innovation processes. Also, the model should be very easy to understand. The example presented here is as a model for product innovation.
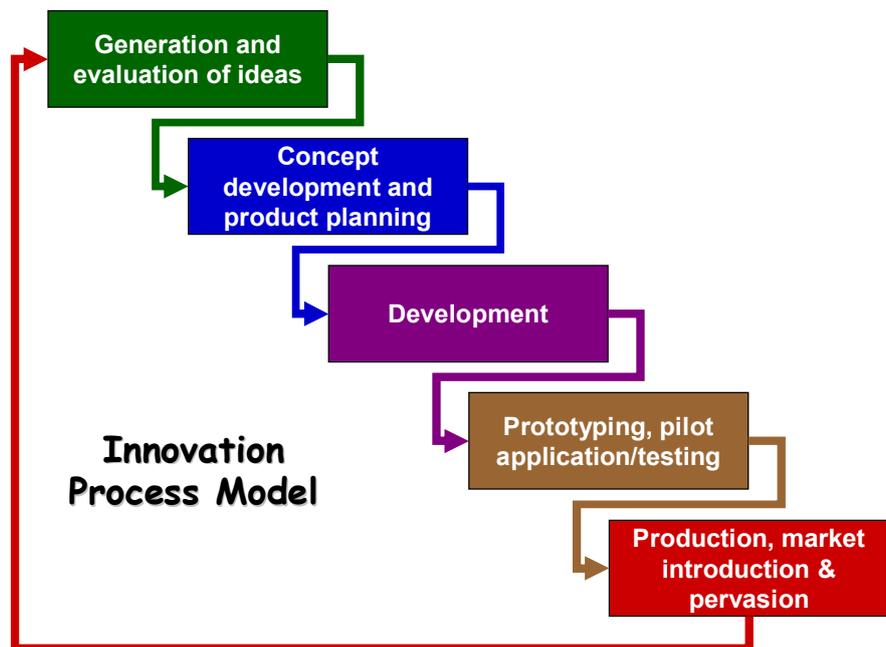
This process model includes different phases from idea generation to market launch and pervasion. Phase 1 deals with the generation of ideas (customer, technology or costs driven), the evaluation of ideas (appeal, risk), the match with existing products, and the reorientation of the product portfolio. Phase 2 includes market analyses, working out a production concept, product planning (volumes, production costs, timing, investments, project costs), as well as the definition of product specifications and the product architecture. In phase 3, interdisciplinary project teams actually develop the product or service according to the intentions of the preceding phase. Phase 4 includes prototyping and testing, market testing, the definite design and the scheduling of the series production. In phase 5 the production is starting, followed by the introduction into the market. After market pervasion the perfective maintenance is a very important step.

Step	Duration	Activity
Validation of innovation process	20 min	Participants are asked to remind themselves of the most recent innovation process in their company and to very briefly tell the story how this process went. These stories serve as a common validation, adaptation and completion of the process model presented by the moderator.

Step	Duration	Activity
The Unexpected	15 min	The moderator asks the participants: 'What has been unexpected in the innovation process of your company?' They document what was unexpected on Metaplan cards and define the cause for the occurrence of the unexpected situation (as above in 'prospective design': disturbances, conflicts…). In addition, they indicate the phase of the innovation process the unexpected situation relates to; the cards are pinned up next to the phases. The facilitator clusters them with the help of the group.
Interpretation	15 min	The group is now split up into smaller groups of two or three people. These subgroups discuss individual unexpected situations or clusters of similar unexpected situations and try to reveal their potential meaning: What does the unexpected want to tell us? What can we learn from it, what is the insight we can get? They write down their insights on Metaplan cards and presented them to the whole group.
External view	15 min	One member of each group is selected. This member receives from the moderator the instruction on the 5 Whys (SixSigma, 2006)

> *By repeatedly asking the question "Why" (five is a good rule of thumb), you can peel away the layers of symptoms which can lead to the root cause of a problem. Very often the ostensible reason for a problem will lead you to another question. Although this technique is called "5 Whys," you may find that you will need to ask the question fewer or more times than five before you find the issue related to a problem.*

Example:

Problem Statement: You are on your way home from work and your car stops in the middle of the road.

1. Why did your car stop?
  - Because it ran out of gas.

2. Why did it run out of gas?
  - Because I didn't buy any gas on my way to work.

3. Why didn't you buy any gas this morning?
  - Because I didn't have any money.

4. Why didn't you have any money?
  - Because I lost it all last night in a poker game.

5. Why did you lose your money in last night's poker game?
  - Because I'm not very good at "bluffing" when I don't have a good hand.

With this tool in mind, he goes to another group. The other group presents him their insights, and he has the task to play the devils advocate to them: He gives them an external view on what they did not reflect upon.

Step	Duration	Activity
Collection and Clustering	15 min	All groups present their final insights. Keywords are noted down, pinned on a wall and clustered.

| Step	Duration	Activity
Reflexion	10 min	Participants reflect on lessons learnt using a template. They write down: • The five most important lessons learnt. • Two actions for their professional work that result from this session. Concerning these actions, participants make explicit which resources they could use, what barriers and resistances they might face, and what would be indicators that they did achieve the objective of these actions.
Presentation	20 min	At least three participants, but ideally everybody, will be asked to present their reflection results shortly. The variety of insights will help the participants to see that understanding unexpected situations and using their potential does mean to rely very much on personal interpretations as there is no 'eye of God', no 'single truth' (Baumgartner & Payr, 1997).

The prospective design process takes 2 hours.

3. Plenary

Step	Duration	Activity
Presentation	10 min	Both groups will finish their sessions at the same time and come together in the plenary for a short summary (5 Minutes each group). The summary will be done either by the facilitator or by an elected group member.
Discussion	10 min	The facilitators then stimulate a discussion of the different learning points people from the two sessions identified with reference to the design of the two sessions: While the first group did work with an existing process and prospectively defined actions that potentially might disturb this process in the future, the second group did work on a retrospective interpretation of the meanings of unexpected situations that already happened in innovation processes. However, the insights of both groups resulted into actions that will change the future innovation process.
Feedback and closing	10 min	After this discussion, participants will judge the session design(s) in a short feedback round, To keep it short, they will be asked to do 'feedback by moving'. Thereafter, the moderators thank the participants for their participation and close the workshop.

The plenary lasts 30 minutes.

The whole process can take longer according to the number of participants, their engagement (e.g. how many stories about own innovation processes they want to tell) and their questions to the innovation process.

Results & Next Steps (The Follow-Up)

'Power of Disruption' makes participants aware of the value of disturbances.

Participants have identified 5 core learning points each and have committed themselves on 2 actions for their own everyday work.

While it is unlikely that a single participant from a company would be in a position to implement 'Power of Disruption' in their company, process owners of change or innovation processes may well want to build on the lessons they learnt themselves or on some of the insights of fellow participants.

So the facilitators or the hosts of the workshop will produce at least a summary report listing all the lessons learnt, i.e. the five major insights as mentioned by the participants. This report could be published on a website and linked to an online forum or an email discussion list that allow further comments and discussions.

Ideally, participants are asked to approve and comment on this summary. This means that the hosts or facilitators of the workshop would continue to stimulate further reflection on the outcomes of the workshop, e.g. maintaining the momentum in a post-workshop online environment. Thus the workshop could lead to building a community of practice among participants. However, this has to be accounted and planned for at the outset since it is hard to bolt-on some community building effort to the workshop if all resources have been used up when the summary report is made available to participants.

Real Cases (As it has Happened)

The method described above was used for the first time at the UnBla.07 conference in Lucerne. Up to now, the authors did apply parts of the methodology autonomously in different settings (see e.g. Vollmer, Lehmann, Ostendorp & Wehner, 2003). They then met and exchanged their experiences with different methods that could stimulate reflection on how to deal with 'The Unexpected' in innovation processes. From that, they constructed the overall methodology presented above.

At the start of the workshop, an overview of the methodology was presented to the participants describing the main differences between the prospective and retrospective design approaches (Figure 3). The moderator then split the participants into two subgroups: One to work on innovation processes according to prospective and one on according to the retrospective design. People chose their groups according to their interest: Some of them were interested into deconstructing a given innovation process and learning from that (prospective design), while others were more interested into reflecting on unexpected incidents within their own innovation processes (retrospective design).
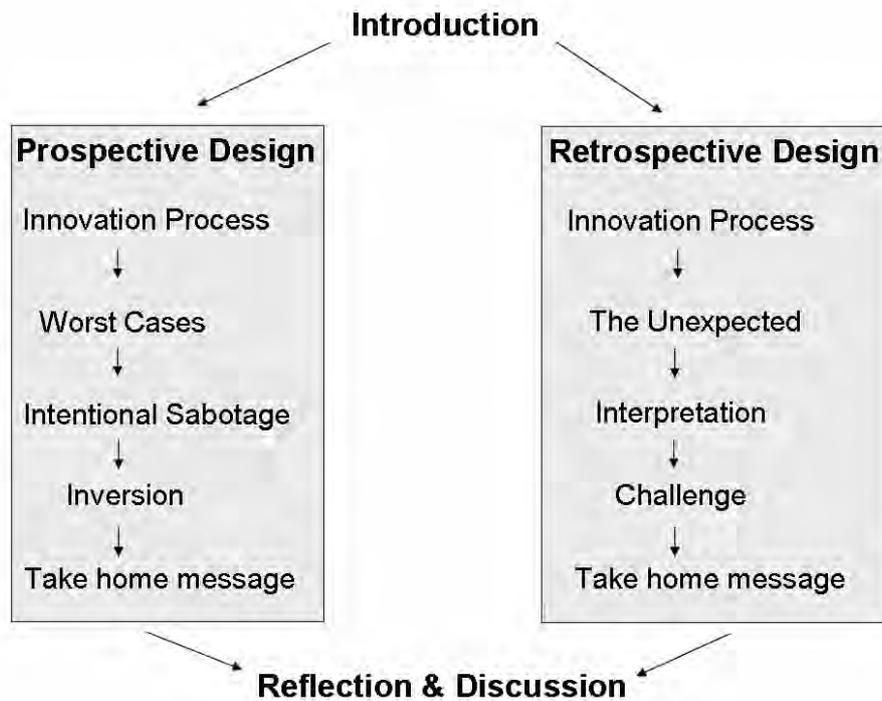
Figure 3. Introduction to Approach

1. Prospective design group

The presenter of the innovation process that was to be deconstructed had prepared his presentation beforehand. He presented the innovation process of his company and informed that when founded in the 1850s the company started with the production of glue. Today, the company is active in the production, trade and research in the sectors of biomaterials for dental and orthopaedic applications, pharmaceuticals (medication) und hydro gels for medical use. Several questions were then asked:

• What could go wrong in this innovation process?

• Where in the process are points at which unexpected situations are likely to occur?

• What can cause unexpected situations (disturbances, conflicts, misunderstandings etc.)?

• What could happen in the worst case?

The deconstruction process then started. The process owner also got into the sabotage mood and helped the others through giving them further information that he did not present beforehand—who in his company likes or dislikes whom, who has to be informally asked before a decision will be made and how one is usually communicating an innovative idea. At the end of the sabotage phase, people were full of energy and power to disturb the given process. The, the moderators needed to at times make an intervention in order to get the crowd back into a more constructive mood.

Figure 4: Snapshot, of what could go wrong in the innovation processes

The moderator explained to the participants the basic theory of disturbances in innovation processes. It was important that people understood that (radically or even disruptive) new ideas usually do not occur in standardised processes as the rules of these processes tend to discredit very innovative ideas as high risk-low potential-waste of money. In order to ensure that participants really understand this, the moderator provided several examples that explained how unexpected situations enabled people to develop very innovative ideas and turn them into a product. One of the participants raises his hand and told a similar story that recently happened in his company. Participants understood now that there is some productive power behind the actions that they meant as sabotage. They discussed in groups, *how could the sabotage actions be integrated into the existing innovation process in a way that they would be productive.*

Several interesting ideas (solutions) emerged from the group discussions in response to the results of different *sabotage* actions. The process owner was overall satisfied with the outcomes of the discussion, and said:

> *"It is important to have people looking at the innovation process. I know now from your feedback that we are on the right track but could do better in some areas, and you told me how to proceed. It is great to know some alternatives. I liked the idea to send people out and give them more freedom to develop ideas - you confirmed that this is a good idea. We already had something similar in mind, but were not sure. I will go back and try the method we have experienced today internally with our people in the next meeting."*

2. Retrospective design group

The work in this group started with a short presentation by the facilitator of the innovation model by Herstatt (1999) and a description the activities and events that usually happen in the single phases from idea generation to product launch at the market. Participants were than asked to tell the story of a typical innovation process in their organisation. Several innovation stories were captured from:

- Research Institutes
- Technology Centers
- Research projects
- Consultancy
- Think- Do- Organisation
- Ministry
- Conferencing
- Pharmaceutical industry

While they are shortly presenting their innovation processes, the facilitator captured some keywords from each story. As a next step, participants reflected individually on what was unexpected in their innovation process. They documented the unexpected incidents on Metaplan cards and classified them by type of cause for the unexpected situation (conflict, misunderstanding, and disturbance). The Metaplan cards were then pinned to the pin board next to those phases of innovation process in which they occurred.

It became obvious that there were several people who had either faced unexpected incidents in the same phase of the innovation process or who had been confronted with the same type of unexpected incidents. As soon as the participants recognised this, they started a discussion on their experiences. The facilitator helped them to split into groups of 3-5 people according to their interests and asked them to do an interpretation on the potential insights one could gain from facing this unexpected situation: What does the unexpected want to tell us? What can we learn from it? Overall, there were three groups with one group covering the first two, the second group the third, and the last group the last two phases of the innovation model by Herstatt (1999) shown earlier in Figure 2.

One member of each group was then appointed to play the role of the devils advocate. They were asked to move to a different group and ask this group to present their unexpected incidents and the results. The role of the devils advocate here was to stimulate reflection on what the group did not reflect on. Initially, some group members were convinced that there was no blind spot in their interpretations, but they recognised through the "why" questions from the devils advocate that there were other issues to consider.

After some further discussions within the groups, their findings on the what (conflict, misunderstanding, or disturbance) and the why for different innovation phases was captured and shared with the whole group.
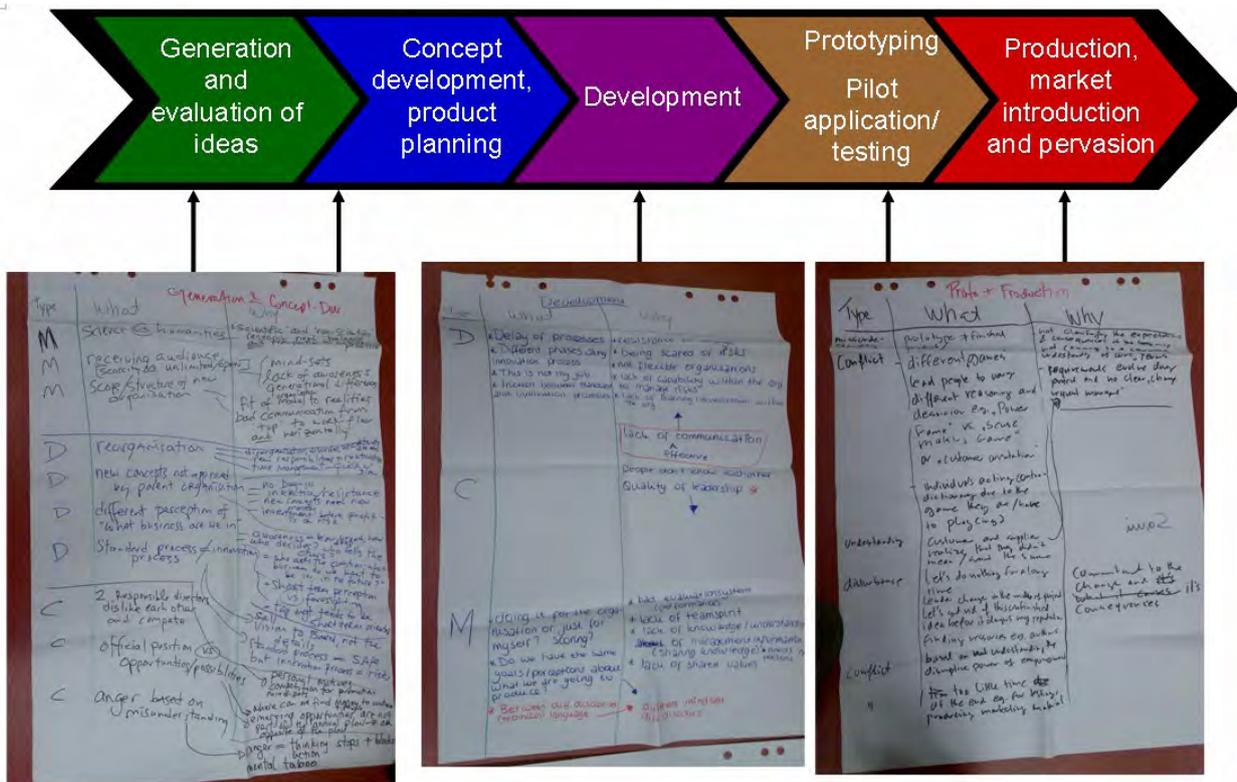
Figure 5: Unexpected incidences (what) and their causes (why) in innovation processes

At the end of the session, the participants identified a series of issues hindering innovation in the various phases of the innovation process. These included mind-sets, lack of mutual understanding, poor leadership, lack of efficient communications, lack of commitment to change, etc. (Figure 6)
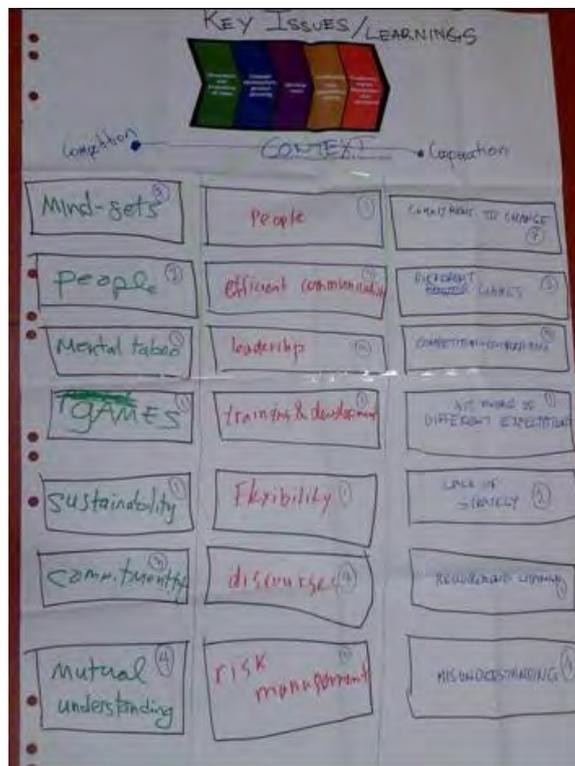
Figure 6: Key issues hindering innovation processes

3. Plenary

The session ended in a plenary where different groups (prospective and retrospective presented their main findings and key learnings. Both groups liked the session a lot and felt that participation was valuable for them: It helped them to look at the unexpected in innovation processes from a new perspective. Both groups where amazed at how much fun both the sabotage actions and the role of the devils advocate was. They were surprised that those actions that looked quite negative in the beginning, destructive and unproductive could build the basis for uncovering hidden productive potential. Both groups liked the variety of ideas and the different perspectives in the group and felt that they profited from them a lot.

Tips & Tricks (To-Do)

☑ For the prospective session design, agree with one of the registered participants that he will present a visualisation of his organisation process before the event.

☑ For the prospective session design, the transition from the stage of defining sabotage actions to turning them into productive actions needs to be carefully moderated. Defining sabotage action stimulates the disturbing and aggressive potential of the participants very much, they need to get 'down to earth again before they will be able to argue in a rational way. A short theoretical input helps very much to make them understand that this is now serious.

☑ If you have only 2.5 hours time, be very restrictive and keep the time plan.

☑ Motivate companies to send two or more delegates to the workshop if they actually intend to benefit from the power of disruption

Potholes (Not-to-Do)

☒ In the short theoretical parts, don't stick too much to theory but enrich theory with examples. This makes participants feel that the theory has something to do with their practice and that it is thus valuable and relevant for them.

☒ Don't give to much room to people who do dominate the group. In contrary, make sure that everybody gets the chance to speak up. This ensures the variety of results from very different perspectives.

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Collect and Share Existing Knowledge on Collaborative Multidisciplinary Scientific Research Processes

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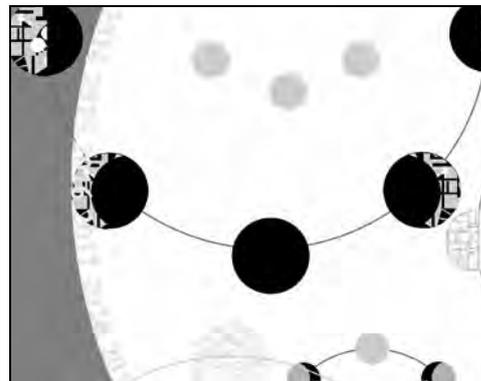
Collect and Share Existing Knowledge on Collaborative Multidisciplinary Scientific Research Processes

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Snapshot (Quick Learning)

A multidisciplinary scientific research project follows a complex process involving team members with different backgrounds and different roles. Such projects, in which persons with different disciplinary backgrounds have to cooperate, encounter often many problems. Members of such teams come from various disciplinary backgrounds therefore they may not share the same set of norms and values (Janssen and Goldsworthy, 1996). Other problems are related to ambiguous terminology, malpractice with regard to input data, inadequate project set-up, insufficient or inappropriate use of methods, insufficient knowledge on some processes, overselling of scientific results and lack of documentation and transparency (Scholten, et. al. 2007). To address some of these problems researchers in several disciplines have introduced guidelines and standards in the form of handbooks for the purpose of disseminating best practices and standardized forms and checklists to improve outputs. However, these guidelines and standards are mainly paper-based, mono-disciplinary, not tailored to needs and preferences of individual researchers, time consuming and costly to apply in practice.

Given these problems, we have developed a collaborative knowledge-based system to support multidisciplinary research. The system provides many features to address the above stated problems:

- **Glossary of terms**. The system provides browsing and editing capabilities of glossary terms. Some glossary terms do not always mean the same thing in different domains; therefore, glossary terms are annotated with a domain label.

- **Knowledge base (KB) and KB-editor**. The system provides a rich collection of knowledge on collaborative scientific research processes which includes tasks, methods, activities, sensitivities, pitfalls, inputs, outputs, etc for the given field of application.

- **Process definitions**. It is a general belief that the desired goals of a project are achieved more efficiently when activities are managed as process (van der Weide et. al. 2003, ISO 9000, 2004, Kassahun, 2006). Therefore, the tasks and all related knowledge items are interlinked to form a flowchart, defining a research process that can be executed and monitored by *a process support tool*.

- **Support for different user types**. Multidisciplinary research involves not only researchers from different disciplines but also other types of users, such as managers, auditors and various stakeholders. Moreover some users are experts in a specific domain who define the research process. Others are users of the research process for a specific research project. The

system supports different user types by providing them different levels of authorisation based on user roles and expertise.

- **Process support tool**. Once a collaborative research process for a given field of application is defined by a group of experts, the process support tool is used to provide guidance in the execution of activities and helps to monitor what members of research projects do. When used as a project monitoring tool, the activities of the research members are stored in a *project journal*.
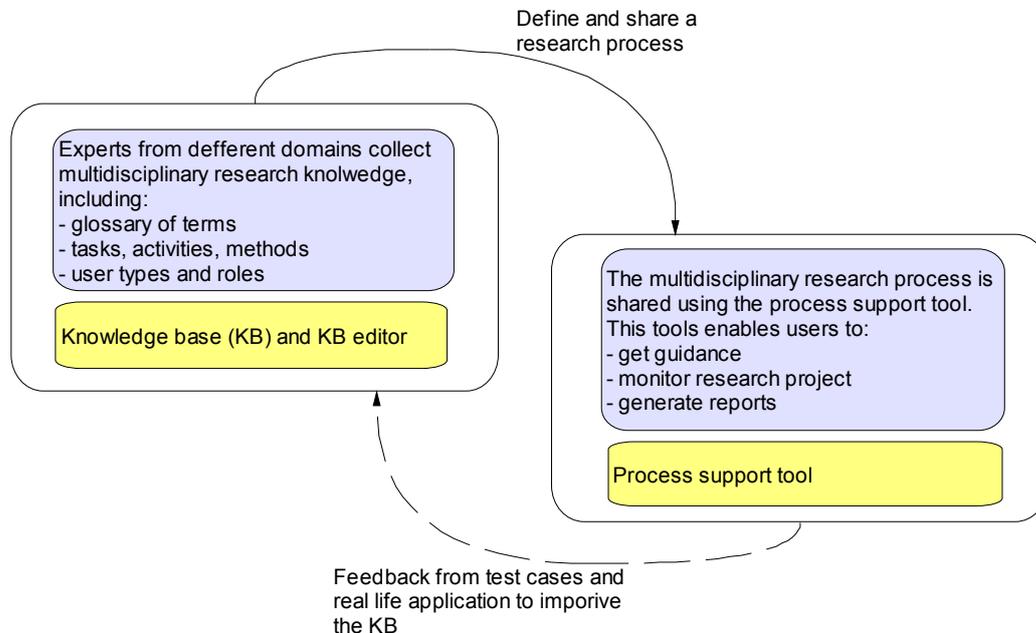
Figure 1. Define and support collaborative multidisciplinary scientific research.

The knowledge-based system is composed of a knowledge base (KB) and a KB-editor for managing the research process knowledge base and a process support tool for guiding and monitoring research projects. Figure 1 shows the process of collecting (knowledge acquisition) and how knowledge is enabled using a process support tool. The intended users of the knowledge acquisition tool are experts from different disciplines, who will define research processes, while users of the process support tool are team members in a research project. The tools have been extensively used in European Union (EU) funded HarmoniQuA project focusing on enhancing the credibility of catchment and river basin modelling. Currently the system is being extended and used in another EU funded project now focusing on delivering interdisciplinary methodologies to enable actors to actively participate in mitigation of water stress problems (AquaStress project).

The knowledge acquisition tool is a multi-user environment that allows experts to collaboratively define, store, edit and manage a research process specification in the knowledge base while allowing all interested parties to read it and comment on it. Once a research process is defined the process support tool allows users (members of a research project) to get guidance and to collaboratively execute a research project based on the process specification. When used in executing a research project, the process support tool stores information about activities of all team members in a central server called *project journal archive* that allows all team members and project managers to see what other team members did and to follow the progress of the project. The result is a well documented research project based on best practices executed and managed in a transparent manner.

Keywords: co-creation, communities, knowledge artefacts, ontologies

Context (Where & What)

In many management areas managers are increasingly using integrated models to help them solve decision making problems (Scholten & Beulens, 2006). Such systems are results of complex and difficult research projects involving managers, stakeholders, researchers and other types of team members with different disciplinary backgrounds that have to collaborate. As a consequence, the context in which this system can be used consists of the following constraints:

- A group of persons that have to collaborate in some process of scientific research.

- The group should belong to a community within a shared field of application, but with (partly) different disciplinary backgrounds.

- There should be a large body of relevant knowledge for the group.

- The group should be aware of associated problems caused by the above.

A multidisciplinary research involves a *group of persons* that need to collaborate and coordinate their work to achieve the scientific research objectives. The persons involved come from different disciplinary backgrounds and have different responsibilities. In water management, for instance, code developers, model users and water resources managers are involved in modelling studies in which lack of mutual understanding may arise due to the complexity of the modelling process (Refsgaard, 2005).

The persons should belong to a community doing research in a shared *field of application.* This implies there must be sufficient common understanding of the problem and the field of application among participants.

The *relevant knowledge* available for the group can be in various forms, such as expertise and know-how, explicit but partly inconsistent knowledge that is distributed in many handbooks, guidelines, etc and common practices, which may differ between countries and between application sub domains. Such inconsistent guidelines and handbooks can be found in various disciplines, for instance, the various clinical guidelines in health care (Campbell, 2006), research in natural resource management (Janssen and Goldworthy, 1996, Refsgaard, 2005), to state a few.

Finally there should be a realisation within the group that there is a need of collecting, harmonizing and managing already existing knowledge. The awareness usually comes from previous experiences of multidisciplinary research in which the goals of research projects were not (fully) met or projects run out of budget due to misunderstanding and other problems that can be attributed to the multidisciplinary nature of the research projects.

Therefore, in this context, our major objectives are harmonizing and clarifying existing knowledge and providing practical software tools that make it easy to use this collective knowledge. Harmonizing existing knowledge means collecting, structuring and organising existing knowledge and making it semantically consistent and explicit. The first tool, the knowledge base editor, is a web-based tool to define, store and modify knowledge on a research processes for a field of application. The fields of applications the tool has been used until now are model-based water management (HarmoniQuA) and water stress mitigation (AquaStress). The second tool is a process support tool that can be used both as a standalone tool and as a client-server system that provides guidance in the execution of a research process (using the process definition from the knowledge base) and helps to monitor what team members do. The process support tool has been used in different real-life test cases during the HarmoniQuA project.

Preparation (The Checklist)

Once the need for collecting and sharing multidisciplinary research process has been identified, the facilitator or leader of this effort needs to put together a small team of domain experts, software and knowledge engineers to set-up the KB-editor and other technologies that are required for knowledge management and implement a preliminary process (see for instance Alavi, M., and Leidner, Marwick, 2001, 2001 and Huysman and de Wit, 2004 for more on these technologies). Domain experts describe the problem and what they would like to achieve from this effort. Knowledge engineers task is to demonstrate the possibilities of the knowledge management tools. Our experience has more than once shown that domain experts most often are unaware of the possibilities that such systems provide. This preliminary process setup serves as a demonstration of the knowledge base and process support tool; therefore, the illustrative content of the process knowledge base can be simple, or even unrelated to the problem at hand.

The facilitator then identifies the domains and the domain experts in each domain and invites the experts to prepare documents on present practices (*the state-of-the-art*) in their domain of expertise. In the mean time a group of software and knowledge engineers set-up the knowledge base based on the initial information.

The knowledge-base and the process support tool form the main knowledge tools. Each field of application has its peculiarities; therefore both the KB-editor and the process tool may have to be customized for specific needs of the project.

In the next section we give a description of the KB-editor and process support tool. In addition, other productivity and communication tools are also required. Based on our experience we strongly recommended the following:

1. **A project website**. A project website is an effective communication, feedback and dissemination means for project information and outcomes to a wider audience.

2. **Groupware**. Groupware tools like ProjectPlace (www.ProjectPlace.com) and Lotus Workplace (www.lotus.com) facilitate communication and collaboration within a group. A groupware tool provides a virtual space, within which participants can share documents and experiences (Marwick, 2001). The virtual space can be organized into different virtual rooms or folders. The organisation of virtual rooms can be based on domains, events – such as a room for each workshop, etc. We recommend the use of such virtual spaces for most of the communication instead of often used emails because this type of groupware tool provides a shared threaded structure that is accessible to all qualified participants. In addition, recent developments in cheap and accessible text, voice and video conferencing provide a rich shared experience and are strongly recommended.

3. **Desktop productivity tools, templates**. Most people are usually more comfortable with standard office productivity tools they are familiar with than better but new software tools. When developing a new knowledge acquisition tool, this fact is easily ignored, which results in less efficiency and slower adoption of the new system. Figure 2 shows a populated Microsoft Excel template that was used as an initial knowledge acquisition tool within the HarmoniQuA project. The use of this simple tool resulted from observed user reluctance in using some popular knowledge acquisition tools in early stages of the project. The Excel templates where later replaced with the KB-editor.

Figure 2. A Microsoft Excel template that initially was used to gather process knowledge for model based water management within the HarmoniQuA project.

Toolkit (The Essentials)

The knowledge-based system is an attempt to make collaborative multidisciplinary research processes explicit, provide tools for co-creating them and make the use and execution of the processes easy and effective. The problem of collaborative knowledge creation and management for multidisciplinary research is characterized by the following characteristics (1) a large number of persons from different disciplines are involved, (2) the process of collecting, structuring, organising, testing and disseminating of collaborative research process information and knowledge takes a long time (months or even years), (3) participants who participate in collecting and organising the existing knowledge – mainly domain experts – come usually from different geographical locations and (4) those who collect and organise knowledge and those who use it in practice may need different tools, tailor made for their needs. These characteristics make the system as a whole unavoidably complex. However, the system is intended to address the needs of different types of users by providing only relevant information for each user with the intension of making the system effective and user friendly from an individual user's perspective.

In this section we describe how participants are assisted by the KB-editor to co-create and share a research process and how the process support tool enables users of the process to collaborate by providing guidance and supporting monitoring of a research project based on the process. The details of the knowledge base system and the process support tool are described in detail elsewhere (Kassahun el. al, 2004 and Scholten and Beulens, 2006, Scholten *et al.,* 2007). We

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will here focus on how structuring the knowledge in the first phase enables the process support tool to support collaboration in a natural way.

The knowledge base is constructed from ontologies that describe the entities and relations of a research process, first built to support model-based water management and currently extended to support other research processes. The research process is organised into *steps*, *tasks*, *activities*, etc which forms part of the ontology of a scientific research process (Scholten, *et al.,* 2007). The knowledge base also contains *user types*, *domain types*, *application types*, etc that describe the relevance of knowledge items for specific users, domains and application types, etc. Collectively these extensions are referred to as *dedication aspects* (Kassahun, et. al, 2004).

Figure 3. The Knowledge Base editor (KB-editor) used for collecting knowledge. The interface of the editor was built to resemble the Excel templates that were originally used.

The ontology was developed using Protégé ontology editor (Protégé project), however, the use of Protégé for collecting knowledge was not acceptable for the participants due to apparent complexity of the tool. Also, in the beginning, most participants felt overwhelmed by the amount of new concepts and tools. As a consequence, Microsoft Excel templates (Figure 2) were used for collecting knowledge. Excel was chosen because it was easy for the participants on the one hand and easy to later transfer into the knowledge base. In the mean time a knowledge base editor was developed that provides a look-alike user interface to the Excel template so that participants have a familiar interface (see Figure 3). The KB-editor has since been continually improved with extra functionalities for co-editing, sharing and collaboration of knowledge. The user interface has also been substantially revised and improved based on users' feedback.

One essential reason to use a KB-editor is that participants need to cooperate and co-author the knowledge base. Participants come together at regular intervals for close consultation and solve issues that are difficult to solve, but since participants are located in different geographical locations, the main interaction space is the internet. The KB-editor supports this collaboration in the following ways:

- Participants can see what other participants have contributed; therefore, they don't have to wait until a finished document is sent over to them.

- Domains, user types and other relevance indicators are part of the ontology and were used to provide a fine-grained authorisation of individuals, so that a group of participants can co-edit knowledge items.

- Consistency of the knowledge base is guarantied by a locking mechanism that prevents concurrent users from overwriting each others work.

- All users have access rights to submit comments, so that they can give feedback to the editors of knowledge items.

- The editor generates readable formats for printing and easy reading.

- A compare feature allows users to compare different versions of the knowledge base, so that reviewers can see what has changed since the previous reviewed version.
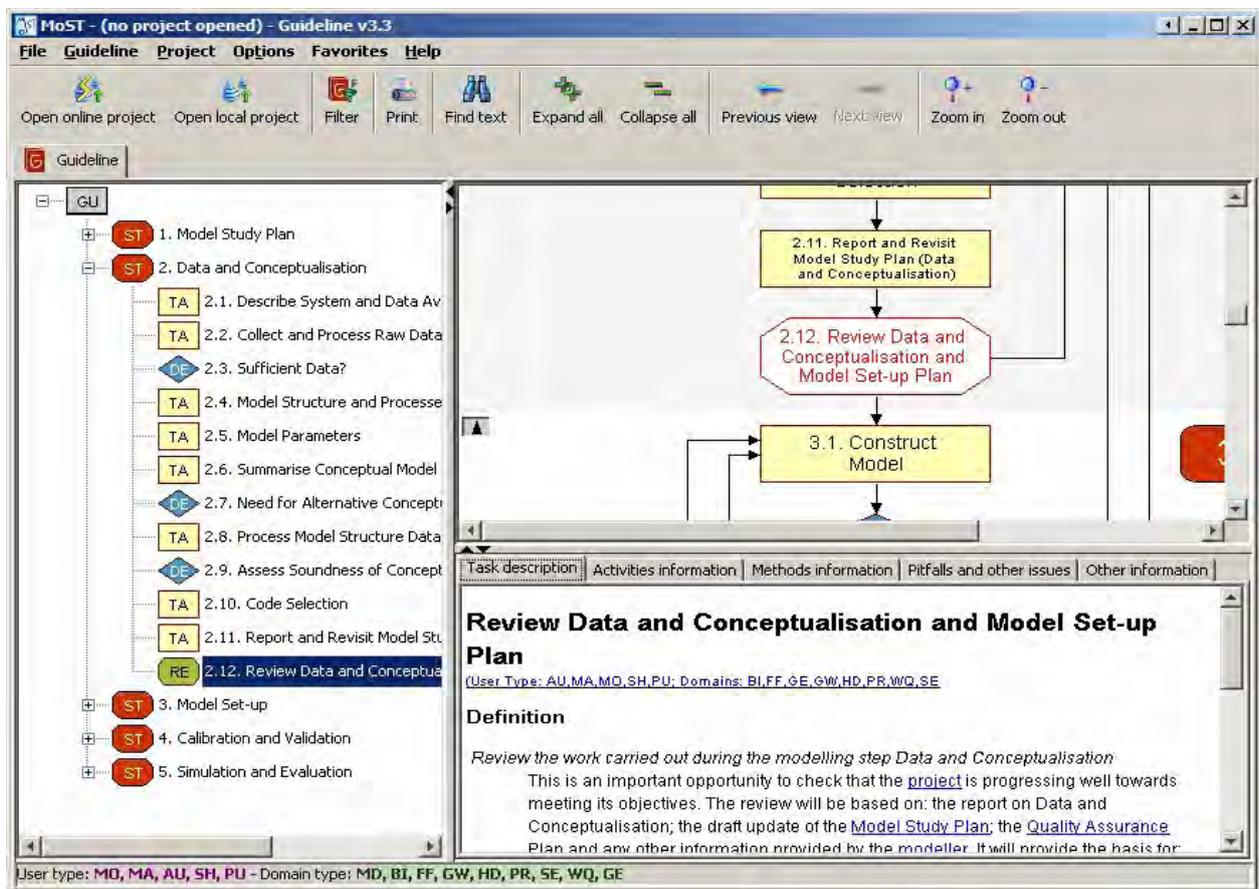
Figure 4. Screen shot of the guidance component of the process support tool showing the research process as a tree on the left pane (*tree view)*, as a flowchart in the upper right pane (*flowchart view)* and the details of the selected item in the lower right pane (*task or detail view)*.

The second tool is a process support tool with three components: a guideline/browser component, a monitoring component and a reporting component (see Figure 4). The guideline component provides user-friendly interfaces for browsing the knowledge base. A knowledge base is usually a rich collection of information therefore the ability to filter information based on user preferences has been provided. User's preferences depend on different factors, such as the user's role in the project at hand, user expertise, complexity of task, etc.

In the monitoring component users (project leader) set-up a project, identify the tasks and enlist project members. Subsequently project members can login (when working online) and record

what they have done. Since the guideline component is part of the same software tool, users have access to the rich collection of the knowledge items (on what to do, how to do it, the pitfalls, inputs, outputs, etc) at hand when performing their activities. The monitoring component can be used both in offline mode and online mode. When used in online mode, two or more users can collaborate on a research project. User can move their offline, single-user, project to a project server and enroll new project members. A user can also take her project offline when no other user is active any more.

This last tool is clearly designed with collaboration in mind. Like in the KB-editor, team members can see what other members have done, are currently doing and which items they are allowed to do. Sensitive information is only shown to authorised members, which makes it possible to enlist all team members involved in the research project. The decision and review tasks are clearly marked indicating milestones where the team have to decide whether to proceed or go back and do some of the tasks all over again.

Making it Happen (The Approach & the Action)

Collecting and organising existing knowledge to define a multidisciplinary research process is a long process by itself and requires clear statements of milestones and deadlines. The first meeting is the kind of kick off meeting in which participants present existing practices in their domain and define the stages of the work. The different stages can be collecting existing generic and domain specific research guidelines, processes and standards, collecting existing glossaries, analysing the existing knowledge, structuring, harmonising/integrating it into one consistent body of knowledge, testing, and using the test results to improve the knowledge.

Subsequently, the facilitator organises a task force with only few participants, preferably not more than 5 or 6 persons. At this stage there are usually different views and misunderstandings in many areas and reaching consensus may not be easy. Therefore, it is vital to keep the number of participants small. This small group has to include the most active domain experts and one or two knowledge experts. The task force makes a high level decomposition of the research process consisting of the *steps* and the *tasks* of the process. This knowledge structure should be annotated with *dedication aspects* that describe the relevance of knowledge items for specific users or domains. Annotation of knowledge items with such relevance indicators is one of the key aspects that make filtering of knowledge based on user needs and preferences, fine-grained authorisation and report generation possible in the process support tool.

Before the next general meeting reports on existing knowledge should be ready. At this point, it is necessary to review those reports for correctness and completeness. During the meeting the reports and the knowledge structure will be presented. Participants will decide on the high level decomposition of the research process. Now the formal collection of existing knowledge can start based on the agreed upon knowledge structure. It is important to realize that the choice of technology used to collect knowledge can affect the progress of the work. It may be important to let participants choose the technology for editing the first draft. Desktop productivity tools may be chosen, in which case templates and processing scripts have to be developed. Groupware tools make sharing of documents and discussion easy and their use is highly recommended.

Once the existing knowledge is collected (and transferred to the KB if the KB-editor is not used for the first draft), the harmonising phase starts. In a series of review cycles, both internal and external, the process knowledge will be made semantically consistent and generic.

A collaborative multidisciplinary scientific research process so developed specifies the activities, methods, sensitivities, pitfalls, etc of a collaborative research project as a process.

Once this process is defined it needs to be tested and finally put in practice. The next phase is selection of test cases, in which the defined process will be put to test with regard to a number of criteria. The results of tests will be used to further improve the process specification in the knowledge base. The process of collecting and sharing existing research process knowledge can be summarized as follows:

1. Selected experts fill the knowledge base. Any interested person can read the contents of the knowledge base and provide comments

2. The knowledge base will be structured, harmonised and made consistent in a number of review cycles. It is highly recommended to invite external reviewers to access the correctness and consistency of the knowledge base too.

3. The validity of the process will be tested in realistic test research projects with the help of the process support tool to monitor the test projects. Feedbacks will be carefully studied and incorporated.

4. The process knowledge will be made (publicly) available for further use in actual collaborative multidisciplinary scientific research projects.

The testing and the use of a research process, assisted with the process support tool, is discussed in detail elsewhere (Scholten, *et al.*, 2007).

Results & Next Steps (The Follow-Up)

The methods and tools described in this study resulted in a knowledge base system. The system consists of:

- A process ontology for collaborative scientific research.

- A glossary of terms.

- A knowledge base and an associated KB-editor based on the process ontology.

- A software tool for:

  o Providing guidelines on the scientific cooperation process at hand;

  o Setting up and running projects, including keeping a project journal of the scientific cooperation process at hand;

  o Reporting project journals.

- Extended multimedia training material.

These results are used to guide and monitor multidisciplinary research projects for the field of application for which the process is defined. The software tool allows multidisciplinary teams of such projects to cooperate better because team members can see what others have done and produced, are doing or are authorised to do. The extended role and relevance annotation of the knowledge items enables filtering and flexible report generation.

The process ontology, the KB-editor and project support tool were developed in the context of the HarmoniQuA project for the purpose of supporting model-based water management. Application of the technology in connection to the AquaStress project enabled us to further develop the methodology and the tools. It also served as a way of validating the methodology and tools as to whether the original idea was generic enough to be applied outside of model-based water management.

The next step in supporting collaborative research processes is to extend the process support tool with an *advisory* tool or component. This component uses information collected during the use

of research processes in real life application and saved in the project archive to generate advice for users when they are doing their next project.

Real Cases (As it has Happened)

The knowledge system has originally been developed and used within the context of the EU funded HarmoniQuA project to develop a knowledge base for quality assurance guidelines (QA) for model-based water management. The application of the tools in practice is done at two stages. The first stage is the use of the KB editor to co-create a modelling process in water management. The second stage is the application the modelling process so developed in real life modelling projects with the help of the process support tool.

In the first stage, project participants were requested to present existing quality assurance practices and procedures in their domain of expertise. Most of those QA procedures evaluated use a process-oriented approach in the form of guidelines in specifying QA procedures. The new HarmoniQuA QA guideline is based on these existing process-based guidelines. The major process steps from different guidelines were found to be comparable and were adopted in the new guideline. However, there were differences in the details of the modelling processes. The discrepancies were explained based on the differences in the following characterisation of modelling in water management:

- *Domains*. Domains refer to water management domains including hydrodynamics, groundwater, precipitation runoff, flood forecasting, surface water quality and biota (ecology). Two addition domain types were also defined. The process items that are common to all domains are identified as *generic*. A domain called *multi-domain* is added to label knowledge items that will describe potential conflicts arising due to combining domains in modelling projects and the solutions for those conflicts.

- *User types*. These are the roles modelling team members can play: modeller, water manager, auditor, stakeholders and concerned members of the public.

- *Application purposes*. These indicate the purposes of the modelling study. Application purposes include planning, design and operational management.

- *Job complexities*: These describe the complexity of the modelling study. Three levels of complexity were identified: basic, intermediate and comprehensive.

These characterisation flags were included as *dedication aspects* in the process ontology. Since experts were identified by their *domain* of expertise and their *user type*, the KB editor authorisations are based on these two dedication aspects. The definition of these dedication aspects allowed editors to enter the initial knowledge items without much worry about the consistency of the knowledge base. Conflicting items were easy to identify since the KB editor provided users facilities such as sorting items by name, comparing, exporting and generation of readable/printable formats. In later versions the KB was harmonised and made consistent across the different dedication aspects.

After a number of revisions the modelling process in water management is decomposed into *steps*, *tasks* and *activities* and other relevant information and made available for use in MoST. As a result a modelling process is defined in the following *steps*: (1) model study plan, (2) data and conceptualization, (3) model set-up, (4) calibration and validation and (5) simulation and evaluation. These *steps* are decomposed into a total of 48 *tasks*, 350 *activities*, 100 *methods* and other knowledge items such as some 900 *glossary terms*.

In the second stage of the HarmoniQuA project, the process support tool called MoST (Modelling Support Tool) is used in real life test cases. For each test case the *project*

administrators (project administrator here refers to the person who manages MoST software for the project) set–up the project. This includes defining *subprojects* and associated *domains*, selecting relevant *tasks* per *subproject*, enrolling *team members*, specifying *roles* for each team member and authorizing them per subproject. The project administrator is also responsible for editing the *scoreboard questions* that are part of the guideline to the fit the project auditing requirements. Team members use MoST to get guidance in executing activities and record what they do. In particular, they use MoST to do the following: (1) start (launch) a task instance, (2) record the start date, (3) execute the activities of the task by describing what is done, selecting methods used from a list of available methods, attaching relevant documents and recording start and end dates (4) record date of completion and time spent of the task and (5) end the task instance when all activities of the task are done. Both task and activities can be skipped in which case the user should specify the reason for skipping.

MoST has been used in 21 real life case studies (Olsson, et.al., 2004, Old et. al., 2005). These test cases were used to validate and improve the modelling process knowledge base and test the usability of MoST. As the result of these tests a number tasks and activities were either merged or split and the use of some dedication aspects were dropped. Thus, the test results were used to find problems in the guideline that were not possible to find through a review process. Most of the testers (mainly modellers) from different domains found that the modelling guidelines are very useful, especially for complex model studies. They also found MoST to be essential for making use of the knowledge base showing that support tools such as MoST that make use of the knowledge base enable users to make the most out of the investment made in the development of a knowledge base.

The knowledge based system is currently be used in the AquaStress project. AquaStress attempts to develop stakeholder driven, comprehensive multisectoral, integrated approaches for mitigation of water stress. Presently a water stress mitigation process is being developed for two test sites, i.e. the Velt and Vecht river basin (Netherlands) and Iskar river basin (Bulgaria). The process will be applied in different test cases at these test sites. In the future the water stress mitigation process will be developed for other test sites too.

Tips & Tricks (To-Do)

☑ The facilitator can help the efficiency of defining the process by allowing domain experts to choose the technology of their choice at the start.

☑ Avoid using emails as the main communication means. Use groupware and setup virtual rooms for each sub group and events.

☑ All tools are accessible for free from www.HarmoniQuA.org. There is also extended training material.

Potholes (Not-to-Do)

☒ If end-users are not involved in a very early stage (from process definition on) they will not adopt such a knowledge based approach.

☒ Do not start too late with defining the process. Defining collaborative multidisciplinary scientific research process is a time-consuming procedure. Experts should start in a very early stage to define the process in order to test it sufficiently during the project.

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Author Biographies

Ayalew Kassahun is employed as scientific software engineer in the department of Information Technology of Wageningen University. He has previously worked for a large Enterprise Resource Planning (ERP) software company developing the ERP system, user interface driver and workflow integration components. He has since then also worked for Business Intelligence (BI) software company developing software for real-time business monitoring. Currently he is involved in the EU-projects HarmoniQuA and AquaStress and is responsible for the development of the knowledge base systems in both projects. His educational background includes, besides software engineering, civil engineering, water resources management and hydrology.

Huub Scholten is employed as senior scientist and assistant professor in Applied Systems Science, in the Information Technology Group of Wageningen University. His professional interests lie in the field of simulation model quality, ontological knowledge engineering, model development, calibration, uncertainty analysis, validation and simulation modeling methodology and also in the development of software to support these activities. He participated in many research projects, of which some as project leader. He is involved in the EU-projects HarmoniQuA as coordinator and AquaStress as partner responsible for knowledge management issues. He has authored more than 80 publications in domain specific model development, model application and in more generic methods and tools in knowledge-based modeling methodology. Besides research he gives four courses in Modeling and Simulation at Bachelor and Master level, supervises Master thesis and PhD thesis work at Wageningen University.

Adrie J.M. Beulens is currently Professor of Information Systems, head of the Information Technology Group at Wageningen University (WUR). He has been director and dean of Wageningen School of Management of Wageningen University (till 2002), dean and director of the Faculty of Informatics at the Haagse Hogeschool (till 1995), taught at Rotterdam School of Management (till 1988), worked in different senior management positions and works as a senior management consultant for a variety of companies. He is author of many articles in journals and (co-)author of books in the areas of ECR, logistics and Model Based Decision Support Systems (DSS). He was also scientific director for the focus area of Transparency for KLICT(2001/2005). He is member of (International) (Professional) organisations (VVS/NGB, GOR, NGI, VIAS, VRI, IFIP TC7). Finally he is member of different (advisory) boards of companies and foundations (EDICT, ACC/AKK).

Developing, Nurturing, and Sustaining Communities of Practice

Rony Dayan and Yossi Pasher
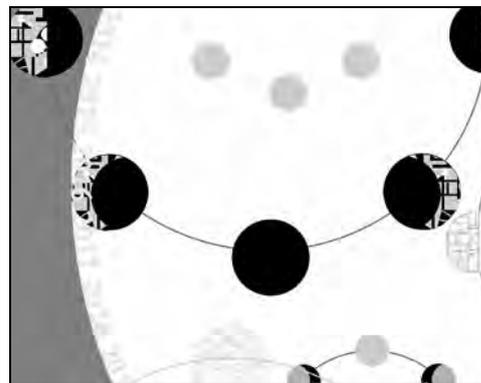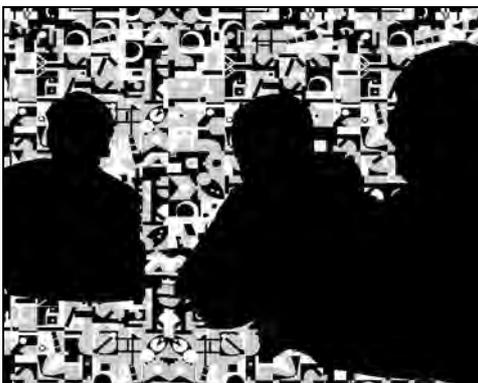
Developing, Nurturing, and Sustaining Communities of Practice

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Snapshot (Quick Learning)

The term community of practice (CoP) describes an activity system that includes individuals who are united in action and in the meaning that action has for them and for the larger collective. They are informal entities, glued together by the connections the members have with each other, and by their specific shared problems or areas of interest.

The five years of experience accumulated with communities of practice, has taught IAI that out of the structural elements enumerated above, some are to be considered as key success factors, and these are:

- A subject of dynamic nature, at the edge of state of the art development, and constantly reinventing itself.

- A charismatic leader.

- Trust among the community members.

- Periodical physical meetings of the community.

- A web site performing as virtual meeting place for the community, a repository for its shared information, and a showcase of its activity for the company.

Potential members of the community are invited to a workshop evolved around guidelines of forming the bylaws, developing the community's vision, mission and core values; establishing objectives, agreeing on realistic measurements and electing the community's officers.

Community leaders are self-elected and being a crucial component for the sustainability of the community, they need to be re-enforced and supported.

Keywords: CoP, Community, practice, industry, aerospace

Context (Where & What)

Israel Aerospace Industries (about 15000 employees organized in 5 groups and 23 divisions) is globally recognized as a leader in developing defence and commercial aerospace technology. This distinction is the result of nearly half a century of designing, engineering and manufacturing, for customers throughout the world. IAI has kept along the last few years, sales figures of about 2 B$ (over 80% of it as export) and an order book of over two years.

What strikes any visitor to IAI is the multiplicity of its fields of activity, the range of its products, and the variation in attitude to values one encounters across groups and divisions. This last attribute is of special significance when dealing with a soft issue as is knowledge

management. Additional parameters expected to be relevant to the implementation of knowledge management in IAI, are the fact that the company as a whole is considered as R&D intense, that as any large corporation it is organized in groups, by themselves divided into divisions each having a bottom line target to meet, and that it is mature. This is a company established in the fifties, which started with aeronautical maintenance jobs, ventured into the development of a futuristic fighter aircraft the Lavi was, and is now developing and positioning satellites in space.

IAI realized that its policy of decentralization has created divisions eager to show their success at the bottom line sometimes to the detriment of other divisions, and that it has to leverage its capabilities as one company. A change programme established on intangible values as Customers, People, Innovation and Technology, and "One Company", has been implemented in IAI ever since the year 2000. This paved the way for the acceptance that:

- It is permissible to have intangible goods (such as customer intimacy, communication and involvement, learning organisation or knowledge management) as long as it is backed and supported by concrete, tangible and measurable actions.

- It is permissible to find non-direct way to achieve results.

This created an environment more favourable to the implementation of a KM programme which incorporates intangible goods:

- KM actions are expected to deliver performance goals.

- A mental link is created with individuals between intangible goods and the use of intangible or tacit knowledge.

Such an environment, in which terms such as internal communication and knowledge sharing are not new to people, would be expected to be more approving for the implementation of KM procedures as "communities of practice", or "good practices", though it doesn't mean it would make it straightforward as it was discovered during the implementation phase.

- The strategy for knowledge management in IAI was set for the following goals:

- Improving the availability of knowledge to IAI employees.

- Organisation learning from failures as well as from successes.

- Cultivating the potential for the creation of new knowledge.

- Enhancing knowledge sharing among IAI employees.

- Increasing the awareness to knowledge management.

The CKO has established the concept of the life cycle of knowledge around the goals of the knowledge management strategy enumerated above. Knowledge management was established then as a comprehensive programme including all four phases of this life cycle (Dayan, 2003):

- Knowledge capture and documentation.

- Knowledge retrieval for reuse.

- New knowledge creation.

- Knowledge sharing.

The idea behind knowledge sharing in a complex organization

It has been claimed that knowledge management could be seen as expressing a metaphorical perspective of the company and its management and working methods, and depending on which perception of knowledge the analysis is based on, its characteristics will change (Christensen and Bang, 2003). Different perspective here means different epistemologies (the root definition of epistemology is 'the theory or science of the method or grounds of knowledge'; in terms of the present discussion, epistemology refers to the claims or assumptions made about the ways in which it is possible to gain knowledge of this reality, whatever it is understood to be; claims about how what exists may be known. An epistemology is a theory of knowledge; it presents a view and a justification for what can be regarded as knowledge – what can be known, and what criteria such knowledge must satisfy in order to be called knowledge rather than beliefs (Blaikie, 1993). Questions about 'what is regarded as the evidence of things in the social world' or simply about 'what we know' are epistemological questions (Mason, 1996)):

- Artefact epistemology.

The artefact-oriented epistemology (Conklin, 1996, cited in Christensen and Bang, 2003, p.122) is characterized by knowledge management focused on collecting and sharing formal data and information such as documents, reports, statistics, etc. This kind of knowledge management found its way onto the management-related agenda of the mid-twentieth century when the view was that organizations may be perceived as open systems which by creating knowledge, formulate more and more precise representations of the surrounding world.

- Process epistemology.

The process-oriented epistemology considers knowledge creation and sharing as a continuous process between people and technology as well as tacit and explicit knowledge. The Nonaka's SECI model is typical to this view but many others also adhere to it (as (Prahalad and Hamel, 1990)). The author has shown the relationship between the implementation of knowledge management and achieving high results in the CMMISM (CMMI is a service mark of Carnegie Mellon University) standard (Dayan and Evans, 2006).

- Autopoietic epistemology.

Autopoiesis (Maturana and Varela, 1980, cited in Christensen and Bang, 2003, p.125), is a theory rooted in neurobiology, that was later developed into a theory about social systems such as employees, project teams, or organizations and about knowledge management and the composition and structure of social, self-organized systems by von Krogh and Roos (1995). Within this theory, each unit determines its boundary through self-reproduction. This self-referential nature is quintessential to the autopoietic system (see also (Nonaka and Takeuchi, 1995, p.76). Autopoietic epistemology requires an untraditional organizational understanding of interaction with the surroundings as it presumes that information and knowledge may not be transferred from one system to another. Communication takes place through data, which thus represents potential information and knowledge. The interpretation of this information and data is determined by the system's own framework of understanding as the acknowledgement converting the data into knowledge depends on the existing knowledge of the system. The focus is therefore on self-reproductive systems meaning that it is only the system itself, which is capable of maintaining itself through internal processes. To create knowledge, people must be induced in sending data to others, by the interest they have about receiving data from others (see also (Koskinen, 2004, p.14)).

We will show that the procedure of communities of practice within the content of knowledge sharing and as interpreted at IAI, includes aspects of all three epistemologies.

Making the choice towards Communities of Practice

The sharing of knowledge has been the subject of numerous studies. In one of them, the environment factors promoting or impeding it have been analysed and specifically the "organizational commitment" and the "organizational communication" (van den Hooff and de Ridder, 2004, p.117). "Organizational commitment" is understood to refer to the affective commitment of organizational members to their organization, whereas "organizational communication" refers to both the communication climate of the organization as a whole and the use of different instruments for communication. Organizational communication is also labeled as the 'knowledge-sharing culture' of the organization (to create a knowledge sharing culture is to make a visible connection between sharing knowledge and practical business goals, problems or results), ((Alazmi and Zairi, 2003), (Chauvel and Despres, 2002), (Martensson, 2000), (Mahti, 2004), (Skyrme and Amidon, 1997), (Mason and Pauleen, 2003), (Park, Ribiere, and Schulte, 2004)). "Organizational climate" has been defined as a set of shared perceptions regarding the policies, practices, and procedures that an organization rewards, supports, and expects (James, Joyce, and Slocum, 1988; cited in Seibert, Silver, and Randolph, 2004). Dividing knowledge sharing into its constituents, namely the donation of knowledge and the collection of knowledge, it was concluded that:

- Commitment to the organization was found to be of influence on knowledge donating.

- A constructive communication climate was found to be of positive influence on knowledge donating and collecting, as well as on affective commitment (identification and involvement with the organization, a feeling of emotional attachment to that organization).

- Knowledge collecting positively influences knowledge donating (the same has been identified in IAI's communities of practice and the original fear of loosing power if donating knowledge was replaced by worry to be viewed as a "free rider" who wasn't able to contribute as the others).
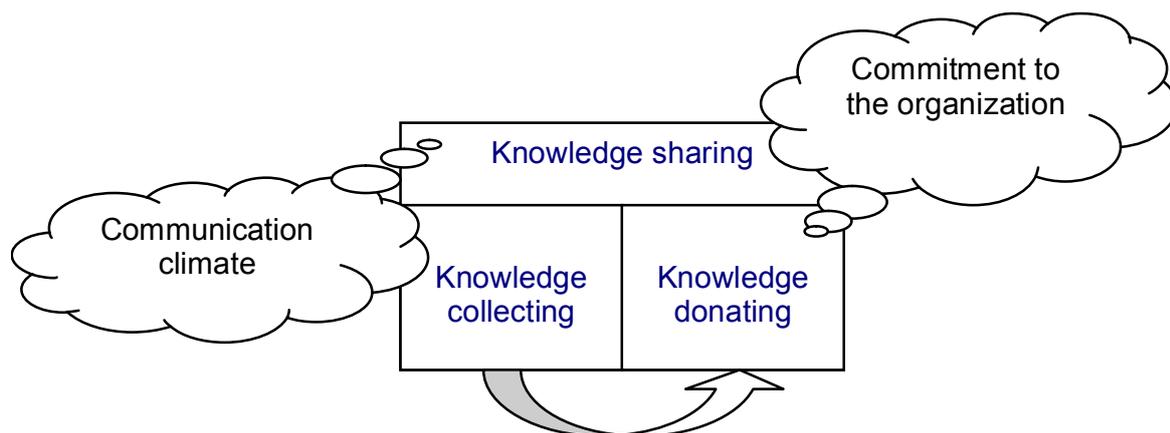
Figure 1: Environment influence on knowledge sharing

The term community of practice (CoP) describes an activity system that includes individuals who are united in action and in the meaning that action has for them and for the larger collective. They are informal entities, glued together by the connections the members have with each other, and by their specific shared problems or areas of interest. The latest reports from the field suggest that virtual communities of practice are becoming a KM tool choice for an increasing

number of multinational corporations. Among the chief reasons why communities of practice are efficient tools for knowledge generation and sharing is the fact that most of a firm's competitive advantage is embedded in the intangible, tacit knowledge of its people, and because competencies do not exist apart from the people who develop them. The successful functioning of a knowledge-sharing community of practice is impossible without an active participation of a substantial part of its members. The method overcomes barriers to sharing information, such that if people would be reluctant to write something for the data-base, they might find it easier to talk about it with their colleagues to the community. Reasons for sharing, range from self-esteem boosting to altruistic and conformist consideration (McLure and Faraj, 2000 cited in Ardichvili, Page, and Wentling, 2003 p.66). Posting of knowledge entries by some member of a community must be matched with active participation by other members visiting the CoP Intranet-site, when they are looking for advice of information.

Francis Bacon (1561-1626) is frequently quoted with his famous call: 'Knowledge itself is power.' His intention was emancipation of the mind from the predominance by the church. His call was accompanied by technological development: 'Paper now came cheaply from Egypt, replacing the costly parchment that had made learning the monopoly of priests; printing, which had long awaited an inexpensive medium, broke out like a liberated explosive, and spread its destructive and clarifying influence everywhere' (Durant, 1926). Bacon, in his early publication 'The Praise of Knowledge' (1592), even defined the individual by his/her knowledge: 'My praise shall be dedicated to the mind itself. The mind is the man, and knowledge mind; a man is but what he knoweth' (Durant, 1926, p 111). Such ideas are the forerunners of intellectual awakening, of mental illumination, that is, of the epoch of enlightenment as the philosophy of the 17th and 18th century with Descartes (1596-1650), John Locke (1632-1704), Kant (1724-1804) and many others who set the foundations of modern science. Bacon did not explicitly mention 'knowledge management'; how could he 400 years ago? At least, he concentrated on human knowledge and not its sediment: printed or electronically stored information. For him, printed materials (and the same is true of electronic devices, as of today) are carriers of information and help to increase human knowledge, but the printed documents as such do not own knowledge themselves, because they are not 'conscious'. Knowledge is the entrance to mental freedom: 'As knowledge grew, fear decreased; men thought less of worshipping the unknown, and more of overcoming it. Every vital spirit was lifted up with a new confidence; barriers were broken down; there was no bound now to what man might do' (Durant, 1926, p 105). Bacon's appreciation of human knowledge is of high contemporary relevance. The competitive advantage of societal systems (nations, enterprises, political administrations, political parties, etc.) seems to depend: (i) upon the individual knowledge of their members, (ii) upon the knowledge-based communication between them, (iii) upon the innovative knowledge creation by them, and (iv) upon the support of individual knowledge creation, knowledge processing, and knowledge storage by information systems. Therefore, knowledge management should be seen as a leadership principle, not only as a subset of computer science (Muller-Merbach, 2005).

It is often argued that people are not willing to give away their knowledge because of the so-called "knowledge is power" syndrome. It turns out that a more powerful syndrome is the unwillingness of using someone else's knowledge (because it means admitting needing it as discovered by the CKO in IAI's communities of practice). With 23 divisions in IAI, it is not unusual to find the same technology being developed for different applications in various divisions. Aiming for improving the general technological knowledge, gaining advantage from a larger base of activity, and sharing methods and practices, communities of practice are organized. Actually, they are consisting of a group of people having a common technological subject, who self-organize voluntarily, vote for a leader, and decide for a set of goals to govern their activity. The community of practice procedure published in the company's KM handbook manages the process and induces the divisions to encourage their employees to join the

communities. It also includes, as all other KM procedures, a set of measures (performance, throughput, and business results measures) to assess the quality of performance of the community.

Communities of practice not being part of the hierarchical organization of the company could feel left-out, or not belonging. For this reason, we have attributed to each and every one of them a sponsor coming from the upper management of the company (division or group managers, or even the CEO of the company who sponsored the technological community for nano-technology).

We have differentiated between three types of communities of practice; there are the technological communities who gather people from different divisions and involved with a specific technology which is part of the developed products of the company (as examples one could consider the community for electro-optics, the one for composite materials, or the one for aeronautical structures); the procedural communities dealing with a specific procedure (as statistical process control, or software testing); and the organizational communities gathering people belonging to the same kind of organization in various divisions (as safety, or pricing).

Preparation (The Checklist)

The structural elements and principals

(Martins, Gilson, and Maynard, 2004) have investigated the virtual aspect of communities of practice which they call virtual teams (VTs). Their research shows the main differences between VTs and CoPs (IAI has limited CoPs to teams that physically meet and has required them to do it nominally on a monthly basis):

- The locational boundary refers to any physical dispersion of team members, such as different geographic locations or different workplaces at the same geographic location. CoP members in IAI are coming from any of its 23 divisions; to facilitate the locational factor they would usually meet alternatively in different divisions according to the affiliation of their members.

- The temporal boundary encompasses lifecycle and synchronicity. Lifecycle captures the extent to which a team is temporary or ongoing, while synchronicity refers to the timing of member interaction on the group's task.

- The relational boundary refers to the differences in relational networks of VT members, that is, their affiliations with other teams, departments, organizations, and cultural sub-groups. In general, individuals are more likely to look within their relational networks rather than across networks for team members. The organization of teams integral to one division has always been an easier task as it doesn't require bridging over the possible competition gap between divisions. What has been labeled as the local learning trap is about the risk of concentrating attention on local knowledge sharing without addressing the issue of how the organization as a whole can benefit from it; concentrating on the human capital rather than on creating a social and environmental capital (see also (Allee, 1999) regarding the flow of knowledge across the enterprise, or (Brentani and Kleinschmidt, 2004) regarding new product development programmes).

Many organizations focus their attention on the operational level only, mainly because it is easier to manage. This creates an inhibitor as knowledge workers are looking for a management example in knowledge sharing. However, VTs can overlap multiple relational networks, enabling teams to be composed of members based on "what they know" rather than "who they know". In such teams, members have to work across differences in assumptions, motivations,

knowledge bases, and working styles that characterize each of the relational networks that are spanned by the team:

Team inputs comparison (input variables represent the design and compositional characteristics of a team):

- VTs as opposed to CoPs that meet physically are often conceptualized as having a more fluid membership such that a specific expertise can be added or removed as tasks change. Members of CoPs at IAI adhere to them voluntarily but then commit to continue their belonging to the team. In some cases, we even tried to re-enforce the binding of members to the team by labeling them as 'founding members', and requiring them to further approve any additional latter applications.

- Researchers have noted the tendency of VTs to possess a shorter lifecycle as compared to face-to-face teams.

- Group size has traditionally been described as critical to group performance. Researchers have noted that team size may affect VTs differently than face-to-face teams because technology can mitigate the negative effects of size. On the other hand, the number of ideas generated in VTs has been found to increase with group size, which contrasts with results found in face-to-face groups. CoPs at IAI typically consist of five to 15 members from 2 to 5 divisions, a limited number of participants promising good group performance, but coming from different environments, and with various sets of interests, enabling a variety of points of view.

- A proposed benefit of VTs is that they can bring together individuals with the needed knowledge, skills and abilities regardless of their location. It has been found that technical expertise in a VT is positively related to a team's success, the team's ability to deal with technical uncertainty, and group member trust.

- The diminished non-verbal and visual cues associated with increased technology usage have been cited as reasons why VTs take longer to make decisions, are less able to make inferences about members' knowledge, and are less able to anticipate other members' responses.

- Theorists initially argued that group composition would be less salient within VTs and empirical research has indeed found that status effects are reduced in virtual interactions. Some researchers reported that minority members were more likely to express their opinions in anonymous conditions, but their opinions were given more consideration in the face-to-face condition.

Team processes comparison ('how' teams achieve their outcomes):

- It has been argued that developing a shared vision or mission may be more difficult for VTs, as it is often harder for members to establish a unified sense of purpose due to diminished member interactions.

- A study assessing variability in the project management of 103 global, virtual, and collocated new product development (NPD) teams found that collocated teams reported a significantly lower number of difficulties with various aspects of project management (such as keeping on schedule and staying on budget) than did virtual or global teams. IAI has had the same experience and practically all its project activity by now is being performed using IPTs (Integrated Project Teams).

- A reason proposed by those who have found that VTs experience increased participation is that computer-mediated communication allows for asynchronous communication that encourages members to contribute based upon their own schedules. Such results cannot

be corroborated with IAI's CoPs that haven't shown high rates of information contribution through their Intranet-sites as opposed to what has been provided by members through physical meetings.

- It has been noted that since the communication tools used for virtual interaction allow for records to be retained, VTs have a means for monitoring team activities that are not available to face-to-face teams.

- The technology-driven bias leads to the conviction that the introduction of technological facilities will improve knowledge sharing amongst people, and can be harnessed by the organization to prevent the loss of knowledge. This can prove to be misleading and having an established Intranet is not sufficient for sharing knowledge. The conclusion from analyzing IAI's CoPs has been that creating a network of experts and facilitating physical encounters opens a large potential for knowledge sharing, only latter to be backed by IT.

Interpersonal processes comparison (such as conflict, uninhibited behavior, interpersonal trust, and group cohesiveness):

- In comparing face-to-face groups to VTs, some researchers have found that conflict is more likely to occur in virtual contexts (researchers have long stated that conflict is an important process that allows teams to make better decisions because more alternatives are generated and considered prior to a decision being reached).

- Related to conflict, researchers have found that the virtual context lends itself to more uninhibited behavior by team members compared to interactions within face-to-face contexts.

- It has been argued that trust in VTs needs to develop quickly as teams may only interact for a short period of time. Researchers have found that trust in VTs is derived initially from perceptions of ability and integrity as well as members' propensity to trust. It has also been suggested that a face-to-face meeting during the initial 'courtship' period of a VT's life cycle helps develop trust in the team.

Team outcomes comparison (affective, such as member satisfaction, and performance, such as effectiveness, speed of decisions, and decision quality):

- In general, lower levels of satisfaction are reported in VTs than in face-to-face teams. However, for decision-making tasks, members of VT groups have reported being more satisfied with the group process, in part, because more alternatives were considered and more voting rounds took place.

- When considering VT performance, researchers have consistently found that virtual interaction increases the amount of time required to accomplish tasks.

Toolkit (The Essentials)

The community launching process

Whether the initiative for the community came from grassroots levels, middle management, or from the CKO representing corporate, the launching process has always started with a meeting of all the people considered to be potential members of the eventual community and coming from various divisions in the company. The CKO would spend about half an hour explaining to the audience the virtues of knowledge sharing, and then would turn to each and every one of the people present, and ask them what would be their personal interest in such a community if it was to be established. General answers claiming interest in better knowing each other wouldn't be accepted and the request would be for pertinent professional needs believed to exist elsewhere in the company. A list of all requests would then be made as a first draft of the community goals. The audience would then be proposed to join the eventual community with its basic set of goals. People accepting to do so would have to participate in a two days seminar meant to crystallize the members as a community, to establish its mandate and determine its goals, and to vote for a leader from among themselves.

The overall purpose of the two days seminar was, to clarify to the joining members, the personal and organizational benefits of knowledge sharing through a community of practice. This was achieved by introducing the concept and the guiding principals of sustainable communities around the world. To be more specific, the seminar evolved around removing barriers to knowledge sharing and ways to at least circumvent them, forming bylaws, developing the community's vision, mission and core values, establishing objectives, agreeing on realistic measurements and electing the community's officers.

To most of us Israelis, learning in groups is an ancient concept since the early days of the Talmud. Learning and particularly teaching is a trait deeply enrooted in Jewish tradition. The introduction of communities of practice to our engineers resonated quiet well. But as mentioned before, people were still somewhat apprehensive about sharing knowledge, since the "One Company" concept has not been well assimilated yet and some felt they might loose a project to a competing unit and consequently even lose their job.

Taking all that into consideration, we had to neutralize their concerns by relating to specific arguments and by pointing to the personal and common benefits to the corporation. This process was well accepted and enabled the interesting journey of forming the community's bylaws and plans for the future.

We did not relate to the seminar as a training session but rather as a process of facilitation through dialogs and consensual agreements. Formulating the vision and mission parts were relatively easy; the more complex part was reaching agreement on goals, objectives and particularly reaching consensus on measurements.

From the view point of a facilitator, the whole process of assisting in establishing the multitude of communities was in itself although some times exasperating, a most rewording experience.

Initiating Engineers to Communicate and Share Knowledge

The overall concept of training adults in the framework of communities of practice can hardly apply, since we are not dealing with an effort to improve a skill or to bestow a new one. In this case we are tackling with something more profound as behavior change. Change by itself is not

always easily accepted, especially changing behavior which is deeply enrooted by habits and values. Therefore, training and the trainer's role in the process is that of a helper and facilitator. The process helper must be knowledgeable in how to facilitate change among individuals and in organizations.

Communicating and sharing are two different issues and both had to be defined and practiced. On the one hand a behavioral change had to be established in order to shift from arguments to dialogues, from swift exchanges of ideas to carefully and actively listened views. On the other hand a paradigm shift had to evolve, develop and mature in order to establish trust in sharing knowledge and information. The concept of "One Company" was cognitively understood but people refrained from practicing it themselves.

Such fundamental changes are not to be administered via training but through persuasion, inducement, motivation and influence. Unfortunately, there is no room for training knowledge sharing, particularly among seasoned engineers such as those of IAI, especially when only two days are allocated for the entire process of launching a full fledged community of practice with all the trimmings, including agreed vision, mission, goals, objectives, standards, measurements and a proclamation charter.

The basis on which we built the establishment of a community of practice is one of voluntary participation. This means that members join by their free choice yet they participate during working hours (which is in fact an expression of the company's participation). Once an employee decides to join, he is in fact committed to his fellow members and 'obliged' to actively participate and contribute. These terms were known and publicized ahead of time before joining the community.

The fact that engineers agreed to participate indicated that the need to take part in such an activity stemmed either from mere curiosity to find out and explore new possibilities in their professional fields, to get socially involved with colleagues who share similar situations and problems, or to draw the advantage of solving some of their professional difficulties out of these meetings. Engineers in a demanding Hi-Tec industry are less expected to be inclined towards social interaction as a result of their high time burden. Nevertheless, since they actually joined the community, it could be that by joining the community they hoped to fill a social void, unless they have been convinced to find there professional answers.

Facilitating such a delicate process entails a great deal of professional maturity, tolerance, patience, endurance and mediation skills.

Making it Happen (The Approach & the Action)
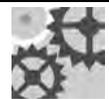
The ways to cultivate and sustain a community

To cultivate, is to prepare the ground for planting 'crops' for them to grow, to develop, to improve and to nurture. All this means creating an atmosphere conducive to development that will provide nourishment for creativity and learning, by creating an environment that will encourage and promote knowledge sharing. Sustaining the community, needs the support and expression of interest by upper management, and its encouragement by ways of celebrating achievements of individual members contributing to the advancement of the common goals and objectives. A newly formed community resembles a newly born baby who is unable to survive on his own. Although we are dealing with adult individuals who share common interests, their group behavior calls for the above.

Preparing the ground and launching a community of practice composed of strangers with common interests is hard enough; sustaining such a community, is a different story altogether. It

entails constant guidance and support on behalf of management that must show constant interest but provide careful monitoring of its involvement. Metaphorically speaking, it resembles holding a small delicate bird in your hands, you can caress it very gently and it will respond nicely but there is a danger that you might squeeze too hard and choke it. The caressing part in the case of a newly formed community has to be directed towards the elected officers who need guidance and encouragement to perform their duties. After all, these people are trained to design and develop sophisticated flying machines and most of them lack the inclination of dealing with the "soft stuff" needed to keep together and nurture a group of strangers and to turn them into a coherent community whose purpose is to expose themselves, reveal their strengths and weaknesses and share their knowledge not only among themselves, but to an entire corporation, by way of publicizing their thoughts through the intranet portal.

Cultivating and supporting should be performed in ways of personal coaching of the community officers, periodical regular group coaching, and wherever necessary, by administrating training in communication and leadership skills.

To make it worthwhile for the members to take part and show interest in the activities, it is advisable to have a structured agenda that will consist of a well balanced mix of outside guest speakers, and presentations given by community members. It is also recommended to create the right balance between presentations where overhead slides are being shown in a darkened room with passive listeners and meetings that are interactive dialogues, discussions and debates that could intrigue the participants, so they can feel as contributing and sharing their knowledge.

An important aspect in the realm of cultivating and sustaining a community of practice is to celebrate achievements and contributions of individual members. It is most important and even essential to acknowledge their existence not only as individuals but as a vibrant active community. This could be most appreciated in corporate culture where people work under the constant pressure of time tables and deadlines. Celebrating achievements and knowledge contributions is not a gimmick, but a fulfillment of a major need of recognition. The most rewording recognition in the case of some of the communities we handled was the allocation of substantial budgets for new and innovative projects generated as a result of the exchange and sharing of knowledge among the community members.

The search for the right mix: Social versus professional as community enhancers

The term 'community' is basically social; it can be defined as a group of people that share common characteristics or interests. The individuals define and set boundaries, delineate roles and regulations stipulate the required conditions to be met in order to guarantee the livelihood and sustainability of the community. The individuals are considered and regarded as members of equal stand. The dilemma to be resolved in the case of engineers (who are considered 'rational', down to earth people) is whether the balance should lean at least at the infancy stage of the community towards the social aspect of activities or hold the bull by the horns and get straight away to professional business.

As we advocated the right balance concerning the ways and methods of knowledge sharing and exchanges of information, the same attitude holds for a balanced mix of social and professional activities. A community is perceived as a cohesive social entity. In our particular case where knowledge is considered power and where people are apprehensive to share it, or on the other hand, people not often expose their lack of knowledge, it is essential to create a protective environment, family like atmosphere, where members can relax and ease their mind. This entails some recreation and social activities some of which are directly related to the core business and topics concerning the community, such as field trips to related organizations, lunches or dinners where a guest speaker is engaged, participating as a group in professional conferences, both

domestically and abroad, where they get the opportunity to spend together leisure time and so on and so forth. This sort of social activity could serve as the glue to bond the ties among the members.

We should not artificially separate between the professional content and the social framework. These two must be interwoven and complementing each other. The recommended balance of the community enhancers in terms of activities should consist of monthly meetings to go along with almost daily visits to the web site where members are expected to adopt the site as their home page. Members are to be encouraged to write down and share their thoughts and ideas as they come, they should be encouraged to initiate dialogs so that a constant flow and generation of new knowledge and ideas is created.

This mix and balance could create a sharing state of mind and turn the community of practice from a trivial association to a focal point for the professionals who will relate to it as an important source and junction of knowledge exchange and support, both professionally and socially. We haven't actually tried this approach yet, but it is worth considering.

Researching the activity of communities

We have compared our research of the IAI communities of practice to one conducted at Caterpillar Inc. They started their CoP activity in the mid 90s and called it "communities of knowledge sharing". Their first community was established in 1997 and at the time of the research they already had 600 online communities with more than 15000 members worldwide. The result of their study, grouped according to four research questions shows (Ardichvili et al, 2003):

What are the reasons for employees' willingness to contribute their knowledge to virtual knowledge-sharing communities of practice?

- The majority of respondents view their knowledge as a public good.

- Knowledge exchange is motivated by moral obligation to the organization as a whole, and to their professional community of engineers.

- The willingness to share is part of the organization's culture.

- Employees felt the need to establish themselves as experts.

- Several managers and experts felt that they had reached a stage in their lives when it was time to start giving back, sharing their expertise, mentoring new employees.

This should be compared to the results of the survey conducted in IAI and showing a clear majority to people joining the community mainly because it supports the performance of their tasks and because it boosts their professional capability.

What are the barriers to employees' contributing their knowledge to virtual knowledge-sharing communities?

- Their research points to the absence of a major barrier to knowledge sharing, often sited in the literature, and variously defined as "information hoarding", or as "knowledge as an individual's private asset and competitive advantage" mentality (Watson, 1997 cited in Ardichvili et al, 2003 p.988). Thus, the majority of participants (55 percent) believed that there was a strong evidence of employees' willingness to share, and only a small minority (less than 10 percent) believed that some employees are not willing to share because of the "information hoarding" reasons.

- People are afraid that what they post may not be important or may not be completely accurate, or may not be relevant to a specific discussion.

- Need for more clear directions for distinguishing between acceptable and not acceptable postings.

- New employees often feel intimidated about posting because they do not believe they have "earned the right" to post on a company-wide system.

- The process of getting knowledge entries approved by managers is time consuming.

- Security and confidentiality considerations lead to self-imposed censorship.

What are the reasons for employees' willingness to use virtual knowledge-sharing communities of practice as a source of new knowledge?

- The majority of respondents view the system as a kind of encyclopedia.

- The system is a useful problem-solving tool.

- The system is used to obtain help with specific problems from individual experts.

- The system is viewed as a tool for keeping informed of general developments in their profession.

- The system is viewed as a tool for managing the work.

- The system is a useful tool that can replace or complement some of the meetings.

- The system helps new people to more quickly integrate themselves into their new place of work and become productive faster.

- The system is viewed as a place to work together, to access to "best practices" or to "lessons learned" data-bases, and as an easy link not only to one's own community, but to other related communities and topics.

- The system's ability to provide benefits beyond specific solutions to immediate problems.

- The system provides a space for jointly generating new knowledge, not just capturing the existing knowledge.

What are the barriers preventing employees from using virtual knowledge-sharing communities as a source of new knowledge?

- Face-to-face group makes the knowledge network connecting the virtual CoPs redundant.

- Some process-oriented problems are hard to duplicate thus making finding a solution on the knowledge network difficult.

- In some cases, people need a quick and accurate solution, and with the system there is a danger of getting lots of answers, some of which may not be accurate and require additional time for verification.

The authors of this research are considering CoPs exclusively as virtual teams, and therefore this remark. We object to this limitation and at IAI, CoPs are required to physically meet on a monthly basis, beyond their usage of the Intranet as a means of communication.

Results & Next Steps (The Follow-Up)

What did participants think about their community a year after it was launched?

During the years 2003 – 2005, we have established 17 communities of practice at IAI (two in 2003, eight in 2004, and 14 in 2005; 14 of them were technological communities and three were procedural), and in them over 200 employees.

Table 1: Technological communities at IAI

Technological communities	Number of divisions represented	Number of participants
Composite materials	11	15
Optical processing	7	10
Network centric systems	9	16
Non-destructive testing	11	12
Printed circuits	6	16
Flight control	6	17
High speed computerized numerical control	8	18
Computational fluid dynamics	3	8
Aeronautical structures	6	12
Advanced processors	5	11
Aerospace cabling	8	13
Electro-optics	7	14
Nano-technology	10	16
Human engineering	6	13

At the end of the first quarter in 2005, we surveyed those communities to evaluate the quality of their performance. 41 members from 13 communities participated in the survey. The results were:

- 56% stated that they participate in most of the community meetings and also try to contribute.

- 78% stated that their participation in the community supports the performance of their tasks.

- 73% stated that their participation in the community boosts their professional capability.

- 93% stated that the professionalism of the subject of the community is improving due to its activity.

- 82% believed that the activity of communities is promoting innovation in the company.

- 76% stated that the community goals are dictating its activity and agenda.

- 34% stated that within the community goals there are some they are dependent upon for the performance of their tasks.

- 66% claimed that the pluralism caused by having representatives from various divisions is advantageous.

- 34% claimed that they don't know how to measure the performance of the community.

- 69% stated that the Intranet-site of the community enables them to readily find relevant information.

- 80% preferred not to be elected as the community leader.

One could clearly deduce from those results that community participants in IAI are very practical people, which cherish their professionalism and which would come to its meetings if their personal goals are on the agenda and if they are listened while contributing to other participants' goals. They recognize the company's advantage of communities consisting of representatives from different divisions but are not willing to make necessary effort to lead despite the recognition by community members and by the Intranet publicity.

We then gathered the community leaders to a structured workshop meant to summarize what they saw as the key success factors learned from one to two years (depending on the community and its time of establishment) of activity.

The issues raised were essentially organizational, such as how to draw and attract more members so that the community would bear and produce more substance? How to 'market' the community to middle management for more support? What criteria or standards should be adopted for recruiting new members? How to increase the current members` motivation for more enthusiastic participation?

With the intention to draw an orderly, factual and honest feedback relating to the overall evaluation of the communities of practice, we set the agenda for a structured workshop that was introduced ahead of time to the community leaders, which included the following points of reference:

- Assimilation and absorption of the culture of knowledge sharing, overcoming the obstacles.

- Motivating, stimulating and encouraging members to actively participate.

- The creation of added values to the individual, to his particular organizational unit and to the corporation.

- Enhancement and advancement of the community's goals and objectives.

- "Knowledge import" from outside sources.

- Building, enhancing and maintaining relationships among the members.

- Invigorating, refreshing and enhancing activities: sort and nature of meetings, fresh ideas and additional contents.

- Auditing and following-up activities.

- The community sponsor's contribution.

- Marketing and public relation of the community.

- Use and administration of the web-site.

In general, the workshop participants dealt with most issues mentioned above. We will point out to those issues which seemed most significant to them:

- How to increase member's interest to participate and take a more active part in the community.

Some pointed out that there were not enough personal incentives as in "what's in it for me". Others recommended appointing new official functions so members would feel more committed and more dedicated. A substantial numbers of participants indicated the importance of enhancing the social aspects of the community through gatherings in pleasant ambiences outside the work place (contradicting the deduction from the survey brought up earlier about the practicality and professionalism of community members). Some proposed identifying community members using badges and emblems so that they can proudly identify with them and be recognized by others as members of a specific community. Some of the participants suggested to monitor the active participation of members in the community and then to include it in the periodical evaluation of employees.

- Criteria for recruiting new members.

It seems that most community's leaders were concerned with the small size of the community. All of them agreed that membership should not be restricted and should be available to anyone in the company who shows interest. The recommendation made by the workshop facilitator, to use limiting criteria for the joining of additional members after the founding members of the community established it, so that to transmit a message of "hard to get", was not well accepted.

- How to precipitate the awareness, the need and the importance of maintaining a community of practice to middle management.

It seems that this was one of the major issues brought up. Some suggestions indicated that there was not enough recognition of the importance of the community by the middle management. The result is the limitation they impose on employees who want to participate. Some, although a minority, pointed to fact that the community activity should be budgeted so that middle management would have less reasons to object.

- The professionalism of community leaders.

An interesting point that came up was the needs to form a community of practice for community leaders that will promote sharing of leadership experiences and help their members acquire leadership and communication skills.

Community leadership

The structure of the community's leadership was based on an elected leader, a web-site administrator and a sponsor appointed usually from the ranks of the upper management of IAI. The community leader hasn't really been trained for the following three skills, leadership skills, facilitation skills and motivation skills.

One way to help him would be to promote leadership to every individual, in view of the fact that a community of practice is consisted of experts in their fields that should be given the task to lead the community toward his specific field of expertise every once in a while. This could be encouraged by distributing more responsibilities to be carried by every individual member. The result is of course that the community leader would now have to lead leaders as opposed to passive members of the community.

Technical experts are not necessarily leaders of people. Because of the nature of their occupation, most of them did not have the time or the energy to socialize, nevertheless to assume leadership roles in a voluntary set up such as a community of practice. It has been claimed that there is a leadership potential in most people. Leadership can be exercised and demonstrated in many ways. Allow people the right opportunity and they will assume the role where they feel confident and safe. In our case we failed to embark on this assumption, we ignored the hidden wishes and some times basic needs of leadership and did not offer enough adequate opportunities to bring out the potential, and therefore missed a greater involvement, interest and commitment to sustain the community.

When launching the communities we planned for two officers only. Should there be more designated roles, it would have allowed for more substantial involvement, that could have been more fertile and bear more fruits. The officers were elected by the members, the leadership role of the community and the web administrator. The more people are actively involved the more they are committed. In order to maintain a sustainable community, we should create more official functions, duties and roles so that members can assume more responsibility for the productive well being of the community at large. Additional official roles such for example as a person in charge of social events could be designated according to the nature of the community's field of interest.

Tips & Tricks (To-Do)

Key success factors

One could summarize the key success factors to the sustainability of communities from the analysis of the issues raised along the workshop:

The subject dealt by the community

- ☑ A subject of dynamic nature, at the edge of state of the art development, and constantly reinventing itself.

- ☑ The subject of the community must be very well focused and defined. Eventually a community can grow in time additional branches to develop specific portions of the subject.

The character of the community

- ☑ Trust must rule among the community members.

- ☑ Communities perform as a professional union which improves the capability of the company in its specific subject.

The community leader:

- ☑ A charismatic leader would have an easier job leading the community.

- ☑ Community leaders are mostly committed to their job. This could be either because they believe it is important, because they are interested in leading the subject, or because they prefer not to be led by others.

- ☑ For the leaders, their position is neither a task nor a hobby. They could be seen as missionaries drawn by the "One Company" value and could therefore gain a lot from the interest expressed by the sponsor.

- ☑ The community leader is pulling it ahead; but who is pulling the leader? It's not the sponsor who shouldn't take an active role in the activity of the community. The

conclusion is that the established goals of the community, voted by the participants, is the main generator for the community leader.

☑ Community leaders should be aware of the dynamics among the participating members, encouraging all to participate, and preventing some from over-ruling the discussion.

☑ The time required by the leader for his community activity is no way comparable to what is invested by the other members. Management should consider the allocation of a specific budget for the community leaders.

The position of the communities in the company:

☑ The higher management of the company seems to be aware of the importance of the communities. The problem is with the middle management, who is sometimes not allowing members to participate.

☑ The "One Company" significance that the communities have seems to be better understood by grassroots than by management.

☑ The promotion of the communities to management must be based on initial results and cannot be left as a matter of principle.

☑ The task of positioning the community in the company cannot be left only to the leader and it should be distributed among additional members.

The community goals:

☑ Communities must elect their own goals and make them rule their agenda, so that they do not deteriorate to be pointless social gatherings.

☑ Communities that have made these goals as their agenda have sustained more than others.

☑ All communities have dedicated their first meetings to knowing each others, but after this first round, if they haven't established goals to themselves, they didn't have good enough reasons to meet.

☑ The community must have a long term agenda (up to a year long), in which members can recognize their personal goals and when are they to be addressed.

The community Intranet-site:

☑ The Intranet-site of most communities acts as a repository for the commonly shared information between the members.

☑ A minority of the communities are using the site to manage and to record their meetings.

☑ A minority of the communities are using the site to manage and to record their goals.

☑ Communities are not receiving feedback about what is appearing on their site from people across the company.

☑ The importance of the community Intranet-site seems to require the appointment of a member for its management.

The community structured operation:

☑ Periodical physical meetings of the community.

☑ The basis of participants for technological communities should be coming from grassroots and not from management.

☑ Not all members are appearing at all meetings of the community (as we can see from the result of the survey). To keep the number of participants in any specific meeting above a minimum of 5-6, one must have a minimum membership of 10-12.

☑ The company should consider the employment of an administrative team to run meetings and the Intranet-site of the communities.

☑ Allocating dedicated responsibilities (as the positioning of the community in the company, the management of the content of shared information, and others) to different members, make them active participants and support the community leader.

☑ Meetings should be run in a managed format, starting with dealing with the pre-planned agenda of goals, addressing ad-hoc issues of community members, sometimes listening to an invited lecture by an external expert, and ending with an appraisal of the participants so that expectations of the leader and the members are addressed.

Potholes (Not-to-Do)

Lessons learnt

Considering that:

☒ Communities in general are characterized by the various forms of interaction, where every individual has something in common that allows him to identify with the group.

☒ Every individual carries a load of beliefs, opinions, resources, preferences, needs, risks, and very often conditions that may affect his identification with the community.

☒ Knowledge can be shared, encouraged and grown in an atmosphere where people feel comfortable with each other.

☒ The crucial factors as far as sustaining a viable community are the balance between self interest and shared interests, the right mix of participants, and the lasting ties among them.

We have learned that:

☒ CoP`s sustainability must be cultivated and nurtured. Just launching a community does not guaranty that it will survive and thrive.

☒ Community leaders must be trained periodically in communication, facilitation, and leadership skills. The training will fortify and reinforce their abilities and motivation to contribute and encourage other member to get more involved in sharing and generating new knowledge.

☒ A marketing campaign should be launched with the intention of making participation in a community of knowledge appealing and maybe even "hard to get", so that it would be promoted to a prestigious status.

☒ Communities should not be left as the only existing means of sharing within the company.

☒ The launching workshop should be spread over a prolonged period of time: one full day for the launch and two additional half days for re-enforcement.

☒ The social aspect of the community has to be enhanced.

☒ More tasks should be distributed to community members in order to encourage more active involvement.

☒ The role of a significant influential sponsor is very much needed to actively participate in the social and professional life of the community. Such an enhancing figure should serve as an active liaison to upper management.

- ☒ Celebrating group and individual achievements is an important factor in enhancing and motivating the participants to deepen their sense of belonging.

- ☒ Notwithstanding the function that the community goals can play for its sustainability, one must be careful not to give it the character of a project team, since then it would lose in the competition for resources to the projects.

- ☒ The communities are dependent on their leader. The leaders would be dependent on the members of their community if the results of its activity were company goals, but they are not – they are the personal goals of the participants. This creates a non-symmetrical balance between the leader and the participants.

- ☒ The way the leader is appointed (in a democratic way by the participants) is in no way concurrent with his importance to the success of the community. The process should maybe in better control and voting should be reiterated after a while depending on the satisfaction of the participants. Unfortunately the last items of the survey mentioned above show this to be an impasse.

- ☒ The preparation given to the community and to its leader during the launching process doesn't seem to be sufficient for the events happening in the life of the community.

- ☒ A community of "Community Leaders" should be formed, where leadership and procedural experiences will be exchanged. Such a community will also serve as a support group where members could vent their concerns.

- ☒ Community members are not communicating through the site; they read the information there and then use emails or the telephone.

These lessons might seem to an outsider, kind of counter productive to a self organizing community; but concluding from our ample experience, we are inclined to believe that although a self organizing community is a sublime idea, it is in the interest of practicality, most helpful to apply at least some of the lessons learnt.

Acknowledgements

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Yossi Pasher is well known in Israel and abroad as a leading expert in O.D and training. Through more than thirty years of experience he has planed and implemented various projects in the areas of HRD, Knowledge Management and team development on a large scale as well as leadership in various organizations in the private business, industrial and public sectors. Yossi is the Principle of Yossi Pasher & Associates - a management training and consulting firm. Yossi coordinated and trained the teams which negotiated the Gaza and Jericho accord as part of the Oslo agreement: sea, air and land as well as ample training experience with airline companies throughout their global system such as EL-AL and North-West in the realm of cross cultural issues. He also designed and implemented various programs for the IDF and Police academy for senior officers in Israel. Yossi has experience in conducting seminars in the field of private banking in the US, Canada, Mexico and South America. He served as the executive director of the Jerusalem YMHA and the associate executive director of the New York Brooklyn YMHA community centers. Yossi holds a Masters degree in the field of adult education from Wayne State University Detroit Michigan, a Bachelors degree in History and Biblical Studies as well as a teaching certificate from Tel-Aviv University. He has published two books under the title of "Effective Presentation" and "Effective Negotiations" as well as various articles on leadership and Management issues.

Mediation and the Mediatory Approach
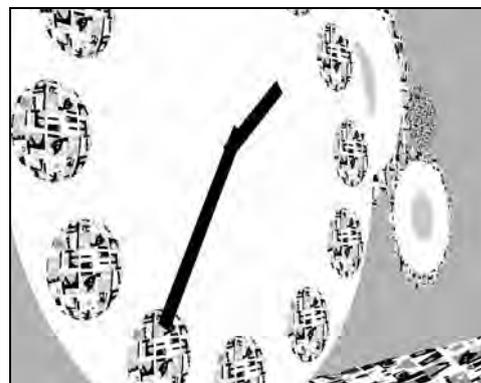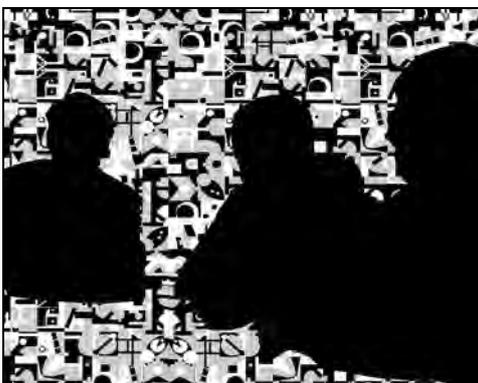
Markus Hess

Mediation and the Mediatory Approach

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Snapshot (Quick Learning)

Mediation is an approach that supports identification and dealing with conflicts in teams. It is a fascinating way of working with others in difficult situations in a way that is democratic and saves face for all parties involved. This process is highly suitable for addressing conflicts in the public domain as well as in organizations of the private sector.

However, overseeing the mediation process constitutes a complex interpersonal challenge that is demanding – especially with regard to leadership, perception, questioning techniques, empathy, and intervention. Each mediator will develop and apply his or her own individual style during the process. This chapter describes the mediation process that the author has developed during almost 10 years of working in the field. It provides an overview on the phases of a mediation process as well as practical tips and tricks for facilitating it.

Keywords: mediation, moderation, group facilitation, conflict solving.

Context (Where & What)

Usually, managers call mediation experts and ask for help in evaluating and settling a conflict within their team when internal channels for resolving conflicts were tried but have failed and thus been abandoned.

In this situation, the team members (core team[1]) who are "trapped" by a conflict are at an impasse. The manager is frustrated and in a helpless, if not hopeless, situation. Having seen how the situation developed more or less first-hand, perhaps even contributed to it, the members of the core team know the story only too well. They are waiting to see what will happen next, and are performing tasks in a work-to-rule manner. All in all, the atmosphere is rather tense. Furthermore, the grapevine is becoming increasingly active because formal information channels are partially blocked and inflexible in their content. The atmosphere is impacting motivation and productivity is starting to decline. In short, the conflict has become a top priority.

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[1] The term "core team" has proven useful in connection with conflict resolution in the closer sense because it also refers to the generally constructive approach adopted by leading project teams. Using neutral language with positive connotations is one part of a constructive and progressive stance adopted of a successful mediator.

Preparation (The Checklist)
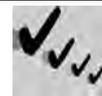
Prior the mediation process, the mediator has to do a careful analysis. For this analysis, he needs to gather both external and internal as well as group and individual perspectives on the current situation and the conflict:

For a first analysis of the current situation, the mediator needs to have a meeting with the manager. Information from the **manager** is here regarded as **external perspective**. This information is important because it forms the basis for engaging an external mediator, and information heard first has the tendency to be given more weight. Most of the time, a client's version of the situation is quite subjective, which is understandable and also normal. Therefore the mediator needs to listen carefully to what is being said and try to pick up specific and general information about those involved in the conflict.

In a second step, a meeting with the whole team needs to be organised. In this meeting, the mediator gathers an overview on the **internal (team) perspective**. The purpose of such a meeting is to introduce the mediator to the parties involved, to present his ideas for tackling the situation, and to obtain the approval of the parties. A further important part of the first meeting with the protagonists involves clarifying the process, and also explaining the concepts of mediation, meditative process, and mediator. For most of those present, this would mean suddenly being confronted with a new instrument. Familiarization with the process content on the cognitive level takes those in conflict (mediatees) to new territory on which they can learn, and thus frees them somewhat from the mental conflict "orbit" in which they are trapped. Furthermore, it is important for them to hear that the process, of which they are the "owners," can be terminated at any time by any one in their group. Their willingness to participate in the process thus receives a boost, and the decision by the manager to engage a mediator is perceived as less authoritarian due to the heightened interest the parties themselves now have in the process.

Depending on the time and degree to which the conflict has permeated the behavior of the mediatees, and depending on the size of the core team, the mediator will use cards to make notes about the mediatees' current situation and adopt the following three-step questioning method. He is asking:

- **What's going well?** This question allows the protagonists to distance themselves from the current situation, which they probably experience as difficult and oppressive, to gain awareness of other aspects that may be positive, and it helps them realize the need for showing respect.

- **How are things at this moment?** This question helps to find out what's working and, more importantly, what's not working at the moment. The current discontent and all the associated emotional baggage begin usually to surface when this question is asked.

- **How would you like to cooperate with the other team members in the future?** This question deliberately creates a future scenario aimed at getting the parties to drop the current activities that are sustaining the conflict, and to introduce something new over which each person has some control mentally.

After having conducted these meetings, the mediator has gathered three pieces of information on the current situation:
- The client's description (manager).
- The description of those involved in the conflict (whole team).
- His own impressions and evaluation of the situation.

With this, the mediator is now starting to analyze the conflict. Here he uses the following theory and experiences as a basis:

- The conflict phases as defined by Glasl (2000, pp. 92)
- Spider web analysis (Knappert 2000)
- Conflict types according to Faller (2000)
- The mediator's own experience and evaluation

The analysis is important as after it, the mediator is in a better position to evaluate precisely if mediation is the right instrument, and address considerations with regard to time, people (co-mediator, administrator), and financial resources that are needed. He may even review his own competencies against the profile that this job requires. In the case that the mediator will accept the job, he will now write an offer that is then discussed with the client a few days later.

A decisive factor in resolving the conflict is for the mediator and all mediatees to establish trust and build a rapport. If the level of trust is insufficient, even by only one mediatee, the mediator will be unlikely able to sustain the process. One technique that has proven worthwhile in building trust in lengthy difficult and entrenched conflicts is conducting one-to-one interviews prior to the mediation. These additional interviews are conducted especially when the mediator has the impression during his first analysis that the conflict is deeply entrenched and the parties have firmly dug in their heels, e.g. are behaving as lone warriors or showing little empathy as a group, a one-to-one meeting is one way of bringing relief to individuals and the situation. Furthermore, the experience is that merely providing people who have been in conflict for an extended period with an opportunity to talk freely and without interruption has a soothing effect, and that this alone helps alleviate tension. One-to-one meetings often also help in building trust between the mediator and mediatee.

During this pre-mediation phase, the meditative process already starts to apply: For example, it involves deliberately paraphrasing and applying questioning techniques that encourage self-reflection and indicate a direction for the future. This also involves expressing thoughts and making inquiries in an empathetic manner as a way of showing understanding and respect for what are mostly personalized and subjective truths, but it can also include a gentle or a confrontational set of instructions involving a hypothetical or alternative course of action. This serves as a way of introducing the non-partisan nature of mediation whereby all members have equal access to the mediator as the contact person, audience, and listener. In contrast to a judge in court whose function essentially involves listening and making decisions, the mediator can more directly address what are often the hidden yet very real interests, needs and wishes of those involved in a conflict.

These one- to- one meetings ends with a further and more detailed analysis phase: All the information obtained from answers is now at hand. The summary of the current situation has been expanded, and the moderator has a detailed list of positive aspects, points of contention and his own evaluation. Thus, the analysis of the conflict situation can now provide details on:

- Current conflicts (who is in conflict with whom about what)
- Level of escalation, as defined by Glasl
- Type of conflict
- Causes of the conflict situation
- Individuals involved
- Organizational aspects
- What's happening right now?
- Key points of contention.

Questions that point ahead now are:
- What will happen if no action is taken?; worst case scenario
- What are expectations and suggestions from management?
- What are expectations and suggestions from other members of the organization?

The analysis is then discussed in detail with the client, who decides on the next steps based on the mediator's recommendation. Here, the budget aspect, too, plays a role. Experience tells that, especially in difficult conflict situations, the budget issue is of secondary importance. In the private sector, in particular on the administrative level, there is increasing awareness that mediation – compared to other measures, such as summary dismissal / release from duties, or outcomes litigated in court – is more effective as a face-saving measure for the parties involved, and that it is quicker and less costly.

Toolkit (The Essentials)

Let's assume that the client has been given the green light to continue the process and that the mediator has been engaged to work with the parties in the closer sense of the word[2]. The toolkit he would need for the next steps consists of the following items:

1. Room type: A calm, large and bright room, away from the participant's daily office premises, if possible; chairs for everybody, no tables in between the persons present (if accepted by the mediatees).

2. Specific materials: Flipchart, Pin-board, writing material, kit for moderation.

Making it Happen (The Approach & the Action)

In Latin, "mediatio" means "in the middle," and also connotes "complete and intact," (Duss-von Werdt 2005, p 26). Mediation comes into question if the mediatees, based on their knowledge of "mediation" and "mediator," have agreed to this approach, and if the mediator regards this procedure to be viable option based on his/her analysis. If the mediation process constitutes an imposed top-down measure, it has little chance of succeeding, let alone leading to a sustainable outcome. Authors generally break the process down into 5-6 phases. Figure 1 shows, the six-phase model (Montada & Kals, 2001). It contains the following phases:

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[2] It is important when making analyses and recommendations that the mediator knows the largest number of alternatives for handling conflicts (coaching, team development, solicitous advice, litigation) that then enable him/her to define and give reasons for a particular course of action being recommended.
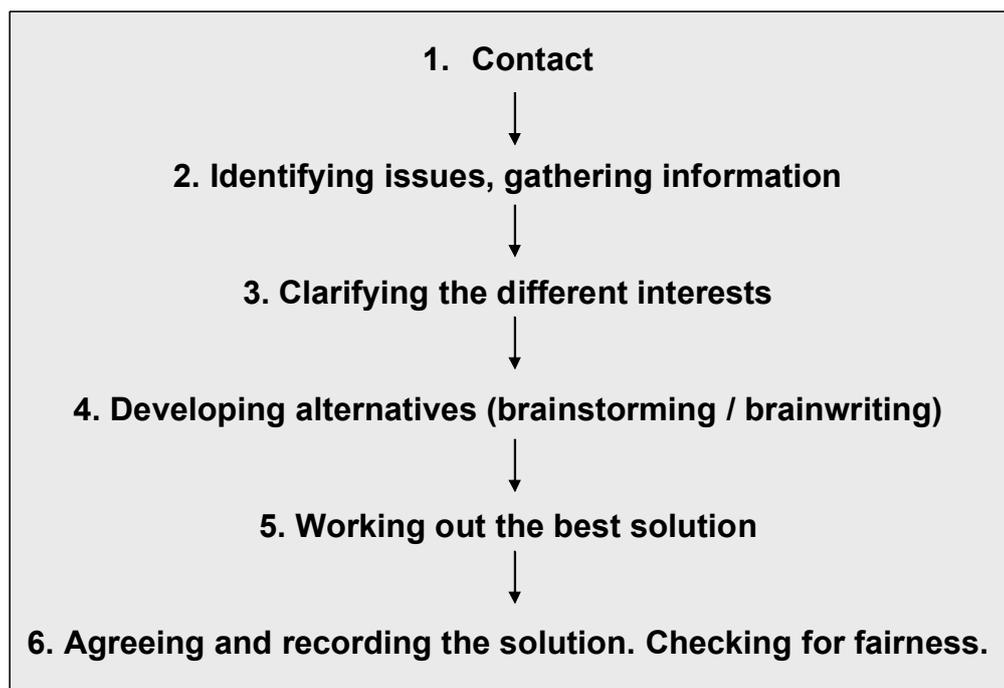
Figure 1: Six phases of the mediation process (adapted from Montada & Kals, 2001)

In a next step, the single phases will be described.

Phase 1 – Contact

Within this phase, all open questions must be clarified with the client: First impressions, definition of the assignment, the fee, location, schedule, invitations to meetings, facilities.

Phase 2 – Identifying issues, gathering information

This phase marks the first time that the mediator actually meets with the people involved in the conflict in the role of mediator. Depending on the extent of the conflict, the process may include the above-mentioned interim phase of the one-to-one meetings at this stage. This is generally a very dynamic phase during which the parties become loud and emotional and occasionally express what they "really" think.

For the mediator, it's important – especially during the more emotional phases of a meeting – to retain the necessary authority when managing the process, to acquire authority by asserting the rules, and to get the members of the group to examine a particular incident that just happened from a bird-eye perspective. The mediator thus becomes fully engaged in the events and is called upon – and hopefully also able – to facilitate the gradual process of gaining clarity and reducing barriers by showing understanding, mirroring behaviours, exchanging opinions, and making inquiries in a constructive manner.

The main objective in Phase 2 is to identify the issues that preoccupy the parties in conflict and that now need to be addressed. These are now written down in neutral language by the mediator (statements such as "he always acts in a horribly brash and accusatory manner" are noted down as "communication style" or "communication"). Both mediatees must end up agreeing to the way the issue is formulated, which then becomes a basis for subsequent work. In this phase, when uncovering the group's differences, and in other parts of the mediation as well, it's useful to focus awareness on whatever common ground and consensus there may be, because this can promote understanding among the members of the group.

Phase 3 – Clarifying the different interests

After the issues have been recorded in neutral language on the flipchart, it becomes important to find out how the members' interests line up with the issues. For example: "What did you want to achieve when you ask in such an assertive way? What's at stake for you here?" Each action is driven by motives, of which the person may not even be aware at a particular moment. By focusing on the interests we start to "dis-cover" the thoughts, ideas, intentions, feelings, and especially the interests that have gotten buried under the debris of the conflict. At the same time we are also separating the person from the issue (reason, cause, intention, and goal connected with the function). While managing the process, the mediator needs to try to point out the extent to which rational behaviour governs both protagonists' action. He should aim at showing that both sides can or could have had good reasons for thinking, talking and acting in the way they just did, and that from their subjective angle their behaviour made sense, and may even have been logical. He then can try to get the other side to understand this causality. Here he should rely on further interventions that highlight the emotional injuries in a way that saves face for the members of the group.

The following questions can help in continuing to structure, inquire, and better understand the members' interests: "Let's assume you're right that your conviction makes you more efficient. In what other ways would this come to bear? Who else would benefit?" In case you're making little or no headway in clarifying the different interests, the following (partial) step was helpful in moving forward:

Mutual acknowledgement of the other side's difference (a unique human being) and that even with the best of intentions it's possible to have different opinions about a particular issue. This approach already constitutes a mutual acceptance of the difference, and marks a first step toward building respect, even toward a current "enemy."

Phase 4 – Developing alternatives (brainstorming / brain writing)

It often happens that a solution starts to emerge already prior to Phase 4. In this case the mediator will write it down on the flipchart (separate sheet) and mention that the group will refer to it later in more detail when the time is right.

Figure 2: Mediator explaining what he wrote down on the flip chart

Whenever possible, the solution phase should be conducted in a less formal and relaxed manner, which is the result of the "secure" and amicable conclusion of Phase 3. Here, it's important to adopt the right attitude and approach during mediation.

To start off, all ideas are recorded on the flipchart under the motto "nothing's impossible; there are only right answers." This activity alone normally helps to relax the members of the group. At the same time there is a risk of having a relapse. The mediator should accompany the process by showing understanding, i.e. through participating in the relapse and making intuitive and analytical evaluations of whether it's important and relevant to linger on a particular past event or if it makes better sense to quickly and jointly return to the present and the current phase of the mediation. Here it is important to support the process by showing understanding and respect, without losing sight of or forgetting the other mediatees and their contributions.

Phase 5 – Working out the best solution

This part of the mediation is vulnerable to further relapses whereby group members again take up their previous positions. In this case it means that the mediatees' emotions were not fully "defused" during previous phases and that both parties are not yet willing and able to fully understand the other side.

Most of the time, the process and the mediatees provide the mediator with a second chance. Other times it's also possible to make rapid headway when mediating in Phase 5. This applies especially in situations where the main causes of the conflict are emotional injuries, which, in the wake of intense work during Phases 2 and 3, the feeling of relief among the mediatees is so strong that developing the solution resembles doing a puzzle: the protagonists' contributions to the solution fall into place like interlocking pieces, and may prove to be complementary.

Until now, a lot of work was done on the relationship level and this has helped to define the emotional and objective boundaries. All members are thus in some form of transitional state, which is always emotional. Change is therefore inevitable; however, personalities and moods may influence the process as well.

Phase 5 is mostly a rather calm, objective and protracted dispute in the form of a familiarization process involving whatever content has been developed and crystallized mentally during the course of Phases 2-4.

As the guardian of the impartial and neutral process, it's the mediator's task to ensure that the following fundamental principles are observed during constructive negotiation:
- "Enlarge the pie": always first look for other solutions, channel the results of ideas on alternatives/choices into the process as additional content to be negotiated.
- "Give and take": Each mediatee gets what he/she wants and offers the opponent something of equal value in return (e.g. a condominium for a piece of property or real estate fund). All mediatees must be able to balance what they take with what they give. The mediator has to draw attention to any noticeable imbalances he or she observes.
- "You can take it": Each member must be able to accept something negative.
- "Whole puzzle": All issues are part of a whole and we will continue to negotiate until the picture is complete. Thorny issues will be left out and saved for later.

Phase 6: Agreeing and recording the solution. Checking for fairness

Although most of the work has already been completed, a number of important points must still be addressed to ensure that the solution remains viable in the long-term. These include:

Playing devil's advocate:

In this (previously communicated) role, the mediator examines if the proposed solution is compatible with the mediatees' overall work environment. "What would happen if…?" This also means continuing to confront the parties to the conflict with worst-case scenarios and assessing their reactions. Here it's also useful to take a look at the organizational structure in order to evaluate if a change would be compatible with the current system, and what side effects or risks this might bring with it.

Checking for fairness

As soon as the solution the mediatees and I are proposing starts to involve aspects that touch on laws and jurisdictions, internal regulations and due diligence obligations will require me to submit the proposed solution to competent experts who will review it with regard to its legality. Although the parties to the agreement generally have free rein in drafting their proposal, the decision-making scope as a whole must comply with the applicable laws.

Results & Next Steps (The Follow-Up)
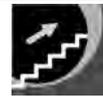
Ideally, implementation of the proposal is put down in writing that spells out who does what with whom by when. The action plan is a very important result of the mediation session. Also, the group will have to define who will draft the mediation agreement and how the flipchart papers will be handled.

After each meeting, and also at the end of the mediation, the mediatees and the mediator agree on what will be communicated to whom and when. For mediation processes taking place in the public domain the mediator recommends consulting a professional agency. He may even recommend that the parties engage a communication specialist.

Usually, the mediator suggests that all parties to meet again in 3-4 months in order to review the current situation and evaluate where the mediatees stand with regard to implementing the solution.

Real Cases (As it has Happened)

Three year old conflict

That conflict involved key persons working in the same team (12 members). The cold conflict got "hot" periodically. The mediators began with a kick off meeting, presenting themselves, explaining the term and process of mediation, answering questions and last but not least, measuring with a quantitative tool the degree of the existing working satisfaction[3].

Next, we lead individual interview sessions with all the team members in order to listen to everybody's "subjective truth" and to check out the general willingness to participate in the mediation process. Then, we wanted to verify the readiness to meet with the main opponents in the mediation process and whether we, the mediators (co-mediation, two persons) were accepted by the participants.

The first meeting with the team: It was not easy for the participants to pronounce what exactly caused all the trouble, anger, frustration and even physical pain. Finally, it happened that two people took the lead and explained their feelings about the situation.

Only the third team meeting with the core team brought all the conflict causing issues on the surface. An extremely emotional session made that one person was leaving the room explaining

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[3] Example: Question asked: How do you feel about the satisfaction in regard to the atmosphere of cooperation in your team?

Please, mark the corresponding number: 1= no satisfaction, 10=extraordinary satisfaction

1	2	3	4	5	6	7	8	9	10

that he was not capable to attend any longer, that he was suffering too much. That moment of the session was significant and allowed a turn: On one side it caused a kind of shock among the mediatees remaining in the room and reflected the previous process in an extremely intensive way. On the other side it made feel responsible and nobody wanted to quit the process in that state. The situation was discussed and it became soon clear that everybody participating up to now wanted to continue the mediation process.

Further sessions of mediation were scheduled, this time with always two persons of the core team only. These sessions showed a different attitude: The participants were calm, concentrated, willing to discuss issues matter of fact, they listened to each other. The participants were accepting to forget about the past und they were able to verbalize mutually the respect and acceptance they had for the other person's way of being and thinking.

Seven months after having met the whole team and having lead five mediation sessions in between, we met again with the whole team, in order to inform what we did and where we stood. Furthermore we wanted to measure again the quality of cooperation asking the same question as mentioned above.

A session to finalize the period of working on the core part of conflict was held and the results of the second inquiry were presented: they were rather positive.

A follow up session was held four months later. The moderation was a real pleasure: The participants were listening to each other attentively and respectfully. Again, we asked the above mentioned question in order to measure the progress achieved. A considerable improvement of the cooperation was expressed.

After that session we handed over the development process – it became now a team development issue - to the head of the team.

What are the success factors? We think:

- The confidence the mediators gained from the persons mandating us but as well as from the mediatees.

- The mediators succeeded finally to make feel the participants responsible of the process, especially for the outcome and success of it.

- Allowing the process taking its time: We accompanied the team for one year (it was necessary).

Lessons learned:

- Not leaving the other members of the team without information or contact for too long, while working with the core team. A lot occurs also on the emotional level, when working on the process with the core team, the team mates cannot fully understand what happened during their absence and they may feel confused and let alone.

- It has proven extremely worth while staying in close contact with the persons mandating us when the process was at its peak and at a critical point as well as remaining in touch with mediatees who were strongly involved emotionally and felt like leaving the process.

Confidence

A team had problems with their leader: Some persons did not accept how their leader (B) lead the team in general nor could they fully accept how he commented on their work delivered to him: The results and recommendations of the work done by the team, usually forwarded to the top manager (A) through B, differed obviously quite often from what was handed in to B. The team felt deceived, the leader (B) misunderstood and disappointed.

Some members of the team were resentful towards the mediation at the beginning. The first meeting was already quite stormy: The atmosphere was quickly filled with a large number of themes, complaints and accusations. Still, the session could be lead in an orderly way. The mediation team (two persons) filtered the information and channelled it into themes written down on a flip chart in a neutral formulation, always in accordance with the authors of the themes.

The second and third meeting helped to stabilize the situation and to find out about the hypotheses that some members of the team would have lost confidence in their leader (B).

During the following two sessions the mediators were fully absorbed treating the questions of confidence, the degree of confidence necessary to do the job motivated, the definition of roles and procedures to be followed.

The sixth session (after 3 months) was the basis of action points drawn. The participants were now able to concentrate on the future, on ways out of their conflicts and problems.

Why did "confidence" become the major conflict issue?

Several reasons:
1. The leader (B) understood his role in a way his team did not, and the team did not know about the job interpretation of B.
2. The management style of B left room for improvement
3. The team could have been more reliable in regard to the tasks B asked for.
4. The whole team including B suffered from an enormous pressure caused by their daily workload before and during a significant part of the mediation period. Each little mistake caused anger, bad feelings and pushed the tensions into a conflict.

What helped to work on the conflict successfully
Again several aspects:
1. The time given to the team to start a mediation process was extremely helpful and crucial for the change of the working atmosphere.
2. The clearing of the roles: B could finally explain to all the team members how he understood his job and why he acted and decided the way he did. The team members on their side could express how they wanted to do their job faithfully.
3. Passing by of the pressure period: It was interesting to observe how the faces and voices became calmer, more relaxed, less nervous and helped to change the atmosphere into a constructive and prosperous working climate.
4. Life- and working experience of the mediators helped, especially to bridge the gaps of understanding the interpretation of job roles

Lessons learned or confirmed

1. It showed extremely helpful to channel carefully the information given, especially during the first and stormy session. Then it was important to paraphrase in a clear way, to take seriously everything what the participants said, to write down the essence of a statement in a neutral formulation, to show interest and empathy, to remain the leader of the process in implementing rules of how to proceed and interact.

2. Also leading the participants to the bird's eye perspective showing the mediatees in which phase of the process we stood, reflecting delicate points together, gave them an orientation and a saver feeling.

3. A general or specific working load of individuals or whole teams can aggravate significantly an already existing problem or conflict situation.

4. The mediators's capability to improvise is extremely helpful, especially when meetings get stormy, when everything prepared is impossible to apply and new ways of how to proceed must be agreed upon, immediately.

Tips & Tricks (To-Do)

☑ A mediation mandate requires, in particular, mediators who have additional qualifications in working with large groups, and who are experienced in managing organizational development projects.

☑ For the one to one interviews in the pre-mediation phase, it is a good idea to use a semi-structured list of questions, of which 3-5 items were prepared and put to all members of a group. Besides or in addition to these questions, and depending on the individuals and the situation, the discussion can also expand in scope, or go into greater detail on some of the issues.

☑ In order to uncover members' interests and line them up with the issues, ask questions like "What did you want to achieve when you ask in such an assertive way? What's at stake for you here?".

☑ The rules of conducting mediation processes drawn up by professional associations as e.g. the Swiss mediation association (SDM-SFM) provide an important framework for the work of professional mediators.

Potholes (Not-to-Do)

☒ Never accept a mandate if, even after the one- to- one interviews, the level of trust is insufficient, even by only one mediatee.

☒ Take care that the situation in the mediation process does not start to get out of control. Therefore, it's useful to introduce a few rules like 'Listen and don't interrupt others' or 'Choose words and a tone that is acceptable to the other person and that allows him/her to respond.'

Acknowledgements

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Defining, Instituting and Sustaining a Knowledge Management Program

Gurbans S. Chatwal and Srinivas P. Jagannath
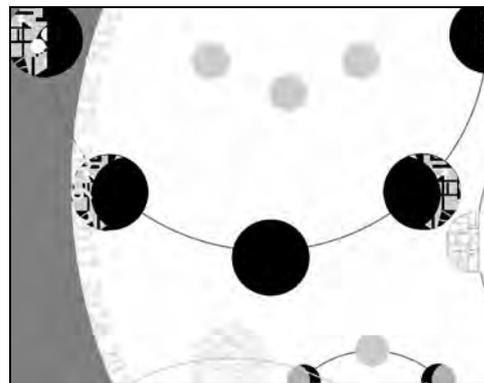
Defining, Instituting and Sustaining a Knowledge Management Program

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Snapshot (Quick Learning)

The global IT sourcing market picked up momentum in the mid 1980's and has continued to mature and face shifting challenges. The challenges of working with outsourced partners have been primarily because of increasing size, complexity of governance, loss of knowledge, high switching costs, not using best practices, and inadequate skills proficiency. Cutting costs has been the key driver till now for businesses to outsource. But new challenges have emerged with increasing size and complexity of outsourced deals and consequently the business results achieved have been lower than expected. While outsourcing is still seen as a strategic initiative, an increased focus on solving business problems and bottom line returns has rightfully brought business rather than IT to centre stage. Now with businesses driving IT needs, CIO's are more focused on solving real business problems and factoring in industry best practices to look for innovative solutions.

How should IT providers respond to these shifting demands and preferences? In the last 10 – 15 years, they have been focused on meeting customer needs and achieving market competitiveness through increasing scale, quality, and standardization of work processes. But we should not lose sight of what Edward Deming had said (In his book "The New Economics", pg 10), "Absence of defects does not necessarily build business, does not keep the plant open. Something more is required." The framework for the solution lies in understanding the systemic cause-effect relationships as explained by Peter Senge (The Fifth Discipline, pg. 101) "…Unfortunately, the more vigorously you push the familiar levers, the more strongly the balancing process resists, and the more futile your efforts become."

Our experience shows that the new levers for IT providers are "higher productivity" and "innovative solutions". The "something more" required by Deming is the creation of an integrated framework for managing domain knowledge, industry best practice solutions, and Quality. In this chapter we shall focus on defining, institutionalizing, and sustaining a knowledge management program to manage domain knowledge and its integration with other initiatives to enable building innovative solutions. The **5i Knowledge Management** framework addresses all the key elements of KM – People, Process & Technology. This framework also attempts to balance focus on:

1. Explicit and Tacit knowledge;
2. Measuring and Managing existing knowledge;
3. Creating, disseminating and building new progressive knowledge;
4. Continuous organizational involvement; and
5. Linking various frameworks seamlessly to deliver maximum value from multiple initiatives.

Context (Where & What)

Knowledge cannot be given, like information; hence we can only create an environment for sharing knowledge the focus of knowledge management shifts attention. The real question in knowledge management does not concern capture, storage, and retrieval but on how knowledge diffuses insofar as new information can be part of creating new knowledge.

The knowledge creation and diffusion process can be looked at from two, orthogonal, epistemological and ontological dimensions. The epistemological dimension is where knowledge conversion takes place between tacit and explicit knowledge. Nonaka and Takeuchi elaborate on four modes of this conversion namely Socialization, Externalization, Combination, and Internalization. Although these modes are not independent of each other, but their interactions, along a third dimension of time, produce five phases of organizational knowledge creation, which we have defined as five phases of "**5i Knowledge Management**" framework:

1. **Initiate**

   This phase essentially captures the need for the overall KM program and allows for definition of KM objectives and goals and their alignment to business needs.

2. **Identify**

   A knowledge management maturity model or a similar framework can be used to identify gaps across various aspects of knowledge to successfully meet the business goals. Knowledge is categorized as core, advanced & innovative.

3. **Implement**

   Typically a small KM group needs to be extended globally through "knowledge champions". Identify and create communities that will enable free flow of knowledge that support innovation. In this phase various technical infrastructural needs are also set up to support the KM program.

   Build knowledge repositories leveraging knowledge transitions (KT) across teams. KT opportunities are identified in this phase and action plans are drafted to put this in execution. Knowledge transition is enabled through a four step model (Acquisition, Codification, Institutionalization, and Continuity) and a scorecard to manage and measure knowledge transitioned.

4. **Institutionalize**

   Leverage the "culture tetrad" to identify leverages to engage the organization and facilitate change. It covers non-negotiable values and desired behaviour, identification of role models / totems, various instruments to be used to fine tune the flow, and rituals that define and celebrate various moments.

5. **Improve**

   This phase provides a quantifiable feedback to take corrective actions and further improve the KM program.

The 5i Knowledge Management framework focuses on identifying the fundamental knowledge / information needs and set them in motion within the organization. This focus provides good

foundation to enhance, apply & adapt to different contexts. While the framework provides highly formal methods to define and align the KM program to business needs, it embeds numerous formal and informal mechanisms for creation and diffusion of knowledge. This framework is therefore geared towards:

1. Ensuring that knowledge assets are continually in motion, being enhanced, shared, sold, or used, and that they generate enhanced business results. And since practice cannot be replicated easily, it also becomes an organizations prime source of competitive advantage.

2. Shifting organizations primary knowledge base from individually held tacit knowledge, to organization held explicit knowledge.

This framework should serve as a reference material for various organizations aiming to create a sustainable knowledge management program. The methodology discussed here can be applied across the organization or within a specific group where a need for KM is felt. From our experience this framework can be customized for teams and small to large sized organizations. Given appropriate time commitments as planned & optimum support from management, IT teams & other stakeholder's a typical implementation cycle within smaller groups (100 – 150 people) could take around 4-5 months. This does not include time requirements for finalizing infrastructural needs (Servers, internet bandwidth, etc.), if any.

The knowledge management project as described above succinctly should have the mission – "**Connection**" and not collection. The purpose will therefore be to get knowledge moving and distribute it and not freeze and shelf it in electronic repositories.

Preparation (The Checklist)

- Understand the Knowledge Management needs for the group / organization. How will it help operationally? Does it enable strategies for differentiating products / services?

- Compile a list of problems encountered or pain areas in current business. Probe business leaders to collate a list of problem areas. This would help to identify the nature of knowledge management implementation that would best meet your immediate and long term needs and seek answers to

  o What are the immediate payoffs?

  o If there are none, when will the payoffs begin to show up?

  o If that is not viable either, how will be value of the project be demonstrated and tested?

- What are the selling points that will help convince employees of the business value of managing knowledge? Initial analysis regarding Problem-KM solution set and improvements expected in terms of productivity, innovation, quality, and market competitiveness can help in achieving buy-in from all stakeholders

- What would the KM team be composed of (identify champions for the initiative) and where would it fit in the organization hierarchy?

- Customize and translate the framework as a project / program plan with time lines for each phase

Making it Happen (The Approach & the Action)
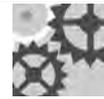
To manage the Knowledge Management (KM) program, the **5i Knowledge Management** framework described below addresses (typically) as Peter Senge would ask:

a. What do we know how to do now?

b. What are we trying to learn – and what will enable us to learn faster and deeper?

c. How do you take the knowledge in one area and use it as the foundation for building knowledge in other areas?

Initiate	Identify	Implement	Institutionalize	Improve
Business Need	**Assess gaps in knowledge**	**Define and Implement**	**Engage the Organization**	**Continuous Improvement Framework**
• Business Need & Alignment of KM Goals • Involve Leadership • Change Management	• Knowledge Gaps • Technology Gaps • Competency Gaps	• Establish dedicated and Virtual KM teams • Set up Infrastructure • Build Knowledge repository	• Communications • Training • Awareness Buildup • Rewards & Recognition • Processes	• Define Metrics & Dashboard • Monitor & Review, Focus & drive improvements • Knowledge Audits

Figure 1

1. Initiate

This phase captures the need and motivation for the KM program. Definition of KM objectives, goals and their alignment with business objectives are accomplished. The steps involved in this process are:

a. Business need & alignment of KM goals

Identify opportunities that would support creation of the KM program, including (but not limited to)

» Identify existing business and operational challenges

» Elaborate the relationship between existing goals, plans, and pain areas

» Benchmark (if necessary) to identify best in class practices and related capabilities

Create a vision / mission statement that clearly articulates the thought of senior leadership in the organization and gives the whole program a stamp of approval.

Use customized Balanced Scorecard and Strategy map approach to identify goals for each of the focus areas such as Financial, Customer, Operational, and Capability Building. These can be further elaborated to define respective initiatives and activities. A cascaded scorecard approach may be used to drill down goals at BU / sub-team level. Shown below Table 1 is a customized Balanced Scorecard built to track KM goals / objectives.

Table 1

Perspective	KM Objectives	Goals (Planned and Actual)		Initiatives	RYG status of initiatives
Growth	# of Solutions branded				
Stakeholder Motivation & Involvement	**Core BU / Team Leadership**				
	# of client facing case studies published				
	Employees				
	# of Best practices shared across teams/org.				
	Collaboration				
	% of knowledge sharing forums conducted as planned				
	Rewards/Recognition				
	Planned, communicated to team, and executed				
Operational Efficiency	Knowledge repositories are always updated				
	Content/Knowledge audits are done every quarter				
Future Orientation	**Thought Leadership**				
	# of white papers / articles published in external forums				
	Competency building				
	% of trainings / workshops / certifications conducted				

The scorecard and strategy maps help to articulate strategic and operational initiatives needed to achieve the goals and hence the KM vision for organization. A clearly articulated need can now naturally lead to creating a long term roadmap of KM program in the organization. There are many ways to implement a roadmap, but we recommend creating a maturity path on a timeline. This helps to articulate behavioural characteristics and key results desired at every maturity level and milestone. A typical maturity path could be modelled as depicted in the table below. It is best left to organizations to establish consistent definitions relevant to the business and across all teams.

Table 2

Maturity Level	Description	Behavioural Characteristics	Timeline (ddmmmyy)	Key Business Results
Default	No need felt to manage knowledge	Belief in formal training being the sole mechanism for learning Learning is reactive		
Reactive	Knowledge shared on need basis	Only routine and procedural knowledge shared.		Senior management recognizes need for formal knowledge management Awareness of what knowledge (internal or external) is appropriate for sharing internally or

Maturity Level	Description	Behavioural Characteristics	Timeline (ddmmmyy)	Key Business Results
				externally e.g. IPR issues
Aware	Establish KM infrastructure	…		…
Convinced	Quantitative management	…		…
Sharing	Established culture of sharing	…		…

Leveraging current best practices and integrating identified initiatives should lead to creation of an operational KM project plan (KMPP).

b. Leadership involvement

Business alignment of KM program assumes an intense involvement of leadership right from the initiation step. It is very critical that the leadership makes visible commitment by allocating resources, performing consistent reviews, provide regular updates suited to the forum, and recognize/reward contributions from stakeholders.

c. Change Management

A key requirement for a successful KM program implementation is to manage change effectively. Change threatens our ability to create and maintain viable and effective programs. People, places, technology, processes simply will not stay the same. Change Management here refers to:

1. Activities involved in defining and instilling new values, attitudes, norms, and behaviours within an organization that support the targeted program and corresponding new ways of doing work and overcome people resistance
2. Building consensus among stakeholders on specific changes designed to better meet their needs, and
3. Planning, testing, and implementing all aspects of the transition from one organizational structure or business process to another

To sustain the KM program, it is necessary to keep it aligned with shifting business needs, and constantly monitor, correct and improve. This can be accomplished by establishing a dedicated self motivated core team having organizational focus. Utilizing the Cultural Tetrad explained in Institutionalize section the cultural shift can be achieved.

2. Identify

The maturity model crafted or the roadmap articulated could be leveraged to identify gaps across various aspects of knowledge to successfully meet the business goals.

a. Gaps

In order to solve a targeted problem or pain area articulated (in the Initiate phase), it is important to know

- What knowledge we have?
- What knowledge is missing?
- Who needs this knowledge?, and
- How we will use/re-use the knowledge?

Also, analyse the new capability requirements for pain area/s in terms of process requirements, infrastructure requirements, and other organizational requirements. As mentioned above to solve a specific pain area the gaps are analysed across the below mentioned dimensions.

i. Knowledge & Information

In the present context, knowledge is perceived as the tacit knowledge existing with various people, as part of various processes, methodologies etc. To facilitate gap analysis & prioritize, knowledge could be categorized as core, advanced & innovative as shown in the below Table 3

- Core Knowledge – It is the basic knowledge required just to sustain the current business. This type of knowledge often creates a barrier for entry to new areas/fields.

- Advanced Knowledge – Advanced knowledge is what makes you competitively viable & gives an edge in the competition.

- Innovative Knowledge - Innovative knowledge allows you to lead the industry to an extent, which clearly differentiates it from the market. This allows an organization/group to change the rules of the game.

Table 3

Business Area	Knowledge classification	Current vs. Target					Strategies to achieve expertise / competency
Area 1	Core						» Collate & host information
Area 2	Advanced						None
Area 3	Innovative						» Build Communities » Execute Trainings

☐ Indicates Current State ☐ Indicates Target

Similar to knowledge being perceived as tacit knowledge, information on the other hand is considered to be explicit/documented knowledge. To facilitate information gap analysis & prioritise, information can be classified as external facing (predominantly sales related material) & internal facing. Few examples such as processes, best practices etc. as shown in below Table 4

Table 4

Knowledge Artifact	Business Area	Current vs. Target					Strategies to collate required knowledge
Artifact 1	Area 1						» Collate & host information
Artifact 2	Area 2						None
Artifact 3	Area 3						» Conduct research » Collate & host information

☐ Indicates Current State ☐ Indicates Target

ii. Technology

To understand and get a comprehensive view regarding the gaps existing across various Tools, Technologies, Methodologies, and Frameworks collate a list & further analyse for any gaps. A similar table structure shown above could be utilized to track these to closure.

iii. Competency

To identify the competency gaps existing in terms of domain/business knowledge, technical or other required knowledge. One could use a simple tracker as shown in Table 4. The measurement is further explained in section knowledge transition.

Opportunities for codification and other means of collaboration are identified. Often it would be required to design several forums/techniques to facilitate knowledge exchange. These forums/techniques will be different for exchange between different types of knowledge (Tacit & Explicit).

3. Implement

This phase deals with the infrastructure needs for the overall KM program. It also includes the role IT plays which shall be utilized for storage & retrieval of information/knowledge.

a. Establish dedicated & virtual teams

Various teams as per business needs are formulated to sustain the KM program & also to enhance knowledge exchange

i. Dedicated KM Team

Dedicated KM team comprising of knowledge champions for groups/across the organization will oversee the success of KM program & ensure the initiative does not fizzle out after initial set up of the KM infrastructure. They would also be responsible for ongoing support to the KM program.

ii. Virtual Teams / Communities

Communities should exist for common purposes. They are one of the excellent ways to encourage peer-level participation. Communities can be formulated for several aspects such as around a specific Topic such project management, niche business domains etc.

b. Infrastructure

IT plays a critical role in the success of the KM program. Below are few critical components:

i. Knowledge Repository

Knowledge repository tool that enables collaboration. Few of the important considerations while building the space are:

- Easy & self-driven for usage

- Information hosted accessible to enterprise with required access rights

- Support & facilitate collaboration

- Easy to maintain & allow effective re-use

ii. Information Architecture

Information Architecture is a very broad term. In the current context, we include Taxonomy, Profiling (capturing metadata) & Search as part of our discussion because these concepts are the backbone for a knowledge management system.

- Taxonomy – Taxonomy is aimed at discovering information through browsing. Controlled vocabulary can be achieved through usage of taxonomy. Taxonomy would contain nodes applied to categories of content type based on employee's mental models. It is imperative to maintain taxonomy on an on-going basis.

- Profiling – Profiling is a mechanism to capture metadata for each knowledge artifact. It is critical since the context information needs to be embedded with each artifact. The metadata would convey where, how & when a specific piece of information is created & where it could be utilized.

- Search – Search needs to be designed as per the business needs. Before designing the search, collecting information from the business users would be a worthy exercise. The metadata fields captured during the profiling process are important to be considered. Users should have the flexibility to restrict the result set based on the profiling information submitted during the upload of an artifact. A full-text enabled search engine would be of good value to the users.

c. **Build Knowledge Repository leveraging knowledge transition**

Knowledge repository is built by closing the gaps which are articulated in Identify phase. Various opportunities for knowledge transition are identified & execution strategies are leveraged to build the explicit knowledge repository.

Knowledge Transition (KT) will need to be performed at various stages in business involving various stakeholders. Knowledge transition framework is enabled through a four step model as shown in Figure 2.
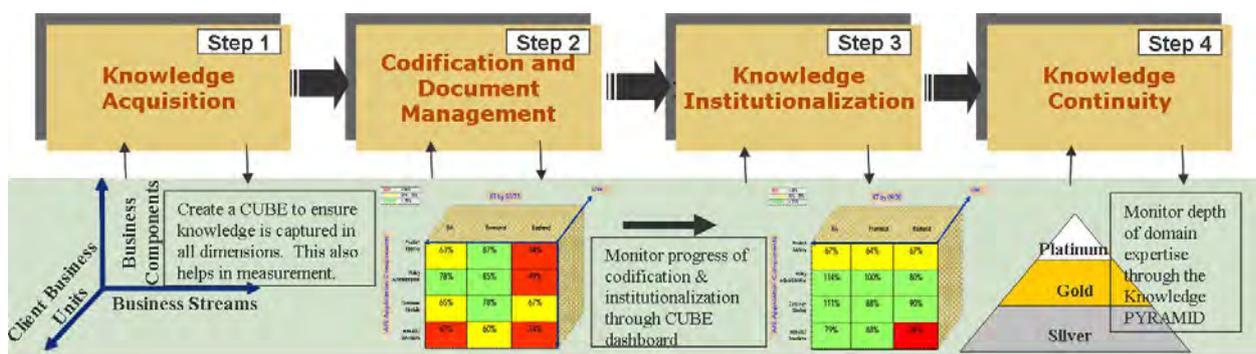
Figure 2

1. "Knowledge acquisition" step includes sub-steps such as gathering, analyzing & classifying the various available artefacts.

2. "Codification and Document Management" step includes intuitively structuring, indexing, and storing artefacts, and business rule extraction.

3. "Knowledge Institutionalization" step includes the trainings to be conducted, certifications acquired as required, and conducting knowledge sharing sessions across various teams utilizing the collaborative techniques.

4. "Knowledge Continuity" step focuses on reusing the collated knowledge and increasing the depth of knowledge within teams.

This model can be enhanced or customized as per business needs.

A multi-dimensional model can be utilized to track breadth & depth of competency acquired through knowledge transition. An example of measurement for breadth & depth of knowledge acquired during the knowledge transition between the customer organization & your organization is as depicted in Figure 2.

Measurement of competency in terms of breadth along three dimensions such as business units, business streams, and business components are depicted utilizing a cube. The percentage figures in the cube represent total knowledge acquired in terms of percentage as versus planned. A simple rating scale of 1-5 ('not aware' to 'completely acquired') can be followed to assess the knowledge acquired by individuals. The average score is calculated for each team/group. Plans would be crafted to reach a specific competency level. The percentage value is calculated for acquired knowledge score to planned knowledge score & is populated for each business component to complete the cube measurement.

Table 5

Business Area	Average Knowledge Score		Percentage Knowledge Score (Acquired/Planned)
	Planned	**Acquired**	
A1	4	4	100 %
A1	4	3	75 %
A2	4	3	75 %

Similarly, depth of knowledge acquired is measured utilizing a triangle to form 100% competent teams.
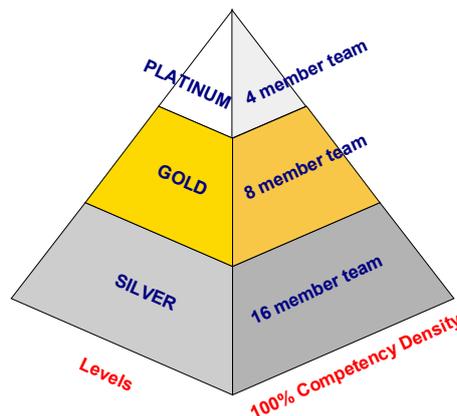
Figure 3

A pyramid model can be utilized to measure depth of knowledge acquired for every individual as represented in Figure 3.

Every individual is measured on a scale against every business component as per the knowledge acquisition plans. A simple scale of 1-5 can be used to assess the individual's knowledge depth. Knowledge Pyramid helps to quantify and track depth of knowledge in

the team. The goal is to have small teams having 100% expertise in a specific business area.

4. Institutionalize

Institutionalization typically happens through trainings, knowledge sharing sessions, and individual certifications. This is supported through periodic management reviews, and content/knowledge audits.

Cultural change is the key for KM program success. Leverage the "culture tetrad" to identify various ways to engage the organization as shown in Figure 4.

The four sub-parts cover

    a. Non-negotiable values or the corresponding desired behaviour,

    b. Identification of role models / totems,

    c. Instruments to be used to fine tune the flow, and

    d. Rituals that define and celebrate various moments.

RITUALS
» Continuous involvement
» Introduce appropriate KM training programs
» Monthly communication

VALUES
» Continuous Learning organization
» Do not Reinvent
» Focus on Productivity
» Share your learning's

KM

ROLE MODEL
» Demonstrate participation in KM & allied activities
» Share success stories
» Rewards & Recognition for groups & individuals demonstrating sharing & reusing behaviour

TABOOS
» Less / No Participation in KM activities
» Inhibitor for knowledge sharing

Figure 4

Identify the non-negotiable values for the KM program from KM strategy/goals. List the corresponding desired behaviours those facilitate or demonstrate activities towards achieving the KM program goals. Groups or individuals demonstrating these behaviours should be recognized & rewarded which would keep them motivated to perform such activities & to encourage others. It is also very important to identify cultural inhibitors for the KM program, referred to Taboos in Figure 4. Execute various mechanisms to counter the inhibitors such as trainings, evangelizing knowledge management in appropriate forums. Communicating success stories & celebrating various moments will catalyze the mass involvement & contribute to the overall KM program success.

Below are few practical (formal & informal) mechanisms to propel institutionalization of KM program.

a. Communication – Formal & informal communications mechanisms are important to provide context of the KM Program. Table 6 below provides examples of few communication channels that can be utilized.

Table 6

Sl. No.	Activity / Communication Channel	Description
1	Email	Send Email messages regarding the initiative with few planned activities & the pain areas to be solved
2	Open House	Announcement of the initiative & support required
3	Launch Program	A formal launch program with the leadership may propagate the word around. Posters, danglers etc. would generate interest in people.
4	Team Meetings	Reiterating about the initiatives in the team meetings, weekly calls etc.
5	Newsletter	Periodic Newsletter covering the accomplishments, planned high level activities, problem-KM solution set etc.
6	Distribution of pamphlets, book marker etc.	Creative & catchy lines around the initiative using these channels

b. Trainings – Trainings are a proven way of sharing & propagating information. Trainings in the context of KM program could span across various categories such as indicated in the below Table 7. This is just an illustrative list.

Table 7

Training Category	Training Topic	Target Audience	Mode of Training
KM Introduction & Methodology	Introduction to Knowledge Management	All	Self-paced training
	KM Methodology/Process	All/Specifically for Knowledge Champions	Classroom Session
	Introduction to Intellectual Property rights	All	Self-paced training
Tools/Technology	Introduction to KM Tool	All	Self-paced training
	Advanced Tool customization	Knowledge Champions, IT Support, KM Leads	Classroom Session
Culture	KM Success Stories	All	Self-paced training
	KM - Trust & Motivation	Inhibitors for KM Program	Classroom Session
Advanced KM	Knowledge Sharing Techniques	Knowledge Champions, Managers, Leaders	Classroom Session
	KM Measurement	Knowledge Champions, Managers, Leaders	Self-paced training

c. Awareness – All KM Programmes involve change management. Often every individual/group/stakeholder asks 'What's in it for me?". Regular awareness campaigns need to be conducted that address & target solutions for every individual. Leverage the culture tetrad (Figure 4) for propelling the change management cycle.

d. Rewards & Recognition – As mentioned in the above section rewards and recognition motivates individuals or groups to sustain the KM related activities over a span of time.

Table 8

Few KM related activities those can be rewarded/recognized are:
▪ Finding existing knowledge
▪ Creating new knowledge
▪ Packaging / assembling knowledge
▪ Applying existing knowledge
▪ Reusing knowledge to create & publish knowledge

A simple point based scale could be adapted. Individuals & groups could be recognized who accumulates maximum points. To further motivate individuals they can be sponsored for external conference/workshops. Recognizing groups are as important as recognizing individuals.

e. Processes – Processes are to be defined clearly such that responsibilities of every individual are covered as part of KM program. Crucial among various stakeholders & participants are to ensure involvement of knowledge champions.

» Involvement of Knowledge Champion (KC)

To ensure optimum contribution from the knowledge champions, it is essential to clearly articulate the role & responsibility. The KC role could be part time or full time for a specific group depending on the size of the group. It would be recommended to have 1 full-time employee (KC) per every 500 employees. Knowledge champions should be motivated through recognitions. Below (Table 9) are a few important responsibilities/activities of a knowledge champion.

Table 9

Role	Area	Responsibility
Knowledge Champion	General	• Evangelize KM across the organization/group • Continuously work towards raising the level of knowledge sharing & reuse • Form social relationship with all groups across the organization • Direct teams to relevant knowledge/people & ensure high quality knowledge services & offerings • Ensure leadership governance
	Knowledge Capture & Management	• Plan KM strategies & track KM activities • Motivate, mentor & evangelise for Knowledge sharing • Tracking of KM goals & Metrics • Approve content in terms of usability, qualification as a Knowledge Asset (KA), check for IPR related Issues etc. • Plan/Create & track Communities • Create knowledge sharing forums
	Knowledge Management Culture	• Facilitate organization to take advantage of collective corporate knowledge • Formulate appropriate strategies for supporters, fence-sitters, & inhibitors • Facilitate social networking
	Content Management	• Manage the knowledge base/space • Conduct timely knowledge audit • Encourage participation & contribution of content • Effectively market the content for maximum use

» Mass involvement

Supervisors and champions of the KM program need to identify drivers (beyond T-shirts that say "I shared knowledge today", mouse pads, and other trinkets) and challenges to form a culture of "sharing" – to get individuals within the organization to talk and contribute to knowledge repositories.

The mass involvement has to be fostered on a continuous basis. Numerous techniques can be used for mass involvement such as quiz competitions, competition for scavenging a particular knowledge artifact etc.

Apart from these, processes to capture information/knowledge can be embedded with the existing processes. Few examples are 'After Action Review' to capture the learning's from a project/program executed; 'Open Space' to capture specific experiences around a particular niche area; 'Peer Assist' to provide assistance/feedback on a problem/activity through engaging peers; 'Success Stories' to capture the success obtained & disseminate to the entire group/organization.

One measure of cultural shift could be the degree of acceptance among various employees as shown below.

Table 10

Target audience	Awareness	Participation	Preference	Loyalty
	Heard of it	Tried it	Believe it	Champion it
Leadership				
Transition team				
Opinion leader				
Everyone else				

5. **Improve**

This phase provides a quantifiable & qualifiable feedback to take corrective actions and further improve the KM program.

a. **Define Metrics & Dashboard**

i. Metrics – Metrics are the concrete way of defining what KM program will achieve & to examine if those goals are met. It is essential to link the KM program metrics to business objectives/ KM objectives. The KM objectives are a part of the KMPP (developed in the Phase 1). Also, measuring both tangible & intangible benefits are important. Organizations are more & more innovation focused, a sustainable KM program supplements to achieve better & faster innovation. KM Metrics are to be designed to convey the tangible & intangible benefits in the area of Innovation, Operational Efficiency, & Competency building. Below Table 11 provides indicators that can be measured. These indicators are combination of qualitative & quantitative.

Table 11

KM Metrics Area	Indicators/Objectives
Innovation & Industry Leadership	• Number of thought papers / articles authored & published • Number of case studies published • Number of new Solutions published
Operational efficiency & Competency building	• Number of new communities established • Reusability index • Knowledge space updated with relevant information at all time • Knowledge Audits conducted
Collaboration & Motivation	• % of knowledge sharing forums conducted as planned • % of knowledge sharing forums with avg. feedback (> 3.5 out-of 5) • Number of Best Practices shared • Number of reusable artefacts contributed • Number of Rewards/Recognitions programs convened

KM is largely process focused & hence capturing the process enhancement is imperative.

Table 12

Few salient processes to be measured to continuously enhance the KM program are:

- Knowledge capture
- Knowledge creation, validation & harvesting
- Knowledge retrieval & reuse
- Assimilation/Dissimilation of best practices

ii. Dashboards – Dashboards facilitates in providing snapshot of overall KM Program success across the organization/various groups. Sample Table 13 below indicates the use of dashboard for senior management reviews.

Table 13

Group	Knowledge Champion	KM methodology implementation					Remarks
		Initiate	Identify	Implem-ent	Institution-alize	Improve	
Group1	Abc	██	██				Competency Gap analysis pending
Group2	Xyz	██	██	██	██		Trainings planned are to be executed
Group3	Pqr	██	██	██			Approval for space allocation required

b. Monitor & Review, Focus & drive further improvement

Regular monitoring of the KM program is necessary. Utilizing the dashboard & other metrics, knowledge champions & other leaders brainstorm for identifying problem area & its corresponding solutions to improve KM program acceptance. Develop a feedback mechanism on the knowledge repository space to understand the problems & clarify user perceptions. These problems could be discussed during the knowledge sharing sessions/trainings. Develop integrated mechanisms to improve gaps in the processes through timely process improvement.

c. Audits

Knowledge audit is a process to review your group's/organization's knowledge assets

& associated knowledge flows. Timely knowledge & content audits should be conducted to maintain the freshness of the KM system & knowledge repository.

Results & Next Steps (The Follow-Up)

At Kanbay, the KM portal hosts approximately 122,000 knowledge artefacts. This translates to approximately around 18 artefacts/associate. Kanbay utilizes Microsoft's SharePoint Portal 2003 as the KM application. We have around 45 operational team sites built for various Practices, Centre of Excellence (CoE's), Communities, and other internal organizational Functions. KM goals are defined for each group as per their respective business needs & are tracked at the organizational level. Effective governance is enabled through comprehensive governance framework & program management. The usage rate of these knowledge artifacts has been phenomenal, receiving approximately 1 million hits within a month's time after the release. Systems are in place to measure the effectiveness of these KM sites.

Importantly the KMPP should be kept updated as & when the business plans change & the knowledge champion shall work proactively with business leaders to ensure the same. Governance from the business leaders are to be strictly followed. The measurement for the overall success is obtained in Phase 5, although timely surveys shall be conducted to ascertain the employee satisfaction.

The KM portal will have more number of artefacts as time progresses, but improvements & tuning of few processes for continued employee contribution & reuse are to be tackled from time to time. Every organization will have floating population & hence awareness campaign needs to be conducted regularly. Intellectual property rights are another area of improvement such that it leads to clear business benefits & competitive advantages.

Real Cases (As it has Happened)

Case 1.

In Kanbay, we have architected the solution by integrating multiple building blocks for managing Quality, Knowledge, Innovation, and Institutionalization. These building blocks not only address compliance and bottom-up incremental improvements but more importantly direct executive attention to harness industry best practices and fuel the innovation engine.

1. A practice based organization structure that drives knowledge acquisition, management, new thought leadership and ensures management commitment;
2. Global Delivery Model that will allow access to 10X as many onsite experts per developer compared to other top tier offshore firms
3. Quality function that allows grass-root level global access to every business unit;
4. Quality System that encompasses processes management and improvement for current and future needs;
5. Co-Sourcing Governance framework;
6. Knowledge management and transition framework; and
7. An institutionalization model

The development of above frameworks and their integration has been a seven year journey of visioning, developing, partnering with our clients for testing our assumptions, and corrections.

Our clients have experienced distinct advantages, which are quantitatively and qualitatively demonstrated as:

1. Largest, longest client-services partner relationship in FSI
2. 98% of revenue generated through repeat business
3. Highest leverage (onsite to offshore) of global resources within FSI
4. 20% more efficient per deliverable than the next nearest competitor
5. 100% reference-able clients
6. Largest concentration of credit card know how in the world
7. Vertical industry content "down to the keyboard"; often tested by client(s)

Case 2.

Client

A US-based Fortune 500 insurer

Business Challenge

Primary policy processing system built for the client from another vendor had the following problems / challenges

» Delayed schedules
» No knowledge transfer from vendor
» Ending of vendor support contract
» Rolling out the application to 7,500 agents quickly

Solution

Kanbay first initiated knowledge transfer and then transitioned support activities:

» Used Cube model to manage and measure knowledge transition. As explained in the section of knowledge transition, a simple scale is utilized & expressed through percentage values. This provides a dashboard like view that conveys percentage-wise knowledge maturity for each of the application's component across the various businesses. The colours indicate the maturity level with regards to the plans crafted as shown in below Figure 5. The cube can be populated for each month which would provide the progressive knowledge build-up month-wise.
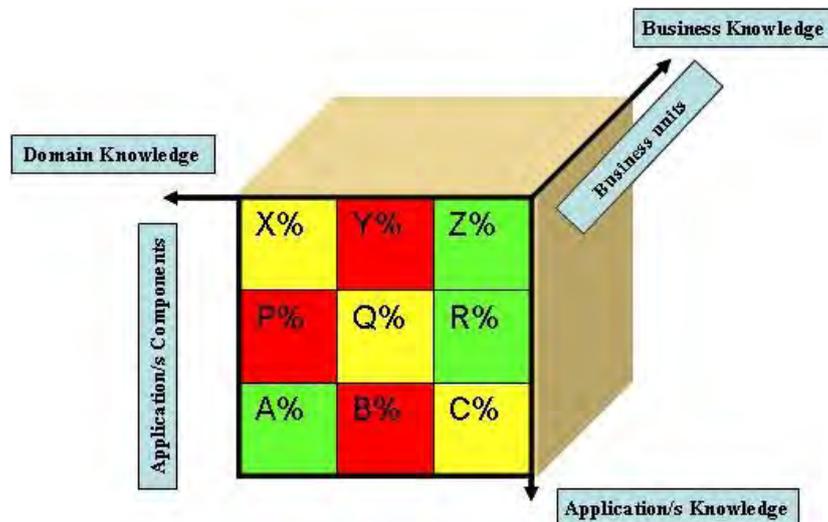
Figure 5

» Studied existing application and source code using tools for automatic code review
» Created new technical documentation
» Primary processing system transitioned from vendor to our client

Results

» 5x more tickets resolved
» Rapid application understanding by Kanbay

> » 85% application knowledge transfer (measured through cube model) in three months

Tips & Tricks (To-Do)

- ☑ Research for similar solutions being applied, some data regarding the competitors could be rewarding

- ☑ Build success stories & communicate

- ☑ KM efforts are not an one-time activity, these phases will reiterate as & when the business plan changes or aligned to new business needs

- ☑ Knowledge sharing techniques should have precise processes to follow, timely audits to be conducted & ensure closure of these findings

- ☑ Metrics are to be simple. Care to be taken such that the right metrics are measured, else it could hamper the success of whole program

- ☑ Usability of the KM application is critical, timely feedback collection & publishing fresh data will pay off

Potholes (Not-to-Do)

- ☒ Assuming the knowledge needs for the group/organization. Utilize surveys, interviews & other means to collate the knowledge needs.

- ☒ Not aligning the KM goals to business objectives.

- ☒ Loss of commitment from the Knowledge Management drivers & management support

- ☒ Combination of Process, Technology, & Culture need to go hand-in-hand. Just concentrating on one of these could have devastating impact on the success of KM program.

Acknowledgements

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Author Biographies

Gurbans S Chatwal has over 15 years of industry experience and leads Kanbay's Global IT Process Consulting and Business Analysis practice. He also oversees the firm's Knowledge Management program globally.

At Kanbay, he has been instrumental in achieving global certifications for ISO and SW-CMM Level 5. He has provided leadership in the roll out of Knowledge Management, Lean Six Sigma, and Systems Thinking practices. He is a certified assessor and has been in the assessment team for CII-EXIM Bank of India Award for Business Excellence (based on European Foundation for Quality Management).

In his previous assignments, he has been involved in Teaching and Research, Application Development, Quality Management, Knowledge Management and CRM solutions for various industry domains.

He has a Masters degree in Computer Science and Business Administration and specializes in IT Governance, Program Management, Systems Thinking and Statistical Quality Control.

Srinivas Jagannath is currently part of the Knowledge Management Group at Kanbay. He nurtures, drives & helps sustain the KM program globally. He works closely with many teams across the organization evangelizing KM, providing training on KM tools & other allied KM activities. His experience of 6+ years comprises of formulating KM Strategies, planning & crafting execution methodologies to improve KM adoption.

He has a bachelor degree in Civil Engineering & an advanced diploma in web-centric curriculum.

Prior to Kanbay, he was part of Knowledge Management Development Centre at Accenture & elite education institute 'Indian Institute of Science', Bangalore, India.

CABD - A Complexity Science-Based Method for Robust Business Development

Liza Wohlfart

CABD - A Complexity Science-Based Method for Robust Business Development

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Snapshot (Quick Learning)

"When you recognize that the business environment is a complex system that is inherently unpredictable, you understand that the failure of long-term strategic planning is not a failure of management but an expected outcome of the business environment" [Regine, 1998]

Assumptions regarding the future, based on detailed rational analyses, have always been a challenge for companies and especially SMEs, who struggle to make strategic steps in their day-to-day work. In recent decades, the importance, but also the difficulty of strategic decisions has increased as environmental conditions get more and more turbulent. Complexity Science is a promising discipline in this respect, as it builds on the conviction that it is visions people should focus on and lessons learned from natural systems. The method presented in this paper – CABD, complexity-based company assessment and business development – tries to incorporate complexity ideas, with a focus on practical applicability, instead of theoretic disputes.

Keywords: robust business development, complexity science, brainstorming, scenario development

Context (Where & What)

Predicting the future has always been a challenge for companies, as well as individuals, that has often resulted in rather intuitive choices. Especially SMEs nowadays are affected by a constant increase in turbulence, produced by shorter product lifecycles, globalised markets, information flood and similar developments, that makes thinking about and preparing for the future at the same time harder and more important.

But to which extent and on which basis can future scenarios be formed? One important aspect certainly is a good assessment of the corporate environment that provides a holistic impression of current and impending threats and chances. The next big challenge then is to develop visions of what a robust way into the future could be. Many SME managers today mainly use their intuition, their experiences, to deal with both of these steps – which often is not a bad choice to do. The problem with traditional management approaches is that they pretend to deliver fact-based, rational analyses that allow forming fact-based, rational decisions. But as anyone knows, it is not just rational analysis that guides our decisions but also gut feeling. A time of increased turbulence thus calls for approaches that take both dimensions into consideration: reason and intuition.

Another problem with many traditional management approaches is that they are strongly influenced by mechanical ideas of linear cause-effect relationships. They offer the feeling that if

people follow certain steps in the right way, they will be successful. These approaches provide a simplistic picture of organisations, where good measurement and the right steps will inextrively lead to success – failure thus being a consequence of having made mistakes.

✱ "Atomic energy might be as good as our present-day explosives, but it is unlikely to produce anything more dangerous."
(Winston Churchill, 1939)

✱ "I think there is a world market for about five computers."
(Thomas J. Watson, President of IBM, 1948)

✱ "X-rays are a hoax."
(Lord Kelvin, 1900)

✱ "Not within a thousand years will man ever fly."
(Wilbur Wright, 1901)

✱ "Year after year the worriers and fretters would come to me with awful predictions of the outbreak of war. I denied it each time. I was only wrong twice."
(Researcher in the British Foreign Office from 1903 to 1950)

Figure 1: Forecasting (Whoops) [Mintzberg, Ahlstrand and Lampel, 1998]

However, real life nowadays is marked by uncertainty and unpredictability, which is why new ideas have paved their way in the last decades that try to give a more accurate picture of today's business environment and thus to propose more appropriate strategies for it. One of them is Complexity Science. Complexity Science is concerned with the study of complex adaptive systems, i.e. living systems such as flocks of birds or ant colonies, consisting of multiple agents and reacting flexible to internal and external changes. It assumes that all of these systems follow the same underlining rules and principles and that, as the business environment itself is just another such system, it can learn from the principles observed in others. One of the complexity scientists, Eric D. Beinhocker [1998, S. 30-32], has summarised the implications of Complexity Science for business theories in the following way.

- **Knowledge.** The assumptions of Complexity Science base on more realistic assumptions about human cognitive behaviour, such as decision making based on intuition and experiences.

- **Webs**. Complex adaptive systems consist of networks of single agents that are in constant dynamic interaction. These networks ("webs") confront traditional ideas of closed business models, while stressing the way people interact with each other within organisations, as well as organisations do with each other.

- **Waves.** Complexity Science understands markets as very dynamic systems. Changes of single elements or agents affect the development of others. The whole economy thus is marked by aspects of co-evolution.

- **Would-be Worlds.** Future economic theories will be more and more marked by the employment of computer simulations producing a real-life illustration of markets and enterprises. Especially so-called Would-be Worlds will play a crucial role in this respect.

These and other assumptions concerning the impact of the science of complex adaptive systems on business theory were investigated in an EU-funded project, RODEO (Robust Development of Organisations), which tried to identify implications for robust business development in turbulent environments today. The project resulted in a set of key lessons learned, as well as concrete tools and methods to help companies to make the best of complex ideas for coping with their day-to-day challenges.

Some of the key assumptions, key lessons, of RODEO were the following:

1) There is no objective, completely measurable reality: so all attempts to come to a holistic assessment of a company's current situation must be based on subjective perspectives.

2) There is no single optimum solution: different solutions could lead to success or failure, as some level of uncertainty always prevails. Adaptability and flexibilty thus are seen crucial to cope with turbulent environments.

3) Results/solutions depend on the specific context: single solutions can only be a best practice in their specific context. Compared with others, they can only serve as good practices people can learn lessons from, which they then adapt to their own situation.

4) A purely optimised resource exploitation approach prevents advancements: so aspects such as emergence (in the style of letting things develop bottom-up), the edge of chaos (balancing structure and flexibility) and evolution (allowing random exploration) are important.

Preparation (The Checklist)

As the method presented in this paper builds on general complexity science ideas, such as that there are no single optimum solutions, and specifically on some principles of complex adaptive systems, such as unpredictability, it is important to prepare people for the basics of this discipline. One thing we used was a calendar for the six days prior to the workshop, where each day showed one of the complexity principles, illustrated by a short explanation, a quote and a photo.

As the CABD is a workshop to be done in one or two days, people should in addition be prepared to moderate the various discussions, to start with a good warm-up and to end with a fitting cool-down exercise.

One thing to be prepared by the companies before the workshop is a good overview on the corporate situation. This should be done in a pictorial way, i.e. by means of an image showing the most important internal and external factors, such as corporate culture and strategy, main competitors, partners, etc. We had a specific template for this that was filled out by one of the workshop participants.

Toolkit (The Essentials)

These are the things you will have to illustrate in the workshop:

- The six complexity principles (poster)

- Corporate assessment of the main internal and external factors (poster, done in advance)

- Overview on robustness enablers (poster)

- Turbulence matrix (two axes: influencability and turbulence)

For moderation you will need:

- Pinboards, post-its, a flipchart, pens

Making it Happen (The Approach & the Action)

The Approach

This paper focuses on one of the workshop concepts developed in the RODEO project, the CABD (Complexity-based company assessment and business development). It builds on the general project assumptions described above, such as "no single optimum solutions" and "exploration instead of exploitation", as well as on some general principles of complex adaptive systems. Different researchers have come up with different sets of what they think the main principles of complex adaptive systems are, and the implications for business theory they have derived alike differ to quite some extend. When designing the CABD, we have therefore decided on a specific set of six complexity principles, which we put on the basis and in the focus of our approach.

- **Self-Organisation/Emergence:** In complex adaptive systems, structures emerge bottom-up out of the interaction of single independent agents, such as flocks of birds forming.

  In organisations alike, not all structures that exist have been planned top-down. Informal structures and relationships are part of the every organisation.

- **Edge of Chaos:** Complex adaptive systems always strive for a position near the edge of chaos, which is the small path in between a clear structure and chaotic behaviour.

  Successful projects usually have a good planning, along with the flexibility to adapt to emergent changes.

- **Diversity:** Diversity is a key element of CAS. Diverse agents ensure that the system evolves and develops over time.

  Companies rely on a good mix of people, ideas, project, products and the like to survive in today's markets. Homogenous strategies will inevitably lead to problems.

- **History and Time:** History and time have a strong impact on a system. Complex adaptive systems show path dependency, so it matters where they have come from.

  Companies are always influenced by their origins, their past experiences and their past identity. This shows in the corporate relationships, the values and the image.

- **Unpredictability:** The behaviour of complex adaptive systems cannot be simply extrapolated from the past to forecast the future. Their development depends sometimes on small critical incidents, which makes it unpredictable.

  Companies are very complex systems; their development alike cannot be predicted by defining a strategy and setting some rules. There always has to be some sort of trial and error.

- **Pattern recognition:** Complex adaptive systems show patterns in their evolution.

  Companies alike can recognise emerging patterns such as informal organisation and communication structures and make use of them.

The Method

The CABD is conceptualised as a one- or two-day workshop. This is the agenda.

1. Warming up: recapturing of the 6 complexity principles

2. Robustness Check: presentation and elaboration of robustness enablers (on a complexity basis)

3. Turbulence Check: introduction to turbulence, identification of main turbulence drivers

4. Next steps vision: elaboration of next steps for dealing with main turbulence drivers by means of complexity-inspired robustness enablers

Warm up

The workshop starts with a wrap-up of the six complexity principles. Participants are asked about their understanding of each of the principles. The moderator adds and explains. People then tell about their daily experiences with complexity. Where have they encountered these principles so far?

**Figure 2: Illustrations for two of the six complexity principles –
emergence (self-organisation) and unpredictability**

Robustness Check

The moderator introduces the factors that are important for achieving a high level of robustness:

- A good sense of identity: knowing about a company's strengths and peculiarities

- An adaptable strategy and organisation design: being flexible enough to meet changing market needs and to make the best of emerging chances

- An internal environment that enables adaptability: showing good communication structures and a learning culture, team work

- Good forecasting: implementing successful ways of observing important trends and developments

The workshop then turns to the corporate reality of the participants, as they are asked to report on their organisation's level of robustness. What is their identity like? How adaptable is it? Where does this show? These details are put on cards alongside the robustness factors.

In the next step, participants use the six principles as heads to discuss their robustness enablers with a complexity view. Taking into account that history has its impact on our situation today, how does this reflect in our sense of identity? How does history influence our forecasting methods? How could we make the best use of our history to improve our adaptability? This is the main brainstorming part of the workshop, where new ideas are made.

Figure 3: The CABD illustration of robustness enablers:
good sense of one's identity, high adaptability of the strategy and the organisation structure, internal structures enabling flexibility, good forecasting methods.

Turbulence check

The moderator gives a short introduction to turbulence, stressing that there are different ways of perceiving turbulence and uncertainty and different ways of dealing with them. Some situations may seem very threatening, while it is often others that inhibit real turbulence. In addition, turbulence is not only a threat, but always at the same time also a chance.

Now the main turbulence drivers, which the company is dealing with, are analysed, the factors that produce the highest level of uncertainty. This is done by first looking at the main internal and external factors of the company (competitors, customers, culture, ...), which have been assessed prior to the workshop by means of a specific template.
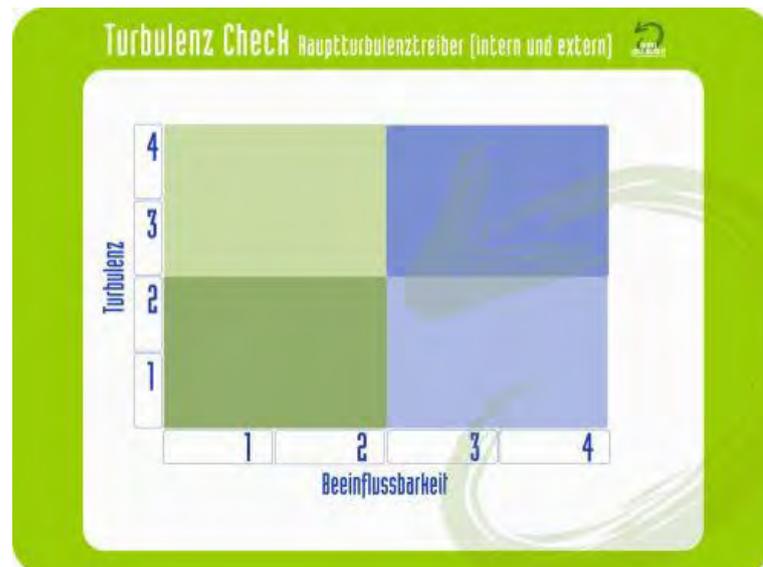
Figure 4: The CABD turbulence matrix
[factors can be allocated according to their level of influencability (x axis)
and turbulence (y axis)]

The participants are then asked to identify the main turbulence drivers their company is dealing with (factors of highest uncertainty). These turbulence drivers are then put in the "Turbulence Matrix", where they are classified according to the level of turbulence they produce and the degree to which they can be influenced. One or two main turbulence drivers from this matrix (the ones ranked highest on the turbulence axis) are then chosen for the elaboration of measures and the identification of tools and methods.

Dealing with turbulence drivers

The next step turns back on the robustness enablers discussed before. Participants use their complexity-based ideas of how to get more robust for identifying possible solutions for dealing with the turbulence drivers they are coping with. This is done by assigning one enabler ("sense of identity", "adaptable strategy", ..) to each participant. How can our strong identity as a small, locally integrated company help us to deal with growing competition? Which benefits can we draw from our adaptability?

Classifying the factors on the "influencability" axis already gives a first indication if a company can find direct ways of dealing with a factor or if indirect measures have to be found.

A turbulence driver such as "strong competition", which is mostly beyond the control of a company, could e.g. profit from using competences and contacts from the past (identity lens) or a network close to the edge of chaos, i.e. showing a good combination of close and loose partners (adaptability).

A turbulence driver such as "weak internal knowledge exchange", which can be influenced more directly, could on the other hand lead to an emergence-driven improvement of the internal environment. This could be achieved by e.g. regular meetings for discussing typical problems arising again and again in daily work or the establishment of a wiki-based collaboration space.

Results & Next Steps (The Follow-Up)

The Complexity Science Based Context Analysis is not very different from other brainstorming methods, such as Walt Disney's six hats. Its benefits thus come back to those of similar approaches: It inspires creativity to make people look beyond their usual ways of dealing with things, opening their eyes for new solutions. The fascinating thing about the method is its link to complexity science and thus to real-life phenomena. The six complexity principles are a point of reference for participants' day-to-day experience. This helps them to get a holistic view of their situation and the broad range of possible next steps in it. The main advantages of the method can be summarised as the following:

- The CABD gives a broader view of the current situation and the various options it offers.

- It brings people's implicit knowledge and intuition to the scene.

- It makes a situation more tangible and thus more discussable.

The CABD should end with the summarising of a vision for the direction identified and the next steps decided on.

Real Cases (As it has Happened)

Two exemplary usage of the CABD are given:

- One workshop with a small company in Switzerland showed internal Know-How transfer as the main factor of uncertainty and thus turbulence. It was something the company really depended on, while they felt this had to be improved. The CABD lead to a variety of different approaches of how to deal with this factor, including regular project reviews on main experiences, an increase of informal discussions, the use of KM tools and the establishment of mixed teams in projects (experts and learners).

- Another workshop was done with the local node of a network in Austrich. The main turbulence factor there was the collaboration with the network partners. Ideas of how to deal with this factor included establishing a vision of once one values and the ones within the network, more common marketing activities, common studies and screening of possible new partners.

Tips & Tricks (To-Do)

☑ Prepare people for complexity ideas before the workshop starts. Provide some sort of tool, such as a calendar or a poster showing the principles and some of their implications.

☑ Relate complexity ideas to real-life experience of participants by asking for little stories. How did unpredictability become visible in your life in the last weeks? How did you feel that history has its grip on the present? Stories may come from business as well as private life. You can use a flashlight (a ball passed from one to the other) for this; everyone should focus on one/a different principle.

☑ When talking about turbulence, pay special attention to "hidden" turbulence drivers, i.e. factors that seem quite stable, but inhibit the potential to make this highly uncertain. Such as critical personnel a company relies on. What will happen when these people leave?

☑ Implement complexity ideas in running the workshop. This means that your moderation as well should e.g. make use of the diversity of participants by fostering a broad variety of ideas (real brainstorming instead of an early discarding of ideas).

☑ End with a cool down relating to the six principles or turbulence. What are the main turbulences every participant is currently preparing for? Which principle currently has the strongest impact on each one's life?

Potholes (Not-to-Do)

☒ Do not work on too many turbulence drivers, but take your time to discuss the most important ones.

☒ Do not forget to stress one of the main lessons to be learned in CABD: turbulence is not a problem, it is just a situation. Some turbulent situations may turn out to be a big positive push forward for the company.

☒ Do not be too abstract, when deriving a vision for the future and related ToDos.

☒ Do not be unrealistic with next steps: which ones can we realise in the near future? Which ones are long-term plans?

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Acknowledgements

Author Biography

Liza Wohlfart works at the Institute for Human Factors and Technology Management (IAT) at the University of Stuttgart, Germany, in several industrial and research projects with a focus on business development, corporate learning and knowledge management.

Liza was the Scientific Manager of the RODEO project, in which the method presented in this paper was developed. She also was part of the content scouting team of the KnowledgeBoard, during its project status. Her current activities include project coordinator of EU-funded project RUSMECO that has established a Community of Practice between innovative Russian SMEs (www.rusmeco.net).

Learning and Performance Support for Effective Innovation and Improving Engineering Processes at IAI

Rony Dayan, Ron Algor, Daniel Naor and Avi Kedem
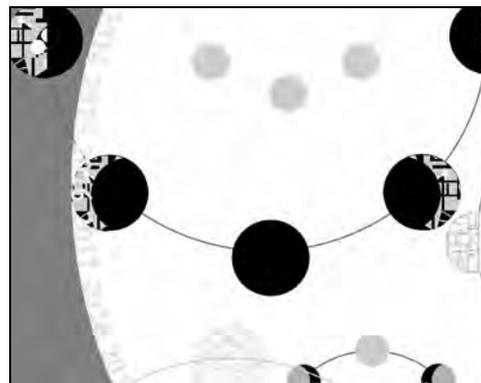
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Snapshot (Quick Learning)

The lessons learned and conclusions from previous experience at MALAT have been cornerstones for current and future development. This is done by documenting the experience gathered at the end of any project and published on the division's Intranet site well organized according to the company's established categorized taxonomy.

The Engineering division uses lessons learned from the engineering process in order to eliminate as much as possible design errors hidden in the engineering products and activities not adding value to the development process that obviously can be characterized as "waste". Measures as Cost of Poor Quality (COPQ) or Customers Escapes (CE) to describe faults not corrected prior to product delivery were developed. Quantified result measurements are compared to current existing base values and to aggressive goals. These assure that the full implementation of actions as components of a specified working plan will set successful contribution to close the gap and achieve the goals values.

The approach MHT took for introducing the NPI methodology to the relevant employees in a more effective and efficient manner has been eLearning. As for the existing manual – they converted it to a user-friendly online version in HTML format. The navigation was built to be very easy and graphics were enhanced. A proper template was prepared to make sure that it is available for updating along the project. Lessons learned is the name of the game now at IAI, whether it is at the marketing research, conceptual design, detailed development, or supporting the people involved with the right information needed to deliver excellence.

Keywords: Innovation, New Product Introduction, eLearning, Debriefing, Lessons Learned

Context (Where & What)

Israel Aerospace Industries (about 15000 employees organized in 5 groups and 23 divisions) is globally recognized as a leader in developing defence and commercial aerospace technology. This distinction is the result of nearly half a century of designing, engineering and manufacturing, for customers throughout the world. IAI has kept along the last few years, sales figures of about 2 B$ (over 80% of it as export) and an order book of over two years. We will attempt in this article to represent the engineering process as it occurs across the whole company,

through the perspective of three knowledge managers for three of its divisions, MALAT, the Engineering Division, and MHT.

MALAT offers a wide scope of state-of-the-art Unmanned Air Vehicles (UAV) systems. The product lines of MALAT range from lightweight tactical UAV systems to enhanced multi-sensor tactical UAV systems and medium-altitude long-endurance strategic (MALE) UAV systems. The development of UAV system programs started in IAI at the end of 1973 and has continued since then to the present time. The various solutions that were conceived over the years are a constant combination of the operational requirements, the technologies and the design principles.

The MALAT division is in constant search for the innovation that enables it to be the global leader for UAVs. It does it by developing knowledge based UAV systems meant to fulfil a challenging evolving market including the many different local and international customers. The lessons learned and conclusions from previous experiences are the cornerstones for future development.

The Engineering Division is the focal location for the engineering process. This article will attempt at showing some lessons learned from of a typical project for a new aircraft development. The engineering environment we refer to, is characterized by the complex involvement of a multitude of engineering disciplines (a variety that includes more than 50 Competence Centres (CC) for airframe structure and systems specification, design, analysis, testing, etc.), by the implementation method using Integrated Product Teams (IPT) of engineers – a multi-disciplinary development team that represent all the skills required for any specific structural part or system development, and by the development process called the New Product Introduction (NPI) which involves the implementation and integration of numerous activities and methodologies that are carried out by an organized set of phases and sub-phases starting from the concept definition through the final production preparation process. Each phase is aimed to deliver a certain and pre-defined number of products (some hundreds of engineering documents including programs, plans, drawings, testing and justification reports etc.). In its totality, such a development process can last up to three years and involve some hundreds of engineers.
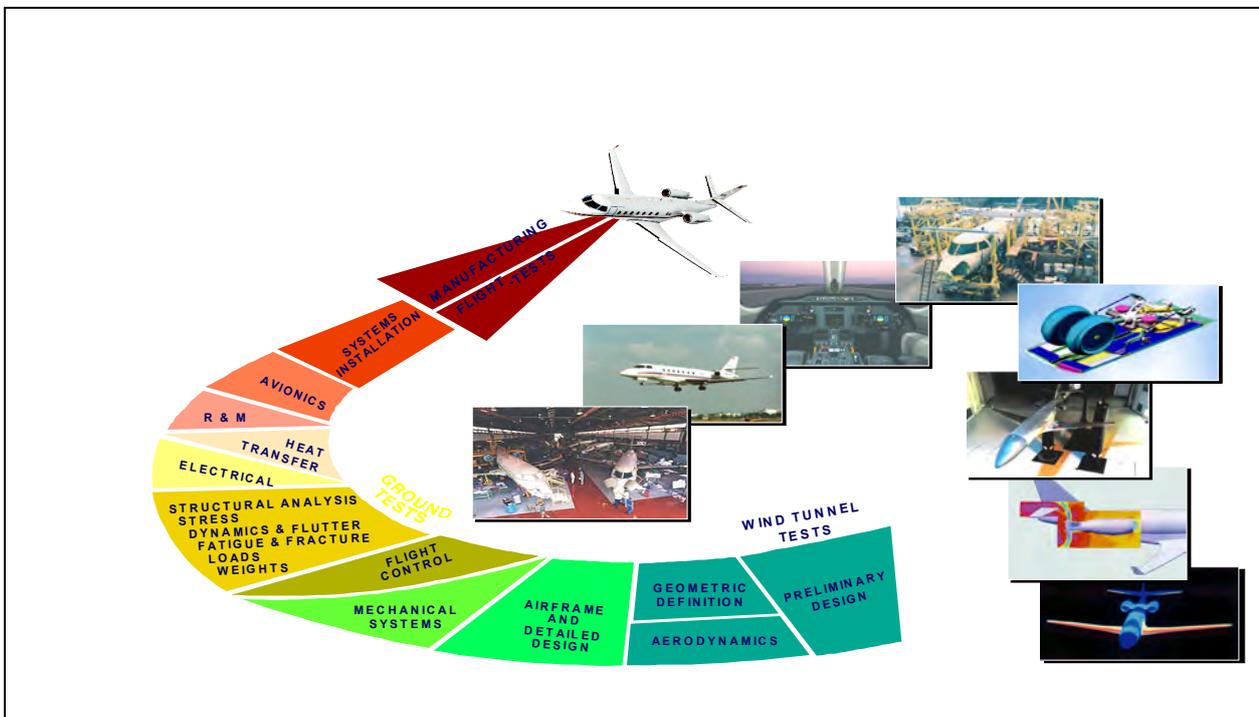
Figure 1: Engineering division full integrated capability

MHT is the Technical Publications and Training Division of IAI. MHT regards itself as the "house of knowledge of IAI", dealing with a large variety of activities regarding knowledge – searching and retrieving, accumulating, processing, generating, "packaging", publishing and transferring. Looking at this from a different angle, MHT can be regarded as the "house of content" while all IAI divisions are supplying the content.

MHT has grown in expertise, world-wide experience, in technical education, professional training and technical publications development for a large variety of aerospace and electronics systems and equipment, computer related technologies and managerial capabilities, for more than 40 years. eLearning and Interactive Electronic Technical Manual (IETM) have been supplied by MHT for over ten years, depending on the relevant solution needed. MHT provides its services to IAI employees, as well as to IAI divisions for the use of their customers and to MHT direct customers in Israel and worldwide.

MHT has developed methodologies for effective training, as User Friendly Manuals and User Friendly Help applications (effectiveness is calculated with both input and output variables; its measures show how well an organization is satisfying the needs of those it serves (Sveiby, 1997p.154)). The training development methodology, mainly for engineering and technical jobs, called Integrated Job Performance Training (IJPT) was the basis of the Israeli MIL Standard. The User Friendly Manuals methodology has become an Israeli MIL Standard as well. The User Friendly Help is a state of the art solution for Performance Support – an Electronic Performance Support (EPSS) application that is embedded in the software system of the relevant cases.

Preparation (The Checklist)

IAI embarked on its Lean program in the year 2000. The Knowledge Management (KM) program, which originated as part of the Lean activity is controlled through the performance, throughput and result measures aimed for performing within specific actions and achieving expected operational and business goals. Among a variety of processes meant to achieve the goal of making all company activity as effective as possible, is a development process we have called the New Product Introduction (NPI).

The process is based on nine phases and gates, and creates predefined products using a complete set of methodologies adapted and tailored for each one of the company's projects. Lean Champions were appointed in every one of its 23 divisions and periodic Lean conferences have been maintaining the program alive across the company. At Motorola, the KM programme framework, focused on the new product introduction process. The NPI process includes the design, product introduction, and manufacturing of new products, and is part of an 'M-gates framework' (Cooper, 1993, cited in Herder, Veeneman, Buitenhuis, and Schaller, 2003 ,p.105). This framework is based upon 'process gate stages' that consists of 15 gates, starting at market and product line planning (gate 15), and ending at end of life (gate 0) of a product. Fast and high quality production is one of the key goals in this NPI process.

Lean Thinking and its principles as prescribed by (Womack, Jones, and Roos, 1990) have been successfully applied to manufacturing and operations environments, and associated case studies and research literature have been published extensively. The same cannot be said for Lean application to the new product introduction (NPI) or development processes. The aim of two papers by (Haque, 2003), and (Haque and James-Moore, 2004) is to describe the application of the Womack and Jones principles of Lean Thinking to the NPI process (from concept development to detailed design through to customer delivery). While techniques such as concurrent engineering (or concurrent product development) have been implemented and have been quite successful in improving NPI, there is still a shortfall in the expected or desired improvements to NPI. This shortfall Haque believes can be bridged through the application of

Lean Thinking to NPI; in particular, the five lean principles proposed by Womack and Jones. The five Lean principles are briefly 'specify value', 'identify the value stream and eliminate waste', 'make the value flow', 'let the customer pull the process', and 'pursue perfection'.

Like anything else we do at IAI nowadays, the NPI process is measured aiming at performing within specific actions and achieving expected operational and business goals. Performance measures have been defined as the "characteristics of outputs that are identified for purposes of evaluation" (Euske, 1984 cited in Pervaiz, Kwang, and Zairi, 1999), or as a "tool" to compare the actual results with a preset target (Euske, 1984 cited in Pervaiz et al, 1999). NPI, as a generic development process has now been implemented for more than 5 years as an essential part of the company wide scale enterprise Lean program.

Figure 2: NPI as part of the product life cycle

One of the main problems in the traditional development process is usually identified as the waste of time and resources leading to project deviation in terms of schedule and cost, affecting product quality, and sometimes even not performing by project's specifications. The wrong implementation of requirements, management processes and resource allocation contribute a major part of this waste. But the worst impact is due to changes occurring throughout the development process. Changes could originate from customer requests, design modification, sub-contractors adaptations and manufacturing requirements. These changes eventually will cause increased project costs. Obviously the impacts on the project and the recovery costs would increase according to the project phase at which the change is identified and incorporated in the project; the further down in the project time-line, the more expensive will be its impact. This in fact was at the basis of the NPI method which tries to involve at each stage all the functions involved in the design in order to minimize reasons for further changes.

Trying to implement the Deming quality assurance ring shown in figure 3, the Lean program has set major company targets and counter-measures activities to eliminate as much as possible, the design errors hidden in the engineering products and non-added value activities of the development process that obviously can be characterized as "waste". For the purpose of monitoring, waste can be related to internal problems through a measure called Cost of Poor

Quality (COPQ), resulted by design errors revealed in the engineering environment through the development process or it can be related to problems identified by the customer upon utilizing the final product and reported as another measure called Customers Escapes (CE) (faults that have "escaped" the scrutiny of our quality assurance process. It is ironic but worth mentioning that it was Deming who advocated a great deal of caution when using measures in order not to be hit by the 'misunderstanding psychology' – "the pressure 'to make the numbers' is given much more attention than the effect of the continued usage of stretch targets and benchmarking to produce figures one cannot trust, whenever 'there is fear'" (Deming, W.E. 1980 cited in Castellano, Young, and Roehm, 2004).

Plan

- Case for Change
- Lean Program
- Operational Fo**cus**

Act

- Corrective Action
- KaiZen Events
- To-Do-List Tables

Do

- PDM Actions
- Work-plan
- Methodologies

Check

- Measurements
- Self-Assessment
- QMS Audits
- Customer Satisfaction

Figure 3: Demming QA ring

Toolkit (The Essentials)

MALAT perceives an expansion of the existing design for basic military tactical surveillance and reconnaissance missions into a remarkable number of different new missions including their application for paramilitary and civil/commercial missions. The new developed systems should therefore be knowledge based on the long experience it has acquired along the years for its classical applications. This is done by integrating maturing technologies with new customer requirements using the NPI process. The result is in the usage of lessons learned from earlier designs to achieve an expansion of performance capability with newer technology enabling better capability with higher reliability.

Design errors could cause problems in form, fit, or function. Structural parts and systems components not designed in the right form, or that don't fit when assembled, or that don't function in the intended way, would not meet the product specifications and requirements. The design debriefing approach and the counter-measure activities are made to serve as major objectives for the processes and products quality assurance methodology improvement and are mainly based again, on lessons learned from the engineering process.

The NPI methodology needed to be introduced to thousands of relevant engineers. They had to acquire the knowledge, understanding, and performance skills; including where to find the detailed know-how. The initial approach was the traditional one – training and preparation of an NPI guidebook. The training consisted of classroom instruction, mainly based on lectures given by various experts and workshops conducted for specific project's IPTs. The NPI guidebook was a regular word document. We realized soon enough that the classroom training, based on lectures, was not effective as there was hardly any "doing" (any effective training should include exercises, feedback and evaluation). Apart from this, the course was not efficient as it was too long and quite a lot of time was wasted on overhead activities (efficiency is calculated solely on input variables; its measures show how well an organization is using its capacity regardless of what it produces (Sveiby, 1997p.154)). MHT debriefed the resulted training material and deduced enough lessons learned to improve it.
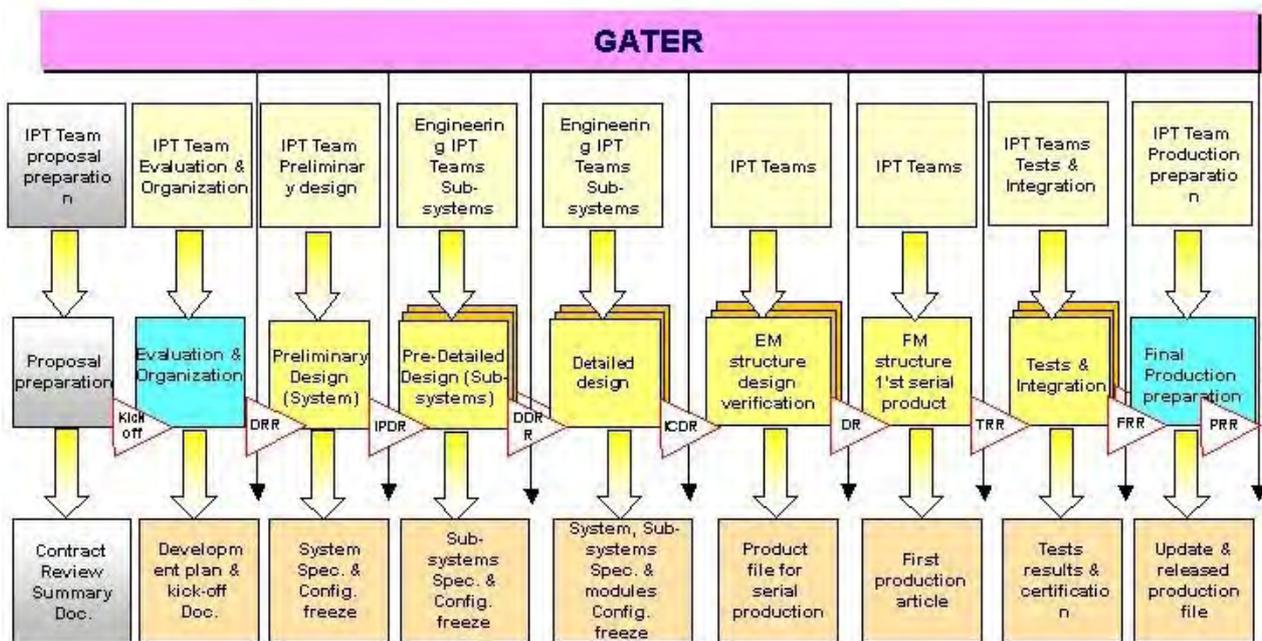
Figure 4: The NPI nine phases

Making it Happen (The Approach & the Action)
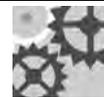
MALAT's responsibility is for the development of a total integrated UAV system of systems solution. Thus the development of new systems in MALAT as a prime contractor has direct impact on the business of other IAI divisions including the Engineering Division, MHT, and many other companies in Israel and abroad.

MALAT, as an innovative company had to keep eyes and ears open to changes and opportunities and respond with ideas and action that keep it growing and profitable. MALAT realized that the lessons learned and the conclusions from previous experience had to perform as cornerstones for future development. To support the development of new robust knowledge based systems, it was essential to systematically implement knowledge management in all management/business/professional departments. This was essential in the process of the accumulation of knowledge from existing developed systems/products for effective innovation.

This was also a catalyst for the integration of all local innovative powers into the emergence of a strong innovation mainstream. In MALAT new ideas do not apply only to products, but also to quality, service, finance, and employee attitude.

It has been essential to develop and implement knowledge based processes for effective innovation as well as design and development of new robust systems while taking into consideration:

- Knowledge based leadership

- Empowerment and human development

- Effective core operations

- Business oriented core operations for support functions

- Total quality management

- Business focused results

One of the Knowledge Management procedures dealing with lessons learned from debriefings and their implementation was adapted as a major Engineering Division approach to encounter the problems of design errors and to meet the objectives. The procedure has been labelled "Extracting knowledge from lessons learned" and it has also been defined as a methodology sustaining the improvement of Processes and Products Quality Assurance (PPQA). Lessons learned are an expression of experience, whether good or bad. Organizations sometimes take the initiative of debriefing an event because it looks significant to them. The outcome of such processes is a list of lessons learned. In fact, a structured and organized debriefing event is not the only source to lessons learned. These could also be the results of most reviews and professional meetings, and if one is attentive enough, they populate our everyday life with good or bad experience that one goes through. The methodical practice of identifying the lesson learned, its generalisation to enable it to be applicative to a wider audience than the one involved with the original event, and its publication is the context of this procedure. This approach was set as a major qualified objective of the Lean program. Quantified result measures (COPQ & CE) are defined by current existing base values and aggressive goals to assure that actions and specific working plans are established so that full implementation sets a successful contribution to close the gap and achieve the goals values. Quality is the main goal of lessons learned extracted from the debriefing of design errors. Reference is made to the quality of the design process as well as to the quality of the designed products. It is believed that the NPI development process is the cause for the continuous improvement of processes and products quality.

Results & Next Steps (The Follow-Up)

Implementation

MALAT has in fact adopted a whole new system development direction, a concept development and a selection process, and these have led to a product development methodology, developed to support the design of new robust knowledge based systems.

New system development directions

The new system development directions were selected by considering:

- Business vision

- Mission

- Values

- Strategies and goals

- Resource allocation

- Concept development and selection

The concept development and selection were based on:

- Market research and benchmarking to capture customer requirements

- Research and development based on knowledge acquisition in systems development

Product Development Methodology

The product development methodology in MALAT is based on the New Product Introduction (NPI) design process developed by an IAI Corporate multi-functional team that draws upon many years of experience, accumulated throughout IAI, in systems and product development, and presents a uniform, orderly, and logical process for system and product development. This process is tailored to the unique requirements of MALAT.

The two measures used in the Engineering Division are defined as annual goals. We seek measures to be Specific, Measurable, Actionable, Relevant, and Timely (SMART). They should be extractable from updated databases, referenced to specific enablers and be actionable every time actual values don't meet the planned value and corrective and/or a preventive action plan is required. Such SMART measures - COPQ and CE are most valuable to indicate discrepancies in the design quality. Design errors defined as COPQ are the type of errors that usually, though not necessarily are identified by the Checker (a senior engineer responsible for checking that the NPI phase outputs are compatible with the requirements) during the development process while the CE type of errors are those that escape all checking and preventive measures taken along the development and production processes to be eventually identified or recognized by the customer or the final user. The COPQ measure is calculated as the total amount of engineering modification expressed by the number of revisions of drawings vs. the total amount of new version released drawings. In other words it is the sum of configured items defined by the project. On the other hand the CE measure is expressed in terms of the number of failures vs. total number of flight hours made by the aircraft.

Cost of Poor Quality (COPQ) has been set at the Engineering Division as one of the obligatory internal quality measurements aimed to evaluate the engineering process activities and internal products. The main goal for this matter is to eliminate or at least to minimize the amount of design errors occurring along the development process phases. When occurring and identified by the designer or the Checker, the design error is documented and stored in the department repository. Not every error can or should be debriefed. Therefore, a set of categories was defined in order to select the most valuable cases for debriefing. The first category due to its being the most valuable is flight safety which refers to any design error that may affect the safety of the aircraft and the crew according to the federal aviation regulations. The second category would be for errors that may cause a 'stop-work' order on the project (mainly through the manufacturing phase). The third category refers to delay in take off time of the aircraft as requested by the customers. Following are categories referring to engineering issues as problems caused by low reliability, problems that cause the customer to express his dissatisfaction, or design errors that frequently occur. Every design error that passes this route of categories is stored for design debriefing under the responsibility of the relevant engineering department manager. Then a design debriefing procedure is being put into action, and a root cause analysis method is applied to find what the root source problem was. When a non-added-value activity is detected, a counter-measure activity is followed to apply a corrective and preventive action plan. Eventually, prior lessons learned are retrieved to extract the needed conclusions. Finally the extracted lessons learned are trained via sets of lectures for the engineering team working on the

project and for new engineers as a routine process for skills enrichment and capabilities improvement. Later on, when these lessons learned are crystallized, they are documented to update the relevant engineering manual. This process is in fact done in accordance with the Knowledge Management procedure for engineering knowledge capture and documentation.

MHT discovered that replacing the classroom training by eLearning made the assimilation of the NPI methodology more effective and efficient. The effectiveness was in fact achieved by:

- Building the eLearning modules in a form based on the four 'pillars' of effective learning – explanation, exercise, feedback, and evaluation (test).

- Focusing on the really important content.

The efficiency was achieved by:

- The shorter time needed for learning, which is almost always the case when classroom learning is replaced by eLearning.

- Less time wasted on getting to and from the class.

- Using the Learning Management System (LMS) for managing the learning activities – providing the learning modules to the relevant engineers and also for managing the evaluation – producing various needed reports.

There were two main aims in the decision taken concerning the content of the eLearning modules:

- Learning the NPI methodology, with an emphasis on the new approach in the development of products and systems

  o At the initial evaluation and organization phase, the goal is to make sure that at the start of the project every aspect is taken into consideration and actually done. This means that the requirements are clearly defined in cooperation with the customer, the risks are identified and the mitigation plan decided upon, make or buy decisions have been made, etc.

  o At the final phase – getting ready for manufacturing; this phase is expected to make sure that there will be an as smooth as possible transfer of all the information needed for manufacturing. This information concerns – tools, technologies, engineering data etc.

    - Making the engineers familiar with the NPI guidebook, by including exercises that need its use for dealing with the assignment.

The new approach MHT took for introducing the NPI methodology to the relevant employees in a more effective and efficient manner was to replace the classroom training by eLearning and to convert the NPI guidebook to an online user-friendly version.

The NPI guidebook was rebuilt, without actually making any change to its content. This included both its adoption to the web (actually IAI's Intranet) and by creating a template, to be used as well for every future update. The template made the content more structured and enabled efficient conversion to an HTML format for the web. While the conversion to HTML format was performed - using a software tool usually used for building help applications – additional features were added. One type of features was an aid for easy navigation – a convenient table of content which can always appear on the screen, hyperlinks, a glossary, and a search toolbar. Another feature added improved the visual aspect - the graphics were made much clearer, their size adopted to fit the screen size, text has been enhanced when needed and the fonts have been changed to Arial. MHT professionals from two Competence Centres were involved in the development and building the solution – the eLearning experts and the electronic documentation ones.

People Involvement

The role of the Knowledge Manager in MALAT is to assist and mentor for the successful implementation of KM procedures; But each Business/Professional Director, Departmental Head or Program Manager is responsible to implement KM procedures efficiently under their authority to meet their departmental/program goals.

The people from the Engineering Division involved in the process are the design engineer who is part of the development process, the Checker whose responsibility is to monitor, track and identify the design errors, the Lean Facilitator that has the capabilities to recommend the proper counter-measure method to be utilized for the specific case after implementing the design debriefing procedure. Then the engineering supervisor or the team leader is responsible for the training of the new updating conclusions and lessons learned to the engineering team working on the project; and finally the Knowledge Manager who is in charge of documenting lessons learned and updating the engineering manuals. When time comes for management review of the program progress it is the duty of the Lean Facilitator to update the Policy Deployment Progress Report (PDPR) for the actual measurement value of the current period of time as opposed to the predefined planned value and to present the counter-measure plan that was implemented to correct and prevent this design error in the future.

The results of this action is then reviewed and evaluated through the related management plan of the program to determine whether the relevant business goal of improving the quality of design processes and products was actually achieved and accomplished. If not, then the division management (Division Manager or Division Lean Champion) instructions should be followed in order to update the program actions or to implement another Lean method and once again the results should be reviewed at the next review opportunity (about every two months).

Challenges

The innovation process faces many challenges such as managing the unknown, the uncontrollable, and the unpredictable in opportunities, concepts, knockouts, strategic fits, resources, infrastructure and deliverables. The Integrated Program/Product Teams at the Engineering Division and in MALAT involve enlightened participants from every functional area that are affected in each step of the innovation process including new system development directions, concept development and selection processes, and product development methodology. Team members must be trained in, and must subscribe to all aspects of interpersonal behaviour to overcome the inevitable gravitation toward old habits. Management must be involved in clearing obstacles, including adjusting attitudes or reassigning obstinate individuals if necessary.

Implementing design errors debriefing and having lessons learned from the engineering process contributing directly to the divisional goals is quite a challenge by itself. The very implementation of debriefing requires even a culture change. Knowing that this process will lead to better quality of engineering development processes and throughputs, essentially by saving time, cost and by eliminating waste of non-value added or unnecessary inefficient activities and all for the benefit of the division and the improvement of its competitive capability is not enough to be widely accepted. Success orientation demands management commitment as a major key for policy deployment and process assimilation.

Monitoring

Four tiers of monitoring and control processes are carried out for all the above described procedures:

(1) The qualitative operational and business goals from the Lean point of view.

(2) Lean Champions conferences to share and evaluate the processes.

(3) COO review performed quarterly in every division.

(4) Self-Assessments of the implementation are conducted at two hierarchical levels:

(4a) Internal Self-Assessment as post-factum control process at the division level at the end of each quarter.

(4b) Mutual-Assessment at company level is performed at the beginning of each year for the evaluation of the previous year achievements.

Extracting lessons learned from the engineering debriefing process is monitored at two different levels:

- By the project management level that impels mid-level management of the appropriate engineering groups to implement the design debriefing process whenever a major design error is identified and fits the categories defined by the relevant procedure as shown in Fig. 5.

- By the QAT team lead by the engineering division management. The senior managers of the division meet as a QAT team periodically on a monthly basis to present and elaborate the design errors which have been debriefed at the first level and make decisions about the lessons learned and the steps to be followed as a practical preventive action plan (e.g. lessons learned to be instructed to the relevant group of engineers, a specific application to be developed, the engineering guide books and manuals to be revised or updated, etc.)

Real Cases (As it has Happened)

During a KaiZen event (a continuous improvement methodology) implemented last year in the Engineering Division, in one of the major aircraft project, a new procedure of revised and unified process had been defined. It was one of the most successful event lead by the project manager herself and participated by major design disciplines directors (e.g. Airframe design and analysis, Electrical and avionic systems, Mechanical systems, Product assurance, etc.). As a result the management of the division had decided to establish as a norm, a Quality Action Team (QAT) forum tasked to review the results of design errors through a debriefing process in accordance with a set of standard categories and criteria of error selection for debriefing. The process of selecting the errors to be debriefed is shown in the following figure taken from that procedure:
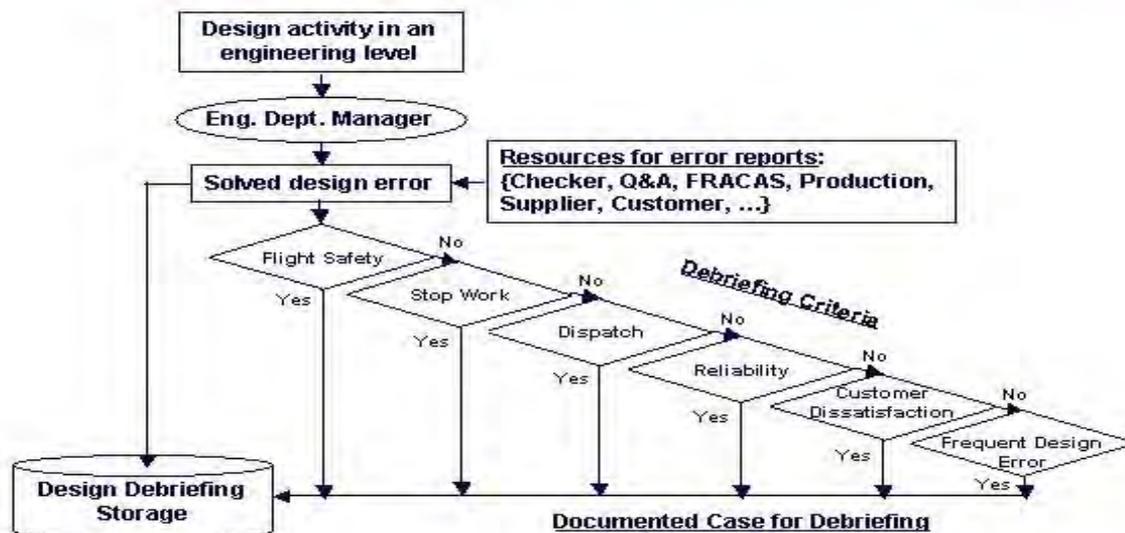
Figure 5: Design error debriefing process

Tips & Tricks (To-Do)

Out of its experience, MALAT has internalised that knowledge acquisition from existing systems/products needs to be integrated along the challenge of new system development in order to compete in highly competitive market. Knowledge management in MALAT has been implemented to support effective innovation in potential high state of the art system development for customers need. Each manager is responsible for the successful implementation of KM procedures.

The Engineering Division's organization is characterized by its matrix structure having engineering disciplines directorates on one-axis and projects managements departments on the other. This environment is bound to have impact of disciplines on the projects and vice-versa. The periodical reviewing system that covers all disciplines and projects every two months, allows relevant lessons learned to be shared and mutual conclusions from one discipline to the other to be adapted (e.g. airframe design and analysis directorate and mechanical systems design can share the same methods of design debriefing, etc.). In addition, lessons learned are documented in the KM portal of each department and can be reviewed and adapted in another department. Further than that, there is a Projects Managers forum that meets every two months. One of the goals of these forum meetings is presenting case studies and conclusions so that every project manager can have the lessons learned gathered in one project to be applied in his project.

Practical experience from the day-by-day performance of the process of gaining from lessons learned out of debriefings goes way beyond what is written in textbooks or formal procedures and manuals. Trying to get hidden hints recognised only by those actually running the relevant activities, one can say that:

- ☑ To enable the extraction of knowledge from lessons learned coming from the engineering debriefing process, one must know the multi-disciplinary engineering environment of the project quite well. This doesn't include only the procedures involved but also the persons

participating in the project, their acquired skills and limitations. When design errors are identified and the need for root cause analysis implementation is required, one has to have the ability to persuade the IPT group members to take time out off the project though the pressure of activities and time is sometimes unbearable, and to invest for future advantages. The facilitator of the debriefing process has to be equipped with the capability to explain both the debriefing method and the importance of this process for the project benefit in the future by saving reworks and repetitions on similar errors. The trick is to know when and where this process can be more effective and to be performed more efficiently.

☑ When design error debriefing conclusions are made, they are defined for the benefit of the current project. Then it takes a delicate and patient behaviour of the facilitator to have the personnel persuaded and ready to continue the process of performing conclusions in order to extract from them generic lessons learned not only for the specific project benefit but for new projects to come in the future. Much has been written about the community gains from one project's lessons learned; this is about the risk of concentrating attention on local knowledge sharing without addressing the issue of how the organization as a whole can benefit from it; concentrating on the human capital rather than on creating a social and environmental capital (see also (Allee, 1999) regarding the flow of knowledge across the enterprise, or (Brentani and Kleinschmidt, 2004) regarding new product development programmes).

MHT conclusions from the experience gathered up to now for the NPI training has been that as the NPI process includes usage of additional Lean tools, the intention is to implement the same approach for many more of them. Actually, as the initial feedback was very positive MHT has already started doing it for the subject of requirement definition. The improvements described at MHT were implemented in mid 2006; there is a need to evaluate their acceptance by the users. Though previous IAI's experience with similar activities is not necessarily for the same subject, it proves the gain in the effectiveness and the efficiency described here. So there is a sound base for optimism in the described case as well.

☑ To summarize, the main practical tips to be remembered are to:

☑ Analyse and concentrate on the knowledge critical to the business

☑ Align knowledge management with business strategy

☑ Make knowledge management dominate over data management

☑ Involve every employee in KM implementation

☑ Keep top management supportive of KM processes implementation

Potholes (Not-to-Do)

☑ Implementing the process of error debriefing is bound to fail unless the involvement of all those who participated in the development process during the relevant phase and activities where the design errors occurred and were identified. On top of that management involvement is required at the level of the project management or the supervisors serving as IPT leaders responsible for the mission accomplishment or the final product delivery. The right implementation of design error debriefing process does not rely on any sort of technology or practicing methodology though these could be important. It is all about the people involved and their ability to initiate and sustain this process for the benefit of the project and the division.

☑ In addition, knowledge managers should never impose themselves on the project staff, but rather show them the advantage of getting and using lessons learned. It is most important to realize the difference between a facilitator who contributes by leading the process for the project's benefit and the recognition expressed by the IPT of the project, and the one who becomes a burden on the project and that causes interferences every time problem occurs. This is why it's very important to create the environment that will have the project personnel define by themselves the procedure and categories as where, when and how to conduct the design error debriefing process.

Acknowledgements

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Rony Dayan is a retired Lt. Colonel of the Israeli Air Force, with industrial experience as deputy GM of MBT, one of the Israel Aerospace Industries successful divisions (http://www.iai.co.il). Prior to that, he was the corporate marketing representative in South East Asia where he received the IAI President Marketing Award for outstanding performance. Rony has been leading the effort to incorporate Knowledge Management in the company's set of actions for the implementation of a comprehensive change program. The program is being implemented now across the five groups and twenty divisions of this 2B$ Aerospace & Defense company. Rony has also given courses in Business & High-Tech Marketing and is now teaching the subject of The Establishment of Schools as Learning Organizations for the Israel Teachers Association. Rony holds a PhD degree from the University of Cranfield in the UK in the field of Knowledge Management; he also holds an Engineering degree from the Technion in Haifa, Israel, and a Masters Degree, both in Electronics, from the US Air Force Institute of Technology at Wright Patterson AFB, in Dayton, Ohio, USA. Rony has been publishing chapters in books and academic papers on the subject of Knowledge Management and presenting it in international conferences along the last four years...

Ron ALGOR is the Director of the Lean Resource Team and the Knowledge Manager in the Engineering Division of Israel Aerospace Industries Commercial Aircraft Group. Previous positions include Lean Champion leading the Change program, manager of Methodologies & Logistic and manager of the Software Quality Assurance (SQA) in the Engineering Division. Ron has been leading the effort to incorporate Knowledge Management as part of the comprehensive Change program. He holds an Engineering Degree from the Ben-Gurion University. Ron presented the subject of Knowledge Management in an international conference held in The Netherlands in 2004 and is about to publish an article on relevant issues in the Real-Life. During the years 1997-1999 Ron coordinated an international project in the European Commission 5th Framework Program (5FP).

Daniel Naor is a Mechanical Engineer with 34 years of diverse and creative experience including 23 years with Israel Aerospace Industries in integrated product and process development, system engineering methodologies, program management, lean resources methodologies, design/development and integration of aircraft structures including advanced composite structures and ten years with Israel Military Industries in production analysis and design for machining and cold-working processes. He has a Bachelor of Science in Mechanical Engineering from the Technion, Haifa, Israel. He is currently responsible for Knowledge Management further to other responsibilities in MALAT Division of Israel Aerospace Industries.

Avi Kedem works for MHT – the Technical Publications & Training Division of Israel Aerospace Industries – IAI's House of Knowledge. Avi is in charge of R&D and Knowledge Management and is actually the Chief eLearning Officer for Israel Aerospace Industries. Avi has focused for many years on various aspects of supporting people's performance - the multidisciplinary aspects of the learning phase as well as those used on the job. These include effective and efficient training methodologies (IJPT), User Friendly documentation (paper and electronic IETM) and Performance Support Knowledge–based / User Friendly Help applications (e.g. context sensitive, task oriented, multilingual and customized) and their synergetic integration with eLearning and simulation. In the past, Avi has leaded the development of Israeli Standards for task-oriented training (Integrated Job Performance Training - IJPT methodology) and for User Friendly manuals. Leading IAI's eLearning Virtual Campus, development of integrated solutions combining learning, documentation and Knowledge Management – drives an intensive, interesting and challenging professional life.

Strategic Role of Physical Settings for Creating and Sharing Knowledge
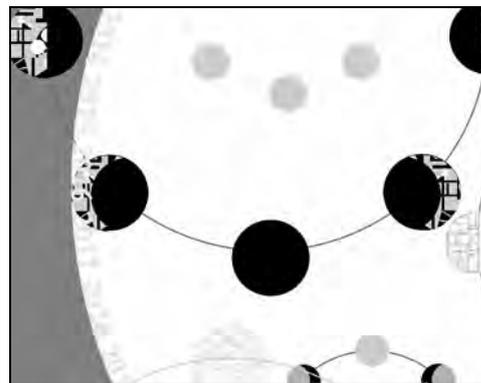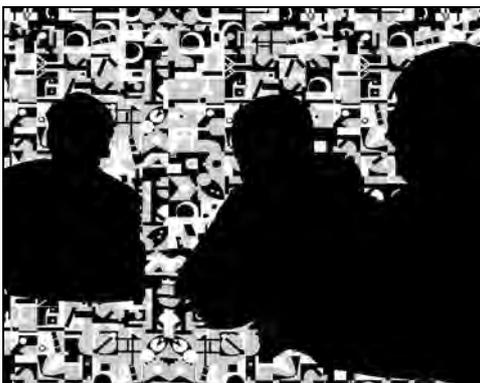
Mustafa Kurt

Strategic Role of Physical Settings for Creating and Sharing Knowledge

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Snapshot (Quick Learning)

Technological applications and organizational processes related to knowledge management have gained importance in many organizations during the last decades. Recently, many organizations have focused on the activities of knowledge creating and sharing as the part of knowledge management. These activities which are generally based on technological settings should convert into strategies taking individuals and their knowledge into consideration. Knowledge is not created by the organization but is created and shared by individuals. Although organizations pay attention seriously on widely accepted components of knowledge management such as technology, leadership and measuring, physical settings that are very significant for interaction (Hatch, 1987; 388) the subject has not been on their agenda sufficiently. It can be stated that it has largely been ignored by managers and scholars (Davis, 1984; 271). However, physical settings can be a key component in the management process of knowledge creation and sharing technological tools.

As a dimension of organizational culture, physical settings and artefacts have an important impact on issues related to knowledge management. Artefacts can have a significant effect on both knowledge creation and sharing. Likewise, the arrangement and design of offices and buildings can play a leading role for the activities of knowledge management.

In order to reveal the tacit knowledge that exists in the minds, individuals should be encouraged to come together in formal or informal environments in workplace. Offices or meeting rooms can serve as formal sites for this purpose. Other informal sites within workplace such as dining areas also may positively affect the activities of knowledge creation and sharing. During breaks people can talk about problems, new ideas and suggestions and can create new knowledge by sharing their own tacit knowledge through informal meetings. Since the knowledge creation process is not linear, knowledge is created in a spiral context that integrates opposing concepts such as 'order and chaos', 'part and whole', 'mind and body', 'tacit and explicit', 'self and other', 'deduction and induction', and 'creativity and efficiency'. Because of this chaotic nature of knowledge creation, physical settings are very important for arranging a chaotic workplace. In this kind of workplace knowledge creation activities can be supported by qualified speeches between experts, and this can be more useful than other technological tools for creating and sharing knowledge.

Keywords: knowledge creation, knowledge sharing, physical settings, artefacts

Context (Where & What)

Organizational Culture, Artefacts and Physical Settings

Knowledge creation and sharing issues are closely connected with organizational culture. Much research (Leidneri Alavi and Kayworth, 2006; Pauleen, Wu and Dexter, 2004; Balthazard and Cooke, 2004) has focused on the relationship between knowledge management activities and organizational culture. Knowledge management efforts are often seen as a means to encounter difficulties of organizational culture. However, knowledge management activities have been observed in limited impact. Similarly, an Ernst and Young study (Leidner, Alavi and Kayworth, 2006) identified culture as the biggest impediment to knowledge transfer, citing the inability to change people's behavior as the biggest hindrance to managing knowledge. In another study of 453 firms, more than half indicated that organizational culture was a major barrier to success in their knowledge management initiatives. Consequently, there seems to be an agreement that organizational culture is a key factor for the implementation of successful knowledge management (Abdullah, 2006).

Culture was defined by Hofstede as a "collective programming of the mind that distinguishes the members of one group from another" (Pauleen, Lingand Dexter, 2004). According to another definition (Schein, 1985; 9), culture is "a pattern of shared basic assumptions that the group learned as it solved its problems of external adaptation and internal integration, that has worked well enough to be considered valid and, therefore, to be taught to new members as the correct way you perceive, think, and feel in relation to those problems."

According to the definitions mentioned above, culture can be divided into four main dimensions: values, artefacts, assumptions, and symbols.
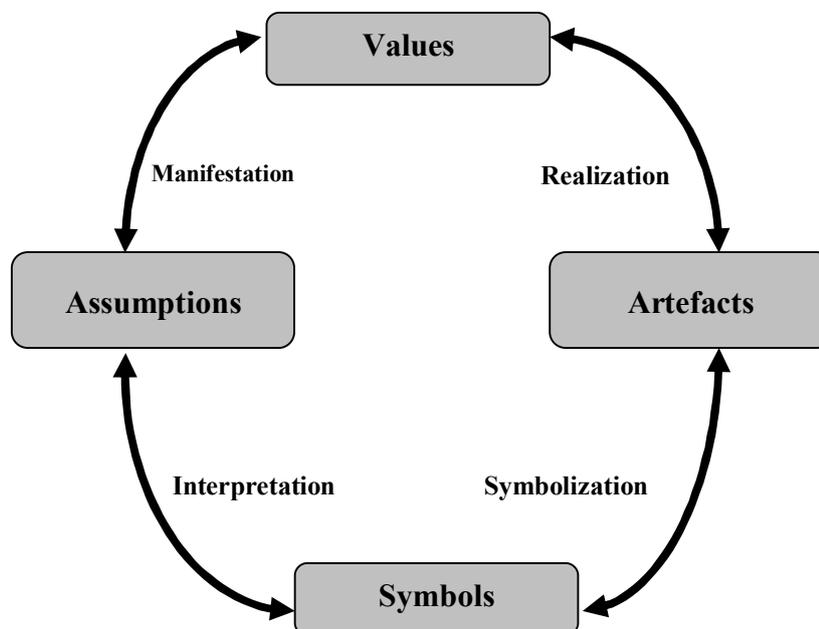
Figure 1: The Cultural Dynamics Model

Based on knowledge creation and sharing activities, the component of 'artefacts' is one of the most important dimensions in which sees, hears, feels, language, technology, products, creations and style, clothing, manners of address, myths, stories are contained. This type of cultural di-

mension is easy to observe but difficult to decipher. Artefacts consist of physical settings, technology, and products.

Knowledge and Culture

As a dimension of artefacts, physical settings are closely related to knowledge creation and sharing activities in knowledge-based organizations producing knowledge-intensive goods/ services. Knowledge creation and sharing is a leading challenge to focus on in this kind of organizations. This is due to the fact that knowledge creation and sharing activities need both technological infrastructure and intensive interaction between individuals. It would be possible to create new knowledge and share all types of knowledge by employing 'people interaction' and information/communication technologies (ICT). Knowledge managers should do some arrangements for physical settings to get and maintain the intensive interaction between individuals in order to build an appropriate environment within the workplace for creating and sharing knowledge.

There are two types of knowledge within an organization that can be called 'tacit and explicit knowledge'. Nonaka and Takeuchi (1995) clearly distinguished between the two types of knowledge. They stated that explicit knowledge refers to intellectual artefacts (books, documents, manuals, theories, models, simulations and their interpretations, mathematical expressions, tables, graphs, databases, and so on). It encompasses all levels of cognition (including information and data) that can be put into visual presentations, words, or numbers. On the other hand, tacit knowledge refers to cognition that resides in people's heads, such as cumulated wisdom and understanding, institutional knowledge, organizational lore, and basic orientations. It also includes personal knowledge embedded in individual experience in the form of rules of thumb, values, preferences, intuitions, and insights (Baker and Badamshina 2002; Gray and Densten, 2004), i.e. unconscious knowledge we possess (compare Polanyi's famous aphorism "We know more than we can tell."). Tacit knowledge consists of habits and cultures that we do not recognize in ourselves. In the field of knowledge management, the concept of tacit knowledge refers to a knowledge which is only known an individually and that is difficult to communicate to the rest of an organization (http://en.wikipedia.org/wiki/Tacit_knowledge).

Main sources of tacit and explicit knowledge can be classified as in Table 1. Tacit knowledge generally consists of experience, wisdom, skills, values, beliefs, and mental models while explicit one includes books, reports, documents, manuals, databases.

Table 1: Two Types and Sources of Knowledge

Type of Knowledge	Source of Knowledge
Tacit Knowledge	Experience, expertise, wisdom, intuition, insight, skill, culture, value, understanding, belief, mental models etc.
Explicit Knowledge	Report, books, documents, manuals, tables, graphs, models, databases etc.

In the concept of knowledge management, both tacit and explicit knowledge represent critical areas to capture, classify, store, and share within the organization. Due to physical settings highly related to tacit knowledge, the relationship between physical settings and tacit knowledge is required to be more important. In this view, physical settings may offer valuable support to reveal tacit knowledge from individuals. This is due to the fact that office characteristics related to physical settings might also influence the amount of interpersonal contact among experts. These characteristics can be classified as openness, density, architectural accessibility and darkness (Oltham Rotchford, 1983; 542). However, the location of amenities such as drinking foun-

tains, dining areas, or coffee pots can also be seen as physical settings, and it leads to the forms of spontaneous communication so necessary for organizational success. These physical features can bring people together or keep them apart, facilitate or frustrate both individual and organizational goals (Carnevale, 1992).

Knowledge Creation Process and Physical Settings

Tacit knowledge is based upon information and bound to people. As knowledge is not static but highly dynamic, the question is how to establish creating and sharing of knowledge (Lemken, Kahler and Rittenbruch, 2000). Nonaka and Toyama (2003) defined knowledge creation as a process in which various contradictions are synthesized through dynamic interactions among individuals, the organization, and the environment. They also argue that knowledge is created in a spiral that integrates opposing concepts such as 'order and chaos', 'micro and macro', 'part and whole', 'mind and body', 'tacit and explicit', 'self and other', 'deduction and induction', and 'creativity and efficiency'. The approach focuses on the flow of knowledge that originates within individuals and is then made available to others in the organization. The process is related to the conversion of tacit into explicit knowledge and is consistent with the view that 'knowledge is a phenomenon in motion' (Gray and Densten, 2004).

Nonaka and Takeuchi's (1995) model of knowledge creation and conversion – the SECI process (Socialization-Externalization-Combination-Internalization) – emphasizes that knowledge conversion is a 'social process between individuals and not confined within an individual'.

Figure 2 provides details of the four modes of knowledge conversion commencing with socialization where individuals share experience and mental models to refine knowledge. Tacit knowledge is converted into explicit knowledge through a process referred to as externalization.

I= Individual; G=Group; O=Organization E=Environment
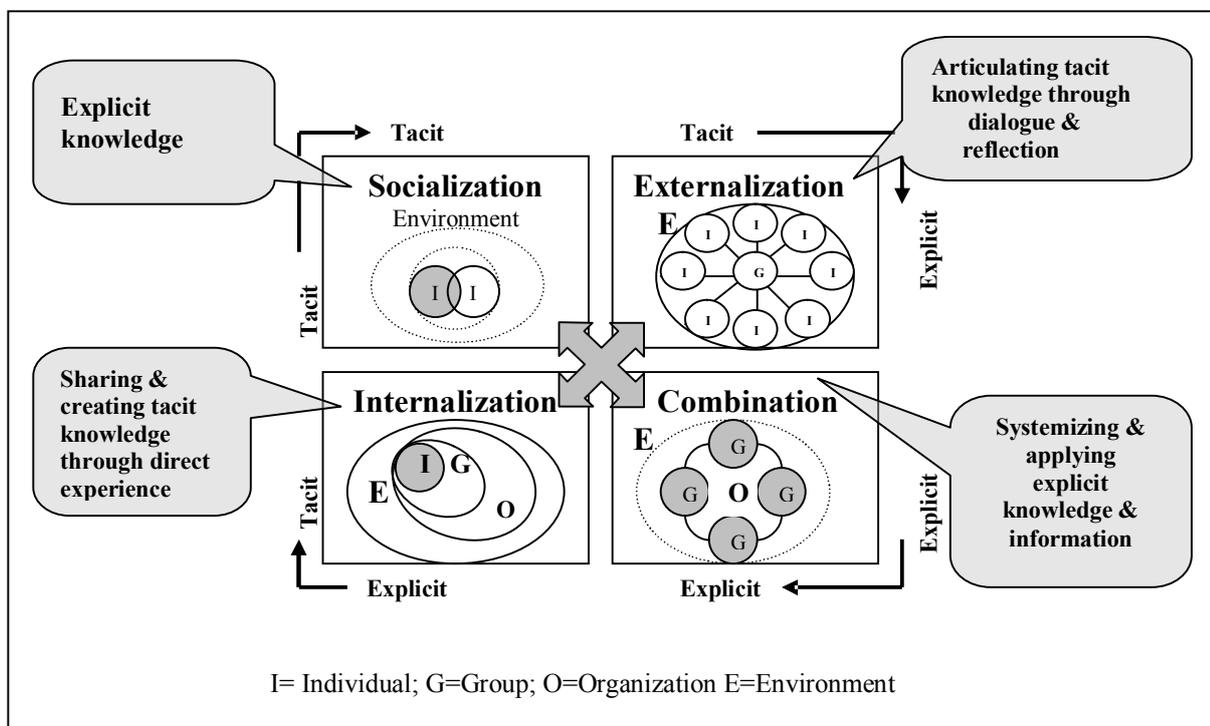
Figure 2: Four Modes of Knowledge Creation

This translation process allows 'the individually held tacit knowledge concepts to be crystallized and shared with other members creating new knowledge'. The combination or knowledge sophistication mode where knowledge is articulated, shared, and expounded involves explicit knowledge reconfigured into more complex explicit knowledge. Finally, internalization refers to

the mode where explicit knowledge becomes internalized through knowledge interpretation and is converted into tacit knowledge (Gray and Densten, 2004).

Organizations provide various settings for the knowledge creation activities. In this process, socialization and externalization of tacit knowledge offer more valuable output than explicit knowledge. Therefore, physical settings for the socialization and externalization of tacit knowledge are relatively important. In such an environment, individuals who have tacit knowledge can meet with others and have quality discussions on the problems of the organizations or on some improvement projects. All of these communications help to knowledge creation activities.

Knowledge Sharing Process and Physical Settings

Knowledge sharing is another important phase in organizational life. After tacit knowledge being revealed and explicit knowledge stored, there is a necessity to share for creating a value by innovations and also innovative ideas. Technology and computer infrastructure can foster knowledge sharing but tacit knowledge sharing needs more social organization than others. It grows up in social atmosphere with individuals and groups. Within this context, organizations should design their spatial layout based on knowledge strategy as spatial layout influences the social interactions that are necessary both for effective task performance and knowledge sharing activities. (Carnevale, 1992).

Individuals and groups within organization should come together and experience face-to-face interactions in order to create and share tacit knowledge. However, face-to-face communication should be designed carefully for gathering clear benefits. Additionally, physical settings (buildings, offices, resting areas, etc.) and some arrangements (drinking fountains, dining areas, or coffee pots etc.) based on organizational architecture can facilitate people to create new ideas, to focus on solving organizational problems and to share their insights to develop new products by face-to-face interaction. Managers should be aware of physical settings' importance both for the socialization and externalization process and the necessity for action plans based on this fact and should make some arrangements related workplace. In formal and restricted workplaces experts continuously work for routine tasks themselves while they cannot contact others. But by using open-offices and related arrangements (drinking fountains, dining areas, or coffee pots etc.) they can reach thousands of contacts and can easily reveal tacit knowledge.

In general, the positive effects of open office result from improved knowledge flow and greater friendship opportunities and chance to observe and learn from happenings in the workplace (Carnevale, 1992). Besides, open offices and related physical arrangements (drinking fountains, dining areas, or coffee pots etc.) offer big social networks and contacts. Consequently, organization and its managers should take into consideration physical settings and should bring individuals together to face-to-face communication for fostering tacit knowledge sharing.

Preparation (The Checklist)

In order to encourage knowledge creation and sharing in a knowledge-based organization, it is necessary to create a supportive organizational culture for gaining importance to share tacit knowledge. In organizations, where people produce value through knowledge, an interactive environment supported by top management is indispensable. Especially the socialization and externalization phases of tacit knowledge are based on interaction among individuals. According to some authors (Canter, 1976; Proshansky, Ittelson, & Rivlin, 1976), building design and physical location within building influence interaction and relationship. Additionally, another study of an apartment complex carried out by Festinger, Schacter, and Back (1950) showed that interaction patterns and the development of friendship among the residents were strongly affected by their relative location in the building. Rooms located close to one another increased interaction and relationship development among residents (Davis,1984). These intensive interaction possibilities should be set in every side of organization both formally or informally. The important point here is top management support for all types of interaction and communication which must be kept under the evident principles ground. Developing or designing some basic principles for the meeting places and speeches can have a positive effect on the socialization and externalization process. Besides, physical settings also reduce distance between individuals and bring them together. Social density has significant consequences for the degree of interaction in workplace (Carnevale, Rios, 1995; 223). When distance is reduced, numbers of social contacts increase regularly. As seen in figure 3, only two people have a social channel but each additional person has geometric effects on the number of communication channels.
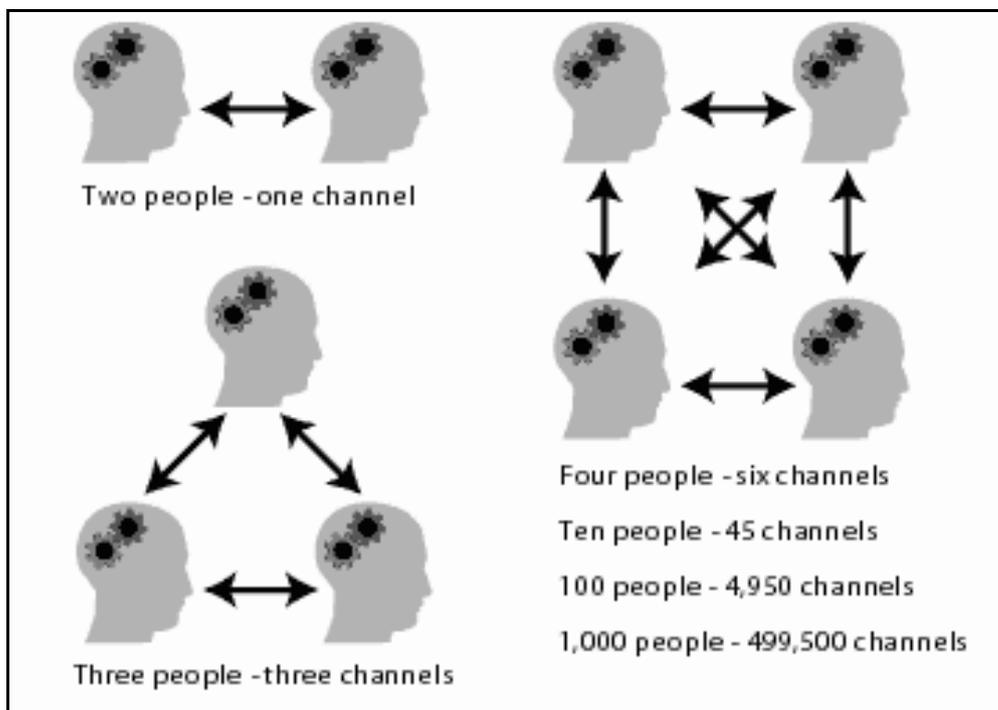
Figure 3: Geometric Growth of Communication Channels

This type of culture, which has intensive interaction and communication, needs the support of top managers, some tools which encourage knowledge creation and sharing activities and reward programs. Firstly, some physical arrangements should be done to allow people to come together in different environments within organization. This step is primary necessary to reveal tacit knowledge. When knowledge experts come together in a different context and side in organization, they may interact to make new strategies, to develop a new knowledge vision and to talk

about their opinion on success of new products in market. This context enables qualified speeches and these may also serve to improve new ideas. In the process of qualified speeches, individuals transport own messages regarding the lack of new ideas to others and help to develop them. Coming together of many individuals with different knowledge and experience to create knowledge is the essential subject within this method (Davenport, Prusak, 2001; p.95).

Consequently, managers should make some arrangements related to physical settings which enable interactions and qualified speeches. Different knowledge experts from different departments can come together at the same time and in the same environment by using physical settings. Settlement of departments and offices within buildings can be designed based on knowledge creation and sharing. And more and more important thing, every expert groups should have knowledge agent to provoke these activities. Otherwise these groups can become "gossip communities".

Toolkit (The Essentials)

Organizational spaces for qualified speeches should be planned and designed by knowledge managers. As physical settings affect both individual and group knowledge creation, physical setting of offices, buildings and other workplaces should take into consideration knowledge strategy. Like other important components of culture such as trust, values etc., physical settings can be used as an effective tool. Technological tools may also facilitate knowledge sharing but may not achieve socialization and externalization of tacit knowledge. Contrary to technological tools, the design of buildings, offices and meeting rooms, the location of departments and eating spaces, drinking fountains, dining areas, or coffee pots can collectively support knowledge creation and sharing effectively.

Offices are most common spaces related to physical settings since they are special living areas of individuals and individuals also maintain their cognitive efforts in these spaces. Main reasons for organizations to move to an open office strategy are not only to control workers easily and reduce costs productively but also to enable knowledge creation and sharing. While in the past one or two persons were working in an office, there are high numbers of experts in any open offices now. People who are centrally located or who are in high traffic areas of workplaces are likely to interact with more people than those in isolated areas of the building (Davis 1984). Every top manager and knowledge manager who cares about knowledge should design this kind of offices and should also facilitate knowledge creation and sharing.

Meeting rooms are also the place of formal knowledge creation and sharing and frequently used by knowledge experts for these tasks. Experts come together in meeting rooms to study on a project, to inform others about last developments and to solve problems by using some collaborative interaction methods. In the meeting rooms, knowledge creation and sharing can be achieved by "qualified speeches". Although only formal meeting rooms are not sufficient for knowledge creation and sharing activities themselves, they still have an importance to realize them formally. If an organization does not have informal places for informal interaction, members of organizations can focus on fixed tasks in formal ones.

Informal places in organizations can also facilitate knowledge management activities. As organizational knowledge creation is nonlinear and interactive, there is no possibility to say that knowledge creation and sharing activities can be hold only at offices and meeting rooms at certain times. This is due to the fact that sometimes new innovative ideas or solutions of any problem can surprisingly appear in an unrelated context, time and place. Knowledge managers should try to push knowledge experts out of formal offices and meeting rooms to spend their time in chaotic environment. Coffee-breaks and dining times can be effective examples for this case. These times have big importance related to knowledge activities although they are short. This is

because environments get nearly chaotic is an individual mind, which focuses on specific subjects, suddenly joins a new environment and group. This chaotic nature enables both recreation of knowledge through socialization and externalization. Consequently, coffee-breaks and cafeterias, designed and organized based on knowledge strategy, support knowledge activities.

Making it Happen (The Approach & the Action)
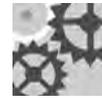
The literature on physical settings has extensively discussed the importance of workplace design (Carnevale, 1992; Hatch, 1993; Yitzhak, 1990; and Domahidy, Gilsian, 1992) for affecting social networks, knowledge creation and sharing. Moreover, settlements of departments and offices – even drinking fountains, dining areas, or coffee pots etc. – have gained much importance. Offices have been more open and experts have been closer for many years.

The effects of open offices could be examined from either a social relations or a socio-technical perspective. In the social relations view, an environment acts like a catalyst affecting the quality and level of social interactions and communications among its inhabitants. For example, physical proximity can provide many opportunities for the development of interpersonal relationships, which may result in high interpersonal attraction, satisfaction, and motivation (Zalesny, Farace, 1987; 241). Both social contacts and qualified speeches appear in this context.

Social contacts and qualified speeches may cause knowledge creation by using tacit knowledge in workplace. The importance of speeches in organization has not been sufficiently researched by authors. Westley (1990) has analyzed the participation of middle level managers in speeches about strategy. Similarly, Von Krogh and Roos (1996) have investigated content and style differences in speeches that focus on strategic perspectives and operational subjects. However, research on speeches in business environments that support knowledge creation has not been sufficiently studied yet (Krogh, Ichıjo, Nonaka, 2002; p.149).

All qualified speeches and contacts may have a nucleus of valuable knowledge as follows: explaining of individual visions, telling about individual ideas orderly and carefully. So speeches can transfer tacit knowledge to others within well designed physical environment. Every expert in organizations thinks about others' ideas and may help to develop these ideas. Thoughts, views, beliefs, and approaches transfer occurring in speech processes enable to share tacit knowledge as the first and the most important step of knowledge creation in micro communities (Krogh, Ichijo, Nonaka, 2002; p.147). According to Krough, Ichijo and Nonaka (2002), in modern business environments speeches have a main role for social knowledge creation. As the important thing in order to achieve this case, individuals with different knowledge and experience by using physical settings should come together (Davenport, Prusak, 2001; 95). Related to physical settings, individual knowledge creation process is explained below to get depth understanding.

Individual Knowledge Creation and Physical Settings

Although managers and authors have not focused on the importance of speeches yet, they offer the critical key to knowledge creation. Workplace spaces can be transformed in an appropriate way so as to enable knowledge creation and sharing by means of speeches. Figure 4 depicts the model where information is acquired through the sensors and processed in the brain by using prior knowledge. During the processing of information, new knowledge can be acquired or created for future use, when more or new information is acquired and processed (Beveren, 2004).

While Figure 4 explains information acquisition and knowledge creation within individual mind, Figure 5 mentions transfer of this knowledge to information by externalization from human brain.
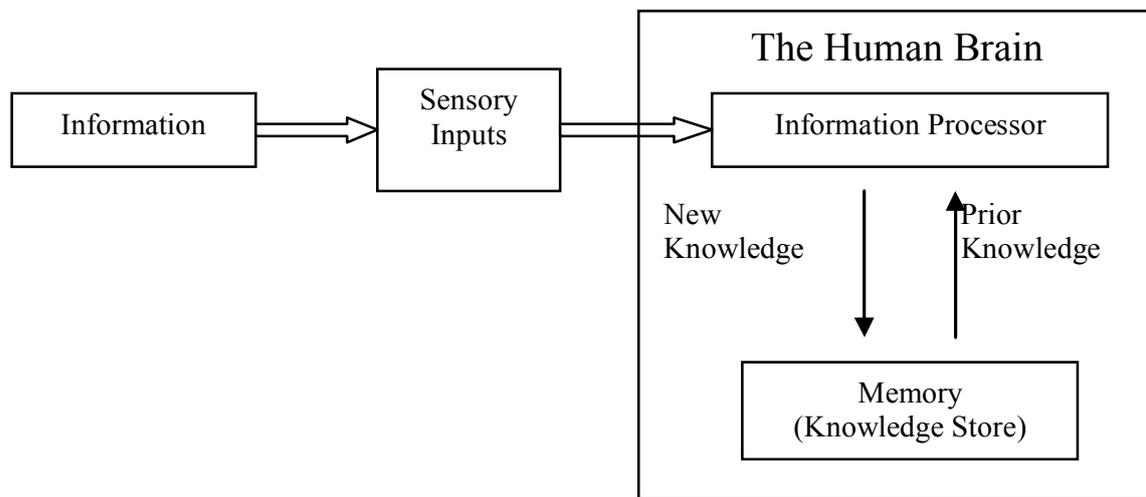
Figure 4: Model of Information Acquisition and Knowledge Creation within the Brain

In both cases, it is very important that individuals should be in a social atmosphere to contact each other by both creation and transfer. This refers to physical settings which assist knowledge creation and sharing.
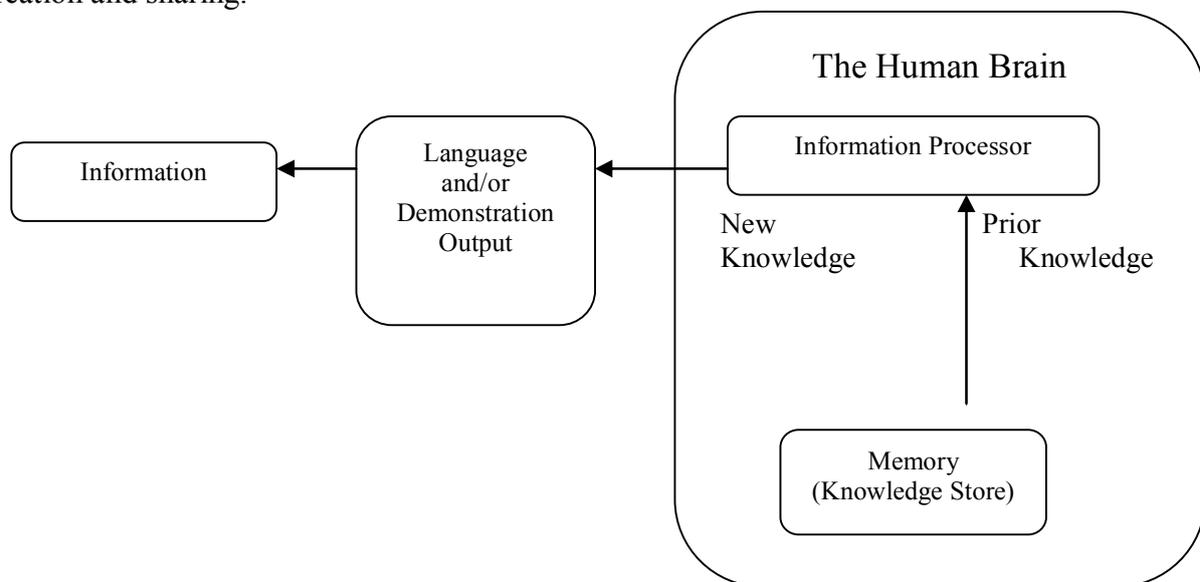
Figure 5: Model of Knowledge Transfer to Information for Externalization

Individuals have knowledge creation processes, but some external components may also facilitate individual knowledge creation. Physical settings of organizations play an important role to reveal tacit knowledge. It also offers basic opinions on whether or not getting employees together in the same environment. In the offices design process, meeting rooms, departments and even cafeteria and coffee-break space, managers should take into consideration knowledge management strategy. Thus, organizations may get the effective infrastructure which facilitates socialization and externalization of tacit knowledge.

If an organization wants to get value from tacit knowledge, managers should structure and continue their physical settings based on the knowledge management strategy. Individuals can not be effective in revealing tacit knowledge by means of formal meeting rooms and offices only, as knowledge creation processes are chaotic by nature. However, informal environments in which people often meet and talk to each other are needed to support knowledge creation. In such an atmosphere, experts can come together to find a solution for the problems and they can create

innovations for business process or products. They can also share tacit knowledge from one to another to create an organization which is based on knowledge management.

In fact, organizations can use different tools to reveal both tacit and explicit knowledge. Figure 6 explains how explicit and tacit knowledge are created and shared through different collaborative tools. Every organization has both tacit and explicit knowledge as usual and both of them offer potential organizational knowledge indeed. Individuals and groups have a different form of this potential organizational knowledge and knowledge management concepts really deal with capturing, classifying, storing and sharing this it by using some collaborative tools.

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┌─────────────────────────────────────────────────┐
│           PHYSICAL SETTINGS                      │
│ (Collaborative Tools for Knowledge Creation and  │
│                Sharing)                          │
│                                                  │
│  Design of buildins, offices, drinking fountains,│
│         dining areas, or coffe pots etc          │
└─────────────────────────────────────────────────┘
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POTENTIAL ORGANIZATIONAL KNOWLEDGE

Individuals and Groups

TACIT KNOWLEDGE

experience, expertize, wisdom, intuition, insight, skill, culture, value, understanding, belief, mental model etc.

EXPLICIT KNOWLEDGE

Reports, books, documents, manuals, tables, graphs, models, databases etc.

ORGANIZATIONAL MEMORY (KNOWLEDGE STORE)

TECHNOLOGIES & FORMAL PROCEDURES
(Collaborative Tools for Knowledge Creation and Sharing)

hardware, software, formal meeting, collaborative technological tool, e-mail, newsletter etc.

Figure 6: Role of Collaborative Tools for Revealing and Sharing Knowledge

Explicit knowledge is easily created and shared by books, databases, manuals, reports etc. based on technologies and formal procedures. For example, individuals simply join a database by interface but creating and sharing tacit knowledge has a more sophisticated chaotic nature. However, physical settings may be an effective catalyst to reveal and share it. For instance, dining times are really chaotic and sophisticated, too. In these areas and times individuals spontaneously come together and share their problems by talking to each other. If these "spontaneous meetings" are managed consciously in many informal areas of workplace, there would be sufficient knowledge for creating and sharing activities.

Consequently, when organizations take into consideration potential organizational knowledge it is necessary that a strategy should be developed for revealing and sharing both tacit and explicit knowledge. Especially, tacit knowledge requires some physical arrangements in the workplace.

Results & Next Steps (The Follow-Up)

The main result of social density and qualified speeches is innovation by innovative ideas within well designed building and offices. Individuals in this atmosphere can create and maintain innovation efforts. Although today's organizations attach importance to innovation through R&D departments, these departments can be accepted as heritage of industrial society. In the information age, however, if an agreement exists that producing innovations is merely an R&D task, managers can face up some paradox, hidden possible innovations. Thus, when physical settings of organizations are formed by contacts, interaction, communication and qualified speeches, value to provoke innovations and ideas by these activities is expected.

Organizations should consider some additional tasks after having systematic knowledge creation and sharing activities by using physical settings. Firstly, managers must make an effort to maintain these activities continuously. This can e.g. be done by means of motivation tools embedded in the corporate performance measurement system. Secondly, some knowledge agents must be selected and diffused within organizations through departments. These agents offer big chances to maintain knowledge creation and sharing and they can improve quality of speeches, contacts and knowledge flow within this process. Finally, managers also should consider the output of knowledge strategies by using some measurement methods. Measurement of strategy has a vital importance to define benefits of physical settings for knowledge creation and sharing. If there has not been progress related to product and process innovation, the method should be scrutinized and carefully redesigned.

Tips & Tricks (To-Do)

In order to realize contacts and qualified speech within organization, managers should make some arrangements and produce some principles based on knowledge workers:

☑ **Support people to talk about their ideas:** In order to generate an organization which creates and shares knowledge, managers must initially create an organization consisting of outspoken workers by using support of top managers. Knowledge workers should be offered the freedom to express their ideas on every subject of the organization. Not ideas which are created are valuable or innovative but within all ideas, some valuable and innovative ones will be an important contribution for the organization.

☑ **Make investment in people who have tacit knowledge:** If tacit knowledge has importance for organizations, making investment in workers is primarily necessary. Especially, organizing physical places to provide positive climate for knowledge creating and sharing activities has vital importance for managers.

☑ **Encourage formal and informal interaction:** Every organization has both formal and informal communication. However, in some organizations formal speech can be an obligation for sharing knowledge and also can turn into a power-show. At the same time informal speech can be restricted whilst formal and informal communication can produce innovations with qualified speech. The main role of a knowledge manager is not to create limits or power-show scenes but to develop principles which will prevail in formal and informal speech areas and also to make arrangements about increasing speech quality.

☑ **Award for knowledge sharing:** If an organization has a clear knowledge strategy, managers should develop an award system. As knowledge creating activity is naturally chaotic, it is very difficult to **assess** its value at first sight. Valuable ideas, however, that were produced by knowledge workers can be gathered by qualified speech and outputs of valuable ideas cannot appear immediately. Managers should always notice that award systems gradually support the constitution of a liberal organization.

Potholes (Not-to-Do)

☒ **Avoid being rule-less:** Managers and organization members rely on spontaneous, chaotic and unplanned meetings with others. A small part of these interactions may not be related to organizations but another part may affect others positively. When directing knowledge experts to communicate on knowledge creating and sharing base, some principles should be designed. Otherwise, managers can face up to "shirkers" problems which are feared by managers or "aimless speeches" that depend on quality of message.

☒ **If tacit knowledge has no strategic importance, do not consider it elaborately:** Physical settings which provide contacts and qualified speeches should be designed by considering tacit knowledge. If products of organizations do not require consideration of tacit knowledge, knowledge creating and sharing activities may cause wasting time and individuals can turn to other subjects by leaving main subjects.

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Future Workshops - The Unthinkable and How to Make It Happen

Peter Troxler and Beate Kuhnt
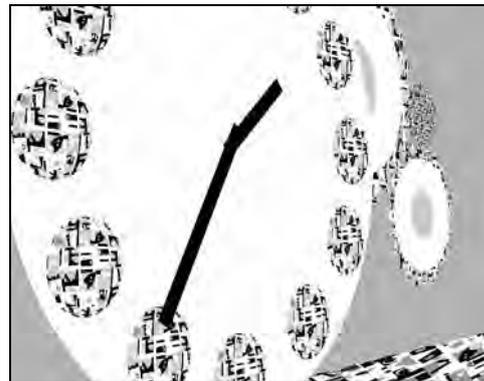
Future Workshops -
The Unthinkable and How to Make It Happen

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Snapshot (Quick Learning)

Future Workshops are a method to develop a vision of the future shared by the participants. These workshops primarily aim to encourage socially or otherwise excluded people to take an interest in their future and to pursue their dreams. The method is fundamentally driven by their creative energy, and it emphasizes the equal status of participants regardless their social, political, etc. background and role.

Future Workshops are best used in a context where there is scope for action and where collective efforts are required to change a restrictive environment to better suit the needs of its users. Ideally the participants of a Future Workshop are supposed to take responsibility for the expected changes and also given the respective authority and resources to initiate this change.

Future Workshops combine analytical (rational) and creative (intuitive) phases to

1. Analyse a given, current situation,

2. Develop visions of the future and

3. Agree on an action plan how to reach these desired results.

Participants of a Future Workshop thus embark on a cathartic journey, starting by naming the curse of today and the fears of the future, continuing by being allowed to dream and so to overcome the constraints of everyday life and the normative power of the factual, eventually ending up developing and initiating concrete actions towards a desirable and better future.

While carried out under a strict time management regime, Future Workshops are extremely open to any content addressed by participants. 'Everything said is important', 'everyone gets the opportunity to speak' and 'everything is recorded' are the underlying principles for true and equal participation. This is supported by a variety of facilitation techniques.

Future Workshops are instruments of fundamental empowerment. If conducted properly they result in powerful action plans and a high commitment of participants to carry actions through.

Future Workshops also might result in cohesive and effective action against established powerful institutions.

Future Workshops have been employed initially in community settings, in the peace movement, the green movement, etc. Even though the method may have been deployed successfully in business, we hesitate to recommend it for use in a context where 'disruption', 'participation' and 'empowerment' are believed to best not interfere with shareholders' interests.

Keywords: action planning, participation, social inclusion, disruptive, empowerment

Context (Where & What)

Future Workshops are best suited for solving problems in organisations such as factories, co-ops and unions, schools and youth centres, pressure groups and voluntary organisations, neighbourhoods and communities.

Future Workshops are a method to develop a vision of the future shared by the participants. These workshops primarily aim to encourage socially or otherwise excluded people to take an interest in their future, to develop a belief in being powerful by themselves, and to give them the prospect to achieve their dreams. The Future Workshop is fundamentally fuelled by the creative energy and equal status of participants regardless their social, political, hierarchical etc. background and role. It is a collective method that stresses the equal status of individual participants and the collective ownership of results. Future Workshops are instruments of real empowerment and can result in cohesive and effective action units against established powerful institutions.

Future workshops combine analytical (rational) and creative (intuitive) elements into three phases, i.e.

> (1) To analyse a given, current situation,
>
> (2) To develop visions of the future and
>
> (3) To agree on an action plan how to reach these desired results.

(1) The analysis of a given situation is the **critical appraisal** phase (or simply critique phase as it has been named in the original translation of the method (Jungk & Müllert, 1987)). Its aim is not to produce a rational, well-balanced, consensus view of the current situation. Quite the opposite should happen in this phase. Participants are asked to name all the negative aspects of the current situation, and all the fears of the future they have. The critical appraisal will inevitably draw a dark picture of the present and a bleak outlook into the future. This is essential for the whole Future Workshop since it is believed that only if participants can express their negative feelings they are able, in the next phase of the process, to leave them behind and invent a new, positive future.

(2) To develop visions of the future is the aim of the **utopian fantasy** phase (or simply fantasy phase). As radical as the critique had to be in during critical appraisal, as radical the utopias should become in this phase. Particularly the constraints of money, power and politics can safely be ignored. Participants are allowed and actively encouraged to dream. The normative forces of the factual no longer should dominate the discourse. Yet participants will not just generate endless wish lists. They will have to develop coherent descriptions of Utopias, defined as 'place[s] of ideal perfection especially in laws, government, and social conditions' (Merriam-Webster Online, 2006).

(3) Realisation—i.e. to transform Utopia into a picture of a desirable future, and to initiate first steps towards that future—is the aim of the **implementation** phase. This is difficult to achieve; and it is best done in several iterations, approaching the desirable from the far end, e.g. by identifying those characteristics of the Utopias that relate most closely to existing realities. Finding analogies and examples of 'what is possible there could also be possible here' is essential to avoid getting trapped by accepting constraints as given instead of challenging them. Once a description of a desirable future has been found, the last stage in the process is to start to make it happen. A Future Workshop ends with an action plan that brings a first step towards a better future within reach of the participants.

The length of a workshop varies from less than one day to one week. Ideally, one should allocate one day per phase. The workshop would need to be led by at least 2 facilitators. The number of participants ranges typically from 25 to 50 people. However, Future Workshops with over 100 participants have successfully been held, requiring up to six facilitators. Variations with even bigger audiences could probably be realised by integrating Open Space approaches.

A team of facilitators ensures that the three phases and the basic principles are respected, i.e.: 'everyone is important', 'everything said is important', 'everyone gets the opportunity to speak', 'everything is written down or visualized'. The facilitation techniques should be varied in order to generate a diversity of opinions, ideas and proposals. Techniques typically employed include: brainstorming, ranking, mind-mapping, fantasy travels, role-play, reportage, collage and painting. Further, the facilitators are responsible for the preparation and the documentation of the Future Workshop.

It is important to keep in mind the context Future Workshops were developed in. Their invention goes back to the 1960s when Robert Jungk, then journalist, later professor of future research at TU Berlin, experienced the long-term impacts of the nuclear bombings on civilians in Hiroshima. He decided to establish future research in Germany as a discipline that studies the long-term impacts of decisions driven by a predominantly techno-scientific society. However, he found, particularly during the first international conference of future scientists, held in Oslo in 1967, that 'experts, politicians and managers started to colonise the future. In the past only countries were colonised, now they started to subdue time by determining the future. From this insight the question arose how we could let as many people as possible participate at formulating and designing the future. (...) In the early sixties I thus started the first Future Workshops giving the people concerned the possibility to meet, to unleash their hidden potentials and to mentally prepare for social change.' (Weirauch, 2002).

Preparation (The Checklist)

The main preparation goes into establishing the aims of the Future Workshop. From these aims the initial question has to be developed which is required for starting the critical appraisal phase. It is important that this initial question actually opens up the analysis of the issue to be worked on. So questions should start with 'What are your concerns ...?' or 'Which are your fears ... ?' (but obviously not with 'how' or 'why').

The second main effort goes into the meticulous planning of the Future Workshop. It is absolutely essential to allocate enough time for the last phase, the implementation. A good rule of thumb is that the implementation phase could take almost 50 % of the actual working time of a workshop (i.e. excluding breaks and housekeeping announcements). Utopian fantasies equally require some time, maybe 1/3 of the working time. The remaining time is then allocated to the critical appraisal. It is important to be aware that participants tend to stick with moaning, so the transition from the critical appraisal to the utopian fantasies has to be designed with special attention. Similarly, the transition from utopian fantasies to implementation requires participants to change perspective, which needs support from the facilitators.

When designing the schedule for the workshop, facilitators have to create a good balance of plenary and small-group activity, schedule enough breaks and allocate time for 'off-duty' activities such as relaxing, chatting, etc.

Also, the material needed and appropriate facilities have to be ready for the workshop. Suggested material (for a workshop with about 25 participants) is 30 flip-chart sheets or a paper roll (1,5 meters wide, 20 meters long), 50 pastel crayons in various colours, scissors, 5 rolls of masking tape, glue, 300 sheets A4, 300 sheets A3. The facilities should be flexible, allowing for plenary

session and breakout groups. Furniture will have to be moved, and it is necessary that sheet with workshop results can be sticked to the walls.

Toolkit (The Essentials)

The essential ingredients of a Future Workshop are on the one hand facilitation principles and techniques, on the other hand an adequate set of tools and materials. In strong contrast to many more recent facilitation techniques, a Future Workshop requires no sophisticated toolkit, available only through specialist retailers – no fancy magnetic shapes, dedicated computer programs or specialist pens. Scrap paper, pastel crayons and masking tape are the main ingredients – the less gadgetry the more the Future Workshop can focus on the content.

Facilitation principles, techniques and skills, however, are the essentials for conducting a Future Workshop. Many of these principles are general facilitation principles, such as being sensitive to the groups needs, listening to constructive criticism and responding appropriately, confronting problems and difficulties, being supportive, encouraging all group members, using questions instead of statements, etc.

Also, common facilitation techniques are used quite extensively in Future Workshops: clarification of statements, clustering of items, combination of similar ideas, prioritizing techniques, negative poll (elimination of low priority items), setting un-related items aside for later use, question techniques such as the nominal group technique, force field analysis, storyboarding, etc.

Additionally, Future Workshops employ a specific facilitation pattern. It is sometimes referred to as the 'funnel pattern'. It gets used at least once per phase, in longer workshops also twice or more often. The funnel pattern of a Future Workshops consists of six steps:

a. *Prepare* the participants by stating the question or topic and creating an atmosphere that supports the current phase (i.e. critique, fantasy, or implementation). This is typically a plenary session, however sometimes appropriate small group activity can serve the same purpose (cf. below the introduction to the implementation phase in table 3).

b. *Collect* items related to the question or topic by using some facilitation technique such as brainstorming, brain writing, etc. This could equally be a plenary session or some small group activity.

c. *Structure* the items collected above to review the items collected, to get an overview of the material and to reduce the number of items the workshop has to deal with to a more manageable size. Typically one would use some clustering technique.

d. *Expand* the clusters to create a richer picture of the issues that are often summarised in a few words and quite abstractly in the titles of the clusters. This step is extremely useful to create a common understanding of the issues at stake.

e. *Select* the most important, most relevant, most interesting or most innovative etc. issue for future consideration in the next funnel or phase. Quite often this is done by voting on individual clusters or items and then counting the votes. However, a good solution might also be to give participants the opportunity to choose issues they want to carry on with, maybe even despite of high vote counts.

f. *Close* the funnel by reviewing the process, acknowledging the contribution of everybody, pinpointing the results of the funnel and stressing the collective ownership of these results.

The facilitation of a Future Workshop also needs to take extra care for the transitions between the phases. So the transition from the critical appraisal phase to the utopian fantasy phase has to change the mindset of the participants from a more negative, backwards oriented attitude to a positive, creative and future-oriented attitude. A good break and some icebreaker techniques can very well be employed to achieve this transition.

Similarly, the transition from the freely floating utopian fantasy phase to the very much action-oriented implementation phase requires participants to change their mindset again. The facilitators have to support the participants in their work moving from utopian ideas to concrete implementation steps. Useful techniques can be trying to find examples where similar utopias have been realised, trying to identify potential obstacles to implementation, or trying to name possible sponsors, promoters and opponents of the utopian ideas.

Making it Happen (The Approach & the Action)

A Future Workshop consists of three strictly distinct phases:

(1) Critical appraisal: To analyse a current situation

(2) Utopian fantasy: To develop visions of the future

(3) Implementation: To agree on an action plan how to reach these desired results

As with any facilitation method, a Future Workshop starts with an introductory phase that gives an overview over the method, the particular techniques used, the dos and don'ts for the workshop and an introduction into the topic.

(1) Critical appraisal provides an opportunity for the analysis of current structural problems and deficits. This phase could include: collecting critique, complaints, problems and fears related to the topic, establishing the main points of critique, illustrating these points with examples, selecting the most important points for further consideration in the workshop.

The aim of the critical appraisal phase is twofold: Firstly, it helps participants to vent frustration with the topic to be worked on. But, more important, secondly, this frustration and critique is taken seriously and will be fed into a process to actually change circumstances. The critical appraisal phase, therefore, is more than a token wailing wall; it is the first step of a self-directed change process.

Table 1: Example of a Critical Appraisal Phase

Step	Duration	Activity
Introduction	10 min	Facilitators explain the aims of the critical appraisal phase
Critique	20 min	Small group activity: Participants formulate their frustration and critique and jot down keywords on A3 oder A4 sheets of paper
Cluster	30 min	Plenary: critiques are clustered into groups according to similarity
Select	15 min	Plenary: Participants select those critiques groups they deem most important (e.g. by marking them with their initials)
Expand	45 min	Plenary: Participants are asked to tell their own stories relating to those critiques that have been selected; facilitators take notes on a flipchart so they are visible (and legible) for everybody.

(2) In the **utopian fantasy** phase daily problems are left behind and fantasies and visions – here for once not in the sense of 1990s MBA-lingo – are developed. This phase could make use of various creativity techniques, eliciting wishes, ideas, fantasies, or utopias. The phase also aims to identify what is the essentially new, fascinating or innovative content of these fantasies.

The aim of the utopian fantasy phase is to leapfrog common constraints, to overcome self-censoring, to make use of possibilities, to open up imagination in order to create space for thoughts that never have been thought before; imagination is king and all wishes are granted. That implies, that there is no place for critique of ideas, but a lot of scope for picking-up ideas and developing them further.

Table 2: Example of a Utopian Fantasy Phase

Step	Duration	Activity
Get positive	15 min	Work in pairs: For each critique participants describe in one sentence a positive situation where the particular critique would be absent or invalidated.
Introduction	10 min	Facilitators explain the aims of the utopian fantasy phase
Visualize	20 min	Small group activity, according to interest in single aspects of the positive sentences: Participants create a visual representation of their wishes by painting a picture.
Associate	20 min	Plenary / individual work: Participants freely associate ideas, stories, etc. that relate to the imagery created in the step above.
Develop utopias	50 min	Small group activity: Every participant selects one idea from the visualisation and related associations (ideas, stories). The group assembles these into a fairy tale, a play or similar to describe an utopian society or setting.
Evaluate	60 min	Plenary: Small groups present their utopias. The other participants try to identify what novelties and inventions these utopias contain.

(3) During the **implementation** phase, these fantasies are reviewed: How could they be rephrased as demands or requests? How could they be captured as goals or requirements? How could they be formulated as projects and put into action? Who would take responsibility to carry them out? The implementation phase is all about translating fantasies into actual and enacted innovation.

The aim of the implementation phase is to select ideas and develop them further into projects and actionable items that participants can walk away with and start implementing right after the workshop. This is notoriously the hardest phase and often requires quite some orienting intervention by the facilitators. However, it works well if the topic has been chosen carefully— i.e. the topic is relevant and addressable. It is essential that the context of the Future Workshop allows for participants actually to take action.

Table 3: Example of an Implementation Phase

Step	Duration	Activity
Review ideas	20 min	Participants form pairs and review all the ideas generated in the utopian fantasy phase and have to agree on one single idea they like most.
Introduction	10 min	Facilitators explain the aims of the implementation phase
Cluster	10 min	Plenary: Every pair reports the idea they have selected, the plenary attempts to cluster the ideas.
Examples	30 min	Plenary: Participants try to think of examples and analogies where an idea has already been realised in a different context.
Demands	20 min	Small group activity: Small groups form according to interest in ideas. Their task is to formulate what is required for the idea to become reality as concrete demands. Ideally, these demands cover short-, medium- and long-term aspects of the idea.
Vote	30 min	Small group activity: The groups rotate and vote on the demands established by the other groups. At the end, each group selects one of their demands to develop into a project in the following steps.
Develop projects	30 min	Small group activity: Participants formulate a project by answering the questions: What do we want to do? Why do we want to do it? How are we going to do it? Who is going to do it? Who do we need to inform, to consult, to get support from? When and where do we start?
Present and commit	45 min	Plenary: Each group presents their project; the other groups critically assess the proposal, ask questions and critically evaluate the commitment of the group's members to actually take action.

Optionally the implementation phase can be extended by activities such as interpreting the ideas from the utopian fantasy phase, i.e. to guess the 'hidden meaning' behind wild ideas, or collecting ideas, tips and lessons learnt from past experiences of implementing demands or starting a project.

The Future Workshop is then concluded by a focussed evaluation phase, reflecting on positive and negative experiences during the workshop itself.

Results & Next Steps (The Follow-Up)

The Future Workshop ends with one or several concrete projects and action plans. Participants have committed themselves to take action. A better future now seems realisable.

However, it is important to be aware that sometimes 'reality kicks in', that everyday routine quickly can consume the enthusiasm an energy that was set free in the Future Workshop. Commitment to take action is not enough to realise plans. If change is to happen an environment has to be created that supports the drivers of change in achieving results and dealing with resistance. Essentially, this means that the process of change that has been initialised in a Future Workshop has to be managed properly. Thus it is of great value to document extensively the

results of the Future Workshop so the participants can refer to the intermediary and the final results of their work. This is of course only the bare minimum the facilitators of a Future Workshop can offer the participants in terms of support.

It is generally a good idea to schedule a follow-up event with at least those participants who actively want to promote change. Additionally other supporters could be invited to that meeting as well.

Such a follow-up meeting would create an environment that supports change by:

- Creating elements that support change—e.g. by setting up pressure groups, securing specialist support from experts, etc.

- Establishing ways for other people to join the projects or the support groups and to stay on top of what actions are taking place etc.

- Planning for quick wins in the change process.

Real Cases (As it has Happened)

Below we present three real cases where Future Workshops were used to feed into change or development processes. The first case, Youth Strategy, is the most typical application of the method, while the other two cases, Future Town and Oil and the City, illustrate variations of the method.

Youth Strategy

For the development of a joint youth strategy for a rural canton of Switzerland, local teenagers themselves were invited to develop their own vision of what services should be available to them. A one-and-a-half-day future workshop was held with 24 young people aged 12 to 20.

This was a typical Future Workshop in terms of audience, schedule, and expected results. On the first morning complaints about the situation for young people were collected in small groups. In a plenary the topics were clustered, and every participant could indicate their three main issues. These for example included the lack of a McDonalds restaurant, difficult access to sports facilities, or tensions between different nationalities.

The first task of the utopian fantasy phase was first to draw a picture of their ideal canton. The four pictures all showed plenty of leisure facilities and shopping opportunities. Interestingly, one of them integrated them all into a youth centre. As a second task the participants had to think of a good experience they would love to make in their Utopia and to enact it as a small play. This proved extremely popular with the teenagers, and they developed stories where they themselves were the protagonists of their Utopias. One group showed a casual encounter between an old farmer and two young guys. The two guys managed to convince the farmer to allow them to hold a beach volleyball tournament on one of his fields which he eventually enjoyed watching (see fig. 1a below).

The implementation phase already started at the end of the first day, recollecting the issues and ideas the teenagers had generated during the day and opening up a public list of other ideas that had not been discussed in detail. Thus the participants were motivated to think about their projects over night.

The next day saw the development of project ideas. The aim was to be able to present these ideas at the end of the workshop to local and cantonal politicians, teachers, headmasters, youth workers and the general public. The participants worked in small groups on the projects they felt most attached to. Halfway through the morning, they had to present their work to their peers who tried to put themselves in the shoes of the politicians. After lunch, the public was presented with

some of the small plays from the first day and the projects developed so far. Sure they were surprised by the content of the proposals, and the presentation that was much more lively than the usual 'death by PowerPoint'. The principal demand was easier access to sports facilities. But also smaller projects like a notice board for youth events were suggested. Politicians were asked to give their feedback on the projects, and the teenagers could then directly react to it. They engaged the politicians in a quite lively discussion, and the pressure mounted when one politician announced that one of the public sports halls was to be demolished. Faced with the—still very polite—anger of the teenagers, the politicians, headmasters, and youth workers promised to look into the possibility of opening a school's sports facility to youth groups. The reception afterwards offered ample opportunity to continue that discussion.

Figure 1a; 1b: Youth Strategy: participants enacting their Utopia; public presentation (Photos by Peter Troxler).

The consultants who lead the development of the youth strategy, of which the Future Workshop was part, made sure that the teenagers' demands were taken seriously in the later phases of the strategy development project. The representatives of the various government and NGO bodies eventually agreed, that only by joining up their individually limited resources they could live up to the expectations of the youth of this rural canton. Smaller projects such as the notice board were realised quickly. The issue of access to sports facilities, however, proved more difficult to solve; and only recently it was explicitly included as a requirement when the canton started the planning of a new sports centre.

Future Town

The project 'Future Town' was situated in a small suburban town in Switzerland, aimed at helping the city council to establish a development strategy for their town. The workshop formed part of an extended organisational development process that involved the whole city council.

This workshop was not typical of the empowerment intention of the method, since only the 15 elected councillors could participate. The workshop had the standard three phases, phase one and two on the first day, 2.5 hours in the morning and 3 hours in the afternoon, phase three on the second day (3 hours). Participants were invited to prepare issues for the critical appraisal, mainly due to time restrictions. At the start of the utopian fantasy phase, one facilitator-consultant told his story of a possible future of that suburban town. The story was carefully crafted and sometimes offered two or three versions in order not to overly influence the participants. The participants were asked to express their visions graphically (fig. 2a).
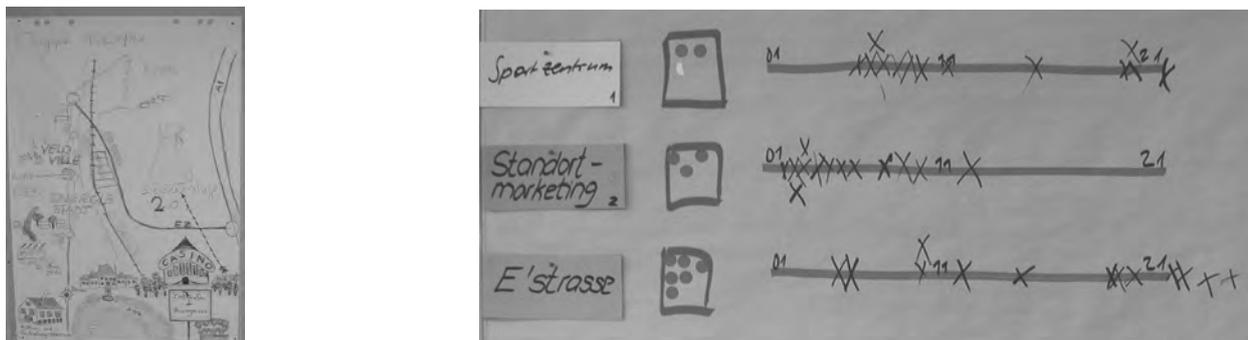
Figure 2a; 2b: Future Town: Graphical vision; potential developments with weighting and projection when they will happen.

In the implementation phase, the participants were not developing an action plan, but they were establishing various potential developments in the town and the socio-political environment. At the end, they had to select what they felt were the most important developments and indicate when they expected these developments to happen on a scale from 'this year' to 'in 20 years' (fig. 2b). This list was then used after the workshop to draft a development strategy.

The mix of analytical and creative methods, the latter being rather alien to city councillors, helped to establish a shared view across political barriers.

Oil and the City

The project 'Oil and the City' aimed to analyse, from an artistic point of view, the impact of the Oil and Gas Industry on the City of Aberdeen in Scotland. This yearlong project kicked-off with a one-day Future Workshop to enable the artists involved to dig into the subject and to develop their artistic practice.

Participation was open to the public and the workshop attracted a range of interest from academics to consultants, from people with a work background in the oil industry to local residents. So a rich base for the artistic work could be build quickly, which provided the artists with sufficient material to develop their own work.

The three phases were entitled 'The Colour of Oil is Black', 'Dreaming of Black Gold', and 'Oil and the City'.

Figure 3a; 3b; 3c: Oil and the City: clustering complaints; collective meals; writing-up individually (Photos by Eva Merz (left) and Peter Troxler (center and right)).

The workshop intentionally had a reduced implementation phase since its aim was to generate material and ideas for the artists to work with. This was also the reason why some particular techniques were used, particularly the 'log book'. Participants were asked to write down a summary of the critique phase and, later at one point in the utopian fantasy phase (fig. 3c), a personal statement a summary of all the 'good things' about oil in Aberdeen. These were then published, along with the other results from the workshop, in a booklet.

Tips & Tricks (To-Do)

☑ *Visualise:* it is indispensable to visualise any content participants contribute during the workshop and make it available to everybody in the audience

☑ *Time management:* The most important results of a Future Workshop are generated in the last phase. Therefore time management is crucial so earlier phased don't eat into the time allocated for the third phase.

☑ *Project creation:* The formulation of concrete actions is a hard step in the whole process. Apart from enough time it needs also special support and an approach that softly but succinctly helps participants to make their ideas more specific and action-oriented.

Potholes (Not-to-Do)

☒ As a facilitator, don't interfere with the content of what is being discussed. Facilitators are to facilitate the work of the participants, as their role suggests.

☒ As a facilitator, never destroy, cross out or dispose of any results from the workshop, nor allow anybody else to do this, as it might hurt (other) participants' feelings.

☒ Never start a Future Workshop with a series of presentations, 'inputs' and the like, as this would bias the participants' opinions. A Future Workshop builds on the original thoughts, ideas and imagination of the participants.

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In order to give multi-lingual readers access to the method here are some references in various major and minor languages (no ambition to be comprehensive, though)

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Author Biographies

Dr. **Peter Troxler** works as a management consultant in Europe. He supports organisations in the private and public sector building management systems for the knowledge economy. Peter has worked in academia at ETH Zurich, Switzerland and at the University of Aberdeen, Scotland. His main interests are cross-disciplinary issues at the interface of psychology, IT and engineering, and management science. He is said to be a passionate facilitator, and he has a second life as an arts producer and manager.

Dr. **Beate Kuhnt** is a research fellow at the University of Zurich, Switzerland, with the Software Engineering Group. Her main research area is to develop a systemic approach for IT project management including methods and techniques for handling social aspects. She contributes to the continuing education project MIO (People, Information Technology, and Organization) as project leader and lecturer. She is a facilitator for Future Workshops since 1989.

A People Centric Approach to Creating Taxonomies and Knowledge Artefacts
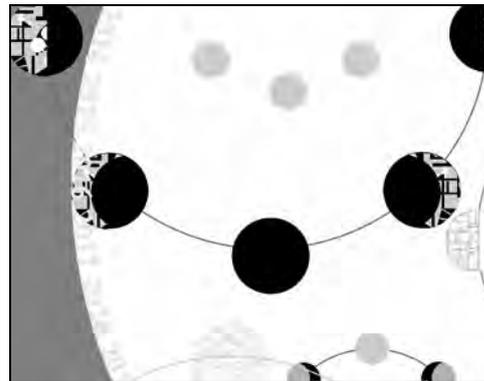
Shashi Kadapa

A People Centric Approach to Creating Taxonomies and Knowledge Artefacts

Shashi Kadapa, CEO, www.activemuse.com (shashi@activemuse.com; shashikadapa@gmail.com)

Snapshot (Quick Learning)

Among the many problems that need to be addressed while building a Knowledge Management (KM) portal, a few key issues are: how to create taxonomy, what type of documents to keep in the KM portal and how to create knowledge capture mechanisms in the organization. This paper attempts to explain these aspects of the KM project implementation along with examples.

Context (Where & What)

The methods, tools and techniques described in this document can be used for IT service and product development companies, manufacturing companies and those engaged in marketing operations.

The techniques would be particularly useful with large organizations that operate across multiple cities or even continents. The techniques can be useful where the employees have different backgrounds and cultures but when a uniform quality of output is required.

Time required for the actual implementation of each phase should not exceed a couple of weeks, assuming that each stakeholder is cooperative and deputes a representative to help the central KM team. By stakeholder we mean each department in the organization that needs to participate in the KM activity.

Some examples of stakeholders of manufacturing organizations could be departments such as marketing, purchase, manufacturing, engineering, finance, HR and so on. Stakeholders in IT organizations could be different domains, verticals, horizontals such as Web Technologies, Database administrators, Mainframe specialists, Embedded Technologies, Insurance, Healthcare, and so on.

Generally KM systems are built when the number of participants is sizeable and the numbers of knowledge artefacts generated are quite large else it is difficult to justify the costs. However, if your organization is planning to expand, has a mobile workforce then the KM techniques mentioned in this document could be used. If your organization is small, not many new engagements happen periodically, the number of documents generated is small, then perhaps these techniques may not be for you.

The goals of this document are simple: to help you create a KM portal that is well organized, does not confuse people, is inline with your organization's needs and further provides templates to create focussed business documents.

Preparation (The Checklist)
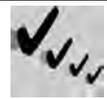
Building a KM portal requires intense teamwork. It cannot be done alone. The team should have members with cross-functional skills. The following illustration shows the ideal KM Core team and the stakeholder members. Also given in the figure are suggested roles, their functions and how they need to collaborate.

Collaborate interactively.

KM Core Team

- Business Analyst
- Web Technology SME
- Database SME
- Content Management SME

Functions: Interact with KM Stakeholders to:
• Understand and map requirements to KM UI.
• Create Taxonomy
• Integrate and Migrate Databases
• Ensure common template for documents

Decide Methodology: Waterfall, IIDM, Extreme, etc. Use Slice if required

Analysis → Design → Coding → Testing → KM Launch

KM Stakeholders
Different depts: Sales, Finance, Mktng, Manufacturing, etc.

KM Representative

Functions: Interact with KM Core Team to:
• Explain departments unique needs and functions.
• Help to create Taxonomy
• Make available Database for Integration and Migration
• Use common template for documents

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Figure 1. KM Stakeholders and their functions

The following functions need to either go hand in hand or they should be ready before the actual coding and building the KM portal starts.

- An appropriate content management tool that forms the backbone of the KM system.

- Suitable database servers with software and applications installed.

- Suitably qualified programmers and developers who would be doing the coding as per the requirements.

Toolkit (The Essentials)

Before approaching the stakeholders, the core KM team needs to prepare presentations and documents that explain what the KM portal is about. They need to have a clear understanding of what is required from the stakeholders.

Meetings with seniors from stakeholder departments should be planned where the presentations would be shown. The presentations must clearly address questions such as: What will KM do for me; what is required from my department; how much will it cost in terms of resources and money, how much control I would have in the process, etc.

Making it Happen (The Approach & the Action)

In this section we will examine how to create a taxonomy structure, create knowledge capture mechanisms, examine templates for different business documents and also examine other facts such as measuring the ROI for KM.

Creating a Taxonomy

The Taxonomy of the KM portal along with a powerful search engine is the most crucial factor in the success of a KM portal. Taxonomy allows content to be organized as per different categories and groups related subjects so that a user can see a listing of documents that can be browsed.

> *The goal of a corporate taxonomy is not only to provide a list of authorized terms for use in writing and in information seeking, but also to create maps between concepts to connect employees with the right knowledge at the right time. The taxonomies create a common semantic network that is based on business needs and takes into account the intellectual assets (the content) and the way in which the knowledge workers (the employees) look for information. Such a network provides an essential tool for managing intellectual capital and connecting employees with knowledge* [1].

Typically, taxonomy has different levels such as Level 1, Level 2, Level 3 and Level 4. Level 1 would deal with the highest classification of topics, level 2 has the sub categories, level 3 has further drill down while level 4 would relate to specific topics. Taxonomy of up to four levels is recommended. Anything deeper may make things difficult and the KM structure more complex while anything less would make the structure too shallow.

Why is there a need for taxonomy? Let us take an example of a street address. By just telling that you live in India, does not help at all after all 1 billion people reside here. You have to get the address correct down to the city, street and apartment number to let people reach you. A taxonomy serves this purpose.

Important facts to consider for developing taxonomy:

- The taxonomy should represent the business interests of the organization.

- It should consider all related areas in which the organization is active.

- It should also represent the market segments in which the organization operates.

- There should not be any repetition in the nodes. E.g. if Java is mentioned in one place, it should not appear again elsewhere as this leads to confusion.

In this section we will attempt to create sample taxonomy for an IT organization. We will first map the business segments and operations of the organization, identify the areas that need to have a presence in the map and create four levels of taxonomies.

The full taxonomy may very well have more than 60,000 nodes and may run to a number of pages. In this document, only a few items have been explained in detail.

Creating the Organization's Business Map

An example of an IT organization that operates globally through multiple development centres spread across India is considered. The clients include a number of multinational companies that have a strong presence in different market segments.

The company operates in a number of verticals and horizontals all targeted to service a number of key accounts that contribute a major part to the sales. The company takes up development projects (where new applications are developed), maintenance projects (where existing applications of clients are maintained) and migration projects (where migration of applications to newer technology is done).

In addition there are service offerings such as BPO, Quality, Verification and Validation, Network and IT infrastructure development and so on. Each project type or service offering has its own unique needs for knowledge generation and more important, knowledge reuse.

The following figure depicts how the organization is structured. Taxonomy would be built to cover this structure.

Important facts about the organization:

- The organization is made up of different strategic business units (SBU). The SBU's cover specific market segments such as Insurance, Manufacturing, Enterprise Applications and so on. These SBU's are the KM stakeholders.

- A number of support departments such as Quality, HR, KM, Marketing, etc. serve as shared resources. They do not have their own revenue generation mechanism. These departments are also the KM stakeholders.

- The SBU's act as profit centres and have their own sales generation mechanisms. Software projects are executed by the SBUs.

- These SBU's have their own set of clients and are authorized to develop clients, look out for sales tenders, present their own proposals, recruit their own personnel and so on.

- While some of the SBU's use specialized software applications such as SAP, Business Objects and so on, a number of common technologies such as Java, .NET, J2EE and so on may be used by different projects.

- While it is possible to estimate and assign the revenue and calculate the Return on Investment (ROI) on the SBU's, it is difficult to estimate the ROI on the support functions as there is no tangible revenue generated.

- The taxonomy should cover the functions of the SBU's as well as the shared resources.

While giving the path for a document in the KM repository, we use the following conventions:
Level 1 Name > **Level 2 Name** > **Level 3 Name** > **Level 4 Name** > **Document Name**.

Business Operation Areas

Industry Segments | Technology Segments

| Insurance/ Healthcare | Financial Services | Manufacturing | Telecom | Special Segments | Product Dev Engineering | eBusiness |

Service Areas

| Embedded Technology | Quality Assurance | Packaged Software Implementation | Application, Development & Maintenance | Energy & Utilities, Media & Entertainment | Retail, Logistics & Transportation |

Domains and Technology Areas (partial list)

| Mainframes MVS, DB2, CICS, IDMS, IMS, AS 400 | Client Server SQL Server, Oracle, Informix BizTalk, Sybase | Internet/ SOA Net, Webmethod J2EE, Weblogic, WebSphere, | Engg Service CAD, CAM, CAE, Pro E, Catia, Ansys, IDEAS | Appln Dev Rapid Appl Dev, Prod Dev, Custom Dev, | BPO Back Office, Help Desk, Data Processing |

| Embedded RTOS - VxWorks, WinCE, Embedded Linux, PSOS, BSP | Embedded RTOS - VxWorks, WinCE, Embedded Linux, PSOS, BSP | Enterprise Applications SAP, Oracle Apps, Peoplesoft, JDEdwards, BAAN, Siebel, SCM, CRM, EAI, RFID, | Packaged Software Maint, Upgrades, Implementation, Bolt On | Business Intelligence SAP BW, Cognos, Business Objects, Informatica, Oracle Express, Microstrategy, |

Quality, V & V, Production Support, Maintenance, Infrastructure Management, etc.

Internal Areas (KM Stakeholders)

Strategic Business Units (SBU's)
Insurance, Manufacturing, Embedded, Engineering Service, Infrastructure Management, Verification and Validation, eBusiness, Enterprise Development, etc.

Support Depts (Shared Resources)
Quality and Audit, HR, Corporate Communications, Payroll, Finance, Hardware and Support desk, Administration, Marketing and Sales, etc.

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Figure 2. Organization's Business Structure Map

Mapping the Level 1 Taxonomy Node

Level 1 is the base structure of the taxonomy. This needs to cover the overall areas of the organizations efforts. This level should include only the top levels of the functional and business segments. Other levels would be nested in this level. While documents can be placed at Level 1, they would deal with broad concepts and may not be specific to any subject. It is also recommended that once the Level 1 is frozen, it should not be revamped unless there is an absolute need. Considering the business and other functional areas, the following broad areas are recommended.

Level 1	Level 2	Level 3	Level 4
Industry			
Technology			
Applications			
Corporate			
Project Categories			
Software Engg			
Service Offerings			
Tools			
Quality			
Management			

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Figure 3. Level 1 of Taxonomy

The Level 1 taxonomy nodes are explained as under:

- **Industry**: This level would include documents that are related to a specific industry such as healthcare, banking, agro, entertainment and so on. Projects are typically executed for a specific client who operates in a certain industry. The Level 1 of the taxonomy allows users to go to a specific industry and examine documents that are related to the industry.

- **Technology**: This level would include all the upper level technology areas that the company harnesses or works with. Some examples are Mainframe, Web, Operating Systems, Business Intelligence and so on. While documents may reside at this level, they will be generic in nature and deal with the technology at a broad level.

- **Applications**: IT projects are built for a specific application and this node would cover all types of applications. Some examples are Logistics and Distribution, Data Processing, Finance and Banking, Insurance Brokerage and so on. This node allows people to directly search for documents that are related to a specific industry.

- **Corporate**: The Corporate node allows a space for all SBU;s and support functions. Documents that are specific to a department can be stored here. These would include overviews of the department, expertise areas, technology and domains they operate in, documents on capability, service offerings and so on. It is also possible to list specific clients that an SBU services but this needs to be done with caution as some clients may not want their names to appear directly in the KM portal.

- **Project Categories**: Documents in these areas would deal with specific project categories such as Development, Enhancement, Maintenance, Reengineering and so on. This level will help users to directly go to documents that relate to a specific category.

- **Software Engineering:** Document in the software engineering category would relate to different methods, processes, Estimation, Metrics and so on. These documents would be used

by the middle management personnel to study and research methods to improve the efficiency.

- **Service Offerings:** The Service Offerings areas would store documents that deal with specific services that the organization offers. Sub nodes in this category would include terms such as BPO, CRM, Engineering Services, Process Consultancy and so on.

- **Tools:** The Tools node would have a list of all tools that the organization uses to complete projects and also for internal use. Some examples of Tools are Configuration Management Tools, Estimation Tools, Code Analysis Tools and so on. Most of the tools would be external and if the organization develops its own tools, they can be classified here.

- **Quality:** Targeted mainly for internal use, this node would have a number of sub nodes that help to maintain and improve the quality of work done by employees. Some examples of nodes that would come here would include Coding Standards, Checklists, Defect Prevention, SQA, Six Sigma and so on.

- **Management**: This would be the playing or recreation area and may have categories that are not exactly revenue generating. In this area, documents of general interests can be placed. Some categories in this level can include: Career, Creativity, Health and Lifestyle, Organization Culture, Team Building and so on.

The next three taxonomy levels would be based on the Level 1 taxonomy.

Mapping the Level 2 Taxonomy

Level 2 taxonomy would essentially have major groups that fall under a Level 1 node. All possible sub groups are created at this level. In this document we will select Technology at Level 1 and create further sub groups at Level 2.

Level 2 would be a specialisation of level 1 item. Further addition of terms at Level 2 should be restrained and only allowed when a new technology is developed or used by the organization.

Level 1	Level 2	Level 3	Level 4
Technology	Business Intelligence		
	DBMS		
	Document Conversion		
	Document Mnagt..		
	Embedded		
	EAS		
	ITG		
	Languages		
	Mainframe		
	Operating System		
	PLM		
	Web		

Figure 4. Level 2 of Taxonomy

- While creating the Level 2, care should be taken that terms that would appear at further levels three or four should not appear or clubbed in other Level 2 items.

- In many cases, Level 2 may very well relate to the expertise area of a department or a department itself would be called by a term such as Business Intelligence, Database Management, Embedded Technology, Enterprise Planning and so on.

- Projects initiated by the organization begin with nodes defined in Level 2. So you may have projects on document management, database management and so on. It is always possible that a project can use multiple Level 2 terms such as web/ database/ languages and so on. In such a case, the content management tool allows multiple paths to be assigned to a document.

Mapping Level 3 Taxonomy

Level 3 of the taxonomy structure offers a further drill down as per the selection done for Level 1 and Level 2. This node relates to specific technologies, process, applications, tools and so on.

In some cases, the taxonomy tree may end at Level 3 while in other cases; it can extend to Level 4. Documents, dealing broadly or specifically with Level 3 can be created and stored at this level. Further additions to Level 3 can be done as per specific requests from users. In some cases, Level 3 terms can be added when the KM content team comes across new terms in business documents. Since the field of business is very vast, it is recommended that nodes only for the terms currently being used by the company or the ones that the company wishes to foray into the future be created.

We will consider that at Level 1, we have selected Technology; at Level 2 we have selected Web. The following illustration shows how Level 3 can be organized.

Level 1		Level 2		Level 3		Level 4
Technology						
		Web				
				Net		
				Application Server		
				EDI		
				Frameworks		
				Integration Technologies		
				J2EE		
				Middleware		
				Search Engines		
				Web		
				Web Languages		
				Web Services		
				Webservers		

Figure 5. Level 3 of Taxonomy

Mapping Level 4 Taxonomy

Level 4 of the Taxonomy will deal with specific tools, applications, process and so on. The directory structure needs to end at this level. All possible terms can be included at level 4 and it is here that the maximum documents would exist.

A project would typically have used multiple items given in Level 4. For example, an IT project may use Java, HTML, DHTML, XML, Oracle and so on. The content manager should allow multiple paths to be added to a document. Level 4 nodes can be created as per users request with the condition that the person who requests a new node should have documents that can be uploaded here.

Following illustration shows the mapping for Level 4. We have selected Technology at Level 1, Web at Level 2, Web Languages at Level 3 and have given a number of nodes for Level 4.

Figure 6 Level 4 of Taxonomy

The following points need to be noted:

- The above sections provide a general methodology to create taxonomy. It may not be the perfect method but the process allows for changes to be made as and when required and most important, it allows for adequate representation of stakeholders expertise and interests.

- While it is not possible to suggest a taxonomy for all the industries and market segments, the above method can be adopted by manufacturing, service, research and the IT industry.

- There are some software's that claim to create 'taxonomy on the fly' and offer to automate the process. The author does not wish to comment on these claims but cautions KM practitioners with a brief word that taxonomy is too complex and filled with life, to be left to their fate with machines.

Integrate taxonomy with the KM portal

After the taxonomy is created, it still needs to be integrated with the KM portal. While it is always possible to hardcode the nodes into the program, this option should be the last one.

Consider the following point:

- A project or document may have used multiple technologies, applications, software's and so on.

- With fixed coding, the document would have to be uploaded multiple times and if all taxonomy needs to be covered, then the document will have to be uploaded eight to 10 times or more. This will not only increase the load on the server but also make the search feature meaningless as the same document will be displayed multiple times. This is unacceptable.

- The content management software you buy should allow you to assign multiple taxonomies when you upload the document once. This would allow a document that is uploaded at one node to be available at multiple places also. This is acceptable, needed and forms the core of the KM processes.

- The taxonomy structure can be made a part of the site map that allows the full structure for the taxonomy tree.

- First time users can be shown a prompt when they spend a few minutes without clicking anything.

- If the taxonomy were made with hyperlinks then that would be ideal. Users could then open the site map and click at the required node or level to view related documents.

Search Engine Versus Taxonomy

Many times, we hear arguments about the need for taxonomy when there is already a search engine place. Please refer to the following quotation.

> *As content grows in the electronic world, it is apparent that simply turning a search engine loose on a collection of information will not give the hoped for improvements in productivity and profits promised by e-business. Taxonomies are the missing link.*
> *—Mike Crandall, former Knowledge Architect Manager, Microsoft Corporation*

Any search engine uses keywords and tags that are either placed in the meta tags or the engine performs a full text search in the body of an article. After running the search query, it brings up documents that have the keyword. Now consider the following examples:

A business document may have the terms 'Java' a few times. The term is used more as a context and the actual document may have very little to do with the term. There may be a couple of sentences in the document such as 'We did not use Java because…' or 'since a JVM was not allowed, we did not use JAVA'.

The search engine will search for the word Java and show it up in the results. So you have hundreds of documents and a hyperlink at the bottom that says 'Showing page 1 of 200'. This does not serve the purpose at all, disheartens the users who give up in frustration and they send a mail to KM support asking for a document.

Using taxonomy on the other hand will host documents that have been deliberately placed in the node related to Java. A crisply written JavaScript will give a summary of the document when a mouse over is done.

We can say that a good taxonomy and a powerful search engine complement each other and both need to be used properly.

Creating Knowledge Capture Mechanisms

It is important to remember that data and information is not knowledge just as a wheel is incomplete without a fixed axle. Knowledge needs to be distilled from people who have experienced the pain and pleasure of applying it. Knowledge lies in the trenches and front where people have worked hard and failed and kept on trying till they could find a breakthrough. Knowledge is not found in books but comes out of applying the theories and models to real life situations. It is knowledge that oils the wheels and gears of an organization and makes it run. It is this knowledge that we should seek. We need to have knowledge capture mechanisms in place to ensure that knowledge artefacts are captured, verified and archived in the KM portal.

This section examines a few knowledge capture mechanisms.

Discussion Forums

Cooperative thinking, instant knowledge sharing, Discussion forums are an invaluable means to capture knowledge, share ideas and ensure knowledge reuse. A discussion form can be integrated into the KM portal and users can participate actively. The main advantages are:

- People tend to share more information when speaking or writing in a discussion forum.

- Though people may balk at creating a regular document and taking it through the approval cycle, they tend to come up with remarkable working solutions in a discussion forum.

There are many Open Source sites that offer the tools and the source code to create a discussion forum. A threaded discussion forum allows users to make multiple replies to the same topic in an ordered fashion. This gives us a discussion tree, with the topic being at the heart of it. The source code can be customized to suit specific requirements [2].

It is expected that the discussion forum follow the structure of the taxonomy tree. This makes it more relevant to the KM portal. While a formal hierarchy of level 1 or even level 2 may be redundant, the forums should be arranged preferably at Level 3 and Level 4 where actual work is being done.

Key features of the forum would include.

- User can access the forum through a link in the KM home page.

- Users should be able to register to any number of forums. A simple form asking that allows them to click the forums of their choice and register should be provided.

- It is assumed that the KM portal has single logon features that capture users login details when they login to the Intranet. So asking them to provide their employee code, email ID, etc is redundant.

- Users should be able to post queries through the same page. All registered users for a forum should receive an email alert about the new query.

- The email alert should include the body of the query along with a hyperlink that when clicked takes them directly to the thread in the forum.

- Users can then provide a reply or offer suitable suggestions.

- There should be provision to upload attachments that are accessible by all.

- Moderation may not be possible. However, since this is not an open public forum, flame wars are rare and if they occur, can be countered through counselling. However, to verify the replies, reward people who give useful replies, a subject matter expert can vet the replies on a day-to-day basis.

- Attachments can be perused regularly and uploaded in the KM portal if found beneficial.

We will examine a sample discussion forum that forms a part of the KM portal. The following figure shows an active forum with queries and replies. The left frame lists a number of forums arranged as per Level 3 and 4 of the taxonomy.


Figure 7. Example of an Active Discussion Forum

Knowledge Kits

An organization that deals with rapidly changing technologies, processes and so on, needs to keep its content dynamic and fresh. Some core topics such as methodologies, information on large enterprise applications, etc. may need to be updated periodically.

While providing MS Word, PDF or other documents is the easiest method, keeping them updated, when users have already downloaded it may present problems. In such cases, it is best to create kits that offer the required information using web pages. Since the source documents for the kits reside in the KM server, the core KM content team can easily update, delete, block or remove information as and when needed.

The following figure shows how a training kit on a core technology is organized.

The kit has hyperlinks that when clicked point to or open relevant documents, giving the required information. Subject matter experts and the KM content team have created content in the above archive.

Figure 8. A Knowledge Kit

Project Documents

Project documents form the main source of the knowledge archive. When a software project is initiated, a number of documents are created along the software life cycle. These documents need to be sent to KM repository and stored as per the taxonomy. It is very important that a common template be used throughout the organization with clearly defined headings and the content arranged as per defined standards.

A template ensures that there is uniformity across the organization and content from one document can be copied and pasted into another document without undue problems with the formatting and fonts. Over the life cycle, the document may be revised as and when progress is made and it should be the responsibility of the project leader to ensure that revised documents are sent to the KM portal.

Some of the project related documents are:

- **Proposals**: The proposal is lodged by the sales team and a project begins with this document.

- **Requirements Analysis and Approach Notes**: These documents are the initial documents that show how the requirements were gathered and the approach used to tackle the opportunities. Also included would be the architecture diagram.

- **Requirements Development and Functional Specification**: These documents give details of how the clients requirements are addressed, functionalities of different screens, validations and show the work flow.

- **Metrics and Estimation documents**: These documents specify the estimated efforts in person days that are required to complete the project. The documents reveal how much the project will cost and the time required for the development. A comparison of the estimated

and actual efforts will give the health of the project and tell if the project is off track or well within control.

- **Case Studies and Project Summary Notes**: These documents provide details of how the project was completed, problems faced, client information, technologies used and so on.

- **Project End Presentation**: After a project is completed, the team gives a presentation that speaks about how the project was completed.

- **Learning's by Team Members**: Individuals complete allotted tasks to complete a project. And on their own, they overcome many technical problems, resolve showstoppers, and devise workarounds and so on. These learning's form a very important source of KM artefacts. Each team member needs to be encouraged and rewarded to note down their learning's.

- **Reusable Software Components**: Many teams devise their own software components to solve technical problems or because an alternative commercial component was not available. Reusable components form the easiest way to measure the tangible benefits of KM.

- **Community of Practice (CoP)**: The above documents can be presented in appropriate CoPs for wider circulation and knowledge reuse.

Reusing Knowledge and measuring the RoI

While all efforts are centred on creating the Knowledge repository, equal efforts must be spent in ensuring that knowledge in the portal is reused by other teams. Much emphasis is put on building the repository but very little effort is spent in finding out how and to what extent the knowledge is reused. The following points will help to increase the knowledge reuse.

- At the time of uploading a document, the efforts in hours or person days required to create the document or solve a specific problem should be given separately by the author. The efforts should be duly recorded in the time sheet and approved by the project leader. This forms the basis for measuring the RoI.

- When a proposal is to be lodged, the sales team should not begin to start drafting the proposal from ground zero. They need to search the Knowledge Portal for similar requirements based on technology, industry, domains, clients and so on. Other than the main body, a proposal will have 'exhibits' such as case studies, past experience in similar areas by other SBU's and so on. These can be directly copy/ pasted. This saves considerable time and efforts.

- When the project teams start to plan the project, they need to search the KM portal for similar projects, find code and software components they can reuse and apply them to the project. Project leaders who show evidence of reusing existing knowledge from the KM portal should be rewarded.

- Teams working on a domain and technology should go through the KM portal to find out how workarounds have been created. How different technologies were handled and so on. They can also reuse software components that have been already created.

Measuring RoI

Measuring the Return on Investment becomes a tricky issue as it is difficult to calculate since there are no tangible returns or revenue generation mechanisms.

> *Few knowledge management initiatives have been successful, unless firms are willing to invest substantial resources to manually collect and organize research material. But most firms in the United States are unwilling to invest non-billable time in this effort, especially when the benefits of such investment are uncertain*[3].

The following points will help to calculate and justify the RoI.

- At the time of uploading a document, the efforts in hours or person days required to create the document or solve a specific problem should be given separately by the author. The efforts should be duly recorded in the time sheet and approved by the project leader. This forms the basis for measuring the RoI.

- Once it is known how much efforts were required by a person of a designated rank, it is possible to calculate the exact cost of the document, based on the authors compensation.

- When subsequent users peruse the document or download it, then an estimate of the effort saved in creating a new document can be calculated. This should, hopefully provide the much needed base to find returns on KM investment.

- An incentive or reward can also be given to people who show quantified evidence of efforts saved and savings realized by using documents in the KM repository.

- Costs of the KM portal can be calculated by computing the compensation of the KM Team members, efforts spent by other individuals in coordinating the KM efforts, cost of servers, software applications and other hardware used and so on.

- It should be emphasized that the efforts spent by project teams in documenting their learning's should not be added to the KM cost. Good documentation of the project is mandatory as per the business requirements, whether KM is there or not.

- After developing sufficient expertise in all phases of the KM development, the KM manager can think of developing external KM projects for clients. This provides the best means to generate revenue.

Real Cases (As it has Happened)

The above sections have been written by the author after intense efforts spent in building the KM portal at Patni Computer Systems Ltd. (www.patni.com) and Mastek (www.mastek.com)

The KM initiatives in these companies are thriving till date and have been widely appreciated by projects for the ease with which knowledge can be accessed in the organizations. Both Patni Computers and Mastek Ltd. Are leading IT companies that operate globally through multiple development centres spread across different locations and cities. For more information on this subject please refer to the document Building KM @ Patni (Shashi Kadapa 2006).

While Mastek Ltd. Has about 4500 employees, Patni Computers has more than 12, 000 employees. These people are work at multiple locations in India and at customer sites abroad. Harnessing and reusing knowledge is a challenge that the companies have to resolve each day.

A questionnaire was circulated among a cross section of the employees and this included software engineers, project leaders, project managers and department heads. They were asked to rate their preferences, likes and dislikes on a 1 to 5 scale with 1 being least preferred and 5 being the most preferred. A summary of their report is given below.

Table 1. Summary of Survey

Issue	Project Managers	Project Leaders	Software Engineers
Ease of Navigation	2	3	4
Documents most accessed	Case Studies, Proposals, Quality Plans, Marketing Brochures, SQA Audit Reports	Project Planning, Estimation, Management Methodologies, Other similar projects	Technical applications, trouble shooting guides, programming and coding documents
Method of Searching for KM Documents	Search Engine	Search Engine + Taxonomy	Search Engine + Taxonomy
User Friendliness of KM interface	2	5	5
Desired Features	Quick search and finding required documents. Faster access speed	Faster Speed. More live examples of applications developed in the company	Faster speed and source code of applications developed in the company.
Does the Taxonomy help	3	4	3

The report highlighted the need for improvement in the navigation and the taxonomy. Project Managers has much more difficulty in finding documents because they expected the documents to be placed in a place that was inline with the business operations. Software engineers wanted the taxonomy based as per the domains. A balance was struck and the taxonomy was remodelled using the actual business flow and the arrangement of taxonomy.

Tips & Tricks (To-Do)

The following points should be considered while building the taxonomy and following other guidelines mentioned in the document.

- ☑ Creating the taxonomy requires people with in depth knowledge of specific domains and areas. So it is important, that while framing the taxonomy and after drafting it, the structure be reviewed by experts.

- ☑ Different stakeholders tend to move the nodes in taxonomy from one level to another. While it may be relevant for one department, the same logic may not hold true for other departments.

- ☑ The content team should actively browse documents to spot new terms that can be added to the structure. It is important that appropriate documents be created to fill the node as an empty structure looks bad.

- ☑ Measuring the RoI is very tricky. For the most persistent pessimists, use the sentence "KM is a part of the shared resources and you cannot calculate the costs. Can you calculate how much RoI the HR department of the latest Board meeting yielded?"

Potholes (Not-to-Do)

The following points are important while building the KM portal.

- ☒ Watch out before you upload copyrighted material from clients or downloaded from the Internet. Some clients do not allow source code created for their organization to be used for other clients. In such cases, just delete all the related documents from the KM portal.

- ☒ Some clients do not allow their business relations with your organization to be displayed in the KM portal. Avoid all such issues.

- ☒ As a rule, financial figures, costs, salaries, compensations, estimations, cost of projects, etc. incurred for different projects should never be revealed in the KM portal. You are free to give formulas used for calculations or the method adopted for calculation along with the email Ids of the document author.

Acknowledgements

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Author Biography

Shashi Kadapa is the CEO of http://www.activemuse.com/ and offers services in the areas of Knowledge Management, Documentation, Animation, Brand Building and also provides content for websites. He served Patni Computer Ltd. as the content manager and helped to drive and sustain KM efforts in the organization.

He has as a Bachelor of Engineering degree in Manufacturing and an MBA in Marketing. He has worked in the IT industry for about 7 years. His previous stints included working with Cummins India, Balzers AG, Carborundum Universal, Ashok Iron and others.

Shashi has a flair for creative writing and has also worked as a journalist with many reputed Indian print and on line companies.

A System-based Approach to the Introduction of Knowledge Management
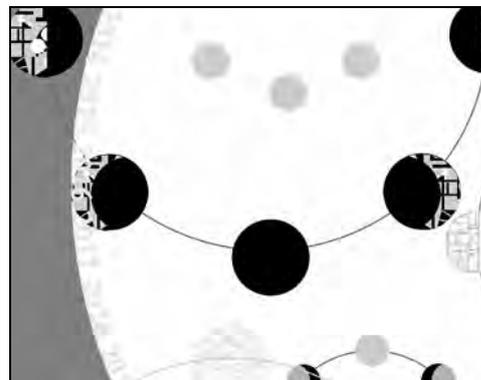
Mark Hefke

A System-based Approach to the Introduction of Knowledge Management

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Snapshot (Quick Learning)

The proposed solution mainly provides a toolkit for consulting agencies in order to accompany a new customer's Knowledge Management (KM) implementation based on previously captured KM Best Practices (BPs). Such BPs represent successfully conducted consulting services. The cases are structured through the system's ontology-based case base in which they are also stored. Once stored and structured they can be reused for future KM introduction services. However, the system can also be applied by interested organisations that intend to implement KM in the near future. The experiences made by other companies help them to get first impressions on an introduction of KM. The technical realisation of the toolkit synergistically combines technologies of the Semantic Web with those of Case-based Reasoning.

Seen from a KM point of view, the system is designed to structure, store and recommend best practice cases that follow a holistic KM introduction considering technical, organizational and human aspects of a KM introduction in equal measure.

Keywords: Knowledge Management, Case-based Reasoning, Semantic Web, Ontologies

Context (Where & What)

An organisation's KM introduction has to overcome manifold barriers which can be categorized into organisational, technical, or cultural ones. In order to handle such a complex endeavour and to flexibly react on new customers' knowledge problems, a KM consulting agency has to collect and capture as many experiences as possible from already accomplished KM implementation projects. This can e.g. be done through continuously performing project debriefings at the end of KM introduction projects and through finally trying to externalise, structure and capture personally made experiences of senior consultants in the form of so-called best practice cases (BPCs). Based on this externalised experience knowledge, consultants are to a certain degree able to avoid mistakes that have been made in previous projects. The practical problem is that descriptions of BPCs are usually in the form of unstructured reports. Therefore, they are not directly comparable, and hence not directly applicable to new customers' needs.

On this account, the proposed Knowledge Management Implementation and Recommendation Framework (KMIR) effectively and efficiently supports consulting agencies in accompanying an organisation's Knowledge Management (KM) implementation. Best Practice Cases (BPCs) of successfully conducted Knowledge Management introductions are captured by the system's ontology-based case base in order to reuse them for further KM introduction services. The technical solution to the aforementioned problem matches a newly defined organisation profile

against existing BPCs in the case base. The most similar retrieved BPC is returned as a recommendation, then adapted and finally reused by the accompanied organisation.

Preparation (The Checklist)

The proposed KMIR framework should be seen as a means to support and accompany KM activities. Therefore, it has to be embedded into the considered KM introduction process from the beginning. To obtain valuable recommendations from the proposed KMIR system supporting the project planning phase, four major steps have to be performed at first:

1. Analysis and documentation of the organisation's knowledge problems and goals (typically, they have to be derived from organisational problems and goals)

2. Analysis and documentation of key business ratios (e.g. company size and sector, turnover, profit, target costs and time, etc.)

3. Analysis and documentation of the organisational structure and (technical) infrastructure (e.g. involved departments, processes, used technologies, tools, etc.)

4. System-based description of an organisation profile based on the steps 1-3 using the provided "Case Editing Component (CEC)", which is the web-based user interface of the KMIR framework.

5. Adjustment of user-specific system parameters (attribute weights, filters, etc.)

After describing the company profile and entering the user-specific definition of parameters, the newly defined profile can then be matched against already existing best practice cases in the ontology-based case base. The identified most similar best practices cases are then presented as a recommendation to the requesting organisation. Those BPCs can be semi-automatically adapted and reused in the context of the new KM introduction. After the reuse (and verification) of the adapted case, it can again be added as a new case into the case base.

A full list of all regarded attributes for describing an organisation profile is given by the following table.

Table 1: Relevant indicators for the description of BPCs

Indicator	Classification	Examples/ Range
Organization sector	primary, secondary and tertiary sector	e.g. IT
Legal form	-	e.g. ltd.
Company size and number of involved KM workers	-	nonnegative integer
Organizational structure, involved processes and departments	-	e.g. matrix organisation
Type of knowledge transformation	-	implicit, explicit
Turnover and profit	-	(nonnegative) integer
Knowledge goals	normative, strategic, operative	
Knowledge problems	organisational, technical, cultural	
Addressed core processes	-	e.g. knowledge identification, acquisition
Solutions and methods to solve problems	-	
Used software/ technologies and KM instruments	-	e.g. Lotus Notes, Semantic Web Technologies
Implementation time and amortization time	-	nonnegative integer
Implementation costs	technical, organisational, person-related	nonnegative integer
Implementation status	-	completed, in progress
Considered quality standards	-	e.g. EFQM
Affected organizational level	-	e.g. team, department
Qualitative and quantitative benefits/ savings	-	e.g. increased turnover or profit
Increased competitiveness	-	e.g. faster knowledge distribution
Sustainability and application	-	
External support	-	e.g. public funding
Maturity level	-	depends on the underlying maturity model

Alternatively, a system user can specify only single problem descriptions instead of describing the organisation's whole profile. As a result of the matching process, one ore more solutions, which are associated with the most similar problem(s) are returned to the user.

Finding solutions for single knowledge problems includes the following steps:

1. **Select language in main menu ("English" or "German")**
2. **Select "Problem Description" in main menu**
   1. Specify, if the problem is "organisational", "technical" or "cultural", press "change"
   2. Verbalise problem in "Subject of Problem" (e.g. "permanently reinventing the wheel"), further orientation examples are given by the problem list
   3. Further Description of Problem (optional)
   4. Select adequate „Core Process"
   5. Press „add"
   6. optional: create further problems (repeat steps 2.1,2.2,2.3,2.4,2.5 + "add")
   7. press "next" to save all problem descriptions into the ontology

3. **Select "Matching" in main menu**
   1. Select „Problem-Matching"
   2. Select problem(s) that were created in 1.) and 2.)
   3. Press "Matching" (similar problems are identified + solution link)

Toolkit (The Essentials)

When performing an organisational audit, at least one representative of each involved department, the top management, as well as the KM consultant should be physically available. Therefore, it makes sense to prepare a one day workshop in order to discuss and consolidate all documented results from the preparation phase before finally adding them to the KMIR system.

The KMIR system can either be directly assessed on

http://www.kmir.de

by simply using a standard web browser. Alternatively, the framework can also be installed locally using a Tomcat web server (required disk space: 3 MB), which is available for any operating system that disposes of a Java Runtime Environment (JRE).

Making it Happen (The Approach & the Action)

The developed KMIR framework synergistically combines Semantic Web Technologies with approved methods of Case-based Reasoning. On this account, KMIR is methodologically based on the CBR Cycle by Aamodt & Plaza (1994). The four processes of the proposed CBR Cycle comprise (1) The *Retrieval* of the most similar case(s) to a new problem, (2), The *Reuse* of information and knowledge from the retrieved case in order to solve the new problem, (3) The *Revision* of the proposed solution, and finally (4) The *Retainment* of a newly originated case for solving new problems in the future (cf. Figure 1).
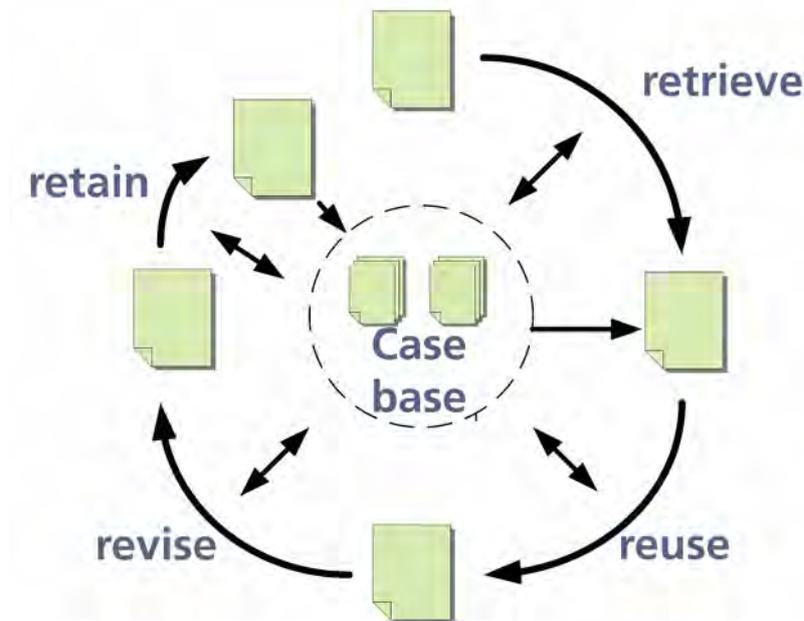
Figure 1: CBR Cycle by Aamodt & Plaza

In order to technically support all process steps of the CBR Cycle regarding a Knowledge Management Introduction, the KMIR architecture consists of the following seven components:

1. An ***Ontology-based Case Base*** containing KM BPCs: BPCs are represented as interrelated bundles of instances of concepts described in an ontology-based case base.

2. A ***Case Editing Component*** supports on the one hand a consulting agency in the structured description of BPCs or single problem-solution pairs based on accompanied KM introduction projects and the component facilitates on the other hand an organisational audit in the customer organisation in order to identify the organisation's general structure, technical infrastructure, knowledge problems and knowledge goals.

3. An ***ontology-based Matching Component*** returns most similar problems or full cases to a given one through matching a request with existing BPCs and problem-solution pairs in the case base. In this regard, syntactical similarity measures (e.g. edit distance with word stemming and stop word elimination, equality, distance-based similarity) and semantic similarity measures (e.g. set similarity, relational similarity and taxonomic similarity) are provided by the KMIR framework.

4. A ***Solution Generator*** associates a customer's profile, knowledge problems or goals with existing solutions, methods and experiences of the most similar BPC in order to offer KM recommendations to a customer (i.e., about how to introduce KM, based on retrieved and adapted most similar cases).

5. A ***Learning Component*** stores adapted, reused and revised best practice cases as new cases in the case base.

6. ***Administration Functions*** support the configuration of similarity measures and filters, and provide further means for maintaining the case base (e.g. analysis functions, interfaces, automatic case completion, etc.)

7. A ***Security Component*** manages user access to the KMIR framework.

An overview on the KMIR framework architecture components and interrelations between them is given in figure 2. All components are described more detailed in the following subsections.
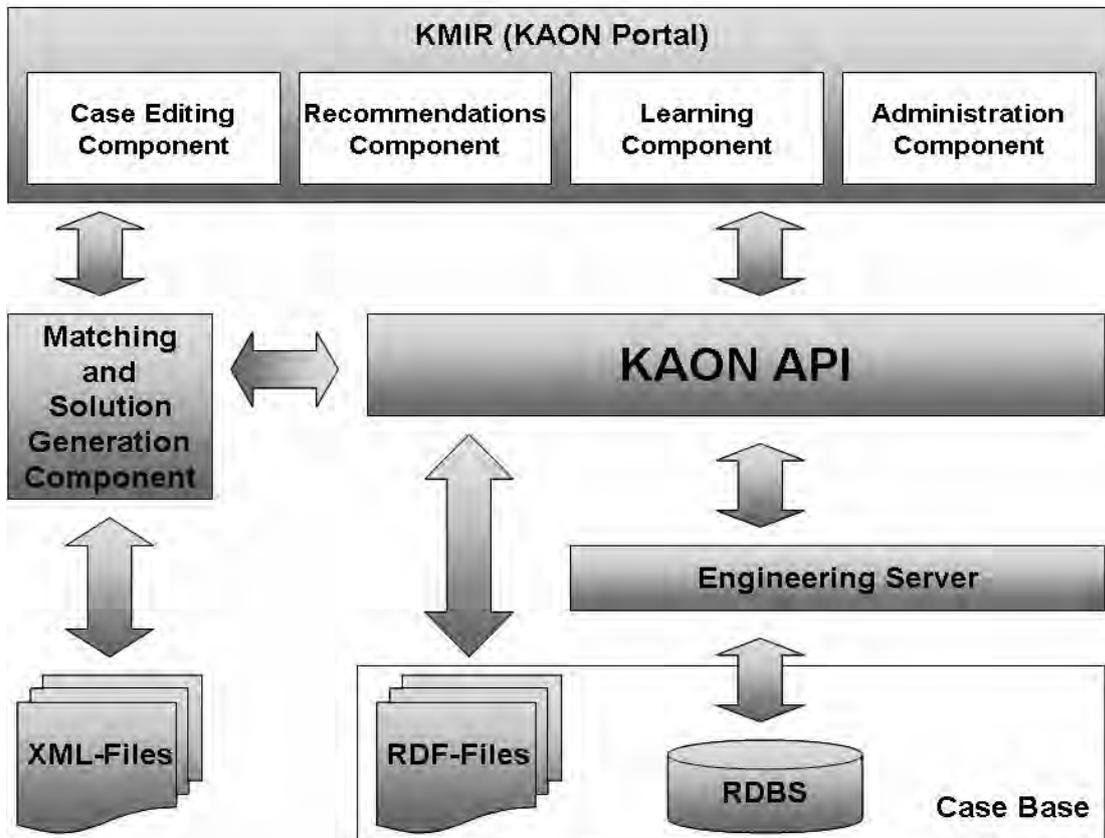

Figure 2: KMIR Framework Architecture

Ontology-based case base

Each BPC is stored as a set of interlinked "profile instances" in the ontology. Therefore, a BPC comprises all above-named entities, as well as relations between them. The conceptual level of the case base ontology consists of the main concepts "Company", "Profile", "Problem", "Goal", "Solution" and "Method". The concepts "Company" and "Profile" are linked together by the property "Company_has_Profile". Knowledge Problems which had to be solved by companies are subdivided into organisational, technical and cultural ones. A "Knowledge Goal" can either be normative, strategic or operative. Each profile is linked to one or more problem(s) or goal(s) by the properties "Profile_has_Problem" and "Profile_has_Goal". A problem is linked to one or more achieved solution(s) with the property "Problem_has_Solution" and an inverse property "Solution_solves_Problem". Problems can address a specific core process (i.e., knowledge acquisition, sharing, etc.) of the Probst KM Model (Probst et al., 1999). Problems are divided into sub-problems by the property "Problem_consists_of / is_part_of_problem".
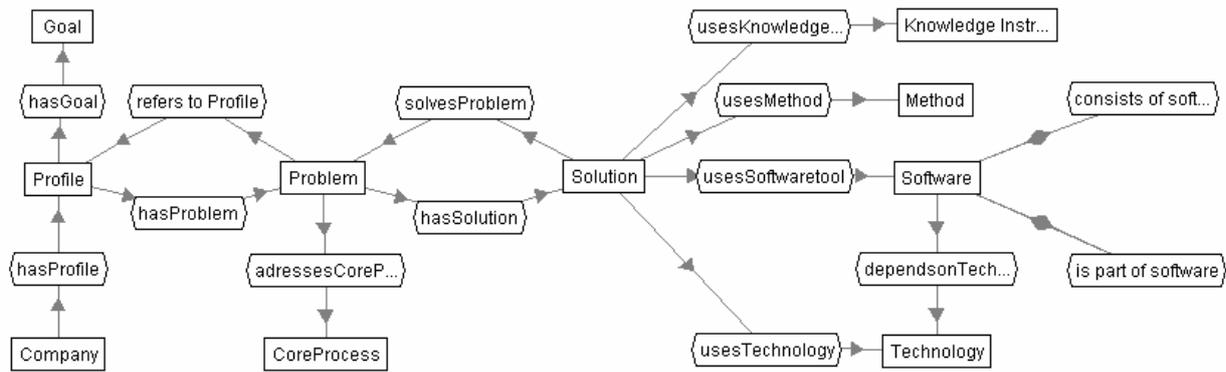
Figure 3: Excerpt of the KMIR Ontology

In order to reflect the holistic KM approach, the concept "Problem" has the sub-concepts "Organisational Problem", Technical Problem" and "Cultural Problem". This is due to the fact that the implementation of a KM system could depend, for instance, on a specific technology and, furthermore, it could require a solution to a specific organisational problem, as well as a cultural change in the organisation. The concept "goal" disposes of the more special sub-concepts "Normative Goal", Strategic Goal" and "Operative Goal". Every solution can be combined with a method (property: "uses_method"), a knowledge instrument (property "uses_knowledge_instrument") and a specific technology or software-tool, which again may depend on a technology (properties: "uses_Software_tool / Technology" and "depends_on_Technology"). Moreover, a solution, software, or technology can consist or be a part of other solutions (just as software tools and technologies). Several other concepts of the ontology are structured through a taxonomy in order to be able to specify the top concepts more precisely. The case base ontology has been realised with the KAON OI-Modeler[1], a tool for visually creating and maintaining ontologies. Figure 3 depicts an excerpt of the KMIR ontology's top concept level.

Description of KM Best Practice Cases

Selected and created episodic and prototypical BPCs are described with the Case Editing Component (CEC), a web-based user interface, which is part of the KMIR framework architecture and which allows template-oriented filling of all known attributes of a BPC. Attribute values are filled in as texts or numbers or they can be chosen from pull down menus. The interface is automatically generated from the ontology defining the case structure. Finally, a described best practice case is directly stored as a set of instances, attributes and relations into the ontology.

Organisational Audit

The Case Editing Component can additionally be used to support a consulting agency in capturing a new customer's organisation profile, thus its organisational structure, technical infrastructure and economic aspects, as well as normative, strategic, and operational knowledge goals. Additionally, the organisation may define target costs for the implementation of a KM solution. It may describe or select organisational, technical or cultural knowledge problems and requirements, and finally assign them to typical knowledge processes (Cf. Figure 4). Finally, KMIR supports the association of all described attributes with *weights* attaching more or less importance to them. The received profile from the organisational audit is directly stored as a set of

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[1] Cf. http://kaon.semanticweb.org

instances, attributes and relations into the ontology which structures the case base. In order to disencumber consultants from filling in all characteristic values of the customer profile that are required for case retrieval, several characteristic values are automatically created or transformed by the use of *derivation rules* and *transformation rules* before storing a new case into the case base. Derivation rules infer the organisation type (e.g., "Small and Medium Enterprise") from the characteristic values "turnover" and "company size", transformation rules are used to transform values between different scale units (e.g., time and currency).

Figure 4: KMIR Case Editing Component

Moreover, it is possible to only define one or more problems or problem-solution-pairs, because in practice, customers often have already accomplished several KM activities and they are now searching for a solution to solve one or more new particular problem(s).

Case Retrieval Process

A matching component matches the profile or a given problem (set) against already existing BPCs or problems from the case base to retrieve BPCs that are most similar to a newly created customer profile extracted from the organisational audit, or to simply find solutions for one or more requested problems, This is done by combining syntax-based with semantical similarity measures (Ehrig et al., 2005). Syntax-based similarity measures in our system are *distance-based similarity, syntactical similarity (edit distance* combined with a *StopWordFilter* and *Stemming)* and *equality* for comparing values of numeric data types from the organisation profile with those of existing BPCs. Additionally, the profile from the self-description process is matched against profiles of the case base using *semantic similarity measures*. That is to compute the similarity between (sets of) instances on the basis of their corresponding concepts and relations to other ob-

jects (*relation similarity*) as well as ***taxonomic similarity***. ***Relation similarity*** is used on the one hand for comparing attribute values of instances that are no direct instantiations of the concept "profile" but which are rather concept instantiations (e.g., of concept "problem" or "software") that are linked to the concept "profile" (using the relations "profile_has_problem" and "profile_uses_software"). On the other hand, the similarity type is used for, e.g., comparing instantiations of the concept "problem" that are linked to further instantiations of the concept "Core process" using the relation "(problem) addresses core process". ***Taxonomic similarity*** identifies similar software tools or technologies for the requesting organisation. The recommendation is based on problem-solution pairs of BPCs similar to the defined problem(s) from the organisation profile. For example, an organisation is searching for an extension of its existing groupware system using an ontology-based tool solution. The matching component identifies a similar groupware system in the case base, which also served as a basis for a similar extension. This result is achieved by checking all instances of the corresponding software sub-concept "groupware" and recommending the assigned solution to the requesting organisation. Furthermore, taxonomic similarity is used to additionally compare particular attribute instances based on the conceptual level improving the results of the syntactic similarity computation (e.g., matching the attribute "sector" of a profile based on the concept taxonomy "primary", "secondary" and "tertiary sector"). Finally, a weighted average determines the global similarity of all local similarities. Figure 3 depicts all regarded ontology concepts, attributes and relations of a profile that are applied in KMIR during case retrieval.

Figure 5: Concepts, Attributes and Relations Regarded during Case Retrieval

For the technical realisation of the matching component, we have integrated an already existing Java-based framework for instance similarities in ontologies into the KMIR architecture (cf. Hefke et al., 2006). An additionally implemented user interface allows parameterizing the user-defined selection and composition of (atomic) similarity measures, and their assignment with weights directly in KMIR. Settings are stored in an XML-File and processed by the underlying

similarity framework. Depending on the selected similarity measure(s), attributes like maxdiff (distance-based similarity) or recursion depth (instanceRelationSimilarity) can be defined. Due to the complexity of computing ontology-specific similarity measures, the similarity framework provides two different types of filters, **pre-filters** and **post-filters.** This method constrains the number of instances to be considered for similarity computation. The filters can be individually combined from (atomic) filters. All filters are configurable either by a KMIR user interface or directly in the XML-File.

Pre-filters are used preceding the similarity computation. They allow the inclusion of one or more particular concept(s), as well as the exclusion of particular concepts that are subsequently regarded during the similarity computation of corresponding instantiations. Furthermore, it is possible to define KAON Queries[2] in order to reduce the amount of profiles in the case base that are used for computing the similarity. The KAON query language allows easy and efficient locating of elements in KAON OI-models.

Post-filters determine the number of instances that are returned after the similarity computation. There exist two types of filter, *minSimilarityFilter* and *maxCountofInstancesFilter*. The first filter type defines the similarity threshold (between 0 and 1) required for inclusion in the result list, the second one retains information about the maximum number of presented similar results.

In case of a negative case retrieval (no existing profile of the case base directly matches to a selected organization profile), the matching process can be constrained to only matching (all) single problems of the given organisation profile with existing problems (independent of a particular profile). In this way, at least solutions for given problems can be identified.

As an alternative for identifying similar profiles/problems to a given one based on the integrated similarity framework, it is also possible to let the user of the system directly define KAON queries or construct them with a query wizard. For instance, the query

[#Profile] AND SOME(<#hasOrganisationType>,!#SME!)

only matches a subset of profiles consisting of small and medium sized enterprises against the newly defined profile, whereas the query

[#Profile] AND SOME(<#is-in-sector>,!#IT!)

only regards organisations associated with the sector "IT" in the case retrieval process. The second example also shows the possibility to define important knock-out criteria, e.g., a user-defined definition of characteristic values that have to be fulfilled in each case.

Recommendations and Solution Generation

The **Recommendations Component** provides recommendations based on case(s) identified as most similar. The recommendation presents one or more profile(s) which were retrieved within the matching process and which correspond to the profile from the organisational audit – including similar problems, as well as interlinked solutions and methods to solve these problems. In addition, the system user can identify further relations with other KM aspects for each profile's problem-solution pair by browsing the structure of the ontology. The identified most similar case(s) also comprise information about implementation costs and time, qualitative and quantitative benefits, savings, sustainability, application to other fields, external support/ funding and others.

An example for a so-called "holistic recommendation" would be the recommendation of using a specific tool, technology or knowledge instrument combined with a specific organizational method, as well as the combination with a required organisational culture program.

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[2] Cf. "Developer's Guide for KAON", http://kaon.semanticweb.org/documentation

Moreover, the system provides a ***Solution Generation Component*** which supports the automatic generation of solutions by merging problems with solutions of similar problems from the case base. This can be done for either single problems or all problems of a selected profile based on a predetermined minimum similarity value. Regarding the generation of solutions for profiles, the solution generator only creates solutions for one or more problem(s) if a profile can be identified with a global similarity of all profile attributes that is larger than a predefined minimum value.

Moreover, we are currently developing ***modification rules***, in order to realise automatic case adaptation in "easy situations". For instance, it is planned to implement a verification component which allows KMIR to check if a specific "software application" makes sense for a recommendation or solution generation, based on background information defined by further specific attributes (e.g., compatibility, interoperability, scalability and extensibility of the software tool to be recommended). On this basis it is planned to also adapt technical solutions from a BPC to specific needs of a new customer.

Feedback Loop and Learning

Successfully accomplished KM implementations are added as new BPCs into the case base. This is done by technically supporting the revision of the new constructed KM introduction solution (e.g., editing/ correcting existing information to the generated solution or providing additional information like for instance new experiences or benefits, etc.). Thereafter, the adapted, reused and revised BPC is stored as a newly learned case into the case base. The learning component collects lessons learned regarding successful or inappropriate given recommendations in order to refine or extend the BPCs as well as the general structure of the case base. To support "lessons learned" an evaluation function is provided to the requesting organisation. A consulting agency has the opportunity to describe experiences made with given recommendations to the customer regarding their correctness and capability to solve a specific customer problem. The evaluation results are directly incorporated into the learning component and they are taken into account during the next case retrieval. They are used for an internal ranking of the best practice cases in the case base. Based on that, the recommendations component is able to provide better recommendations to new requesting organisations in the future. Low ranked recommendations that are evaluated as useless can either be optimised or thrown out of the case base.

Administration Functions

KMIR disposes of several administrative functions for maintaining and analyzing the case base. In the following they are briefly described:

- **Import-/ Export Interface**
- The Import-/ export interface supports an easy import of instance lists from csv-files in order to instantiate concepts in which the content changes over time, like e.g. "Technology", "Software" or "Knowledge Instrument". Thus exhaustive modelling with an ontology editor is avoided. Furthermore, the concept structure of the ontology based case base comprising attributes, ingoing and outgoing relations of concepts can be exported as a structured text file.

- **Case Completion**

- Case completion is used for automatically enriching cases with existing background knowledge. In KMIR, case completion is used to learn new relation instances through analysing existing solution descriptions for the appearance of instances or synonyms of the concepts "software tool", "technology" or "knowledge instrument". Based on that, instances are interlinked with the respective solution (e.g. "Solution S uses technology T"). The functionality is particularly suitable for updating existing cases after enhancing instance lists (e.g., the lists of existing tools, technologies or knowledge instruments). However, the case completion component is freely configurable for using it with any concept or relation in the ontology.

- **Web Link Creation**

- The KMIR system is available to discover Wikipedia entries for selected instances and concepts of the case base. If there is an appropriate entry available, the accordant concept or instance is automatically linked to the corresponding website.

- **Similarity Caching**

- KMIR provides ontology-based caching of local and global similarities between profiles in order to reduce the similarity calculation time. Caching can be done for single profile pairs as well as for all profiles available in the case base.

- **Case Disjunction Testing**

- The function identifies BPCs, problems or goals that are very similar to each other on the one hand checking the relevance of specific attributes regarding case retrieval and on the other hand identifying redundant profiles, problems or goals.

- **Statistical Analysis**

- This function provides a "real-time analysis" of the existing case base by presenting frequencies, averages and standard deviations for all interesting concepts supporting the examination of the BPCs' statistical distribution.

Results & Next Steps (The Follow-Up)

The described KMIR framework supports consulting agencies in successfully accompanying a customer's introduction of Knowledge Management by providing recommendations based on CBR and Semantic Web Technologies. For the development of KMIR, an extensive collection, analysis and structuring of BPs from different information sources was conducted. The analysis as well as the ontology for structuring BPCs directly focus on human, technical and organizational aspects (holistic KM approach).

For the future, we intend to validate KMIR under real-life conditions which might be realised in the context of an actual project with a consulting agency. Moreover, we will integrate KMIR with ONTOKNOM, an ontology-based software infrastructure for retaining and maintaining KM Maturity Models in order to better focus on an organisation's needs regarding a successful introduction of KM (cf. Hefke and Kleiner, 2005). To achieve the integration of both systems in KMIR BPCs will be associated with a specific maturity level and in ONTOKOM BPs will be proposed depending on the calculated maturity level. A further research interest is to extract a reference maturity model based on all captured KMIR cases and, the opposite way around, to extract a reference BPC out of several KM maturity models in ONTOKNOM.

Real Cases (As it has happened)

During the development phase of the KMIR framework, we have performed the following steps:

1. *Identification of indicators* for the description / portability of KM BPCs.

2. *Verification of identified indicators* in the form of an open survey (cf. Hefke, Jäger, Abecker, 2006)

3. *Development of a "reference model" and ontology-based case base* implementing the evaluation results.

4. *Collection of (unstructured) episodic cases* from different information sources which are describing "real" events.

5. *Definition of "prototypical" cases* to capture innovative technical solutions, new methods and practices into the case base that are not widely used in organisations (these hypothetical cases complement the "real" ones in order to sufficiently cover the space of possible organizational problem situations).

6. Development and implementation of the *KMIR Framework Architecture*.

7. *Structuring and storing cases* from 4.) and 5.) into the case base.

At present, the developed KMIR framework comprises 36 structured episodic Best Practice Cases (BPCs) of real KM introductions. 39% of the BPCs are provided by SMEs and 61% by LSEs. In addition, the BPCs dispose of 180 defined knowledge goals, 159 problem Descriptions and 132 solutions. Further details about the composition of the captured problems and goals are provided by the following two tables:

Table 2: Number/ ratio of Knowledge Problems

Total number of problems	159
Ratio of organisational problems	69%
Ratio of technical problems	12%
Ratio of cultural problems	19%
Ratio of problems addressing core process "Defining Knowledge Goals"	2%
Ratio of problems addressing core process "Identifying Knowledge"	4%
Ratio of problems addressing core process "Acquiring Knowledge"	9%
Ratio of problems addressing core process "Developing Knowledge"	1%
Ratio of problems addressing core process "Distributing Knowledge"	33%
Ratio of problems addressing core process "Using Knowledge"	13%
Ratio of problems addressing core process "Preserving Knowledge"	14%
Ratio of problems addressing core process "Measuring Knowledge"	4%

Table 3: Number/ ratio of Knowledge Goals

Total number of goals	180
Ratio of normative goals	17%
Ratio of strategic goals	32%
Ratio of operative goals	52%

As a first validation step, we have analysed the basic ability of the KMIR framework to automatically find appropriate solutions for typical knowledge problems. In that context, we have identified most frequent knowledge problems that have been identified in several user surveys. Finally, we have recorded them in the system. First validation results seemed to be very promising. At present, we are performing a comprehensive evaluation of the system with regard to retrieval quality and processing time. The results of the evaluation phase will be documented and published soon.

Tips & Tricks (To-Do)

- ☑ Definition of normative, strategic and operative knowledge goals and continuous verification

- ☑ Considering KM as a holistic approach regarding the organisation, processes, technology, people and culture in equal manner

- ☑ Selection of a KM project team

- ☑ Obtaining Top Management Support

- ☑ Creating and fostering knowledge-oriented culture

- ☑ Identification and Structuring of relevant organisational knowledge

- ☑ Continuous involvement and training of employees

- ☑ Knowledge measurement and evaluation

- ☑ Reasonable combination of intrinsic and extrinsic incentives

- ☑ Integration of KM activities into an organisation's processes

Potholes (Not-to-Do)

- ☒ Just considering KM activities as a technical thing

- ☒ Ignoring employees and their needs when implementing KM

- ☒ Only providing monetary incentives

- ☒ "Downsizing" the organisation at the expense of knowledge bearers

Acknowledgements

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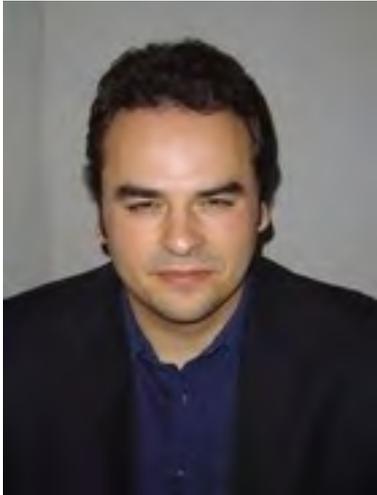
Mark Hefke earned a degree in Business Engineering at the University of Karlsruhe, Germany. Since 2002, he has been working as a scientific assistant pursuing his PhD in the research group "Information Process Engineering" at the "Research Center for Information Technologies (FZI)" in Karlsruhe[3]. His research team develops techniques and applications for the acquisition, representation & modelling, extraction, storage, access and application of knowledge and furthermore advises organisations on the implementation of KM. Research interests also comprise the conception and development of ontology-based tools for supporting the Introduction of Knowledge Management:

- ONTOKNOM - An ontology-based software infrastructure for retaining and maintaining KM Maturity Models[4]

- KMIR - KM Introduction and Recommendation Framework based on CBR and Semantic Web technologies

Moreover Mark Hefke is the project coordinator of the public founded research project "Im Wissensnetz" [5] (http://www.im-wissensnetz.de).

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[3] http://www.fzi.de/eng
[4] http://www.ontoknom.de
[5] http://www.im-wissensnetz.de

Strategic Roadmapping and Implementation Actions

Abdul Samad (Sami) Kazi

Strategic Roadmapping and Implementation Actions

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Snapshot (Quick Learning)

To continuously evolve and innovate, organisations and industrial sectors need to set clear evolutionary paths facilitating a transition from a "current" state to an envisioned "future" state.

This chapter presents a simple and visual methodology for developing strategic roadmaps supplemented with a set of well-defined implementation actions that support realisation of the elements of the roadmap. Using a futuristic visionary state as the goal, a set of short, medium, and long-time to industry actions are defined.

Keywords: strategic roadmapping, implementation actions, time to industry, business drivers, thematic priorities

Context (Where & What)

Strategic roadmaps and supporting implementation actions (also called projects in some cases) may be seen as essential elements of organisational strategies and/or business plans as they provide the pathways to achieve a desired state from a current state (See CABA:2002, FIATECH:2004, IMTI:2000, Ribak and Schaggers:2003, Strategis:2007, and Kazi, Hannus and Zarli:2003).

The strategic roadmapping and implementation actions method can be used within context where there is not only a need to define a vision, but a means and set of actions for the realisation of the vision. It concentrates on a definition of a set of short, medium, and long term targets in terms of their respective time to industry for transition from the current state to a future envisioned state. The method is primarily used to support different types of innovations: business; marketing; organizational; process; product; service; and/or supply chain (see Figure 1) within an organisation, across co-operating organisations, or spanning an industrial domain.
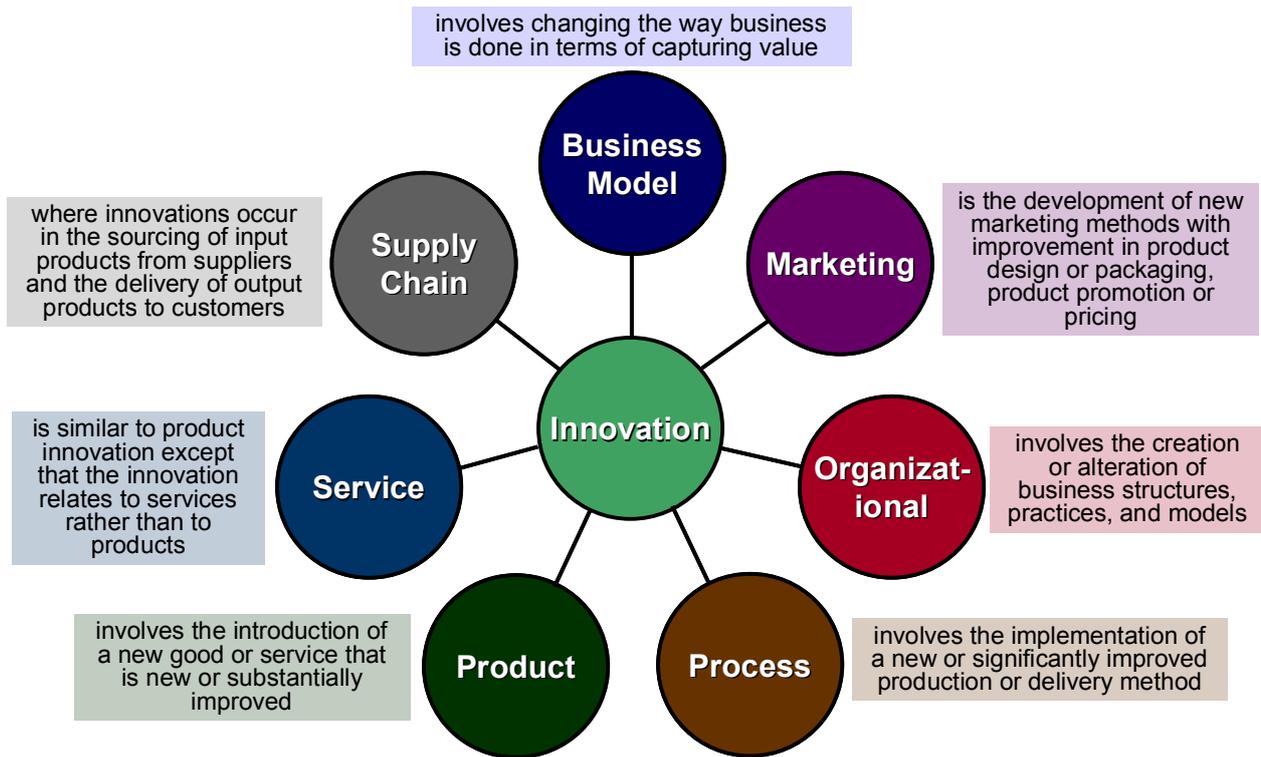
Figure 1: Types of Innovation
(source with modifications: http://en.wikipedia.org/wiki/Innovation)

The method, though usable within a few hours, usually spans a series of workshops spanning one to two days each with intermediate feedback. This is essential to ensure proper interactive dialogue and feedback to support iterative development and refinement of the roadmaps and their supporting implementation actions.

The method essentially covers three main steps (goals):

1. Setting priorities (defining the vision)
2. Developing the roadmaps
3. Identifying the implementation actions

The number of participants for each of the steps varies. During setting priorities, it is best to limit participation to between 30-40 participants. In the case of developing roadmaps, small teams of between 4-6 persons each should be used. While, in the case of identifying implementation actions 30-40 participants may be used.

Preparation (The Checklist)

A key to tangible outputs from the strategic roadmapping and implementation method is the right mix of participants in the workshops. There needs to be a balance between different types of stakeholders who are engaged (e.g. industry, research, software solution providers). While decision makers are required to ensure that decisions are taken and implemented, knowledge workers are required to provide key inputs in terms of innovation requirements for necessary

functional needs. To ensure meaningful results, attendance to the workshop should be "by invitation only" based on pre-identified and pre-selected participants.

The facilitator/moderator of the event when inviting participants needs to know their expertise and interests to ensure they can make a meaningful contribution. Furthermore, participants should be provided with background information on the topics/issues for which the strategic roadmaps and supporting implementation actions are to be defined.

Last, but not least, where and when possible, participants should be provided with a set of example roadmaps and implementation actions to become acquainted with the method. When examples do not exist, they should be provided with blank roadmap (Figure 3) and strategic action templates (Table 3) along with a short method description (such as the one presented the section on "Making it Happen (The Approach & the Action)".

Toolkit (The Essentials)

When preparing for the workshop, it is essential to have different means (paper, electronic) that can be use for roadmap development based on the desired working methods of the (see Figure 2).

Most participants like to work with pen and paper and move around. In such instances it is best to have a white board and Post-it® notes of different colours (preferably green, yellow, and red) corresponding to different phases (short, medium, and long). These enable participants to post items, draw links between them, and re-arrange them when necessary.	
A commonly used approach these days is a large screen for projecting "work-in-progress" slides. If participants are used to this approach, then a screen, computer, and projector should be made available. In such cases, typically while most participants discuss, one of them acts as a rapporteur and notes down key points on to the roadmap template. Using this approach, it is easy re-arrange items, delete if necessary, and have the results ready to present in a plenary. The results are well-captured and do not need to be typed in again.	

Figure 2: Different tools for roadmap development

While the main introductory and summary sessions may be held in a plenary fashion (large room), it is necessary to have small break-out rooms for small teams to be able to concentrate during roadmap development. Having teams in different corners in a large room does not help and only leads to disturbance and lack of concentration.

Making it Happen (The Approach & the Action)

The strategic roadmapping and implementation actions method focuses on the achievement of three main goals:

1. Setting key priorities (vision)
2. Developing (thematic) roadmaps
3. Identifying implementation actions

Each of these steps is briefly described followed by a typical workshop agenda (Table 1).

1. Setting Priorities

The fundamental starting point of the strategic roadmapping and implementation actions method is to identify clear priorities related to the main issue to be addressed. In short, this is similar to breaking down a main high-level vision into a set of inter-related "sub-visions" or "thematic priorities". During this process, consider asking the following questions:

a. What do I like of our situation today?
b. What do I NOT like of our situation today?
c. What do I want in the future?
d. What do I NOT want in the future?

Ask each participant to provide a unique answer to each question. If there are many participants in the room, consider asking some questions from some participants and other questions from other participants.

The answers should provide you with a basis for the current state, what needs to be improved, what needs to be done, and what needs to be avoided. Use these answers to create a consolidated list of relevant key items. Through a show of hands (consider allowing each participant between 3-4 votes) identify the main priorities of the participants with respect to the main issue addressed. Use these main priorities as the thematic priorities for roadmaps. Ideally, each thematic priority should lead to one roadmap.

2. Developing Roadmaps

The thematic priorities identified earlier should serve as the basis for distributing the participants into teams of between 4-6 participants each, with each team assigned the task to develop a roadmap for their respective thematic priority. Ensure that each team is in a separate room and equipped with the tools they prefer for roadmap development (refer back to Figure 2)

Figure 3 is an illustration of the roadmap template to be used for each thematic priority.
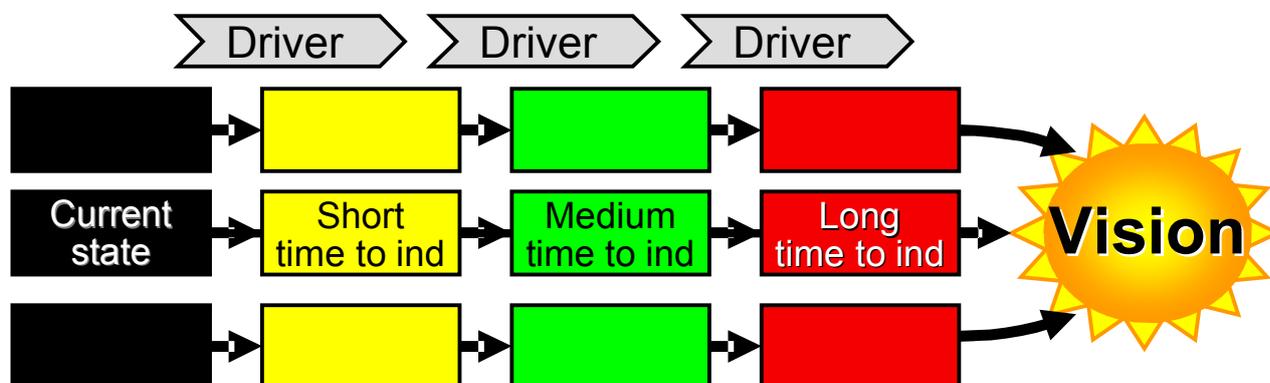
Figure 3: Roadmap Template – From Current State to Vision

Each team typically starts off with the current state and vision. Once these are established, the next step is to identify the key business driver for change in the short term (time to industry). Based on this, they identify and define key elements/actions to be achieved in the short term.

Using short term elements/actions of the roadmap as the baseline this time, the business driver for incremental change is identified and based upon this, key elements/actions to be achieved in the medium term identified and defined. In a similar fashion, the driver for change from medium to long term and supporting elements/actions are identified.

Ensure that there is enough time in between for teams to walk around, see and discuss, what is being developed for other thematic priorities in different teams. Allow each team to do at least 2-3 iterations for the roadmap they are developing.

3. Identifying Implementation Actions

Once the roadmaps have been finalised, the next step is the identification of key implementation actions (sometimes also referred to as project ideas). These implementation actions may cover one element (e.g. one yellow box) of a given roadmap or span several elements. When identifying implementation actions, the following items for each implementation action should be considered:

i.   Title of the action (should be self explanatory).

ii. Industrial problem / relevance (Why is this action important? What are the main business drivers?)

iii. Objective (What is the aimed measurable achievement / innovation / progress beyond the state of the art?)

iv. Approach (How will the problem be solved: baseline technology + methodology / approach + necessary competencies)?

v.   Results (What tangible, applications / tools, methods etc. will be developed / extended?)

vi. Exploitation (How will the results be provided to users? Who will use the results and how?)

vii. Impacts (What potential benefits will follow from the use of results?)

viii. Follow-up actions (What else is required to achieve the benefits?)

A Typical Agenda

To ensure mutual trust and creativity, the agenda for the event is designed to allow for social interaction in between sessions. This creates opportunities team members to reflect upon the work done within breakout teamwork sessions and for different teams to discuss and share their findings with each other.

Table 1: Typical Workshop Agenda

Day 1	
15:00	Registration, Coffee, and Meeting Participants Coffee Break and Nature Stroll
16:00	Setting the Scene: Identification and Selection of Thematic Priorities for Roadmapping
17:00	Understanding the Approach: Common Approach to Roadmapping and Team Building
18:00	Free Time
20:00	Team Dinner
Day 2	
09:00	Re-Cap: Roadmapping Approach, and Objectives for the Day
09:30	Break-Out I: Roadmapping (One Team per Thematic Priority)
12:00	Lunch and Team Building
13:30	Roadmap Tours (see what others have done)
14:30	Break-Out II: Roadmapping (One Team per Thematic Priority)
16:00	Coffee Break
16:30	Feedback: Presentation of Each Thematic Roadmap
18:30	Free-time
20:00	Team Dinner
Day 3	
09:00	Breakout I: Identification & Definition of Strategic Actions for Each Thematic Roadmap
10:30	Coffee Break
11:00	Breakout II: Identification & Definition of Strategic Actions for Each Thematic Roadmap
12:00	Lunch and Team Building
13:30	Feedback: Presentation of Strategic Actions for Each Thematic Roadmap
15:30	Forward Planning: Next Steps and Follow-up Actions
16:00	End of Workshop

By the end of the workshop, it is expected of participants to have:

- Co-developed a series of thematic roadmaps
- Identified a set of implementation actions to support realisation of the roadmaps
- Agreed upon common follow-up actions to refine and document the roadmaps and strategic actions

Results & Next Steps (The Follow-Up)

A key follow-up of the workshop is means to appropriately document the key findings for each roadmap and the detailing of each implementation action. While the roadmap documentation is lead by the facilitator of a particular roadmap with the support of other participants the team engaged in developing the roadmap, the implementation action detailing is done by the person(s) proposing the implementation action.

Consider using the following table of contents (Table 2) for documenting each roadmap:

Table 2: Table of Contents for Roadmap Documentation

1. Background
2. Vision
   2.1. Business Scenario: *xyz*
   2.2. Business Scenario: *xyz*
3. Roadmap
   3.1. Objectives
   3.2. Key Elements
      3.2.1. Current State
Provide a few lines describing each element (box)
      3.2.2. Time to Industry: Short Term
Provide a few lines describing each element (box)
      3.2.3. Time to Industry: Medium Term
Provide a few lines describing each element (box)
      3.2.4. Time to Industry: Long Term
4. Business Impacts
5. Resources for Further Information

Note that once the roadmaps have been documented and shared with all participants from all teams, participants may also contribute implementation actions for roadmaps other than those that they co-developed.

Consider using the following template (Table 3) for detailing each implementation action.

Table 3: Implementation Action Definition Template

|						
Title (max 10 words)						
Keywords (max 5)						
Time to industry		Short term		Medium term		Long term
Topic areas						
Industrial problem / relevance (Why is this action important? What are the main business drivers?)						
Objective (What is the aimed measurable achievement / inno-vation / progress beyond the state of the art?)						
Approach (How will the problem be solved: baseline technology + methodology / approach + necessary competencies)?						
Results (What tangible, applications / tools, methods etc. will be developed / extended?)						
Exploitation (How will the results be provided to users? Who will use the results and how?)						
Impacts (What poten-tial benefits will follow from the use of results?)						
Follow-up actions (What else is required to achieve the benefits?)						
Contact information of the proposer						
Name (First, Last)						
Organisation						
Email						

Real Cases (As it has Happened)

The strategic roadmapping and implementation actions method was extensively used in the Strat-CON (Strategic Actions for Realising the Vision of ICT in Construction) project (see: Kazi, et al., 2006). Strat-CON was a follow-up to the earlier ROADCON project that focussed on a definition of key take-up, development, research, and emerging technologies for information and communications technologies (ICT) in the construction sector. Strat-CON took a more "industry" friendly perspective and relied on inputs from members of the industry-led European Construction Technology Platform.

Key Topics and Thematic Priorities

The issue of needs for Processes and ICT in the construction sector was first broken down into four main thematic groups: process, product, project, and enterprise. Each of these thematic groups was further broken down into two themes with each theme covering one priority (issue). These priorities and associated visions are shown in Figure 4.
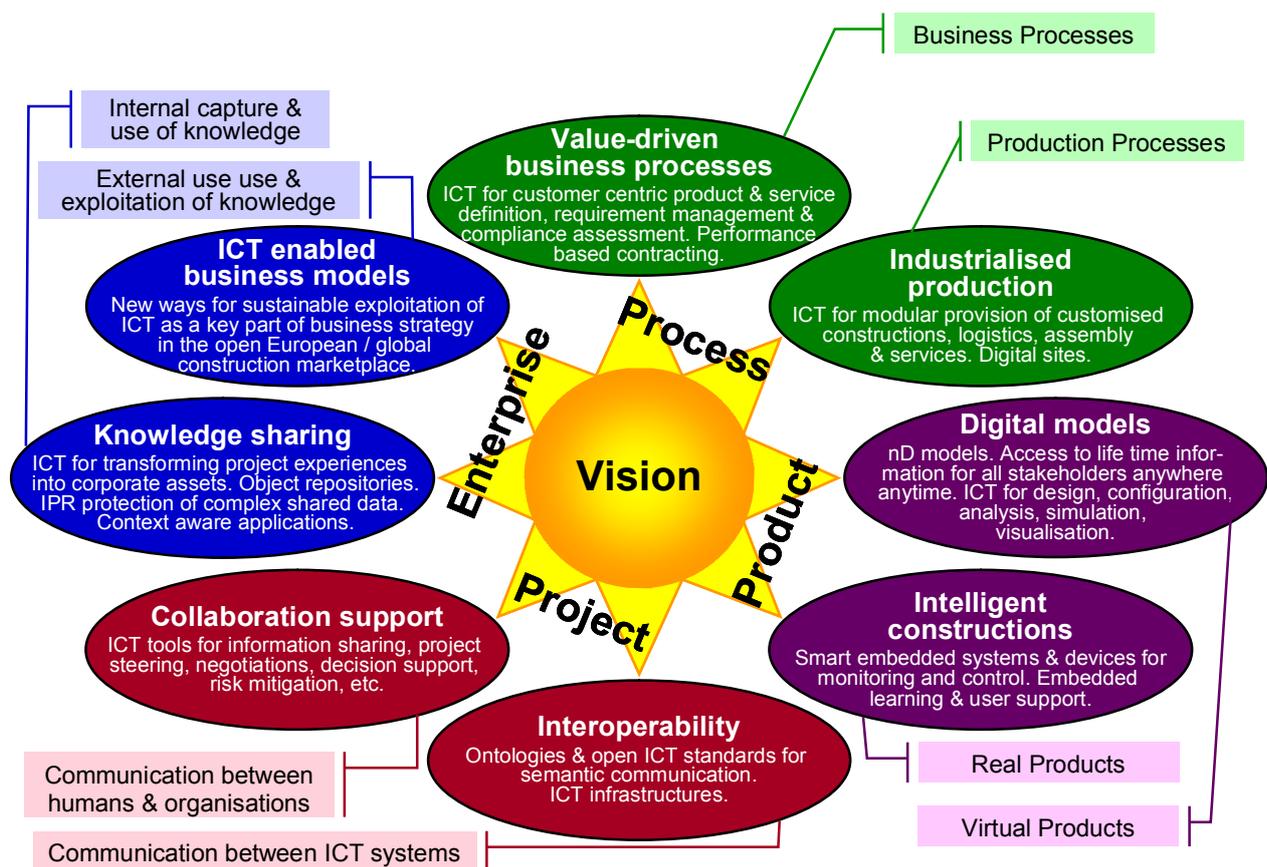
Figure 4: Key Thematic Priorities (Roadmap Topics)

As an example to help understand the undertaken work, some elements (vision, business scenario, objectives, roadmap diagram, and business impacts) are presented for the roadmap on value-driven business processes.

Roadmap: Value-driven Business Processes

Vision

The vision proposed in this roadmap is based on the fact that today, there are no tangible methodologies, models and tools available to manage performance and business processes in construction. It is advocated that to move from the current state of time and cost driven process towards value driven processes, performance driven processes, value to customer, total life cycle support, and product and service customisation must be supported.

Such a vision also leads to the following considerations:

- Strong stakeholders, like clients, are important agents of change and may provide leadership in the development of a sustainable built environment provided by an integrated supply side.

- Business relationships are based on trust, partnerships and win-win.

- The demands of end-users and society are met while optimising the use of resources; the technology available to achieve sustainable development is integrated in a systematic way, and the integration is site-specific thereby exercising vigilance and meeting local expectations of end-users and achieving performance and 0-accident and health risks.

- The procurement of services or products is done in ways that improve responsibility, reliability, quality, encourage competition and stimulate innovation.

Business Scenario: On-demand Customisation of Products and Services

Clients require customised products and services that address changing client product/service needs during the lifecycle of the solution (product/service). Modular product and service design alongside mass customisation tools allow this to happen. Rather than select the closest solution available, clients will be able to "pick-and-mix" different product/service modules to design their solutions. As the product/service components will be modular in nature, they will not only be easy to design (modular design), but to also easily manufacture and assemble (industrial production). Once the product/service has served its purpose, rather than being demolished/terminated, and it could be easily disassembled, reconfigured, and re-used.

Objectives

The objectives of the roadmap are to develop an extended approach for Construction re-engineering, revisiting process-chains for conception, achievement, maintenance & restoration of buildings and infrastructures. This re-engineering should rely on knowledge-based paradigms and assessment metrics and methods, related to *value-/performance- driven business models* which can create incentives for better performance, innovation and knowledge creation, and it should include a systematisation of the value analysis over the life-cycle, from inception and design to exploitation and maintenance. This roadmap aims to address four main business drivers:

- Performance-driven process

- Value to customer

- Total lifecycle support

- Product and service customisation
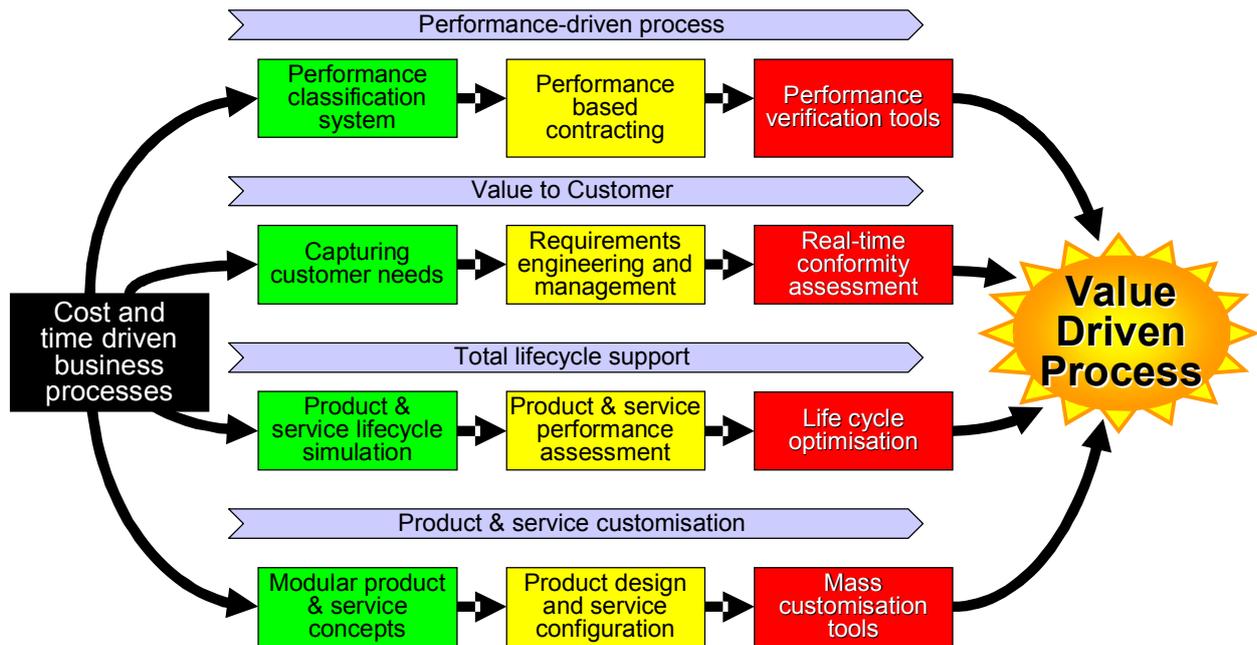
Figure 5: Roadmap for Value-driven Business Processes

Business Impacts

There will be a paradigm shift in terms of product/service delivery from lowest investment cost to optimal value to and conformance of requirements of the customer. Both customers and contractors/suppliers will share a common terminology (or interfaces to a common terminology) allowing for better understanding and delivery of customer requirements. Aided by modular product and service design, not only will more solutions be available to customers, but it will be feasible for designers and mainly contractors to deliver them. The products/services of the future will be fully configurable at start and reconfigurable during the lifecycle of the product/service. This will allow for example in the case of a major hazard (e.g. earthquake) to convert an opera house to a fully functional hospital within a matter of days (2-3), and to then re-convert it back to an opera house thereafter. Buildings, infrastructures and urban achievements of the future will integrate all new constraints, including a rational use of energy, minimising risks, trouble and discomfort for the individual users, and minimising pollution and risks of any kinds for all users in general and the society.

Prioritising Implementation Actions

During workshops held in Versailles, France, and London, United Kingdom, participants were asked to identify and prioritise key implementation actions. Each participant was given 40 "dots" to identify his/her favourite implementation actions from over 150 implementation actions identified across the eight roadmaps. Figure 6 illustrates the prioritisation for the roadmap on value-driven business processes.
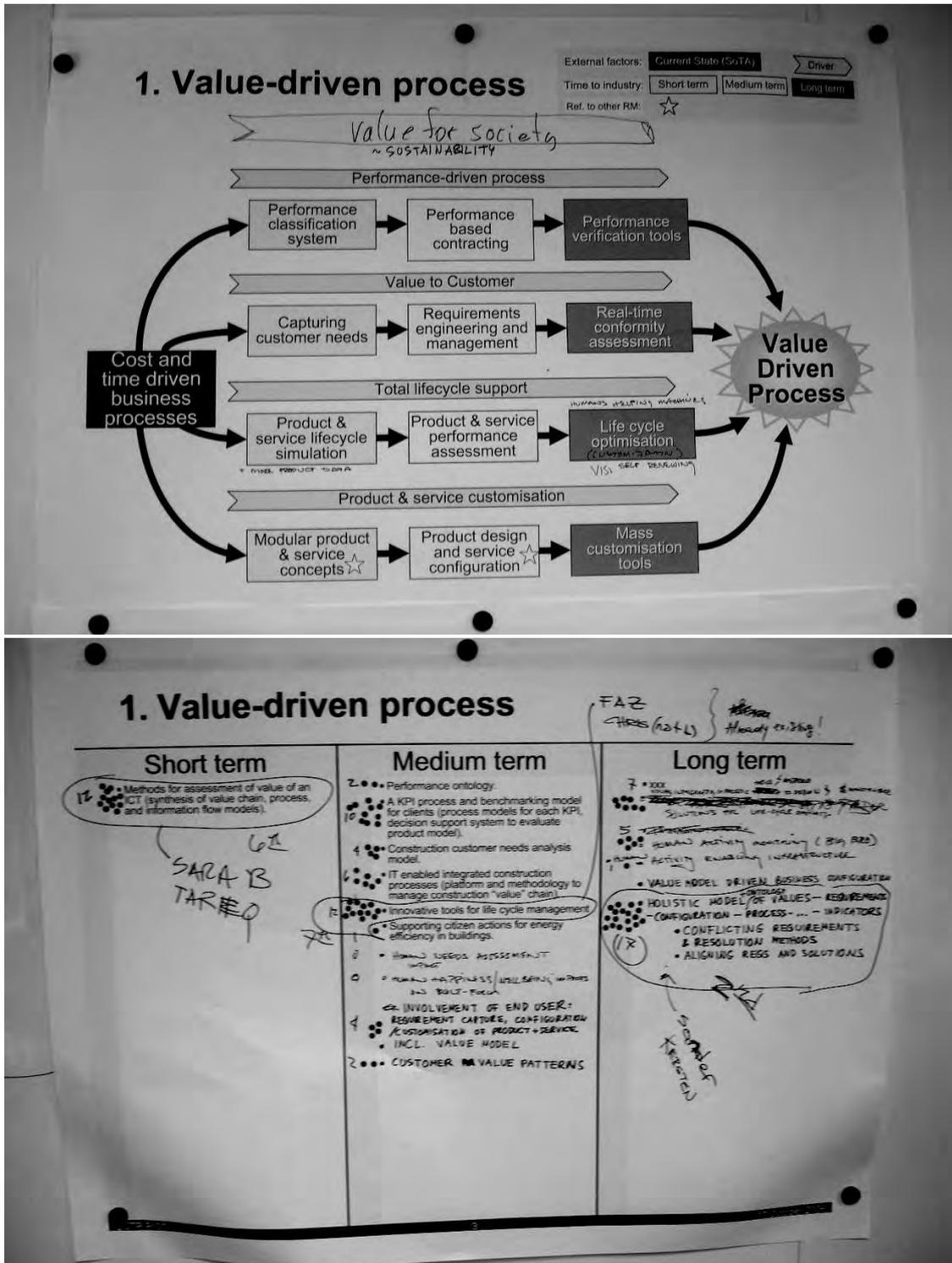

Figure 6: Prioritisation of Implementation Actions for Value-drive Business Processes

Mapping to Funding Opportunities

Each developed roadmap was mapped on to different relevant funding opportunities within the 1st calls of the European Union's 7th Framework Programme. Figure 7 shows where one could seek funding for the implementation actions defined within a thematic priority area (roadmap).
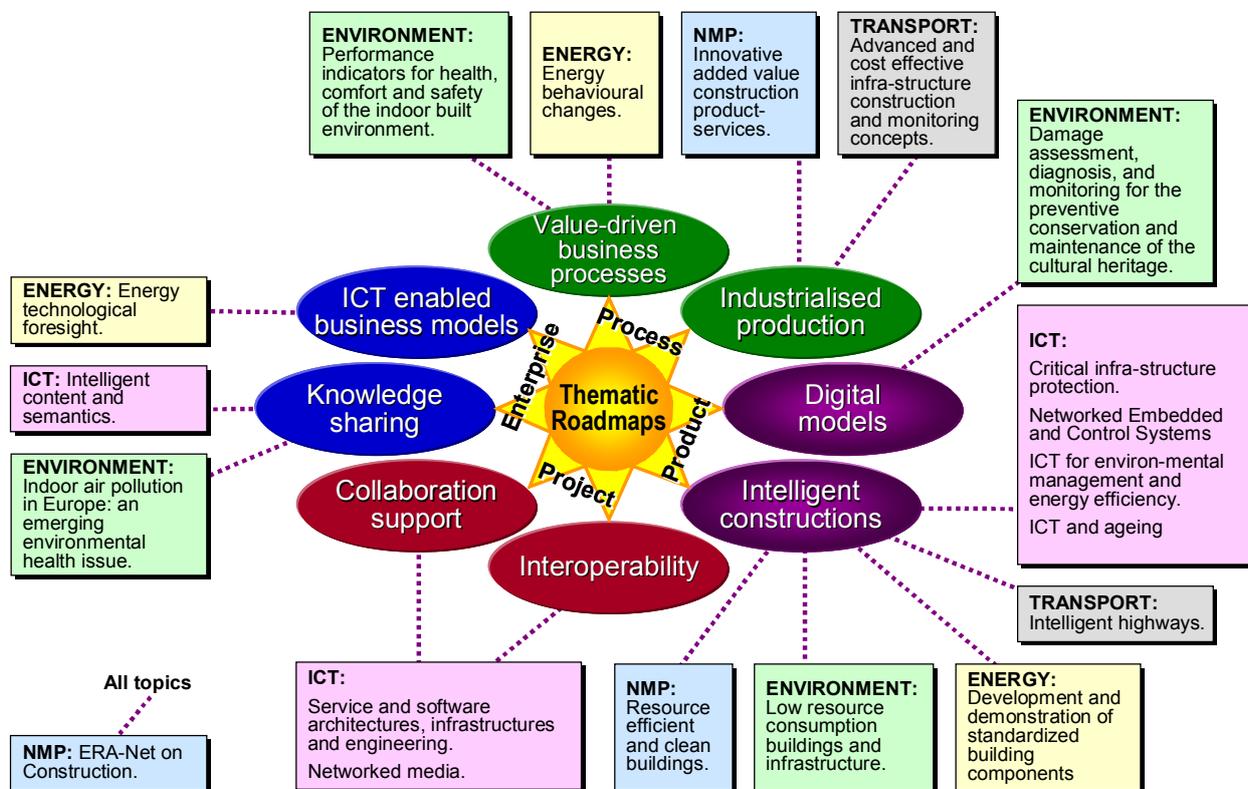

Figure 7: Example - Mapping to 1st Calls of European Union's 7th Framework Programme

Tips & Tricks (To-Do)

☑ A roadmap is simply a plan, and the implementation actions means for executing the plan. Be sure to regularly follow-up on both at periodic intervals. Roadmaps may evolve as new technologies and trends emerge, and implementation actions need to be monitored to ensure they take place.

☑ Consider pre-assigning members to a team (one team per thematic roadmap) based on their experience and key interest areas.

☑ For each team, consider pre-assigning a discussion moderator and rapporteur; though allow the team to make the final decision.

☑ Within 48 hours of the end of a workshop, send a thank you note by email to all participants along with a summary of the work done, roadmaps prepared, strategic actions identified, and list of follow-up actions.

☑ Consider sending images of each roadmap as postcards to participants to hang on their walls.

Potholes (Not-to-Do)

☒ Avoid engaging teams larger than 6 in size when developing a particular roadmap.

☒ Never distribute teams to different corners of a large room for teamwork as this only creates disturbance and hinders concentration. Use separate rooms!

☒ It is possible that within certain teams one participant will dominate the discussions. Be sure to inform the team facilitator to ensure that all are given an equal opportunity to speak.

☒ When documenting the roadmaps and detailing the implementation actions, be brief and to the point. Too much text only leads to confusion. Try limiting each roadmap document to between 6-8 pages and each implementation action to 1 page. Implementation actions can later be detailed in the form of project plans, once some starts implementing them.

Acknowledgements

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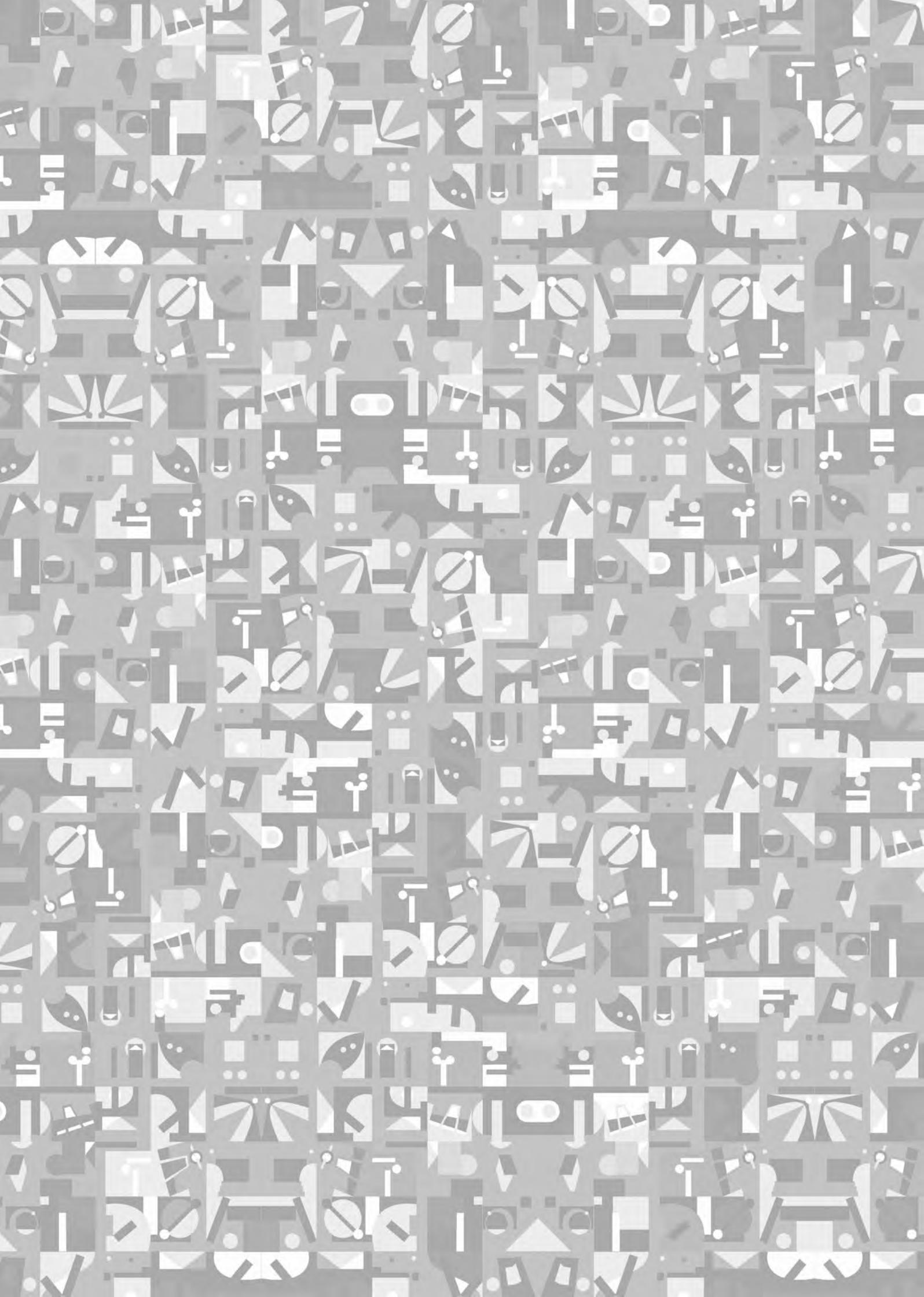
Hands-On Knowledge Co-Creation and Sharing:
Practical Methods and Techniques

Edited by:
Abdul Samad Kazi, Liza Wohlfart and Patricia Wolf

This is the second book by the KnowledgeBoard Community for the Global Knowledge Community. It follows the pattern of the first KnowledgeBoard book, "Real-Life Knowledge Management: Lessons from the Field", in presenting the practical experiences of knowledge workers.

"Hands-On Knowledge Co-Creation and Sharing: Practical Methods and Techniques" presents thirty hands-on moderation, facilitation, collaboration, and interaction methods and techniques, both face-to-face and software-based. Each presented method/technique is augmented with real-life cases on its use; provides directions on what needs to be done before, during, and after the use of each method/technique to achieve tangible and measurable results; provides a set of tips and tricks on the use and adaptation of the method/technique for different contexts and settings; and provides a list of potholes to avoid when using the method/technique.

The prime audience of this book is industry practitioners, event moderators, facilitators, consultants, researchers, and academia with an interest in the use and adaptation of effective methods and techniques to foster knowledge co-creation and sharing.

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