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«What is **right** and **good** management?»

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Team Syntegrity – Using Cybernetics for Opinion-Forming in Organizations

- **Overcoming complexity**
- **Utilizing cross-linking**
- **Creating commitment**

Keyword:
Complexity
Cybernetic management

«Total **Quality** Management is important, but Total **Management** Quality is ten times as important.»

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Foreword

For every organization, the real problem is not new technologies, globalization, the New Economy, soft human factors etc. – it is **complexity.**

Any manager can solve simple problems without outside assistance. It is the complex problems that present difficulties, those which are interconnected, whose variables interact and whose solution requires many kinds of knowledge – and mainly highly specialized knowledge at that.

In this issue, I will be letting one of our experts on dealing with complexity have his say. He will describe what is the most effective method yet developed for using and integrating knowledge to solve complex problems. In contrast to other approaches, it has a **sound** and readily **understandable** basis in **cybernetics** – the actual science of complex systems, their structure and how to deal with them. It is a core component of **management cybernetics** developed by Prof. Stafford Beer, the pioneer of this field, and constitutes one of the bases of the St. Gallen Management Model, which in turn is the basis of our work.

This issue is somewhat longer than usual – and it merits concentrated and even repeated reading. The syntegration model provides managers with a completely **new** instrument for solving their **biggest** problem: mastering complexity.

St. Gallen, May 2001

Yours sincerely,

Prof. Dr. F. Malik

Team Syntegrity® (1) – Using cybernetics for opinion-forming in organisations

«The chip beats the brain!»

This was the headline in 1997 when the chess computer Deep Blue beat the reigning world chess champion Kasparov. This event was held up as proof that computers are intelligent – more intelligent than people. Enthusiasts prophesied that the human brain would become redundant in the world of work. Now, of course, we know that while the profession of chess player may have fallen victim to rationalization, the brain has far from had its day in our organizations. On the contrary, the number of knowledge workers in today's organizations is increasing, in both absolute and relative terms.

In the automation of manual activities, we have experienced massive advances in productivity, which have been achieved through the use of the computer and, therefore, the chip. Now, however, productivity improvements in most organizations in modern industrialized nations no longer depend on further automation of manual activities, but instead on the productivity and the co-operation between their knowledge workers – an area in which relatively little progress has been made in the last 100 years. The benefits of communication and information technology have certainly brought about many changes – but by no means all of them have had a positive impact on productivity. More people still depend on co-operation with others than ever before. It is relatively simple to increase the productivity of manual work: if you harness two oxen in front of a cart, they will pull twice as hard. However, if you sit two brains down together at a table, are they automatically twice as smart? How do you make two heads better than one?

(1) Team Syntegrity®, Syntegration® and the Team Syntegrity icosahedron® are registered trademarks.

1. Large numbers of people involved in reaching and implementing decisions

Opinion-forming in organizations – and in a narrower sense, making decisions and finding consensus – has long ceased to be the responsibility of a small number of people. It is often necessary to involve many people when critical decisions are made. This is due to increasing specialization and, consequently, greater interdependence not only within organizations, but also increasingly between organizations. The need to co-operate beyond the legal boundaries of the company, as is the case in supply chain management for example, is growing in importance. What experienced manager can honestly say of organizations that critical operational and strategic problems are studied by all departments and specialist areas so that the solution chosen is without a doubt the best? And how many decisions can actually be implemented?

11 Increasing division of labour leads to reductionism and weaknesses in implementation

Specialisation has the advantage of better insight into, and more precise knowledge of, a field of activity. It provides **focus and concentrated** attention, and consequently improves skills and productivity. However, it brings with it the danger of **reductionist thinking.** A specialist sees the world from the viewpoint of her own particular field and judges it accordingly. Problems to be solved, however, do not conform to our classification of companies, divisions, departments, functions or fields. In fact the symptoms of a problem (or the signs of an opportunity) may initially come to light in one area - although the problem cannot actually be solved there. Specialists from other areas need to contribute so as to be able to understand and tackle all aspects of the problem. So the input of various specialists has to be brought together to solve the problem. Here are a few examples of this:

a) Preparing for decisions - strategic planning

Critical decisions are normally **made by one person** – the person who will also bear responsibility for them. In most cases, however, **a number of people** are involved in the **preparatory stage** so that the correct decision can be made and preparations started for the implementation stage. This is necessary for two reasons:

- Problems and challenges are frequently **too complex for one individual to have sufficient information and experience** to assess the situation correctly. This is particularly the case with high-consequence decisions, as they can influence the future of an organization. It is rarely enough simply to listen to a second or third opinion. To recognize causes rather than symptoms, the problem must be examined by people **with different viewpoints.**

- The **implementation** of the decision should already be built into its preparation. Early **involvement of those affected, and of key people** (and therefore their interests) in the opinion-forming process helps ensure decisions are implemented.

b) Mergers and reorganisation

We are currently seeing a wave of mergers. All merger integrators face the same problem: the calculated synergy potential must be realised as quickly as possible – but with two groups of managers with different cultures, a different history and different views and interests. The most important goal is to develop consensus about priorities and to establish a common view and language within a reasonable timeframe.

c) Project management

To introduce, for example, a new IT application in 10 branch offices, the IT specialists at head office, external consultants and project managers, as well as the future users (and this can quickly come to 30 people) have to develop a shared view of the project. The costs of a project are after all largely determined in the initial

phase when the requirements of the various interested parties are considered so as to avoid going down blind alleys and making investment errors.

d) Readjustment / Change

As Machiavelli described in «The Prince», the new always harbors the danger of unknown risks, so the forces which develop in an organization to protect against change are strong. Therefore, innovation and change processes have no chance unless the key people have a common and clear understanding of, and a high level of commitment to, the project. In such situations, compromises can quickly be reached. Consensus, on the other hand, requires a thorough examination of different opinions, views and interests. Ultimately, what matters is not only reaching consensus, but finding the right consensus – not that of the **lowest common denominator,** but that of the **highest common numerator.**

All these examples underline the importance of involving a number of people in the opinion-forming process so as not to fall into the trap of stereotyping or weakness in implementation. But how can one use and integrate knowledge present in an organization but widely distributed and perhaps even hidden? This is management's job.

1.2 The invention of Team Syntegrity®

Management cybernetics, which has its origins in various areas including operations research, information theory and brain research, is concerned with the problem of managing things holistic, in contrast to reductionist approaches. In operations research, it was originally concerned with the systemic (and systematic) understanding of problems, and solving them by examining and considering all obviously relevant factors. To this end, teams of experts from diverse disciplines were assembled who, jointly as a team, were able to consider different views. **Prof. Dr. Stafford Beer,** the British founder of Management Cybernetics, had prior experience in systemic approaches and the integration of specialist knowledge during the Second World War.

His work was one of the theoretical foundations of the system-oriented management approach, as developed at the University of St. Gallen, and from which the St. Gallen Management Model evolved. In **1994,** in his latest book **«Beyond Dispute. The Invention of Team Syntegrity»,** Beer proposed a new and scientifically-based way for integrating **distributed knowledge** to find **solutions.**

Information technology alone cannot help to do this. What needs to be integrated is the knowledge in the minds of the specialists working to solve the problem – their tacit knowledge and their experience. This kind of knowledge can only be integrated by direct exchange, by dialogue. Thus, the problem is: **how do I organize co-operation between several brains so that they work better and more productively than a single brain?** What kind of **communication design** or **architectonics** is necessary for the available knowledge to be optimally distributed and integrated into a creative and efficient process?

1.3 Requirements of the integration process

What are the **requirements** of a method intended to integrate the knowledge, the interests and the views of a group of people, so as to move from hierarchical opinion-forming to a «flat» organization?

a) The first requirement relates to the overall **criteria for good teamwork.** All manner of creativity techniques may well be commonplace, but complex and important issues can rarely be dealt with properly by «card games». There is just as little room for discussions that go around in circles, or endless meetings, as there is for one-sided manipulation. The criteria for good teamwork are:

   - ➢ A well thought-through division of work (or division of topics)
   - ➢ Strict discipline (timekeeping, role assignment etc.)
   - ➢ No group dynamics at the expense of results

b) A second requirement relates to the **level of cross-linking of information.** A group of 30 people has a total of **n(n-1) or 870 possible relationships,** assuming that the relationship of A to B is in some way different from the relationship of B to A. The question, therefore, is how this number of possible relationships can best be used so that every participant can have an intensive exchange with every other participant. This ensures the **use and convergence of different views** so that the best possible solution and commitment can emerge.

c) The third requirement relates to the **effectiveness of co-operation.** Key people are normally expensive people and almost always people who do not have any time, so the method has to be effective and efficient. It must ensure that the **correct topics** are dealt with (effectiveness) and that **synergy effects are used** to do so (efficiency). Thus, the **correct co-operative architecture** is critical to effectiveness.

Practice shows that **20 to 30 people are frequently necessary and also enough** to provide an adequate range of views. In most cases it is more than the 7 people in a project team but not the entire 100 people who could also have something to say. A group of around 30 people, with their common vision and their commitment, creates enough momentum to get something done in an organization.

A **scientific principle** is essential if 30 people are to work together effectively. Simply allowing everyone to enter the debate normally ends in chaos, dominated by the person who can shout the loudest. Team Syntegrity opens up **a route somewhere between unilateral dictatorship and chaos democracy,** based on a reliable mathematical principle. This prompts experienced and down-to-earth managers to make statements such as the following:

- *I am fascinated by how we were able to deal with such a complex topic in such a short space of time, and how the cross-linking took place.*
- *After a 41-year career with wide experience of workshops, I must say that I think the method is extraordinarily effective. It creates scope for creative processes. It was demanding but the discussions were limited by having small groups.*
- *I am speechless about the logistics and the organisational concept. Personally, I was amazed at how teamwork starts to motivate you after a certain amount of time. I have never experienced this before.*
- *I learned more in three days than in the one and a half years that I have been working for the firm.*
- *I came here with high expectations – and they have been exceeded.*
- *This was the best workshop of my life.*

So what are the mathematical principles which lead to discipline, to a maximum cross-linking of information, and to a high level of effectiveness through the use of synergy effects?

2. The architectonics of natural structures: Fuller's «Tensegrity»

«To do more with less»: when inventing Team Syntegrity, Stafford Beer applied R. Buckminster Fuller's architectonic principle of **efficiency in the design of things** (which Fuller demonstrated time and again by innovative cars, houses, ships and domes) to **efficiency in the design of co-operation.** The objective of both scientists was to achieve maximum stability, robustness and content of output with a minimum of input.

Fuller (1895–1983) is regarded as one of the foremost inventors of the twentieth century – he has sometimes been described as a modern-day American Leonardo da Vinci. He held numerous honorary doctorates (although he was expelled from Harvard University as a student and thereafter was self-taught), 25 US patents, and was the author of 28 books. Fuller is best known today for his geodesic domes, the lightest, most stable and most cost-efficient structures ever built (see Fig. 1). Even early in his career, he looked **to nature for efficient construction solutions.** Among other things, he discovered that nature **never** builds with **right angles,** instead preferring, **60° angles.**
He transferred this principle to domes using equilateral triangles. This method of construction achieves stability not by compression, as in traditional building, but by the distribution and concurrent application of tension and pressure. As in the open-spoked wheel, the unity or integrity of the structure is determined by the distributed tensile stress of the entire system. Fuller called this principle «**Tensegrity**» **(tensile integrity)**[2]**.**

[2] Fuller explains the principles he discovered in greatest detail in his works «Synergetics: Explorations in the Geometry of Thinking, Macmillan 1975» and «Synergetics 2: Further Explorations in the Geometry of Thinking, Macmillan 1979».

Fig. 1:
Geodesic dome, 76 m in diameter, erected as the American pavilion for the 1967 World Fair in Montreal

The **energy efficiency** of this revolutionary structural principle can be illustrated by comparing geodesic domes with traditional dome structures which are constrained by the fact that they can have a maximum diameter of 45 m, after which the cupola collapses due to the increasing weight. Thus, the construction of Seville Cathedral, the second largest after St. Peter's, was a five-generation long struggle against material. The cupola of St. Peter's in Rome, erected under the direction of Michelangelo in 1546, has a diameter of 42 meters and is therefore the world's largest traditionally designed dome. This maximum diameter does not apply to the 60° construction using equilateral triangles. Fuller was able to prove in practice that his domes actually gained in energy efficiency as they increased in size. The bigger they are, the more stable they are.

Other scientists have documented similar structures in micro-organisms, textiles, protein shells or the C60 carbon molecule (the Nobel prize was awarded in 1997 for the discovery of «Fullerene», which is expected to have enormous impact on chemistry, electronics and nanotechnology). «Geodesic tensegre» lattices based on the 60° method are often encountered.

Geodesic architecture uses the **synergy effect of the densest sphere packing.** The following experiment illustrates this effect: If four tennis balls are arranged in such a way that the individual balls have the **smallest possible distance between them,** the result is always a tetrahedron. A tetrahedron is a regular polyhedron (a regular solid) with four equilateral triangles. This is a **minimum structure,** i.e. there are no smaller structures. If, as a second experiment, you try to make four equilateral triangles using six matches, you will find that to do so you use a **synergy effect** (see Fig. 2).

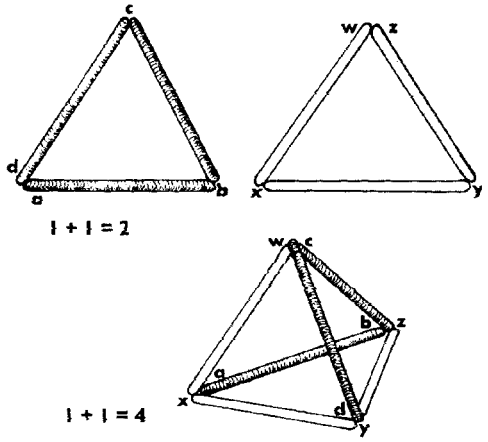

Fig. 2:
Synergy by rearrangement
(Source: Bucky Works)

Three of the five regular solids consist of equilateral triangles: the **tetrahedron** with four triangles, the **octahedron** with eight triangles and the **icosahedron** with twenty triangles. They also demonstrate the **principle of minimum distance between the vertices with maximum synergy.** The icosahedron structure is normally used for Team Syntegrity.

3. The architectonics of effective knowledge integration: Beer's Team Syntegrity

The **Team Syntegrity** method for structuring co-operation, developed by Stafford Beer in 1994, is based on the same architectonics as used by Fuller for geodesic domes. The use of synergy effects and adherence to the principle of integrity gave the method its name: Syntegrity is an artificial word made from **synergistic tensegrity.** Fuller argued that tensegrity, or the simultaneous occurrence of tension and pressure, is omnipresent in nature. Beer applies the concept to a social system: a group of people also seeks to compress their divided views into a united message which represents more than a consensus in the sense of the lowest common denominator, and which at the same time is exposed to tensile force, which then provokes discussion, argument and counter-argument. Beer calls the implementation of a structured working process such as this **«syntegration».** It normally takes place in the form of a retreat and takes around 3 days.

Fig. 3:
The Team Syntegrity icosahedron: the vertices represent topics (aspects of the general topic); the edges represent people.

Beer selected the icosahedron as a synergetic and «tensegre» communication structure. An icosahedron has **twelve vertices representing individual topics,** which are discussed by the syntegration participants and are basically **different aspects of the initial question.** Each topic is also allocated a color. Breaking a problem down into twelve topics provides a sufficient degree of subtlety while still allowing the individual to track and influence developments. If there are more than twelve, the overall picture gets lost – factions start to form, the participants form groups which are only interested in individual aspects of the solution to the problem. This is definitely to be avoided.

An icosahedron also has thirty edges. **The thirty edges represent thirty participants.** Thus, each participant has their own personal place in this structure from which he can exert some influence on the twelve topics. With the participants arranged in this way, information is distributed across all the topics in a **self-regulating** manner.

The level of cross-linking of knowledge can be expressed in terms of the so-called **Bavelas measures**[3] (group dispersion, relative centrality and peripherality) which relate to the communicative distance between the individual participants pre-determined by the working structure. The objective of the method is to obtain the shortest gaps or information distances between all the participants and, therefore, optimum cross-linking of knowledge. When the Bavelas measures are calculated for a syntegration, we get a **peripherality of zero.** In other words, the symmetry of the structure results in optimum connectivity, as none of the participants is marginalized. The method and its basic mathematical structure ensures that **thirty people could not be organized more efficiently in terms of cross-linking and information exchange** (the associated mathematics can be found in «Beyond Dispute»).

[3] Named after the great, but unfortunately little known communication researcher Alex Bavelas; Communication Patterns in Problem Groups, in: Cybernetics: Transactions of the Eighth Conference, 1951, Josiah Macy Jr. Foundation, New York.

The icosahedron structure thus maximizes the **effectiveness** of co-operation by making optimum use of the maximum possible number of contacts (n(n-1), i.e. 870 for 30 people). It shortens the information distance between the individual participants and – since it has no top or bottom – it has no hierarchy. Every participant has an equal opportunity to influence the outcome and still occupies a unique position making optimum use of his or her strengths.

4. The Syntegration process

A Syntegration process starts by **deciding on an initial question** – the **general topic** – which is specified in consultation with the client. The next step is to decide which **participants** can help in finding a solution in view of their knowledge, their experience and their function. They are then invited to a Syntegration process which is carried out in the form of a retreat. The length of the Syntegration varies depending on the number of participants 2.5 days for 18 to 24 participants and 3.5 days for 24 to 36 participants.

The Syntegration agenda, i.e. the twelve topics to be discussed as aspects or dimensions of the general topic, **is not set in advance.** The participants themselves specify the twelve topics to be discussed. This is important as it ensures that the Syntegration outcome is not predetermined by a pre-set agenda. It also guarantees the commitment of the participants as, during the Syntegration process, they will be examining topics that they personally feel are important. The topics are decided on the first morning, in a guided process called the **«Importance Filter».** It comprises the following phases:

a) **Generating Statements of Importance:** «Brain-storming» to shed light on all aspects of the initial question

b) **Problem Jostle:** A forum in which potential topics are discussed and negotiated

c) **Hexadic Reduction:** The reduction of the potential topics to just twelve

d) **Topic Auction:** Allocation of the participants based on their personal strengths

After this first Syntegration phase, the **structure of the system is configured and optimized** using a computer-aided algorithm. The topics are assigned to vertices and the participants to the edges of the icosahedron. The process normally begins at lunchtime on the first day with the second Syntegration phase commencing the following morning. In this phase, a sequence of meetings is held according to a precisely defined pattern, with a total of three meetings for each of the 12 topics. In these meetings, each participant performs three different roles:

➢ Team member in two topics

➢ Critic in two topics

➢ Observer in four topics

In each meeting, the **five team members** for a particular topic (symbolized by a color) sit around a table to explore and discuss the topic. Each team member is also a team member for a second topic (see the icosahedron: each edge has two colors) thereby creating a direct information link to that specific topic. The meeting, e.g. for the red topic, lasts 60 minutes and ends with a team summary of the discussion.

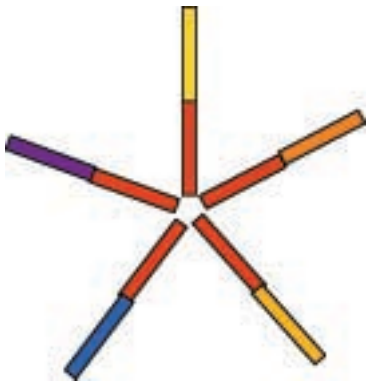

Fig. 4:
The five team members for the red topic (see the icosahedron in Fig. 3)

In the second row in the same meeting, further back in the room, are the **five critics** for the red group. Their task is to provide two sets of feedback, each of around five minutes during the meeting, on either the content or the course of the meeting. Each of the five critics is also a critic for another topic and, like every Syntegration participant, a team member for two topics and an observer for four topics – once again guaranteeing an information link to the other topics. Experience shows that, in contrast to other methods, criticism here is handled very positively as it is institutionalized in the critic's role. Each critic is expected to give the group feedback. Every participant critiques when acting as critic, and is then in turn critiqued when acting as a team member.

In the third row are the **observers.** They can come and go as they please during the meeting. They are not allowed to get involved, but can relay matters of interest to their own teams in which they are either a member or a critic.

Each group has a **facilitator** who records the team members' discussion and the critics' feedback on flipcharts. S/he is also the person who writes the team's summary as a 1–2 page **statement** at the end of the meeting. The facilitators do not attempt to influence the content of the topics; they are there to give the participants maximum freedom for thinking. Each statement from the 12 teams is distributed to all 30 participants.

While the red team is meeting, the white team meets in a second room – also with five members, five critics and some observers. **In the icosahedron, these two teams are situated exactly opposite one another.** The two opposite teams, therefore, work simultaneously: the red team with 5 members and 5 critics in Room A and, at the same time, the white team with 5 members and 5 critics in Room B. The 10 remaining participants perform their role as observers in either meeting. Once the red and white teams have finished their first meetings, the next two teams (black and light blue) start their first meetings. This continues until the evening by which time each topic has been dealt with once by the relevant team.

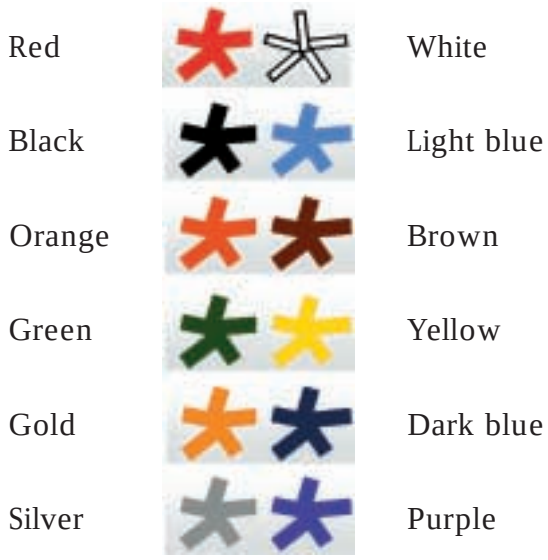

Fig. 5:
Sequence of meetings on the 12 topics: the two meetings for topics opposite each other in the icosahedron are held simultaneously.

As the same people perform different roles in different topics, they take with them ideas, arguments or methods they have heard in one topic to the next. In this way, the discussions of the individual topics stimulate one another, but do not get out of control as there are **only ever five people in a discussion** and each group feels the pressure of having to draw up a **statement** after the meeting; this statement can of course reflect any disagreement within the group.

There are next to no signs of fatigue normally experienced in management conferences – as the topics, the composition of the teams, and the roles of the participants are constantly changing. In the course of a day, they examine the initial question – the general topic – from different perspectives and with different people.

The critical effect of syntegration starts to emerge the following day, and is perceived by the participants. Each team now meets for a second time, having the same members as on the previous day, and resumes its work from the point at which they left off after the first meeting. This effect is known as «**reverberation**» and could perhaps best be described as an «**echo effect**». The ideas and arguments put forward by a member of the gold team, for example, are heard by four other members, five critics and several observers. Even if a particular argument is dropped, it remains in the short-term consciousness of these people, and a participant can suddenly hear their own argument from the lips of another person discussing a different topic (echo). When each team meets for the second and third times, it automatically has access to all the information from the other teams thanks to the icosahedron structure. Information starts to flow in the icosahedron and seems automatically to find the place where it is most useful. The following illustration shows the red team's second and third meetings. **It illustrates how all the information generated in all twelve topics in the first meetings is now available to the red group for their further discussions.** All twelve topics are represented by members or critics, with one exception: only the white group has no-one present, as it always meets at the same time as the red group (opposites in the structure).

Fig. 6:
Reverberation, taking the red team as an example: the topics stimulate one another (thick arrows/circles = participants, thin arrows/circles = critics).

In this way, information is exchanged and topic development co-ordinated in a **self-regulating** manner. In the icosahedron, the participants have a structure which allows them to **organize themselves** – a true **learning organization.** The following illustration shows how information is distributed to all participants as the team meetings are repeated. **After the third iteration, therefore, around 90% of the relevant information on the initial question has been distributed to all the participants** or, to put it another way, 90% of the information in the network has become homogenous (which can be expressed as a fall in eigenvalue – the precise mathematics are described in «Beyond Dispute»). The participants have found their best possible solution.

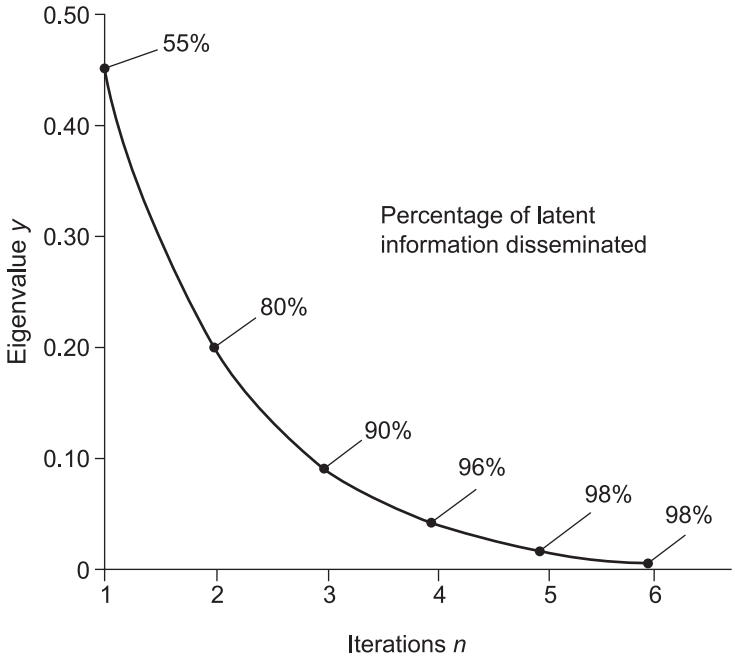

Fig. 7:
Syntegrity iterations. Eigenvalue y = 1/√5 for n iterations
(Source: Beyond Dispute)

In other words, three meetings per topic – as defined in the model – suffice in a Syntegration process; the gains from any further iteration would not justify the effort involved.

The **closing statement for each topic** is produced by the evening of the third day – this is the documented result of the Syntegration which each participant can take home with them. The closing statements of all the teams fit together like the individual **pieces of a jigsaw puzzle** thanks to the self-regulating co-ordination of the topics. Together, they provide a complete answer to the initial question posed at the outset. The **documented statements, incorporating the best knowledge of all those involved in answer to the initial question,** are one result of a Ssyntegration process. In most cases, they are concrete action plans.

A second result is the changes in the minds of the individual participants. The Syntegration process has made all the participants **learn about and understand each other.** They have had the opportunity to leave their normal thinking patterns behind and,

to learn to understand their colleagues' points of view.

A third result is the **group's alignment and commitment** to the documented closing statements.

A fourth result of every Syntegration process is the **networking or team building** among the participants. A Syntegration process is no 'walk in the park' for the participants. It compresses everything into a short space of time – like a pressure cooker or think-tank for ideas – allowing the participants to grow together.

As a **follow-up** to the Ssyntegration process, the written results are normally presented again in an overview, supplemented and given greater detail where necessary, and then presented to senior management as a **decision document.** The senior management can then assign a budget to the measures and re-draft them where necessary. Experience has shown, however, that the majority of the measures do not require a budget or any special project management, as they are supported by the commitment of the participants who have a personal interest in implementing them and therefore do just that. A controlling system for their implementation is nonetheless put in place – and another characteristic of the icosahedron structure is often used for this.

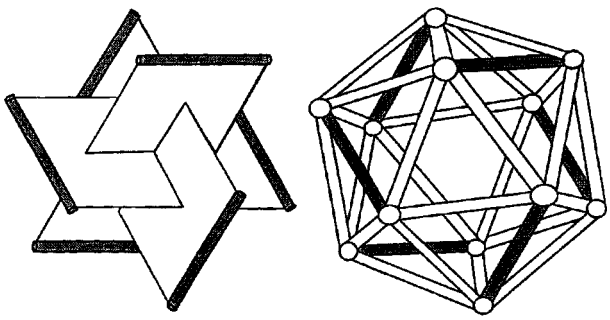

Fig. 8:
An orthogonal set: six people cover all twelve topics
(Source: Beyond Dispute)

The thirty participants form into groups of six orthogonal sets covering all twelve topics. There are, therefore, five orthogonal sets in the structure. With one of these five sets, work can continue

after Syntegration, for example: to refine or add detail to the measures, or to act as a controlling group ensuring that the measures are implemented as designed in the Syntegration process.

«The chip beats the brain» was the headline at the start of this article. With methods like Team Syntegrity, the productivity of knowledge workers can be improved through the use of synergetic working structures, resulting in something other and much more than the sum of the individual contributions by the individual knowledge workers. Perhaps we will experience an increase in the productivity of knowledge workers in the coming decades as, despite information technology, the human brain will remain our most powerful computer. This is clear to those who know that every night a human being worked on Deep Blue's programming.

5. Appendix

A selection of European organisations, which already work with Team Syntegrity:

Alcoa, Bahlsen, Balzers, British Trade Union Congress, Daimler-Chrysler, DSM, EADS, Heidelberger Zement, Dutch Ministry of Transport, IBM, Inselspital Bern, Israeli/Palestinian Center for Research and Information, Migros, Nashuatec, Pharmacia, Swiss Government Departments (BLW, BAG, BUWAL), Swiss Tennis Association, UBS, Universität St. Gallen, WWF, YMCA

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About the author

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