THE COHERENT ARCHITECTURE OF TEAM SYNTEGRITY®: FROM SMALL TO MEGA FORMS

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Professor Stafford Beer's book *Beyond Dispute: The Invention of Team Syntegrity*, (Wiley 1994) describes the invention of a group methodology for dealing with complex issues. Beer applied principles of managerial cybernetics to work out how to achieve high levels of 'syzygy' (cooperation and commitment) in groups that are large enough to satisfy issues of requisite variety, and small enough to accomplish something. The result is Syntegration®, a collaborative group process for thirty people that takes five days. In 1992, Team Syntegrity Inc. (TSI) was founded to find viable markets for Syntegration, and to continue the development of the methodology together with Beer. Delving deeply into the underlying geometry of the icosahedron, Joe Truss led the development of a suite of applications of the TS method that remove the constraints of thirty people and five days. Truss showed how the TS method could be used for groups of virtually any size, in sessions lasting from one to many days, without compromising the mathematical integrity of the technique. This paper describes the development of the TS protocols since Beer invented Syntegration and explains how the application of TS architecture and protocols can support viable, connected, self-organizing and truly empowered groups and learning communities.

Keywords Syntegration, Management, Cybernetics, Community, Collaboration

INTRODUCING TEAM SYNTEGRITY

Since 1992, TSI and its growing international network of licensees and practitioners have delivered well over 100 Syntegration® events in many contexts, countries and languages, building on the early experiments and theoretical bases reported by Beer in *Beyond Dispute: The Invention of Team Syntegrity* (Beer, 1994). One of the most significant challenges in bringing the Syntegration process to market has been retaining the integrity of the protocol as invented by Beer. Those sponsoring or participating in Syntegration events, especially in the early days, were quick to suggest adaptations requiring less time or fewer people. This is particularly true in corporate environments, where the demand for immediate and tangible results understandably prevails. The advent of e-business and the collapse of fiscal years into web years (now calculated as ninety days and decreasing quickly) only increases this demand.

The early reticence to consider such changes arose from an understanding of the cybernetic principles underlying the methodology. The Syntegration first needs to be

seen as an integral whole. Once this became clear to those involved in marketing and delivering Syntegration events, approaches to dealing with shorter duration and groups of varying sizes were encouraged and many successful experiments have now been completed. We are grateful for the ongoing support and personal involvement of Stafford Beer, who has kept an encouraging eye on the developments reported here, and has frequently acknowledged the significance of Truss' development of the TS ShortForms. Before describing the adaptations and experiments that have been designed or delivered, we begin with a very brief description of the Syntegration process for those unfamiliar with Beer's invention.

The Staffgraph Syntegration

A StaffGraph Syntegration event brings together thirty people for five days of facilitated divergent and convergent conversations around a broad Opening Question - normally some variation of "What shall we do?" or "How will we do it?" The objective is to take a comprehensive, fresh look at a complex topic. It is especially useful for exploring multiple perspectives and integrating people's ideas. Groups who gather in a Syntegration event tend to share some constellation of common interests that make them members of the same information set or 'Infoset'. Beer suggested a 'syzygy' measure (from a word referring to yoking) to reflect the extent to which individuals in the group feel connected and committed to each other and to their topic before the event and afterwards.

From the beginning, it has been strongly recommended that Syntegration events be residential. This allows people to put their usual responsibilities on hold and be free to concentrate on their discussions. It is also desirable to balance the formal, scheduled sessions with informal time and create opportunities for people to become better acquainted, share tacit knowledge, and balance their hard work with some fun. A residential event also provides opportunities for programs to be introduced which encourage people to shift gears completely, such as a music night, movement workshop or other social activity.

In Phase One of a Syntegration, participants are challenged to come up with new or important thoughts about the issue or Opening Question. These are written up on adhesive notes and posted on a wall. Individual Statements of Importance are examined and clustered if they appear similar. These Statements form the basis for an 'agendaless' meeting called the Problem Jostle in which floating informal groups of people explore the Statements in more depth. The most promising discussions are written up as more complete Statements relating to an aspect of the Opening Question. These Aggregated Statements become candidates to be chosen as one of the twelve topics to be explored in depth over the next several days. The Aggregated Statements are subsequently further refined, combined and/or set aside to arrive at twelve agenda topics to be discussed in Phase Two.

Before moving into Phase Two, the Outcome Resolve, the twelve topics are mapped onto the icosahedron, a three dimensional Platonic solid. It has thirty edges, twelve vertices or

nodes and twenty triangular faces. Each node of the icosahedron is colored and the edges or struts are coded with the two colors of the nodes they connect. Each of the thirty participants is mapped to a two-color strut to form twelve five-member topic teams around each node. The three-dimensional regular solid emphasizes an equivalency of roles and a lack of hierarchy in a structure with no top or bottom. Participants' topic preferences may be indicated and assigned by algorithm, using the topic algorithm developed by Jo Hancock (*Beyond Dispute*, 300), or their roles may be allocated randomly.

Figure 1 Syntegrity Icosahedron

Each individual plays an equivalent and unique role as the only member of a pair of teams. As a team member, he or she explores the chosen topic and becomes an advocate for its development. Team members are responsible to the group for preparing a statement at the end of each of their meetings that communicates the essence of their discussions and conclusions. Tensile strength is added through internal connections between ‘two-away-from’ topics. These ‘critic’ connections create another unique set of two roles in which each participant acts as one of five critics for each of two topic teams. The job of the critic is to listen to the content of team discussions, ask questions, point out gaps or connections with other discussions, and generally to play a ‘devil's advocate’ role during their allotted time slots.

The five members and five critics on each of the two teams on opposite vertices meet simultaneously. Each team and their critics meet three times over the next several days in three iterations as shown.

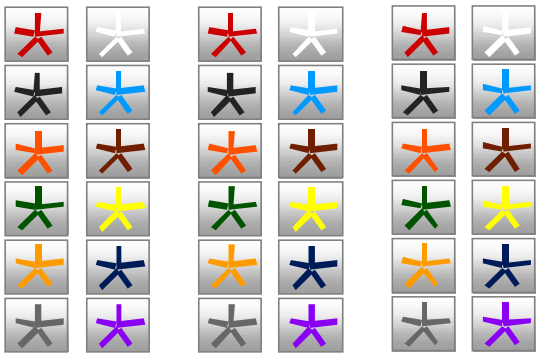

Figure 2 Team Meeting Schedule

Red and White meetings happen at the same time, followed by Black and Light Blue, and so on. Typically each round of meetings lasts from sixty to seventy-five minutes each. Participants are encouraged to listen in on other teams as observers in the two time periods they are not scheduled to meet as members or critics. As the results of prior discussions accumulate from people's experience and from reading the written statements there are opportunities to incorporate ideas from other meetings. It is common for an idea to reverberate around the structure and pop up again in another guise in the team where it originated. Presentations can be scheduled at the end of each iteration of Outcome Resolve meetings, and after the third iteration of meetings team members present their conclusions to a plenary session of the whole group.

The complexity of the colored icosahedral structure and the intensity of the discussions place considerable demands on participants. Fortunately they do not have to understand the structure or the nature of their relations to other discussion groups to participate effectively. The map of the simultaneous meeting sequences and color-coded name badges make it simple for participants to navigate through what would otherwise be daunting complexity. In addition, a certified delivery team of about seven people (organizer, facilitators, and logisticians) is on hand to guide participants through the protocol. Facilitators act as moderators, timekeepers and scribes during the Outcome Resolve team meetings but do not contribute to the content of the discussions. Nor do they often intervene in the process, except at the direction of the team. Teams are encouraged to 'self-organize' and become stronger and more effective if they, rather than the facilitators, take responsibility for drawing out silent members, staying on topic and maintaining a reasonable division of airtime. As teams learn how to best manage the complexity of their interactions, this learning transfers quickly to other teams due to the interconnected team memberships.

Syntegration differs from other collaborative group processes in several outstanding ways. Beer was seeking a means to affect the System 3/4 homeostat in organizational systems, as articulated in his Viable System Model (VSM) (Beer, 1979, 1981 and 1985). Syntegration was invented to help organizations balance attention and resources on both the 'Inside and Now' and the 'Outside and Then'. Beer determined that a group of about

thirty people brought enough variety to be representative, but recognized that special meeting protocols were required to ensure the group did not devolve into chaos and a useful outcome could be achieved. Beer's deep understanding of neurophysiology, mathematics, philosophy, systems science, management cybernetics and other fields of activity including the arts, resulted in a group process truly designed for humans, one that enables the best possible contribution of each participant, and mitigates the resulting complexity through means that generate and sustain both group cohesion and individual autonomy.

Participants experience an event in which the content of their discussions is not pre-ordained by the prior establishment of an agenda, and in which each has the opportunity to contribute in an equivalent way. They discover that although they only have to attend four out of twelve team meetings as members and critics, they learn about and are influenced by information generated by all the teams. Beer determined that three iterations of Outcome Resolve meetings are mathematically sufficient to distribute about ninety-percent of the information throughout the system and, because we are not dealing with ciphers but sentient human beings who gossip together, the total distribution of actual information approaches 100 percent (Beer, 1994, 263-380). In any case, there are few systems in which a contribution of about thirty-five percent generates a theoretical payback as high as ninety percent.

Whether the Infoset is an intact work group, or a mixed group of people who have no prior association with one another, the group of thirty evolves into a community with a sense of shared purpose and of responsibility. People learn to trust that conflict can be managed within the group, and that the ideas they share with other members serve to enhance the outcomes for the whole group. Though healthy competition can arise between teams, it is seen to serve the purpose of the group in the search for innovative responses and conclusions.

Alan Pearson and Dr. David Beatty, both former Directors of TSI, contributed chapters concerning facilitation to the 'Collaborators' Surplus' of *Beyond Dispute* (313, 323) and were instrumental in helping to arrive at an understanding of what makes Syntegration facilitation effective. Dr. Allenna Leonard, also a contributor to the 'Collaborators' Surplus' (*Beyond Dispute*, 346) has played a special role by offering support to groups and communities who have limited resources yet desire the benefits of a collaborative approach to dealing with their issues and problems. The Team Syntegrity protocols have been delivered in many languages, and in both developed and developing countries. Because TS is essentially 'content-free', little adaptation is required to enable delivery in other languages and cultures, which represents a distinct advantage relative to other group process methodologies.

Geometric Features Of The Syntegrity Icosahedron

The icosahedron, the largest and most robust of the regular polyhedra, forms the underlying structure for Syntegration. By mapping people to struts and topics to nodes, a

system can be articulated in which relationships among people and ideas can be made explicit and explored. However, the design of Syntegration itself did not exhaust the possibilities for rigorous connections between people and conversations based on relations described by the underlying geometry. Even before *Beyond Dispute* went to press in 1994, Truss described a planning system to follow a Syntegration event that was based on the relationships defined by the structure and designed to coordinate implementation of the broad statements emerging from the event (Beer, 1994, 333-345). FACE Planning brings together the three positions that surround each face for the purpose of articulating a goal or policy that integrates three of the twelve topics. Each of the thirty strut positions lies between two such faces, and so each person participates in two FACE Planning teams. A Syntegration event, followed by FACE Planning involving all twenty FACE Planning teams, generates twelve interconnected ideas or topics fully integrated by twenty goals or intended actions. If time is limited, all twelve teams can be accommodated on eight faces, involving twenty-four people, and the remaining six people can be distributed among the faces that include their team colors.

Figure 3 Minimal Set of Eight Face Planning Teams

Another set of relationships is defined by groups of six people who occupy three pairs of strut positions that are opposite and at right angles to one another. Beer identified in *Beyond Dispute* the intersecting golden rectangles that are formed by these three pairs of polar opposites. Note that the six edges of the colored intersecting golden rectangles touch all twelve colors. The significance of this to Team Syntegrity was subsequently determined by Truss.

Figure 4 Intersecting Golden Rectangles

Each of these rectangles formed by the two polar opposite edges and the connecting lines between them is in the proportion of the golden rectangle (Beer, 1994 181). Phi is a proportion that states the equality of two ratios, and its number is 1.618034. This represents the proportion of the length of a strut, with a value of 1 unit, to the distance between the top of two polar opposite struts, which is 1.618034 units. The intersection of three of these golden rectangles at 90 degrees (i.e. orthogonally - hence the name

'orthogonal set') produces an icosahedral sphere. Thus, Beer describes the icosahedral sphere as having the quality of 'phi-ness' (Beer, 1994, 181).

Polar opposite pairs cannot encounter one another in Outcome Resolve team meetings because they are always in session at the same time (Beer, 1994, 131). When three sets of polar opposites are brought together each member represents two of the twelve topic groups. There are five orthogonal sets in the icosahedral structure. Orthogonal set meetings are often scheduled between iterations of team meetings in order to increase the 'reverberation' of ideas in a Syntegration event.

Reverberation refers to the way in which information passes indirectly from person to person during a Syntegration event and arises as a consequence of the interconnected team memberships and roles, the simultaneous meetings, and the iterations of the Outcome Resolve meetings. It has become common for participants to comment on how their own ideas seem to buzz around the structure and return in another form through an unexpected channel. It is this reverberation that contributes to high efficiency in terms of information distribution, creativity and new learning for participants. The effect of reverberation is related to the eigen-value (Beer, 1994, 215) and the architectonics (Beer, 1994, 172) of the Syntegrity Icosahedral structure.

The orthogonal set became the key to the 'deconstruction' or 'decompression' of the Syntegrity icosahedron and to the subsequent development of forms of Syntegration through which smaller groups of people can be connected to an icosahedral twelve-node topic space. As the six struts of the orthogonal set touch all twelve colors, when one set is removed each topic team of the original icosahedron is simultaneously reduced by one member, leaving four-member teams connected in the original color-coded manner.

Variations On The Theme – The TS Shortforms

Not surprisingly, it became obvious early in the experimental phase that it was very difficult for groups of thirty people to free up five full days to participate in a Syntegration event, and equally difficult to encourage potential sponsors and clients of the value of enabling this. One challenge therefore was to find ways of shortening the duration and decreasing the number of people who needed to participate without compromising the integrity of the protocol. In *Beyond Dispute*, Beer explained that retaining the 'twelveness' of the topics examined and maintaining some separation between opposite topics was desirable to reduce the risk that topics and positions would collapse onto each other. This was given mathematical formulation when Assad Jalali noted that the icosahedron was a Paley Graph of diameter three – that is that the opposite poles do not share any members or critics since it takes three steps to get from one pole to the other (Beer, 1994, 263-280). Beer himself, and some of his students, have experimented with the tetrahedron, the cube and the octahedron. Although these forms address the issue of smaller numbers of people, they also reduce the number of topic groups that can form in response to a complex Opening Question.

The first experiments dealt with working out how the Syntegration event could be accommodated in less than five days. It was found that a 3.5-day schedule was adequate, although participants frequently state afterwards that they wish they had more time. The shorter duration makes it even more important that the event be held in residence, as meetings must start early in the morning and run into the evening. The 30-Person, 3.5-day event has now become the form of Syntegration event most commonly delivered, especially for corporate clients.

Experiments with shorter events for thirty people were found to involve serious compromises in terms of both process logistics and in terms of the time needed for participants to bond socially, which is always longer than the time required to merely complete the process. Shortening the divergent Problem Jostle stage, for example, can lead to a set of twelve topics that have not been expressed in their full depth and can reduce the level of commitment the group feels towards some of the topics. When Outcome Resolve meetings are shortened, there is a risk that the full scope of the topic cannot be explored adequately, or that the views of all team members are not expressed. The aggressive meeting schedules can result in both participant and delivery team fatigue. Holding sessions during mealtimes constrains opportunities for participants to relax, converse with others and review the output of the team meetings as Statements are developing, thereby decreasing the flow of information through the system. Finally, there is likely to be insufficient time for teams to do justice to their reports in the plenary presentations.

This is not to say that groups have been unable to achieve valuable results in shorter time periods, but it takes a heroic effort on the part of both participants and delivery team members to do so. There is also a noticeable reduction in the quality of output and in participants' overall satisfaction with the experience. We recognize a dynamic of the Pareto principle or 80/20 rule at play here in that eighty percent of the effect – both in terms of the output and of the social bonding that is essential to the formation of 'community' - comes in the last twenty percent of the time. We do not recommend the delivery of Syntegration events for thirty people in less than 3.5 days because our experience has demonstrated that this is the shortest duration needed for group cohesion, deepening of overall dialogue, high creativity and shared understanding to reach critical mass among thirty people.

Early experiments with smaller groups were supported by moving from the icosahedral structure to a different but associated structure. The cubeoctahedron also has twelve vertices, each connected by four rather than five struts, forming eight triangular faces connected by six square faces. As the six struts of an orthogonal set touch all twelve colors, when one set is removed each five-member topic team is reduced by one member. This leaves four-member teams connected in the original color-coded manner. Therefore the cubeoctahedron offers a structure to support groups of twenty-four. Topic teams have four members and four critics, but the 'twelveness', the unique and equivalent roles, and the meeting schedules of the original protocol are retained.

Figure 5 Syntegrity Cubeoctahedron

Subsequently, later successful experiments were performed with eighteen people, involving three team members and three critics, but still retaining the original meeting schedules. This form results from removing a second orthogonal set.

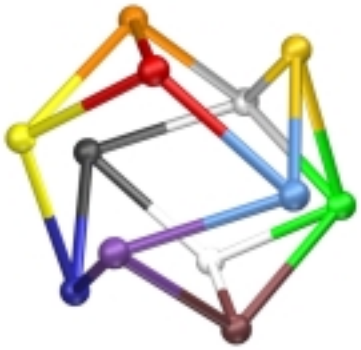

Figure 6 Syntegrity 18-Person ShortForm

The Syntegrity Cubeoctahedral and 18-Person ShortForm Syntegrations have proven to be reliable variations, both derived by the removal of one or two orthogonal sets. Generally, 3.5 days are recommended for twenty-four people and 2.5 to 3 days for eighteen. Dealing with groups smaller than eighteen presents a new challenge, as removing a third orthogonal set from the 18-Person form leaves two remaining sets that are no longer connected to one another.

Figure 7 Removal of 3rd Orthogonal Set

The solution to this challenge was invented by Truss and based, like Beer's original work, on geometric features of the regular polyhedra as articulated by Buckminster Fuller in his

work on Synergetics [Fuller, 1979), and explored by many others including Pythagorus, Plato and Leonardo da Vinci. Using a representation of the cubeoctahedron known as the vector-flexor, which has rubber connections at the vertices, Fuller showed how it could be folded in on itself to form other regular polyhedral forms such as the octahedron and the tetrahedron. When the vector-flexor is folded in to form an octahedron, two struts of the cubeoctahedron come together along each edge of the octahedron. When folded in to form a tetrahedron, four struts come together along each edge of the tetrahedron. The tetrahedron can be folded one more time to produce a two-dimensional triangle where eight struts come together along each of the three edges.

Applying the Syntegrity color system to the vector-flexor enabled Truss to recognize that the twelve-topic space of the Syntegrity Icosahedron can be used by groups of twelve, six and even three people on the basis that each person represents more than one strut position, and therefore participates in multiple team meetings to carry out the role that each position represents. The term 'quantahedra' was coined for these folded-in polyhedral structures, where multiple nodes occupy the same position and edges collapse onto each other, forming different but self-consistent regular smaller structures that retain the connectivity of the original icosahedron, and to which Syntegrity protocols can be applied.

Team meetings for twelve, six and three-person groups require different schedules than the larger groups, and the role of observer is not retained in these forms. In fact, the twelve-person group does not use the octahedral formation as the map for working out the meeting schedules, due to the way in which topics converge at the nodes. Instead, the 12-Person schedule is derived from flattening the cubeoctahedron as shown below. Each member of the 12-Person group plays two positions which are polar opposite to one another, producing a simple meeting schedule that is easy for participants to follow. The TS protocols for twelve, six and three person groups are similar, but not identical, to those for larger groups.

Figure 8 Syntegrity 12-Person ShortForm

A very successful 12-Person ShortForm Syntegration was delivered for a digital media company working with a large multi-national high-tech company to produce a commercial multi-media learning product. As a consequence of bringing twelve key product design, project management and subject matter experts together in a 3-day Syntegration event to initiate the project, our client estimated that their development and

production costs were dramatically reduced. The resulting CD-ROM product subsequently received a prestigious design award.

Few experiments with the Syntegrity 6-Person and 3-Person Forms have been completed to date, as they are generally recommended in the context of ongoing integrated applications of Team Syntegrity within a larger organizational initiative. As our clients move from using Team Syntegrity as a method for delivering discrete events to viewing it as the basis for designing connected workgroups and communities sharing an overall architecture defined through the Syntegrity color system, these forms will become important components of the TS offerings.

Figure 9 Syntegrity 6-Person ShortForm

Figure 10 Syntegrity 3-Person ShortForm

One other TS ShortForm was designed specifically for the purpose of providing a 'taste' of Syntegration for those who wish to sample aspects of the protocol before sponsoring a Syntegration event. Called 'Syntegritaste', and delivered in one to 1.5 days, this protocol helps groups of about 18 to 30 people identify problem conditions or clarify issues prior to engaging in a full Syntegration event.

More Variations On The Theme – The TS Smallforms

Early experiments in the use of other regular polyhedral forms have already been mentioned. In *Beyond Dispute*, Beer describes experiments with the tetrahedron and octahedron (Beer, 1994, 74 and 79). Albakri Ahmad recently completed a doctoral thesis at Liverpool John Moores University (LJMU), *A Pluralist Perspective of Team Syntegrity: Design and Intervention Strategy for Organisational Change*, based on experiments with regular polyhedral forms. TS licensees have run successful experiments with both the octahedron and tetrahedron, notably IcoDrome BV in The Netherlands. Not all problems require a twelve-node space to work out the inherent complexity. Accordingly, TSI now counts the Syntegrity Octahedral and Tetrahedral forms among its offerings, aimed at groups of twelve and six people respectively.

The Octahedral form, with its twelve struts, six nodes and eight faces, involves twelve people who gather together to address a problem or issue which is explored and discussed through six rather than twelve points of view. Outcome Resolve team meetings involve

groups of four team members and two critics, and polar opposite topic teams can meet simultaneously. There are no observer positions in this form.

The Tetrahedral form has six struts, four nodes and four faces, and applies to groups of six people who gather together to explore a subject through four points of view. Outcome Resolve team meetings involve three team members and three critics. With no polar opposite teams and no observer positions in this form, simultaneous Outcome Resolve team meetings are impossible.

The TS SmallForms are recommended for situations where the work of the group is discrete in that the groups' conclusions do not need to be integrated with an already established twelve-node space. They are particularly useful for project groups and other small focused workgroups. The protocols that support these forms are similar to those for other Syntegrity forms, involving both divergent and convergent discussions.

Extensions Of The Theme – The TS Expanded Forms

The desire to find approaches to handling various group sizes and time duration was accompanied by a need to help clients develop strategies to move the outcomes of Syntegration events into and through the organization, and to extend the conclusions reached by an initial group into the plans and activities of others.

The simplest and most obvious extension is to encourage the twelve topic teams and critics to continue to meet after a Syntegration event for the purpose of ongoing exploration, conversation and implementation of the groups' ideas. Simple meeting schedules are established to support this. In the same way that three iterations of Outcome Resolve team meetings are used for the initial exploration and development of each topic, once each team has met in sequence three times after the event, the groups' conclusions are refreshed. Information continues to flow through the system just as it does during the Syntegration event itself so that people are informed about what is happening in the full group without having to attend all of the team meetings. This offers an efficient and effective way of carrying the results of a Syntegration event into the ongoing activities of the group with minimal overhead and associated costs. If the group uses the FACE Planning protocols as well, FACE Planning meetings can also continue at appropriate intervals such that the entire integrated system of results is continuously refreshed over time. Providing systems to support remote meetings and manage information will help to sustain such ongoing initiatives.

Because each of the five orthogonal sets has representation from all twelve topics, these groups can also play a special role after a Syntegration event. For instance, one or more of the five orthogonal groups can be challenged to recruit up to twenty-four other people, thereby forming up to five new Infosets each with equivalent topic representation from the original Infoset. The growth of such a group reverses the pattern of 'deconstructing' an icosahedron. Each orthogonal set group from the original Infoset can 'grow' a new Infoset by recruiting new members into the twelve topic teams, balancing team membership on the basis of the missing orthogonal sets. This provides a balanced and

participative way to brief others about the outcomes of a Syntegration event, or to move specific conclusions and results from an initial Syntegration into the operations of larger groups.

In the summer of 1993, 14 Syntegrations were sponsored by the World Syntegrity Project, under special license with TSI, to address a question dealing with world governance. Since then, many more events have been held, and more are planned for 2000 and beyond. Repeat Syntegrations of this nature allow the same question to be answered by different groups in different contexts, generating varied responses to the same Opening Question.

Another extension is the cascading Syntegration where an initial group of thirty people is brought together to deal with a subject of significant complexity. A Syntegration event is held in which the Infoset articulates and explores twelve aspects of the subject. Each of these aspects or topics is seen to be of sufficient complexity to be explored in a similar manner, and thus twelve Infosets are established to explore each of the twelve topics in much more depth, involving twelve subsequent Syntegration events. The figure below represents this scenario, which would involve up to 390 people:

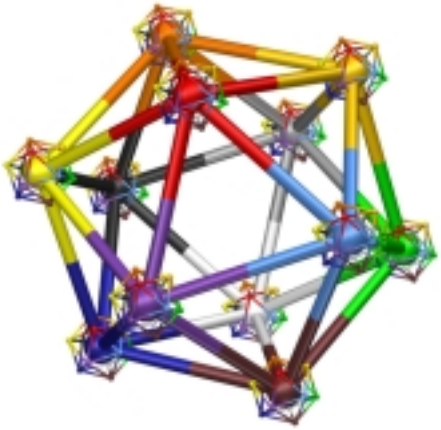

Figure 11 Syntegrity Node-Recursion Form

The concepts of scalability, recursivity, fractals and the geometry of natural structures were embedded in the thinking of those involved in Team Syntegrity designs from the earliest days. In *Beyond Dispute*, Beer proposed an approach for large groups of very high variety where 30 Syntegrations would be held, involving 900 people (a Hyper-Infoset), followed by a meta-Syntegration involving one representative person from each of the thirty Infosets (Beer, 1994, 173). This enables the voices of 900 people to be crystallized into twelve focused points of view, thereby facilitating decision-making processes for large groups and organizations, including governments.

Truss and Chris Cullen have designed a Syntegrity-based conference process capable of handling thousands of people, where each color topic represents a major conference theme. An initial Syntegration event is convened to establish twelve themes based on the overall purpose of the conference. This is followed by twelve Syntegrations to fully

explore the domain of each theme and reach initial conclusions to be shared with others. Subsequently, a large conference is organized, and participants are invited to select the themes in which they wish to participate as members and critics. Over a series of days, three iterations of theme meetings are scheduled to correspond to the Outcome Resolve team meeting schedule, such that two themes are addressed simultaneously. In this way, as in Syntegration, conference participants can learn about all the themes as they are developing while participating actively in four of the twelve topic themes and observing at least two others. This facilitates a much better dissemination of important ideas and conclusions arising from the conference than the traditional large conference design.

Taking full advantage of the recursive nature of the Syntegrity Icosahedron involves considering the internal space of the structure as well. The figure below reflects an infinite number of levels of recursion, both outward and inward. It demonstrates the embedment of Infosets within Infosets, using the dual of the icosahedron – the dodecahedron – where the thirty struts of the icosahedron correspond to the thirty struts of the dodecahedron and nodes are transformed into faces. The dark black lines of the figure represent the enneagram, which has always been represented as a two-dimensional figure. The discovery of the enneagram as a three-dimensional form hanging inside the icosahedron is recounted in *Beyond Dispute* (Beer, 1994, 207). This figure demonstrates the richness of the icosahedral structure as the basis for designing architectures and protocols for groups that match the overwhelming complexity of our 'real world' of relationships and connections.

Figure 12 Syntegrity Full Recursion Form (with red polar cap removed)

Experiments With Electronic Support

From the beginning, logistical support systems for Syntegration were seen as key to ensuring effective delivery of the protocols, and Cullen, among others, played a significant role in developing initial support systems using computer technologies available at the time. These systems needed to ensure that all output generated by

participants was available as needed during the event, and that by the time participants departed all materials generated before and/or during the event were in their hands.

Though commercial use of the Internet was in its infancy in the early nineties when TSI was founded, it was already clear that it would play an increasingly important role in future developments. In *Beyond Dispute*, Beer says, "The world is a geosphere, a planet of rock and water, and shrouded by its biosphere, a seamless robe of life that permeates and inhabits both. Similarly and thanks also to technological advance we may think of the world as enrobed in a technosphere…Because there is a technosphere, the people of the Infoset do not have to be located anywhere in particular. A Convention of Infosets coming together (as each does itself) through the medium of the global technosphere would constitute a world convention." [Beer, 1994, 169). What seemed almost futuristic just a few years ago is here today with a vengeance, and recently others have begun to use the term 'technosphere' to describe the quickly changing landscape of technical infrastructure that surrounds and envelops us.

In 1996, the first stages of the Stafford Beer Festschrift Syntegration were conducted at a distance using electronic support, and after the event the twelve teams continued to work together using e-mail and e-bulletin boards to complete the twelve chapters outlined during the event, and produce the resulting Festschrift book and CD-ROM publications (Espejo and Schwaninger, 1996). Subsequently, a 1998 Syntegration event on the future of the Digital Media industry in the UK, sponsored by the Department of Trade and Industry and the British Computer Society among others, generated a website (www.interaction2.org.uk) that was open to non-Infoset members before, during and after the event, enabling the contribution of interested parties who were unable to attend.

The focus of TSI to date has been to support the development of the TS licensee and practitioner network, to develop a commercially-viable set of product offerings, and to support grass-roots and community-based projects for social good. Except in response to specific client requirements such as those described above, TSI has not had the resources to simultaneously develop electronic applications, though many exciting Syntegrity-based designs are awaiting the right opportunity and resources. Our task for the future ranges from providing the ability for groups to conduct some or all of the Syntegration process online, to applying the geometric design principles underlying the architecture of the Syntegrity forms, and the cybernetic principles underlying the protocols, to support the evolution of and connections among groups and communities.

A Hint Of Future Directions

In an associated but independent effort, Truss and Cullen are developing a new system based on a multi-recursive tetrahedral form. Fuller identified the tetrahedron as minimum structure, and most people are familiar with his development of geodesics as the basis for architectural structures that are surprisingly robust (Fuller, 1979). Truss and Cullen have invented a system based on the internal structure of an articulated three-frequency tetrahedron. When the one-frequency tetrahedron at each node of the three-frequency

tetrahedron is removed as in truncation, the resulting form is identical in shape to one of the thirteen Archimedean solids, which has four plain hexagonal faces connected by four plain triangular faces.

As in the Team Syntegrity system, color is used to reflect relationships among the parts. The truncated one-frequency nodes, colored red, green, blue and yellow, are used to represent four related and connected people, groups, and/or topic areas. When colored in this way, each of the hexagonal faces reflects all of the possible combinations of three of the four colors. The result is a four-color mapping system made up of twenty-eight triangular panes. The articulated surface of this form distinguishes it from the Archimedean solid.

Like the Syntegrity Icosahedron, the system is recursive and scalable. This permits its application in situations of massive complexity. The figure below shows a recursively articulated nine-frequency tetrahedron using the four-color mapping system. Although not evident in this graphic, the cubeoctahedron appears at the center of a four-frequency tetrahedron, which provides one of two codes that cross-map this system to the Team Syntegrity color system.

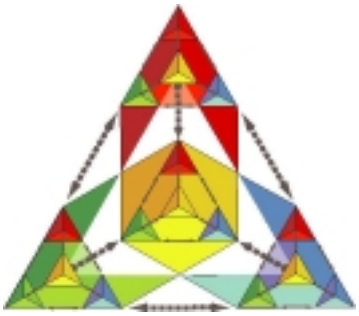

Figure 13 Truss/Cullen *ConnectWorks* Model

Truss and Cullen see application of this system for small, focused, mission-critical work teams, and are designing protocols to enable groups to work out their complexity by making explicit the relationships among them. We also see opportunities to use the underlying tetrahedral architecture as the basis for the design of very complex systems. Beer's enthusiasm for this new development has him working alongside Truss and Cullen to explore the larger implications of this system, and the future prospects arising from its cross mapping to Team Syntegrity.

ARCHITECTURE AND COMMUNITY

Truss (TSI Chairman & CEO), Cullen (President, Regions) and Leonard (Licensee and former Director) continue to work closely with Stafford Beer (formerly Chairman, now lifetime Chair of TSI's Development Directorate). TSI has adopted VSM for its own design, and Syntegration as the process that fuels its planning and operational systems. Together with its new partner TS Europe (TSE) and a growing international network of

licensees and practitioners, TSI is evolving a 'community of practice' with the competence and confidence to promote and deliver applications of Team Syntegrity to address complex issues and problems everywhere. An even wider 'community of interest' has sprung up around Team Syntegrity, whose members also include many VSM practitioners who have long supported Beer's contribution to the field of managerial science. The ongoing quest is for viability of these communities. Beer's humanity, patience and deep commitment to the enterprise have helped immeasurably to sustain our unconventional journey towards viable 'community'.

Whether one considers the growth of communities within shared physical spaces such as neighborhoods, work places and such, or the emerging e-communities that enable collaboration at a distance, the question of architecture has relevance. We have come to accept that issues of structure, form and function – the core elements of architecture – matter a great deal in terms of information systems design. The proliferation of information and the increasing need to find better ways to store, navigate, retrieve and use data have led to the development of enormous data warehouses, and architecture is now a critical consideration in their construction. Perhaps more importantly, the overarching architecture of the Internet and the World Wide Web needs to be reconsidered in the light of its astounding patterns of growth and increasing acceptance as the core manifestation of the emerging technosphere. The viability of the technosphere is surely one of the most critical issues facing humanity today. Beer's Viable System Model and Team Syntegrity, seen by some to be 'ahead of their time', may find new relevance in helping us grapple with these issues.

The architecture of the Syntegrity Icosahedron is isomorphic with natural structures, and we believe also with the structures needed to support human communities. It offers a deep, rich and coherent architecture for the design of communities, whether connected directly in time and space or at a distance. For self-organization to arise and be sustained, an organized shared space is required as the basis for the coming together of the group, and for facilitating ongoing interactions among group members. We have come to see Team Syntegrity as offering an 'organized space within which self-organizing can occur'. This organized space is content-free until 'inhabited' and informed by people. The non-hierarchical nature of the form ensures an equivalent opportunity for all participating to contribute freely and to share with others in the outcomes and benefits that result from their collaboration. The connections among people and ideas are arrived at collaboratively and made explicit and navigable through the simple use of color. The roles of member, critic and observer help to ensure that groups do not get mired in their own stories and opinions and facilitate the generation of creative, innovative ideas.

The Team Syntegrity protocols provide a means by which people can freely collaborate, constrained only by their own competence and the simple 'rules of interaction' that facilitate empowerment and autonomy while generating the necessary cohesion to sustain the identity of the group. Team Syntegrity's power comes from a robust, scalable architecture and a rigorous, replicable process that establishes the necessary boundaries

within which people can participate democratically, focusing their energy on the purpose of their collaboration.

REFERENCES

Beer, S. (1979). *The Heart of Enterprise*. Chichester:John Wiley & Sons.

Beer, S. (1981). *The Brain of the Firm*, 2nd Ed. Chichester:John Wiley & Sons.

Beer, S. (1985). *Diagnosing the System for Organizations*. Chichester:John Wiley and Sons.

Beer, S. (1994). *Beyond Dispute: The Invention of Team Syntegrity*. Chichester:John Wiley and Sons.

Espejo, R. and Schwaninger, M. Eds. (1996). *To Be or Not To Be, That is the System*.

Fuller, B. with Applewhite, E. (1979). *Synergetic 2: Further Explorations in the Geometry of Thinking*. New York: Macmillan Publishing Co. Inc.

Leonard, A. (1996). 'Team Syntegrity: a New Methodology for Group Work,” *European Management Journal*.14(4):407-413.