Walking the Line: Making and Dissolving Distinctions with the Viable System Model and Team Syntegrity

Allenna Leonard

The Complementary Set, 34 Palmerston Square, Toronto, ON M6G 2S7, Canada,
allenna_leonard@yahoo.com

Abstract

The job of an organization, or an organism for that matter, is to manage its interactions so as to meet the challenges thrown up by the complexity of its environment. This requires that knowledge be obtained about itself and its environments now and in the foreseeable future. One of the most profound questions that must be addressed is whether the distinctions and assumptions that served well in the past will continue to do so. Beer's Viable System Model is an effective tool to clarify distinctions and assumptions. It examines the five management functions that support productive operations, the seven vertical communications channels they use and monitor, the balance between these channels and the horizontal ones linking it to the present and future environment and the balance between its present and future emphasis. Once these distinctions have been surfaced, the Team Syntegrity process may be used to bring in additional stakeholders and information and dissolve them. Starting with a broad opening question, participants are invited to aim high and wide and introduce any factor they think might be important. If the mix of participants is diverse, new light can be shed on almost every distinction and assumption made in the context of the VSM exercise. Some may be confirmed, others abandoned and still others modified to take into account different perspectives on constraints and success criteria. These may be remapped onto a new VSM with different homeostats defined and different feedback loops designed to monitor them. Although the default profile of 'the organization' is a profit-making corporation, this path could be beneficial as well to governments, cooperatives and non-profits who are likely to have a broader range of stakeholders, who may include opposing parties, and multiple success criteria.

Keywords: Viable Systems Model, Team Syntegrity, Requisite Variety

Introduction

Human beings are hard-wired to make distinctions; that is how we make sense of the world. Stafford Beer (1988) paraphrased Spencer-Brown (1969) in his thousand line poem ' One Person Metagame':

> " that continent distinction builds

the universe
in a plane space make a mark
the world will follow from this."

Distinctions follow from assumptions and lead to choices about what is significant. Many distinctions in cybernetics and systems thinking are expressed as boundaries and thresholds. Boundaries are part of the perceptual world: shorelines, temperatures, elevations, and the movements of the sun and moon. Some are made meaningful by human beings and marked with significance and sometimes ritual: seasons, life stages and initiation into roles in the community. There are physical boundaries such as walls, rivers and mileposts and others less physical but tangible, such as borders between countries or communities. They carry symbolic weight and additional distinctions having to do with identities and values: us and them and believers and unbelievers, order and chaos... The inner world is also informed by boundary distinctions such as that between the conscious and the unconscious, the known and the unknown and the background and foreground. Some boundaries can be measured with instruments to a certain level of accuracy such as the passage of time, the lines of longitude and latitude, mass and weight. Others are definite by agreement, such as when qualifications are earned or a contract is signed. Still others are compound. It is possible, for example, to measure parts per million or billion of a pollutant, but to disagree about safe exposure levels. Barriers are another sort of boundary, whether they reflect limits of thought, action or of the physical world.

Boundaries may be thresholds - points where circumstances change such as when a doorway is entered or a perception becomes conscious. Folkloric traditions include many stories and rituals surrounding the crossing of boundaries and thresholds. Individuals and social groups still cross thresholds but rituals are few, and their significance is not always appreciated, especially among large groups. There are thresholds when a cusp or tipping point is reached. A scale change requires new procedures or requires a level of complexity that is beyond the scope of current understanding. A risk may move from manageable to unmanageable. These are probably the most problematic because many thresholds are discovered only when they have been crossed. Organizations and the ways they operate are not well designed to make the distinctions that would enable them to anticipate, recognize and deal with their thresholds and boundaries. It can be difficult for them to distinguish between those standard measures that reflect their recent history and changes and the present in which events or attitudes may have utterly changed their contexts.

Distinctions, including those dealing with boundaries and thresholds, are conceived and expressed in language. In a global economy it is common to interact with people who learned different languages as children. Country or regional differences, training and experience are reflected as differences in perception and articulation even among people who share a common tongue. Because each of us, in one sense, speaks our own language, models are useful because they allow us to negotiate our meanings and share them with others.

Models and processes from the cybernetic tool kit can be used to make organizational boundaries and thresholds explicit and to reconsider them in a broader context. Beer's Viable System Model and Team Syntegrity process will serve as examples of tools to accomplish this.

The Viable System Model

Stafford Beer's Viable System Model was developed from his operational research work in the steel industry and his studies, especially of McCulloch's (McCulloch, (1989) neurophysiology and Ashby's cybernetics (Ashby, 1956). Having determined that the neurophysiological explanation was daunting (Beer,1981), he presented the model according to graphic representations (Beer 1979, 1985). These graphic representations make prodigious use of lines to denote external linkages between the system-in-focus and its environment and internal connections within each system-in-focus. The VSM also highlights the multiple more comprehensive systems in which a system-in-focus is embedded at higher levels of recursion and its relationship with other systems of lesser comprehensiveness embedded within it. Each of these lines denotes a set of distinctions or a boundary between one organizational function and another or between the system and its environments. Although expressed as single lines, most of these are really multiple. The small dots in the lines refer to homeostats or balance points that need to be monitored. They too are multi-factorial: see for example Chart 4 (Beer, 1985) for the treatment of a single homeostat.

The usefulness of cybernetic models is that they provide means to address complexity, which Ashby called 'variety'. He said "only variety can destroy variety" , This was expressed in the title of a paper as " Every good regulator of a system must be a model of that system." (Conant and Ashby, 1970) The Viable System Model addresses the necessary and sufficient conditions for an organization to be viable — that is, capable of independent existence. It looks for ways to amplify the variety of a system to deal with its environment and attenuate the variety of the environment so as to deploy the organization's activities most effectively. It accepts that the variety disposed by the environment is always much greater than that available to the system.

Communications channels carry the messages needed to deal with variety, but they are subject to their own constraints. How much information a channel can carry and the level of accuracy of its transmissions were the technical problems addressed by Shannon and Weaver (Shannon and Weaver, 1949). They noted that their work did not address the semantic problem (whether the message was understood at the other end) or the effectiveness problem (whether the message resulted in the desired action). A cybernetic model typically uses filters to design communications channels so that they pick up the desired information from the flood of available data. Negative and positive feedback loops measure the systems' outputs so that their inputs can be adjusted to maintain variables within acceptable limits or encourage desired growth.

Beer deals explicitly with the act of crossing boundaries in his Third Principle of Organization. It says:

> Wherever the information carried on a channel capable of distinguishing a given variety crosses a boundary, it undergoes transduction; and the variety of the transducer must be at least equivalent to the variety of the channel. (Beer, 1979 p. 101)

Translation from one natural language to another is a form of transduction, as is the expression of scientific information in a popular form. Transduction suffers from the usual constraints associated with the capacity of communications channels including the technically describable ones of time, format and noise and the less distinct ones of trust, internal distractions and unstated assumptions. Transduction between the perspectives of different observers is also

important, although somewhat less obvious. Its variety handling capacity includes mapping what is in or out of the picture from multiple perspectives as well as negotiating the meaning of the communications themselves.

Any communication between the system and its environment and between operational and management functions is affected to some extent by transduction, even if it takes place within the head of a single manager trying to make distinctions about the capacities of an operation under different circumstances.

Beer's Third Principle is followed by the Fourth (p. 258):

> "The operation of the first three principles must be cyclically maintained through time without hiatus or lags."

Here is another boundary — a temporal one. If the message doesn't arrive within the window of time in which effective action is possible, variety cannot be matched.

Horizontal Channels

System One operations communicate in many ways with their environments of customers, suppliers and competitors in the course of their making a product or providing a service. For example, the sales person's message travels across the boundary to the customer and the customer answers with words or actions. The sales person should be able understand and act upon the customer's response to either say thank you or adjust the offer to come to a mutually satisfactory outcome. Knowing what the customer values — durability, effectiveness, style, ease of operation, sound advice — adds variety to the communications between them; as does knowing what the customer especially dislikes.

The boundaries between the operation and the environment may be more or less distinct. With various collaborations and alliances, what distinguishes inside and outside the boundary may not be clear. Sales people and other representatives in the field, outposts of enterprises and cross-functional or cross-enterprise teams play boundary roles. Their allegiances may lean towards their customers or work groups or they may be divided. The adage 'where you stand depends on where you sit' describes their position. When this is seen positively by the larger organization, the teams or individuals are happily claimed as our face in Somewhere. When it is not, they are said to have 'gone native' and steps may be taken to pull them back from the boundary such as rotation back to headquarters every several years.

Similarly, any system-in focus belongs, with stronger or weaker connections, to more than one more comprehensive system at a higher level of recursion. An individual belongs to a family, a workplace, a community and so on. An organization may be part of a larger corporation but also be an employer or a corporate citizen in a community or an entity subject to different government regulations from the rest of the organization. In other situations, formerly inside operations may be contracted out. The question here is whether contractually determined standards are sufficient to provide satisfactory service or whether there will be a variety deficit from not sharing the same culture.

Managers of System One operations determine what is the best allocation of time and other resources to accomplish their objectives. 'Management' may be self-managed peer teams where individuals play operational roles. Knowledge and disposable variety may be of equivalent value or evenly distributed. It may also be supervisory, such as the management of short-term or temporary employees who, whatever their skill level, require direction to amplify their variety to work effectively. Interactions occur within operations and within management at the System One level that may require attention to the transduction of messages, such as between different operational processes or shifts. These may be expressed a level of recursion down as communications along the squiggly lines connecting System One operations.

System Four, concerned with the future, interacts within itself, comparing its model of the organization with the potential or anticipated changes in the environment and its resources to adapt to them. To be effective, it must manage the transduction between R & D and marketing, between lobbying and public relations, between scenario planning and financial planning and among all of them together.

System Four interacts with the future environment along many lines. It is concerned with the circumstances of projected demand for its products or services, new developments in its field, the recruitment of new employees, emerging changes in public opinion, regulatory matters and future developments that will affect the landscape for everyone. Each of these different aspects of the future communicates in its own language according to its own priorities. Thresholds between the near and midterm future and the midterm and long term future will differ depending on the type of organization, the volatility of the environment and the opportunities and threats on the horizon.

The variety of these horizontal communications channels is balanced, more or less smoothly, with the variety disposed along the vertical communications channels, remembering that the most significant attenuator of variety is sheer ignorance. It is often helpful to try out different distinctions and boundaries when nominating groups of System One activities. They can be grouped according to several possible answers to the basic journalist's questions: who, where, when, how and how much. The 'who' question might be answered according to who buys, who uses, who supplies component parts or who regulates. The where question could be answered in terms of geographical site, jurisdiction, proximity to transport, and so on. Each choice involves different distinctions, different boundary conditions and different variety constraints.

Vertical Channels

Within the environment, there are communications channels that connect the markets and sub-environments of the different System One operations. The operations and their boundary personnel listen to this channel for hints about how they might work together, fill a gap in the market or avoid a problem that has affected one of its competitors.

The System One operations communicate with one another. This communication runs the gamut from tangible goods such as inter-process stocks to internal payments to informal e-mail and water cooler conversations. If a threshold is being approached, this channel may notice it first. This is depicted in the VSM by a squiggly line.

System Two, the anti-oscillation channel, exists as a service to smooth activities where two or more System One units share common resources or use common protocols. It communicates with both the operations and management of System One units and with System Three. Its job is to handle matters about which there is already general agreement. If System Two's coordination activities break down, it is evidence that the boundaries drawn by Systems One and Three did not provide System Two with sufficient variety handling capacity (possibly including resources) to do its job.

System Three is responsible for exercising executive management of the System One units to achieve synergy and usually includes the managers from the System One units.

When System One managements communicate with one another about decisions, it is in the context of their participation in System Three. Its function is to make the distinctions that balance the preferences of the parts with the well-being of the whole.

System Three communicates with System One management along two channels. The resource bargaining channel is a two-way channel over which negotiations are conducted and agreements made. Most management decisions are, or should be, made on this channel. The command channel is a one-way, top down channel that conveys requirements and choices that have been made between alternatives. Often, it reflects legal requirements or decisions made at higher levels of recursion. One of System Three's important capabilities is being able to distinguish and communicate the difference between these two channels.

System Three uses an audit channel, called Three Star, to delve directly into System One operations on a specific and sporadic basis. Its role is to mop up the variety that is not caught by other channels. It includes the financial audit but also seeks answers to such questions as 'does our available space meet our needs?' and 'what is our exposure to a newly identified risk or hazard?'

System Four's most important internal communication is with System Three on the Three/Four homeostat. These communications balance the needs to keep the current show on the road with the need to adapt to the anticipated requirements of the future. Making the distinction as to what this balance should be can be difficult, especially for large organizations with components belonging to different environments. Mature verses developing markets, stable verses changing technology and short verses long term product life are some of the differences that make a difference here.

System Five's role is to maintain a coherent identity and monitor the Three/Four homeostat. Culture, values, traditions, stories and metaphors are the business of System Five. It must adapt via its connections with Systems Three and Four so that the organizational culture and values do not get out of synch with what it does to relate to its environments. Systems Five, Four and Three form the management of System One at the next higher level of recursion.

A final communications channel, called the algedonic (or pain/pleasure) signal is an alarm channel to alert the entire organization to an immediate threat or opportunity. While the messages of other channels follow protocols, the alarm channel cuts through them so that the organization can take action as a whole.

An organization that examines itself using the VSM, whether gathered around a flip chart or according to a more ambitious exercise, is almost certain to identify aspects of its variety handling capacities that can be improved. Laurie diBivort (diBivort, 1992) had an assignment with a client where employees literally walked the lines of the VSM. They rented a football field, laid out the VSM with lime on the grass and put folding chairs inside the boundaries of the environment, operations and the five management blocks. People in System Five who wanted to know something about the future environment walked to System Four and asked them to find out. People in System Two who wanted to talk about a problem crossed over to System Three or to System One's operations or management. People in the operation could talk to the environment, to System One's management or to System Two. Although most individuals in any organization will play roles in more than one function, it is useful for them to be conscious of what hat they are wearing and the constraints that go along with it.

Beer (Beer, 1994) described pathologies of the VSM. I had an opportunity to observe this first hand when delivering a workshop with Socio-Technical Systems Associates. We used a factory assembly exercise developed by STS and combined it with the VSM, which was mapped out on the floor with tape. Participants were distributed between two 'self-managed' operations and the supporting management systems. Everything ran smoothly until 'disturbances' began to arrive from the 'environment': a big order, a demand for higher quality, a health inspector… System Five promptly moved down to System Three, bringing System Four along and then all of them landed on the boundary of the two operations. Systems Two and Three Star were ignored. This left no one doing the Five, Four and Three jobs and the regulatory resources on the sidelines. This, according to Beer, is a typical pathology when an organization panics in the face of excess variety. It leaves the organization with the responsiveness of a decerebrate cat — still reacting but without the capacities of will and judgement. Since this was an exercise, we replayed it the next morning at a slower pace and the participants were able to work with all the systems effectively. In actual organizations, however, a slow-motion replay isn't possible.

Team Syntegrity

The distinctions that are drawn in the VSM are dissolved in the Team Syntegrity process.

Beer, before inventing Team Syntegrity, (Beer, 1994) ran several varieties of 'agendaless' meetings and conferences for professional or voluntary associations. He was concerned that reductionism had led to false boundaries between disciplines and even sub-parts of disciplines. He had also been struck by the fact that the most interesting portions of professional conferences were the breaks between meetings or the discussions in the bar at the end of the day. That is when connections were made across boundaries and new thinking sparked.

A Syntegration, in common with other complexity-handling group processes, assumes that no one individual or small group has all the answers. Rather, it assumes that there are a variety of stakeholders with multiple perspectives who can learn from each other and come up with recommendations that improve the variety match of the response. The process helps them put aside the boundaries of their own perspectives and situate them in a broader context. It also may show them where their perspectives overlap with those of others and where they do not. The individuals may have simple disagreements but usually it is more complex — not opposing

positions on the same continuum but positions on different ones.

A Syntegration is organized when there is a question people want to explore in a democratic format. The standard number is thirty people but versions can be run for from twelve to forty-two participants and from two to five days. It should be a diverse group, representing all the major stakeholders or their representatives. These individuals may or may not all know one another or belong to the same organization. The important thing is that they will play unique, equal and equivalent roles in the discussions. They assemble in response to a broad opening question. It can be something general like "What is our future?" or more specific like "What should happen to the waterfront?". The invitation is to start with a blank slate, rethinking assumptions, goals and strategies and opening the possibility of creative breakthroughs.

The process begins with individuals being invited to try to put aside or dissolve their distinctions and 'refresh' the frameworks in which they think about the question. Their brief statements are written on sticky notes and posted on a wall. There are no limits on what can be posted beyond the channel capacity of legibility on a 3/5 paper. The only admonition is that motherhood statements are not valuable, as there as little point in discussing matters everyone agrees on. The best statements are provocative — stimulating debate and surfacing choices, contradictions and inconsistencies. How would our response be affected if… "a new religion based on environmental stewardship swept the country?" or " if the wage disparity between Asia and the West narrowed as quickly as the education disparity has narrowed?" or "if people's working lives were extended to one hundred?" are examples. Even the most far out possibilities (and these are not, as they simply extend already observable trends)may be considered.

In the next stage, called the problem jostle, ideas from the notes are taken to flip charts where they can be refined and expanded by small groups of free-floating discussants. This part of the process allows small groups to gather informally and to dissolve when they have finished the discussion or, individually, when someone loses interest. Some ideas are considered, then dropped because, although they might be good ones, they are too clear to be worth discussing for several hours or not clear enough that the any progress seems likely. The discussion groups produce new statements that incorporate, combine or branch off from the individual statements. If one of these statements acquires a certain number of participant signatures (agreeing that it is a topic they would like to see discussed) it moves on to the next stage. The statements are reduced to twelve through a vote, eliding of statements or a combination of the two.

The twelve topics are mapped onto an icosahedron with each individual participant represented by a strut connecting the two nodes that are their topic teams.

(Versions for smaller numbers retain the role equivalency and three-dimensional mappings on different geometric figures; versions for larger groups assign a second participant to some struts.) The icosahedron is a regular solid composed of twenty triangles, twelve vertices and thirty edges. It provides a non-hierarchical structure in which every edge is an unique and equivalent connector of two vertices. In the icosahedron, individual participants or stakeholders are put in a structure with a new set of boundaries.

The new boundaries include time, topic and role. Each topic team meets three times, for about an hour each time. Since there are twelve of them, only two can meet at once. Within the discussion, there are three different roles. The five team members discuss the topic. It is their

responsibility to come up with a statement at the end of each meeting that reflects the results of their conversation. Each team also has five critics, from next but one teams. The role of the critic is to stand one step back and comment on the content or the process of the team. The critics are given a period of about ten minutes for their commentary. There is a third role — that of an observer who may attend meetings.

when not in another session, but who cannot speak. This arrangement has the effect of breaking up stakeholder groups and reformulating them in different configurations. Each topic is likely to have a champion or two among its members, but will not have five of them. This structure also makes it quite difficult for even a strong personality to dominate.

Syntegration provides a highly interconnected structure and a tight schedule to allow for the maximum flexibility in the content of the discussions. The structure pushes the limits of channel capacity so that everyone has the opportunity to be heard without being overwhelmed by variety. Distinctions between topics, roles and iterations keep the discussion points from blending too early and becoming too general

Ideas do move around though. Often a point or metaphor is brought up in one meeting and is passed onto another. At the end of the three iterations, it is not unusual for several of the topic presentations to revisit the same points from different perspectives. The event will produce, in addition to the final verbal reports written statements from each of the three meetings of each topic. In some cases, this will be enough. In others, each team may continue or hand off their results to be developed in more detail.

After a Syntegration, several things have usually occurred. More than 90% of the significant information will have been shared throughout the group. A great deal of tacit knowledge will also have been shared, and people will have a much richer picture of both the answers to the opening question and of the positions of the participants who have been discussing it. Often, bonding occurs that makes further collaboration easier and more fruitful. This of course should be self-evident. If people learn about one another and their areas of strength and weakness, they will be in a better position to work together or, at minimum, know who to call if something comes up.

Post-Syntegration

If the organization or group has occasion to continue to work together after the event, there are a number of configurations that can be continued. The teams can meet of course, the members of the triangular faces can meet (the three topics covered will each have two members), or groups of six participants who represent all twelve topics can meet in the five 'orthogonal sets' found in the icosahedron.

In the case where the group or organization is familiar with the VSM, they can look at the Syntegration results according to the VSM's identified recursion levels, management functions, communications channels or important homeostats. It would be unusual indeed if their Syntegration experience, and the contributions of other perspectives, did not modify the assumptions and distinctions identified earlier.

Conclusion

Distinctions, boundaries and thresholds are an important part of approaching any system. When that system is an organization, or an infoset of people with common concerns, the VSM and Team Syntegrity, alone or in combination can provide pathways through the complexity of their situations, allowing them to walk lines that connect rather than follow tracks that wander off into nothing. Attention to these lines, and what they represent will clarify issues and concentrate attention on those thresholds which represent essential variables and viability.

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