

Achieving and sustaining high performance

Self-organizing criticality and the Process Enneagram©

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Abstract

This paper describes how organizations experience self-organizing criticality in a crisis. Then it describes how the processes of many purposeful conversations can build the energy of self-organizing criticality to a level of high energy and creativity, and then hold the organization in this space using the Process Enneagram, co-created by the people in the organization, as a strange attractor, a container providing order and focus as well as the space and freedom for the people to make the decisions they need in order to do their work quickly and well.

Introduction

The purpose of this paper is to show the influence of the self-organizing criticality process (SOC)¹ in organizational change and how the Process Enneagram© can enable organizations to move toward and thrive at the critical point near the edge of chaos where energy and creativity are generated and sustained high levels of work performance and outputs.

We propose that knowledge and awareness of self-organizing criticality provides deep insights into the ways organizations behave, and that the use of the Process Enneagram© by the people, reveals the strange attractors that help the organization to stabilize both order and freedom concurrently at the edge of chaos.

The Process Enneagram©, created and developed by Knowles, has been used successfully with hundreds of organizations around the World. It provides a structured, facilitative, dialogic process to help the people to move through the SOC process and underpin the evolution and cohesiveness of high performance work teams helping them to move to higher and sustainable levels of performance.

Self-organizing criticality

Self-organizing criticality (SOC) is a phenomenon that occurs in the physical world. We believe that SOC also applies to social structures like organizations as well. The SOC concept was introduced in 1988 by Per Bak, Chao Tang and Kurt Wiesenfeld. SOC is a property of self-organizing systems that, at their critical points, can suddenly shift to a new order. Examples of these phenomena are earthquakes, mass extinctions, stock market fluctuations and traffic jams. While these systems have attractors they are typically beyond discovery using traditional Newtonian scientific methods.

Bak's first examples were sand piles like the one at the bottom of an hourglass². As each grain of sand falls onto the pile, the pile gradually gets higher increasing its potential energy. At some point, one that is not predictable, the next grain of sand causes the pile to experience a shift like a landslide releasing some of the potential energy. As more sand is slowly added to the pile, it builds up again until the next slippage occurs. The shifts can be small ones that happen frequently, or intermediate in size occurring less frequently, or large ones that occur even less frequently.

SOC is typically observed in self-organizing, non-equilibrium systems where extended degrees of freedom and high levels of non-linearity exist, like near the edge of chaos. The value in understanding SOC is its tendency to be a paramount guiding principle that reveals order from disorder, making visible the invisible and providing stability to the system.

Bak showed that the sizes of these landslides followed a power law. The graphical plots of the logarithms of the frequencies of events against their sizes (or intensity) results in a straight line. He showed that earthquakes, volcanoes, and traffic jams also followed a power law. He believed that his ideas accounted for how order emerges from disorder and how, in turn, the most enduring structures can unexpectedly collapse.

Knowles defines organizations as 'complex, adapting, self-organizing, networks of people'. Since organizations are self-organizing the SOC process can take place within them. The more complex that human interactions become the greater the influence the SOC process has on systems and networks and the greater the importance of understanding the emergent properties of the attractor to hold the organization at the edge of chaos.

Instead of grains of sand building up on each other, one can visualize a myriad of conversations in the organization building up energy over time. No one knows when the next conversation will be really significant and shift things. The challenge for organizations is the optimization of SOC for collective output and organizational gain. Understanding how to reveal attractors that influence SOC is important in solving complex problems and living at the edge of chaos. The organization's attractors provide order for the organization, a boundary and space within which the organization can hold firm yet allow freedom for the people within the organization to make the best decisions possible about doing their own work at the individual level.

Using Per Bak's ideas and extending them to organizations is a very useful way to see the invisible patterns and attractors.

In pursuit of excellence

Most organizations are trying to grow and improve their performance and earnings. Many people in traditional management positions want to maintain a high degree of control so that their people do what they are supposed to do to make the organization more successful. These managers seek reliability, predictability, stability and control. They see organizational challenges as systematic and machine-like, complicated issues that need reductionist thinking and linear tools like project planning, cost benefit analysis, and training to fulfill the expectation that the people will do the job "right".

These command and control cultures in many of these organizations are often plagued with the unintended consequence of the people feeling cynical, frustrated, confused, fearful of and resisting change and often angry³. Improvements in performance, productivity and safety are difficult and slow. When the decisions are made at too high a level in the organization and the people are expected to unquestioningly follow these decisions, unintended as it may be, unproductive behavior often results. Information flows are constrained and restricted, trust is low and managers lack the capacity to help the people to develop the collective purpose and identity of who they are and what they are trying to accomplish.

For many managers this complicated, machine-like approach is seen as the proper and responsible way to lead. The roots of this go all the way back to Frederick Taylor and his 1911 book, *Principles of Scientific Management*⁴, and are further influenced by Max Weber, A. M. Henderson and Talcott Parsons in *The Theory of Social and Economic Organization* who refer in their 1947 book to layers of hierarchy, rigid status and structure, rules, and the role of experts⁵. This way of leading is conservative, efficient, low-risk and repeatable across many levels of the organization. It is what most managers have always done. They see the organization as if it is a machine, but, people and organizations are not machines; they are much more like living systems such as flocks of birds or schools of fish.

These traditional, management barriers to significant progress can be creatively destroyed and new, more effective processes introduced when managers shift their thinking and approach to seeing their organizations as complex, full of non-linearity, feedback loops, and iterative processes. Then new opportunities open up for the organization and the people to become much more effective, productive, profitable, robust, resilient, safer, and better places to work. The cultures in these organizations become more vibrant and alive with the people feeling hopeful, having a sense of urgency with clarity of purpose, and openness to change and new possibilities (Knowles 2002). Energy and creativity flow abundantly.

While this is a new and different place for most managers, they can develop the confidence to become significant change management leaders learning to live with the certainty that previously unseen properties will emerge enabling them to reach higher, more sustainable levels of performance with their teams.

To do this, though, requires an awareness and receptivity to the notion that human experience has probably evolved with SOC as a basic property behind the actions and thoughts of people. This is one reason the authors understand organizations to be complex, adapting, self-organizing, networks of people. They are dynamical systems with changes occurring in both time and space. These networks are resilient and robust with information flowing freely throughout the networks in myriads of conversations. They can operate near the edge of chaos.

In addition to many conversations building up over time, a key for organizations to thrive and grow is to recognize the importance of SOC and the need for strange attractors that hold the people and the organisation in this dynamical space. The hidden patterns behind the visible patterns of behavior are difficult to discover. However, once revealed they provide a region of order among the chaos as well as a space for freedom in which the people make the best decisions they can for their own work.

Knowles discovered a methodology to reveal strange attractors that enable SOC to be a positive force in the organisation. He realized that strange attractors enable the organization to have sufficient stability to live in the ambiguity at the edge of chaos. The tool for discovering the attractor he called the Process Enneagram[®]. This tool helps the people to discover and reveal the hidden patterns that allow creativity and energy to emerge while, at the same time discovering the order and freedom as well..

Knowles calls the strange attractor, the BOWL. It is a basin of attraction made up of the vision, mission, principles and

standards (of behavior and performance) and the ideas that emerge from the people co-creating their own Process Enneagram© map. The BOWL reveals how SOC can work collectively to build energy and creativity of the people and the organisation by providing order and a boundary in which the people can co-ordinate and co-operate, yet also enabling the people within the BOWL to have the freedom to make the decisions that are appropriate and best for their particular work. As people see the need to do something they have the freedom and support to step forth to address this need and in doing so the organization becomes "leaderful"⁶.

The Process Enneagram©

The Process Enneagram© is a tool for dealing with complexity. Enneagram is a Greek word for a 9-term figure. The Process Enneagram© builds on this figure and is focused on the patterns and processes taking place in organizations. Knowles identified the unique nature of each point, the way they interact, and the nature of the inner lines. Patterns for three leadership processes as well as for personal and organizational transformation were also discovered. The use of this tool in a guided dialogue enables people to see who and what they are as well as discovering how and why things happen as they do⁷. The business and people sides of the organization are reconciled and brought together resulting in the release of creative energy and commitment. In the course of the dialogue the people develop practical solutions to solve complex problems, make the connections with other people that they need to help them to do the work and, in the course of the dialogue, energy and commitment emerge⁸⁻⁹. They co-create their living strategic plan. Beverly G. McCarter and Brian E. White suggest that the Process Enneagram© provides the missing link between complexity theory and practical application¹⁰.

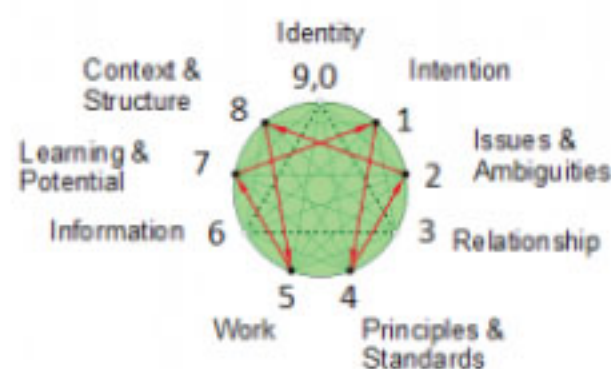


Fig. 1: The Process Enneagram©

The Process Enneagram©, Figure 1, guides and informs the conversations that are needed to move towards excellence in all aspects of performance¹¹. A breakthrough in developing the Process Enneagram© was Knowles discovery that Bennett's systems could be placed around the circumference of the figure¹².

Previously, all that was known about the enneagram was the circular figure, the lines and numbers. The descriptions by Bennett and others are difficult and impractical. Some people use the enneagram figure as a tool to look at personality. The personality use of the enneagram has no relationship to the Process Enneagram.

Point 1	The Monad renamed as "Intention"
Point 2	The Dyad renamed as "Issues and Ambiguities"
Point 4	The Triad renamed as "Principles and Standards"
Point 5	The Tetrad renamed as "Work" (the actual, physical things going on)
Point 7	The Pentad renamed as "Learning and Potential"
Point 8	The Hexad renamed for "Structure" (the internal structure of the organization) and "Context" (the external environment in which the organization exists.)

Points 0, 3 and 6 were renamed from Bennett's Function, Being and Will to "Identity, Relationship and Information", the three elements required for self-organization. These are the visible manifestations of Function, Being and Will.

In the course of the dialogue with the Process Enneagram©, a map is co-created by the people in the organization. This is consistent with David Byrne and Gill Callaghan in their 2014 book, *Complexity Theory and Social Sciences, The State of the Art*, who point out that everyone, including the managers, needs to be involved and engaged in the dialogue for it to be effective in the complex system of the organization¹³. The dialogue process begins with a question that is important and compelling to the people like "How do we improve our safety performance?" This is followed by dialogue at each of the 9 points writing onto the

map the people's ideas and comments as they emerge. This is an enlightening process of self-discovery for the people; they realize that collectively they have a lot of knowledge they share together, and together they come to understand how SOC can work collectively for them.

The Process Enneagram® map that the people co-create is then posted on the walls of their meeting rooms and constantly discussed each time they meet, asking each other about their experiences since the last meeting as they are related to the Process Enneagram® map they created. As the people work together in this dialogue at each of the 9 points, the organization becomes conversationful¹⁴ around their core work. These ongoing conversations keep the Process Enneagram® map alive allowing the people to learn, grow and make constant adjustments as the world changes and to sustain their work processes.

An important role for the leaders in the organization is to constantly maintain the ongoing conversations about their Process Enneagram® map, fully sharing information by going into their organization, listening to and talking with the people, learning together and helping them to see the importance of their contributions for the success of the whole organization. The Process Enneagram® map reveals the strange attractor (the BOWL) and is refreshed continuously ensuring the cohesiveness of the work and sustainability of performance. The old barriers are destroyed and new systems and processes are created providing the transition to their new state.

In the hundreds of workshops that Knowles has led, the people shifted from and destroyed their old, traditionally led, low-energy organizational basin of attraction, and moved to their higher energy, more effective and efficient, self-organizing basin of attraction called their BOWL. This shift often happens in just a day or less. Then the leaders sustain the processes through the ongoing conversations and dialogue each time the people meet.

This is illustrated in Figure 2.

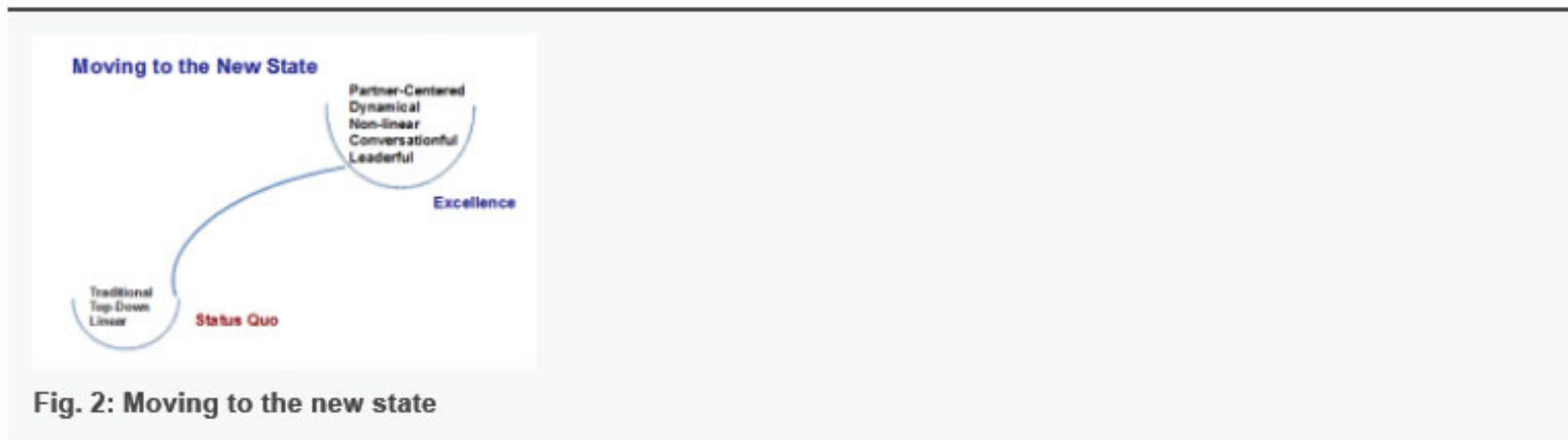


Fig. 2: Moving to the new state

The Process Enneagram® is fractal and can be used at any level of scale. It begins with the starting question of importance. The opening question can be narrowly or broadly focused. The ideas, developed as the Process Enneagram® map are co-created by the people, and are guided by the nature of the question. A narrowly focused question develops a Process Enneagram® map with a narrow focus and a broadly focused question develops a more broadly focused Process Enneagram® map.

The completed Process Enneagram® map, co-created by the people, becomes their living, strategic plan and is updated constantly as conditions and the dialogue evolve and change. This is their strange attractor, their BOWL enabling them to live and thrive at the edge of chaos, adapting, thriving and growing by providing the stability and order to hold everything together and the freedom for the people to learn, grow and make the best decisions possible and create new opportunities. Many of the changes they make are small, some of the changes are bigger but less frequent, and occasionally the organization reinvents itself. This is consistent with Bak's SOC observations. The organization is much more resilient as the people constantly make adjustments to improve things. Since most of the changes the people make are small, they need to keep track of their progress and be patient; the big changes will come.

There is a lot written about how most change efforts fail to produce real change. I have a hunch that many change efforts have gotten off to a good start, but the big change did not happen. The organization was impatient, a lot of smaller changes were lost and the effort was abandoned.

In using this approach when Knowles was the Plant Manager of a large, DuPont chemical plant in Belle, WV, the earnings rose about 300%, injury rates dropped by about 98%, emissions dropped by about 88% and productivity rose by about 45%.

SOC — Purposeful use of a natural phenomenon

Many of you reading this paper have experienced SOC in a major crisis in your organization like a fire or the loss of a very big customer. You have probably noticed how quickly the people self-organized, became a high performance team and successfully

worked through the crisis. This was SOC in action. There is so much happening and so little real-time information for the managers that they are forced by the circumstances to open up and move through the upper path indicated in Figure 3. Great energy and creativity emerge as the people engage with the crisis, talking together, making decisions and overcoming many obstacles. Morale and excitement build. But then when the crisis passes, the organization reverts to its former self with all the dysfunctional behavior resurfacing. Usually neither the people nor the managers know how to hold themselves at the edge of chaos and sustain the excellent performance so they slip back to the old ways.

Figure 3 shows the pathways for the two choices that a leader or manager can make each time he/she is faced with a complex decision. The lower, command and control pathway is followed when the manager decides that she/he has the answer and imposes it upon the organization. This pathway choice usually feels quicker for the manager and if the people just follow the instructions, things will be just fine. But many times things are not just fine because when the manager imposes his/her will onto the natural tendency for self-organization, the people in the system begin to pull back and shut down. Information flows become weak and blocked up. The energy dissipates. The levels of trust between the people in the organization and the leaders get broken, all sorts of dysfunctional behavior spreads, like the way people form cliques and resist change. The hidden elephants grow. People self-organize around the kinds of behaviors that drag the organization down and suck the energy out. Nothing basically changes; the culture is quite dysfunctional, the network breaks down and the organization gradually dies.

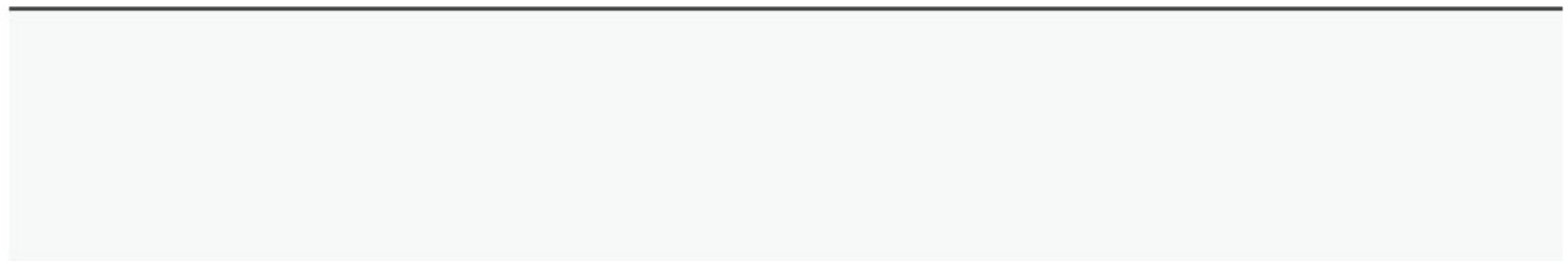


Fig. 3: Pathways for the two choices that a leader or manager can make when faced with a complex decision

However, when the leader follows the upper pathway, engaging the natural tendency of self-organization, he/she is now using the natural phenomenon of SOC, the path typically experienced as the people plunge into overcoming a crisis. As the conversations open up and the energy builds, the organization moves up along this path. New ideas and possibilities emerge; the elephants get rooted out. Information flows freely enabling the network to better know itself. The excitement and interest in the work build. People become more creative, energized and leaderful. The organization moves towards the edge of chaos where it is most dynamic, creative and healthy. The people co-create their shared future using the Process Enneagram® thus enabling them and their organization to hold themselves successfully at the edge of chaos becoming a highly functioning organization with a positive, sustainable, strong culture.

The BOWL they create enables the people in the organization to live effectively at the edge of chaos. The leaders and others maintain the BOWL broadening the people's understanding and continuing to learn together. Walking around among the people, learning, listening, talking with each other is one of the processes to sustain the BOWL. The BOWL is the strange attractor that enables the organization to live and work successfully at the edge of chaos and to do their work most effectively and safely. A number of case studies showing completed Process Enneagram map (BOWLS) are in Knowles 2002.

Here are some real examples of new things happening in organizations near the edge of chaos.



- Many small changes occurred like when one member of the City of Niagara Falls, NY Leadership Team shared a truck with another group, and another Team member provided temporary clerical help to another group. These kinds of behaviors are rare in many Governmental organizations.
 - Some intermediate sized changes occurred like eliminating \$600,000 a year in wasteful truck handling procedures in just two months which was done by the operators at the Belle Plant.
 - Occasionally a large change occurred like when a new leader at the DuPont Niagara Falls Plant came into a dysfunctional, failing organization that was not able to run. He declared that "failure was no longer acceptable" and opened up the conversations smoking out the elephants. Change happened quickly and the operation is still productive and profitable 25 years later.
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- Another example of a major shift occurred in the CSR Invicta Sugar Mill in Ayr, Australia when the people cut their number of injuries from about 35/year to zero in just 3 weeks and sustained that performance for the next 9 months.
 - Another example of a large change occurred at the DuPont Belle, WV Plant when 16 different conversions of chemical process control systems were made without building the new control processes in parallel to be sure that the new processes would work before the old ones were shut down. Everyone conversion worked enabling the organization to cut the time and costs of these conversions by about 50% saving millions of dollars of investment and months of time.

The people at the DuPont Belle, WV Plant, where Knowles was plant manager, leading and using principles of the Process Enneagram® from 1987 to 1995, the people learned to sustain this high level of work for 17 years even though subsequent managers failed to follow through, retreating into their offices and themselves. Things gradually fell apart when the BOWL was not sustained and the SOC process broke down, in this case, to the point where a man was killed in 2010 in an preventable accident 15 years after Knowles had been reassigned and had left the Plant.

Continuous dialogue and conversations along with the use of the co-created Process Enneagram® map keeps the BOWL alive. These are the keys for the organization to move through SOC and thrive in highly energetic, creative, effective, productive, profitable and safe ways of working at the edge of chaos. The future is built one conversation at a time! Organisations ultimately ignore this at their peril.

Summary

The map, co-created by the people with the Process Enneagram® tool, reveals the strange attractor for the organization helping the people to move up the SOC pathway and hold themselves at the edge of chaos. Constant conversations facilitated by the Process Enneagram® map, the constant revisions as their dialogue and environment changes and the emergence of new ideas and potential keeps the organisation up the SOC curve near the edge of chaos, and its people sustaining their work. Their Process Enneagram® map is their living strategic plan.

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