



Emergent strategy in managing cooperative supply chain change

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Abstract *There is much debate about the nature of strategy formulation as content or process. This paper takes a process view informed from insights from non-linear dynamics, complexity and chaos theory and applies it to a well tested management of change process in cooperative supply chain management to draw illustrations from two case examples which reinforce the utility of this use of complexity in formulating emergent strategies.*

Introduction

This paper is in three parts. Part one will examine the nature of business changes and the insights that can be obtained from the viewpoint of scientific chaos. In a more interactive and unstable world a different approach to initiating and managing change is required. The second part is to consider the role of management in managing a chaotic change process. Part three describes an existing change management approach and its application (informed by a new model from complexity theory) in two case studies of companies moving to more cooperative working in the supply chain.

Part one: business changes and insights from chaos theory

Glass (1996) neatly summarises the argument that traditional management practice is based on linear assumptions (i.e. if A then B will follow) whereas, the reality of business is different. If instead of a linear relationship between interacting influences we are subject to non-linear influences then actions will have unforeseeable and unforecastable outcomes that can work for or against our intended changes.

The need to bring into sharper focus the fundamental features of complex systems and their interaction becomes ever more important. Since Forrester (1958) we have come to realise the impact of negative and positive feedback loops, time delays and information decision rules on system performance and effectiveness. This has been reinforced by Senge (1990) in his discussions about the beer game where, in spite of the best efforts of all players, instability in upstream demand follows on from small downstream changes in real demand. The beer game is an example of a non-linear system.

Non-linear systems produce the important result that small effects can have unforeseen and unforeseeable outcomes. The classic example taken from chaos theory is related to the concept of the butterfly effect in the thought that a “butterfly stirring the air today in Peking can transform



storm systems next month in New York” (Gleick, 1988, p. 8 and originally attributed to Lorenz).

Such inherent uncertainty also manifests itself in another feature of non-linear systems. This is that a single common ancestor event is subject to all of these modifying forces over time and therefore, the outcomes are completely dependent on the path through the decision space that emerged over time.

A further significant feature is the discovery that extremely complex looking effects can be produced by the iteration over many cycles of relatively simple rules captured in an equation or the DNA of a leaf and that their pattern is consistent no matter at what scale they are examined. (Mandelbrot, 1977). The analogous concept for managers is the role of behavioural rules.

In the nature of complex systems we recognise that our concepts of stability and equilibrium need now to recognise that the system under review is not static and that equilibrium need not always imply no movement. We can have the interesting possibility of occupying a bounded area exhibiting “far from equilibrium conditions”. In this region, systems exhibit what might appear to be random behaviour, but in some cases, this can actually be described as chaotic in the scientific meaning. During this stage the system exhibits apparently random fluctuations but within what is called a “strange attractor” (Stacey, 2000, p. 259). The strange attractor describes the nature of the dynamic change that is in a form of dynamic equilibrium. During the activity in the strange attractor another feature emerges in that there can be multiple regions of relatively stable dynamic equilibrium such that for a period the activity appears to cluster around one zone before suddenly flipping over to another one, the bifurcation point.

In areas associated with academic theory this is akin to a Kuhnian paradigm shift (Kuhn, 1962). To bring this into the context of the later examples this is similar to operating in a pure market, adversarial way to suppliers and customers in the extended network before moving to a focus on collaboration with key business associates. In effect both approaches have a degree of stability but overall it is possible to switch the predominant pattern between the two approaches.

The concept of self organisation is also relevant. Self organisation (Kaufmann, 1993; Coveney and Highfield, 1995) captures the reality that out of the zone around the bifurcation point some new dynamic equilibrium emerges such that the strange attractor performs its flip over to the new arrangements of complex behaviour. The scientists find that the provision of energy during the far from equilibrium period permits this self organisation process to take place. It is almost as if different possible configurations are being pilot tested; discarded and then a predominant pattern emerges.

Part two: role of management

MacIntosh and Maclean (2001) discuss the way in which they interacted with their research subject to develop the concept of conditioned emergence discussed in their earlier paper (MacIntosh and Maclean, 1999). This they developed from the scientific view to reflect a more managed transition across the zone of far from equilibrium conditions. Their approach is to recognise the

essential difference between physical and social circumstances. Rather than deal with inanimate objects in physics we are dealing with individuals and groups in interaction which can reflect and learn and exercise some preferential choice. This provides both retarding and supporting forces for change. Retarding ones since there are a variety of defensive routines (Argyris, 1990), which work to maintain the status quo, and supporting ones, driven by new visions, and, as we will see, the creation and reinforcement of new rules.

Figure 1 shows these authors' view of the model.

The approach is strongly influenced by the process view of strategic change which sees "strategic behaviour as a phenomenon which emerges in an unpredictable way from the networks of influence and interaction in the organisation" MacIntosh and Maclean (1999, p. 299).

The essence of this argument is that there can be interventions during the conditioning phase to surface the defensive routines and remove the ones no longer seen to be appropriate. At the same time, new rules of behaviour are explored and agreed on, which, if subsequently acted on, would tend to produce the kind of future structure and behaviour seen to be desirable.

In some cases creating "far from equilibrium conditions" will not be a problem. Perhaps the market is already indicating that the existing business model is not delivering the wished-for success. Without the direct stimulus of looking into a corporate failure abyss then managers have a more difficult task to artificially create the mindset that will challenge the old model sufficiently rigorously. Re-structuring, re-engineering or major IT systems installations might provide enough focus but energy has to be imported to enable the transformation to emerge. (In the case examples, the re-structuring was in the business relationship with suppliers.) In this far from equilibrium state two

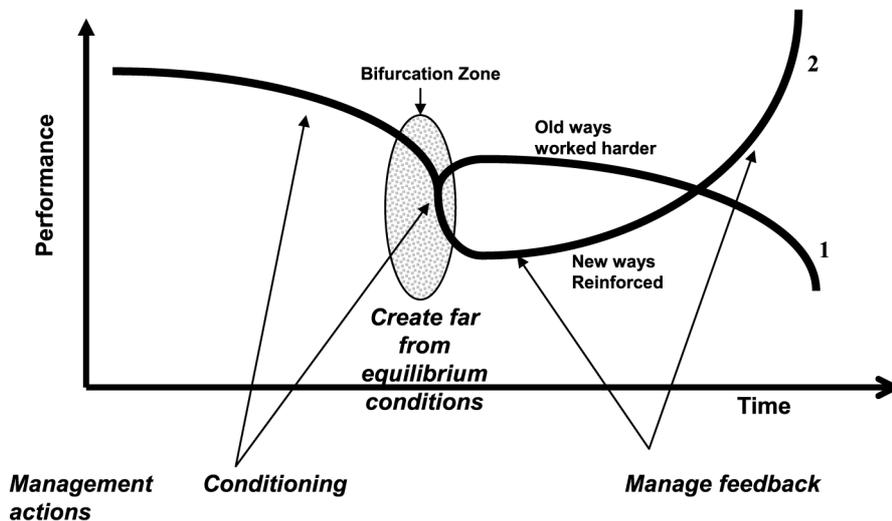


Figure 1.
Conditioned emergence

Source: Adapted from MacIntosh and Maclean (1999)

possibilities are readily recognised. If the old model and defensive routines are too strong then the system tends to react to the perceived threat by trying to make the old model work better. So it does for a short period as shown in path 1. If however the new improved model is going to be better in the medium term then it needs to emerge from the zone but initially it will not perform better than the old one, which is being driven harder. Path 2 shows this apparent lower performance. Of course, if the evaluation is being made on too short a timescale, the new model will not win the argument and the system could revert to type and head for ultimate disaster. MacIntosh and Maclean (1999) take the view that by conditioning the social system the model that emerges will be formed on the base of new rules rather than on the older defensive routines. Thus emergence is influenced by and directed by the need to find the details of a new model that satisfies the new rules and progress will be measured in a self-referential manner (Stacey, 2000).

In social systems, the validity of a resource-based view of the firm is evidenced (Penrose, 1959; Barney, 1991; Wernerfelt, 1984). The people resource becomes the means to experiment, evaluate, enforce and extend the emerging new model. They in effect are the core competence of the firm (Prahalad and Hamel, 1990). In reality, such an emergent process is dependent on making explicit the current deep structures of the organisation. The deep structure lies hidden in an organisation, but remains largely intact, while more surface level structures break down. It is formed by experience, common understandings and beliefs and through the application of procedural rules consistent with agreed sets of activity. In challenging the defensive routines and in forming new rules the conditioning stage aims to re-define the deep structure. During the experimentation in the far from equilibrium conditions the evaluation is being made against the deep structural elements to form the emergent model and to create new tacit knowledge (Nonaka and Takeuchi, 1995) of a truly unique nature.

As results emerge from the “far from equilibrium” zone the task is to reinforce, using positive feedback, the desired new rules and emerging model such that the preferred trajectory is followed. In addition, reflection and learning is taking place to evaluate the results against anticipations and to build and reinforce the deep structure to maintain the momentum of the change processes.

The process of conditioning provides an ideal format in which to manage the creative discourse and to present images of a desired future. Painting such a picture and instilling belief that it is both desirable and ultimately obtainable is essentially what leaders have always done. Perhaps now they are being offered the opportunity of two forms of leadership, that is, the great visionary who inspires belief as well as the leader who follows his/her subordinates as they march towards the uniformly desired future. In the latter case the manager is now acting more as a participant than a director/planner and controller but here there can be no concern that the solution is imposed. On the contrary, the solution is precisely the will of the people expressed in systemic actions. In

such circumstances there can be no talk of plans being implemented, rather it is a vision made real.

To make the conditioning effective the manager has to influence the surfacing of the defensive routines and their critical appraisal and banishment if such is needed. He/she has to participate fully in the discussion about the form of the needed new rules to be consistent with the articulated vision.

During the far from equilibrium phase the manager has to be part of the process of failure and discovery, to shape, evaluate and introduce the new model which is demonstrably supportive of the new rules and in fact emerged based on them. A crucial managerial support at this stage is to provide the additional resource to allow the process of experiment to be fully worked out.

It is perhaps at the feedback stage that much depends on the manager. Here the manager must be the custodian of the new rules, evaluating practice for adherence to the new rules and reinforcing the behaviours that support the new rules and the emergent model and fighting against the natural tendency to slip back into the comfort zones of old and now discarded routines and rule sets. Given the nature of the two post bifurcation trends, the manager also has the ultimate responsibility to hold true to the emergent model and fight against other managers who, looking only at short term performance, will worry about the apparently adverse performance gap. On an upbeat note, the positive feedback of new behaviour will be a more pleasant task from the manager to the rest of the team.

A manager in this situation must welcome both the chance to participate in such a stressful process and the onset of complexity and chaos as the necessary way to release new potential and new competitive advantage for the new model will be operational in a very effective way. Allied to this, the learning that the team will experience will further enhance their collective capability. All members will by then understand the power of reflection, action and evaluation. Again these are skills that are invaluable.

An interesting corollary is that to do nothing in such circumstances is the worst thing that can be done. Action allows evaluation providing new information. Inaction simply holds the level of current understanding at a constant. However, the actions at this stage might look to a bystander as more random or chaotic noise in the system so another task for the manager (if not all the managers are directly involved) is to protect the team's right to pass through the zone and to work out their solution without the input of more noise from their immediate but less relevant environment. Of course such interest is part of the wider system boundaries so must be factored into the systemic considerations, but carefully!

Part three: supply chain improvement process (SCIP ©SCMG Ltd)

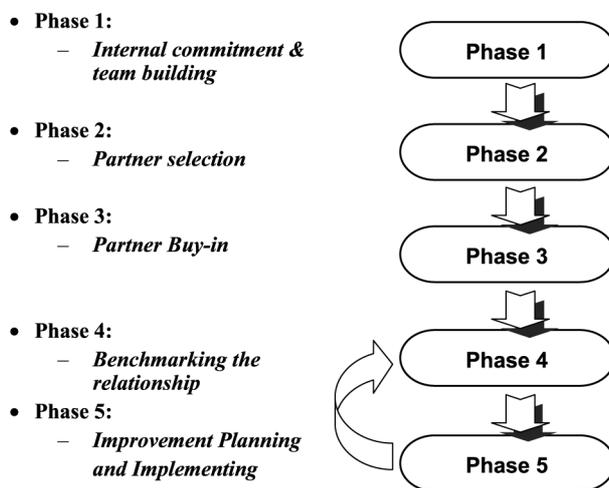
Business relationships have been described as being complex (Håkansson and Snehota, 1995), dynamic in nature, and varied in terms of importance, intensity, closeness, strength and commitment (Cheung and Turnbull, 1998).

Cooperative strategies with supply partners have been much discussed. Håkansson (1982) introduced an interaction approach to analysing business relationships with Ford *et al.* (1986) re-examining the concept; Metcalf *et al.* (1992) argued that cooperation was a pre-condition for investment; Sako (1992), using Williamson's (1975, 1987) framework to analyse inter-organisational relationships, brought together the concepts of "obligational contracting" and "relational contracting" in her continuum of relationships; Lamming (1993) presented a four-phase model to explain the evolution of buyer-supplier relationships and Hines (1996) presented a network sourcing model; relationship measurement was addressed by Macbeth and Ferguson (1994) and Cousins (1994); Harland (1996) reviewed the supply chain field; while Macbeth (1998) argued the case for cooperative relationships.

Within this research background the process developed from initial research at Glasgow (Macbeth and Ferguson, 1994) has now been commercially applied to well over 150 companies by the consulting company SCMG Ltd (www.scmg.co.uk) (see Figure 2).

The overall SCIP process was created after working with a major international company, effectively at stages four and five in the model. In this model, phase four is the area where the relationship positioning tool (RPT) is employed. Table I shows in outline the structure of this measurement process that produces a comprehensive "picture" of the relationship. The results of these are then fed back to the two groups to create an agenda for action.

The case study process had involved a workshop with both customer and supplier representatives present that had exposed them to the realities of their former work practices and had caused them to reappraise the kind of business relationship they wished to develop. In effect we had been exploring the existing deep structures and developing or recognising the new rules that they now wished to use to drive the new relationship. The very practice of the



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Figure 2.
Supply chain improvement process

Joint performance	The actual performance as a function of both the customer and supplier expressed as the outputs from the relationship. Measures of quality, delivery, cost and innovation
<i>Customer strategy</i>	
Requirements	How well the customer defines requirements to the supplier in terms of current requirements but also for future requirements and when these will come into force. Measures of quality, delivery, cost and innovation
Attitude	The customer's willingness and attitude to develop a long-term business relationship based on a high level of commitment and dependence with the supplier. Measures of business, commitment and trust, involvement and policy about risk
Systems	Systems that the customer has to capture information that is essential to make objective and informed decisions about the relationship and that formally involve the supplier in the customer's business. Measures of the cost of business, balanced evaluation criteria, approval process and criteria, scheduling, and non-problem involvement
People	How the customer organises, involves and rewards personnel involved in dealings with suppliers
<i>Supplier capability</i>	
Company profile	How well the supplier is organised and managed in terms of dealings with suppliers and what policies and strategies are in place to improve this. Measures customer base, organisation structure, strategy, financial performance, external approvals, and existing markets and customers
People	The supplier's strategy and policy towards organising, motivating and rewarding people directly involved with the customer. Measures skills, joint team activities, responsibilities, training, flexibility, reward systems, and attitude for customer support
Process	The supplier's processes that are essential requirements for a customer considering developing a Partnership with a supplier. Measures design, technical capability, capacity, systems, quality and safety management, process range, flexibility, lead times, and management of technology
Supplier management	The supplier's processes and competence to manage their own suppliers. Measures supply base, supplier selection, approval process, performance evaluation, communications, involvement, delivery, quality and cost
<i>Information flow customer to supplier</i>	
Technical	The flow of technical information to the supplier that the customer manages to create. Measures specification, problems, improvements
Involvement	The flow of information to the supplier that allows a higher level of involvement and participation in improvement activity. Measures performance feedback and improvements
Business	The flow of information to the supplier about commercial and planning aspects of the relationship. Measures lead times and changes, costs and market information

Table I.
The elements of the
RPT ©SCMG Ltd

(continued)

People	The different personnel that are involved in the relationship and the information that flows between them. Measures information about organisation structures and processes and interacting personnel
<i>Information flow supplier to customer</i>	
Technical	The supplier's ability to create a flow of appropriate technical information to the customer. Measures process and capabilities, problem sharing, efficiencies and improvements, internal quality
Involvement	How the supplier creates a flow of information to give the customer confidence in the supplier's own ability to manage their own business
Business	The flow of information about the business aspects of the supply of products or services that the supplier creates. Measures identify the performance of supplier's sub-suppliers in terms of cost performance and lead time information
People	What people from the supplier are involved or communicate with the customer and for what reason

Table I.

customer inviting the supplier personnel to be part of a joint process by which the third party would investigate and potentially criticise the customer's actions as well as the supplier's, sent a signal to the supplier that there was indeed a new rule set under consideration. Furthermore, by being in at the beginning in the initial workshop the solutions would not be imposed in the same manner as once would have been the case with an all-powerful customer. In fact the workshop addresses issues of competition, collaboration, processes and mutual measurements such that both sides can achieve an acceptable result and one that will allow both parties to develop their business interests together.

The RPT process captures these more cooperative rules and questions both sides of the relationship as to their behaviours against these new standards. It thus brings a focus to bear on issues where the parties' interactions are producing a less than optimum result. The RPT challenges actions and behaviours, systems and measurements and produces a list of potential improvement projects that can be highly significant to business success but inevitably require extensive change in either, or more often both, organisations at many different organisational levels.

In the first case we had accessed the company through senior managers, had performed the measurement process with the customer company and a number of its suppliers when a crisis hit the customer company and the message came through from head office to cut the supply costs by 20 per cent immediately. Of course, the suppliers who had believed what they were being told about new collaborative ways of working were incensed and so were their immediate contacts in the customer. In fact the situation was actually resolved but not before the customer managers had to fight back against their senior managers' actions and persuade them that they risked causing great threat to the investment in the relationship building process under way. In the end, the

customer obtained more than 20 per cent reductions but in more innovative and collaborative ways.

The new process was later applied to a different set of customers and suppliers and was reported on by Murphy (1998). In this project the full SCIP and also some of the improvement agendas were acted on such that a range of improvements was identified. In this case the sought-for price reductions were 6 per cent per year producing a saving of £240,000 but the potential cost reductions highlighted through the RPT and subsequent process mapping produced potential savings of £1.3 million while, if the time saving were converted into additional or earlier sales, the value enhancement was £2.9 million. Clearly there are issues about realising potential gains in real money but at least in this way the debate could be better informed and any ill informed pressure from outside the group, on the immediate relationship players, could be challenged as to the best route for improvement actions.

The outcomes from that case were summarized as:

- The improvement in relationship performance has delivered quantifiable bottom line benefits for the customer and the supplier.
- The benefits from working together far outweigh the price reduction opportunity.
- A total cost/value add perspective needs a more mature relationship.
- The investment in resource and effort is significantly higher than a traditional price reduction approach.
- The benefits achieved are more sustainable than one-off price reductions including increasing the competitiveness of both the customer and the supplier.
- Process improvements provide significant cost reduction opportunities.
- The teams must be focused on process.
- A holistic and long-term perspective is required (Murphy, 1998).

The necessity to create the first three stages in the SCIP model was because we collectively needed to address the issues of deep structures and defensive routines at the beginning of the process since aggressively seeking the large cost reduction was seen by the suppliers as a reversion to the discredited “old ways” of interacting.

The problem in the first case example was that the senior managers in the buyer company had not been part of the process of surfacing the defensive routines but their operational managers and the suppliers had been. The new rule sets jointly developed and committed to were now so strongly embedded in the operational joint teams that it allowed the internal managers to fight back against the senior but “unenlightened” head office. In effect, what was threatened by head office was a forced return to the old ways of working but putting them under severe short- term pressure, i.e. path 1 in Figure 1. It would have worked in the short term but the damage caused to the relationship would certainly have produced the same declining curve as drawn. By fighting back,

the internal managers were actually reinforcing trajectory 2 on which the operational team were working hard and the fact that better results were achieved than head office had demanded was testimony to the strength of the new rules and their capability to overtake the old ones in business effectiveness.

Figure 3 maps these new features on to the original SCIP model.

The defensive routines of the old adversarial ways of working which are brought to the surface and challenged in the initial workshop include: customer is always right; everyone is opportunistic; unit cost is real, total cost is a mirage; supplier switching costs are negligible; information is power; and my margins are my business.

These same defensive routines can be seen in action in any discussion with practitioners about collaborative working and some seem unable to see past them at all but the conditioning argument says that these must all be brought to the surface from the inner recesses of the organisational memory and looked at coldly for degree of fit or dissonance with the new, desired patterns of behaviour. We do need to recognise, however, that there will be circumstances, especially for commodity products, where these rules are still the most appropriate and should not be changed. We might then be faced with the situation of running two sets of rules within the one organisation so the structuring of the relationship portfolio and its associated support process and staff becomes another agenda to be managed.

The parallel task for the chosen partner organisations is to create the new rule sets that will inform the emergence of the new model. As part of the challenge to the defensive routines these new, but agreed to be more appropriate, rule sets form the structural elements which will be used as a

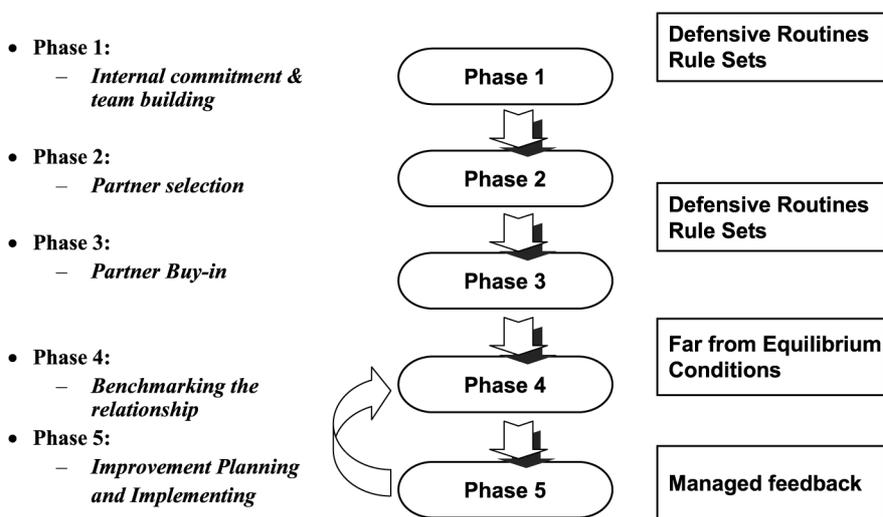


Figure 3.
Conditioned emergence overlay

reference for choices in the future and as the founding principles of new structures and procedures.

These rule sets are built into the RPT questions and scoring regime and include: win win outcomes; act to build trust; two way measurement; waste removal; risk and reward sharing; communicate with and consider other party's needs; cooperate where possible, compete when necessary; build capability; and increase the value add.

The process of utilising the third party questioners inputs energy and information and creates the far from equilibrium conditions needed to release the creative energy of the chaotic region. The analysis of the relationship is critical of both party's actions which contributed to the results and this is inherently threatening to the status quo. There are some painful realities to be faced when the mutual responsibility for a poor score is made public. It is not a blaming situation though, for by this stage there is recognition of mutual dependency for both the failure and the solution. What is not imposed by the third party is the solution for the two groups. Instead, the agenda for action concept allows the emergence of a set of new projects and procedures to modify the scores to better values over time. The effort is then to address areas where both sides have created a problem and where both sides can be part of the solution. In this way action plans and new business relationships emerge on the other side of the bifurcation zone. These embody and develop the new rules and are able to be monitored and managed in feedback terms as the project work continues. This was the effect in the second case example. The potential improvement was identified and covered issues: in design which extended out from the focal group to include brand company and marketing staff and back to suppliers' second tier supplier; planning; purchasing; production and order processing, but it was up to the joint teams to prioritise and action their own plans.

It is also clear that there is no alternative to an emergent strategy since the variations in project areas are such that no prescription of a correct implementation path is possible by the third parties. The two organisations must determine their own priorities according to their own reading of what is achievable in the short and long term. In other words, implementation is path dependent. What is also clear and has been reported in Boddy *et al.* (2000) is that the content of the planned changes is also multi-dimensional. In that work, the change content agenda is described as being represented in a circle of objectives and results, business processes, structure, technology, people, culture, power and financial resources. As previously described, such situations accord with a complex system dynamically influenced by the various feedbacks in the interconnecting links between the major areas. Successful implementation therefore cannot be pre-determined according to a "one best way" path. Truly it has to emerge through the interactions in and between the organisational groupings tasked with making the improvement agenda projects deliver their desired results.

Summary

Major change is required to effect a cooperative, strategic relationship. Such change drives to the heart of defensive routines and requires the creation of new rules to support the emergence towards a desired future state. A period akin to far from equilibrium conditions is required to free the organisations from the old rules and open them up to input of dissonance, energy and new opportunities. Conditioning enables the emergence of new actions and projects that can be used to demonstrate the desired trajectories of change and provide the means to enact appropriate positive and negative feedback.

The concepts of complexity theory and conditioned emergence have here been used to posit an explanation based on academic theory for a process that works well in practice. We have thus an interesting mutual support of theory and practice in an area of business activity that has been subject to much debate and failure to implement successfully. Perhaps now the situation can be better explained to the managers about to embark on this journey and make it more likely that they will not be discouraged at the difficult stages but rather support them in recognising the need for such difficulties in order that a more robust result can emerge.

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