# Strategy in the context of uncertainty

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Most strategists try to control the future based on an understanding of the past. They assume there is a right answer and any failure to achieve a desired outcome is a failure of analysis, data capture or execution. Not so, says the author, who explains in this article how learning from the past is not always perfect. The better method for the strategist is to see the world not in terms of order versus chaos but in terms of various complexities.

Different ontologies, or systems understood in the context of their underlying causality, require different approaches to epistemology: the way that we know things and thus the way that we make decisions. This apparently simple concept is revolutionary in its nature; most approaches in management science assume a single ontology, namely that of order.

## The three ontologies

The dominant ideology in organizations assumes that in any "system" there are underlying relationships between cause and effect. These relationships can be discovered or approximated in such a way that the future can be planned on the basis of desired outcomes. Examples include the three-year plan, the commission investigating past failure and scenario planning.

The objective is to control the future on the basis of an understanding of the past. In effect, it is assumed that there is a right answer and a failure to achieve a desired outcome is a failure of analysis, data capture/distribution or execution.

In management science we see this evidenced in the heavy reliance on case studies and consultancy recipes, seeking to replicate best practice by studying the practices of successful companies and seeking to identify aspects of those practices that can be imitated by others. Such approaches often confuse correlation with causation (Christensen and Raynor 2003).

In essence, there are many aspects of organizations that have benefited from these approaches, provided they are not taken to excess. Process re-engineering, for example (Hammer and Champy 1993), with its focus on efficiency has proved highly valuable in handling the ordered and structured aspects of an organization. However, less success occurs when extended to aspects of the organization that are more dependent on human interaction.

## Order versus chaos

The desire for order is understandable and has, historically, been contrasted with chaos as an "either-or" alternative – from the age-old battle of Zeus and the Titans to the acceptance of authoritarian government. Chaos in this sense is seen as the antithesis of order: total and absolute turbulence, without form and substance. The state of order provides structure and predictability and is the object of desire, while the state of chaos is to be avoided. In this context the function of strategy is to reduce the potential exposure to chaos by reducing uncertainty.

Unfortunately, the dichotomy between order and chaos is both wrong and of itself an incomplete statement of the various types of possible systems. In recent years, for example, we have learned from disciplines such as chemistry and biology, and discovered a third ontology, namely that of complexity.

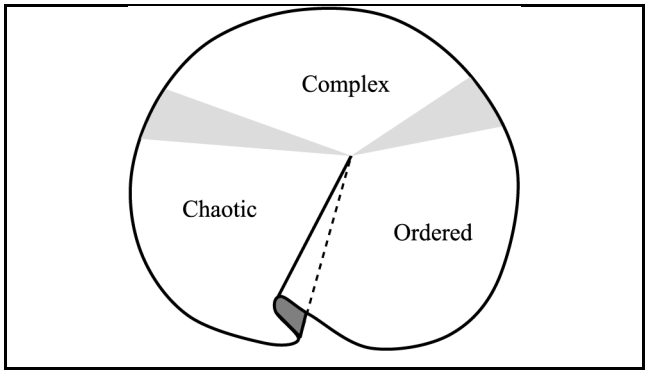
Such systems are retrospectively coherent; that is to say that we can see the pattern of causality with the benefits of hindsight. However, future events do not repeat except by accident. The reason for this is that order in complex systems is emergent in nature, arising from the interaction of many agents.

Emergent order is seen in nature, from crystal formation (Camazine *et al.,* 2001) to the flocking behavior of birds (Reynolds, 1987) and is also present in human systems. Emergence is also seen in chaotic systems. In this article we utilize Axelrod and Cohen's (1999) distinction between complex and chaotic systems that contrasts the turbulence of chaos with the connectivity of complexity.

One way of visualizing the three systems and their interrelationship is shown in Figure 1. This is a representation (projection into two dimensions) of the (multi-dimensional) phase space of the system. Understanding these interrelationships can be assisted by a metaphor. Consider the three states of solid, liquid and gas as a metaphor for the three types of system: ordered, complex and chaotic. An ordered system is stable, requires little containment and does not change too much in form. But, as the temperature under conditions of constant pressure, rises it reaches a state where it turns from solid to liquid. This state can be contained but with more difficulty and can change its form rapidly according to the boundaries in play.

With the transition from liquid to gas the containment issues become major and the capacity for dissipation is much higher. There is also a physical barrier as we go through these changes that are caused by temperature loss or gain without change of form at each boundary.

**Figure 1** The three ontologies and transitions




Moving beyond the metaphor, the boundary between chaos and order is a catastrophic one involving the most dramatic and dangerous of transitions. In Figure 1 this is represented as a fold on a plane. As one approaches the boundary of chaos from order, things appear to be stable. But then we literally "fall off the edge" as we reach the boundaries. The energy required to move back over the boundary is high.

Ordered systems are prone to catastrophic failure, especially in human systems where complacency and the human capacity to ignore or re-interpret unpleasant facts increases the probability that change will be forced catastrophically rather than through gradual change. This is the final straw that breaks the camel's back or the last grain of sand that collapses the pyramid.

### Improving decision making

An understanding of complex systems and acceptance of ontological diversity can therefore improve decision making and planning in at least two ways:

1. In a crisis, the transition from chaos into complexity offers a more adaptive and sustainable future state than the draconian imposition of order. This will be discussed later in the article.
2. The shift from an ordered state to a complex one on a regular basis to prevent the various forms of complacency can reduce the possibility of catastrophic failure.

Introducing complex systems thinking is not easy. Within our centre, it has taken some five years of active experimentation to develop methods that do not readily relapse into the conventions of order. The retrospective coherence of complex systems can easily be used to provide false evidence for order. In other words, hindsight is a common sin in the process of strategy.

To illustrate this point, the tragic events of September 11, 2001 have now been subject to over two years of investigations. As a result it is claimed that there is increasing "evidence" that there was a failure in intelligence. It is believed that the various factual dots were not joined up in time to detect the terrorists' plans, which could (it is argued) have been prevented.

It is not the intention of this paper to argue that better intelligence might have improved the possibility of prevention. However, in a complex and chaotic system, prevention and detection should not be linked. In fact, a focus on detection detracts from prevention. It will lead to a focus on discovering what is going to happen (so that it can be prevented) rather than changing the boundary conditions so that unknowable events are less likely to occur.

### Learning from the past not always perfect

The debate over 911 illustrates the way in which the use of retrospective coherence is dangerous for three reasons:

1 No two terrorist outrages are the same. Plus, the system evolves quickly to adapt to detection devices and methods. Similarly in business, no two actions by a competitor are the same. The pattern entrainment of human collective decision making (Klein, 1944) means that, in both public and private sector organizations, recipes based on past success often hinder, and in many cases distract from, innovation, Boisot (1998) explains this in the context of learning styles.

2 The mathematics of joining up the dots provides a simple counter. If I have four dots, then there are six possible linkages between those dots and 27 possible patterns arising from those dots and linkages. If the number of dots rises to ten, then the number of possible patterns is over three trillion (Boisot and McKelvey unpublished paper).

3 Data is not of itself informative without a shared context between giver and receiver (Snowden, 2002) and an ability to gain attention. The most recent space shuttle disaster showed that all the right data was in the right place at the right time, but context and attention issues prevented it being acted on.

Treating systems as ordered when they are, in fact, complex is the likely default option in strategy. Changing that default position is a function of collective sense making in organizations and requires:

- a ready and easy way to distinguish between the three ontologies that recognizes the nature of human decision making;
- validation of existing tools and techniques, within the boundaries of an appropriate ontology; and
- new tools and techniques for complex system management, and to a lesser degree for chaotic systems.

The framework we helped devise allowed the first two of these systems. Aside from continued refinement of that framework, the primary activities of the Cynefin Centre focused around the third. The Cynefin framework can be understood in terms of situational assessment by domain, i.e. what type of system are we in and dynamic trajectories, i.e. which actions can take place as they move between domains. We will now proceed to discuss both domains and dynamics.

### First-fit pattern match

To date we have identified three ontologies, ordered, complex and chaotic, each of which requires a different approach to analysis, interpretation, intervention and management. All of these are human acts. Humans in general do not make rational decisions based on a careful evaluation of available data. Rather, they make decisions based on a first-fit pattern match to either their individual experiences, or to their collective experiences as expressed through the narratives of culture in which they reside (Klein, 1944).

As we mentioned earlier, there is an ideological dominance of order as the single ontology approach to strategy. The orthodoxies of management education, for example, require evidence and assume recipes. Therefore, it is not surprising that events are interpreted within a cognitive pattern of rational decision making.

Making people aware of those entrained patterns and training them to be more rational (the conventional approach) is unlikely to succeed as this contradicts the way the brain is physically constructed. Humans are pattern-processing intelligences, not information processing ones. The experimental approach adopted by the Cynefin Centre was to work with patterns, rather than against them, based on a fairly simple reasoning: if people make decisions based on patterns then what matters are the patterns that pre-exist, individually and collectively, and how the range and variety of those patterns can be extended to improve decision making.

Working with, rather than against patterns requires a distinction to be made between sense making and categorization. In categorization models the framework precedes the data which is then fitted to the framework and the framework is defined in terms of strict criteria or rules.

Here is the major danger with categorization: if you give a group of decision makers a categorization framework (the ubiquitous consultancy two by two is a classic case) with a data set that only partially fits the framework, then they will only see those aspects of the data set that match the framework; this is called pattern entrainment. The capacity to see novelty or detect weak signals is thus reduced in categorization models in compensation for which consistent execution of appropriate responses to the categories is improved.

In contrast, with sense making the data precedes the framework, the boundaries of which emerge from data. When the Cynefin framework is created, it is created in a social setting and the domains and boundaries are defined by multiple narratives, where the narratives are commonly understood within the decision group. This corresponds with common sense: most people use cases and stories extensively in communicating ideas. In addition, teaching of any kind is heavily dependent on the use of illustrative narrative. Of course a social constructed sense-making framework can then be used for categorization, although a cyclical process of disruption and re-creation is necessary to prevent the pattern entrainment that comes with categorization models.

The Cynefin framework, shown in Figure 2, shows five domains in contrast with the three ontologies we have identified earlier. There are two reasons for this:

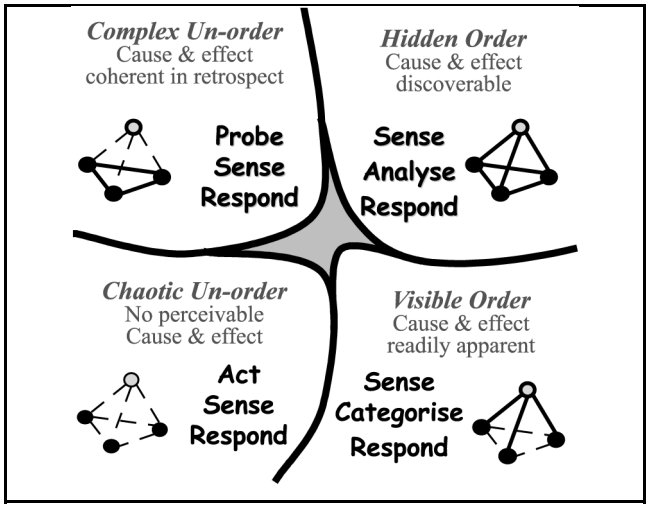
1 In practice, (and the framework has emerged from practice), humans distinguish between two types of order depending on the visibility of causality within the community. Humans naturally think in abstractions and are distinguished from animals by, amongst other characteristics the ability of language to create an abstraction through which the physical reality of the world is filtered.

2 Given that mono-ontologies are more common, it is normal for people to interpret a situation according to their personal proclivity of action. For example, bureaucrats naturally think in terms of process and their solutions reflect that perspective. Accordingly there is a state of disorder in which we are ontologically uncertain and prone to cognitive bias based on personal past practice. The central domain of Cynefin is the domain of disorder and it's minimisation a goal.

The Cynefin framework thus distinguishes between two domains of order and four ontologies:

1 *Visible order: sense-categorize-respond.* Order and the associated relationships between cause and effect (which give rise to a phenomenon in the space) is visible and self evident to any reasonable person within the population being considered. This nature can either be physical reality, or convention; for example which side of the road we should drive on. We can categorize according to best practice in an objective way that will be readily accepted by the community. We gather data, categorize it on the basis of past experience and then act in accordance with best practice.

**Figure 2** Cynefin domains




2 *Hidden order: sense-analyze-respond.* While there are repeating relationships between cause and effect, these are not self-evident and require analysis and expert knowledge to understand them. The dependency on expert knowledge brings with it an innate conservatism in that peer group. Acceptance of analysis and proposed solution is necessary to survival. We gather data, subject it to expert analysis and respond in accordance with established or good practice.

The other two ontologies can then be summarized as un-ordered where "un" is being used not to indicate a lack of order, but the existence of a different kind of order. The nature of un-order means that we cannot look at the system without changing it in some way; we are either managing or creating patterns. Accordingly we have to do something – either probe or more decisively act, before we can gather data with any validity. So our two domains of un-order are:

1 *Complex un-order: probe-sense-respond.* Here interactions between multiple agents produce patterns and emergent order that can be understood in retrospect. We understand this domain by sensing patterns and the potential patterns which we either act to stabilize or to disrupt. We probe the environment to determine what patterns are possible. In effect we still manage in this domain, but not on the basis of desired or predictable outcomes, rather we manage the attractors around which patterns form, the boundaries that contain that formation and the identities or agents that interact.

2 *Chaotic un-order: act-sense-respond.* Order is not retrospectively coherent; it is not evident even after the fact. Cause and effect does not exist in any conventional sense of the words and it is critical to act, either to impose order, or to create the conditions from which patterns can form (this will be discussed later under dynamic movements between domains).

It is critical to realize that chaos has the potential for order. It is uncanny in that the potential is difficult to see and even more difficult to act on, but small interventions can have massive impact, either as a result of deliberate or accidental action.

### Another aspect

Establishing these four domains allows us to create a pattern of different ways in which we know and act: ontology precedes epistemology. Table I shows those that have already been experimentally established by the Cynefin Centre.

Another way to look at the Cynefin framework is in the types of component connections that are most prevalent in each domain (Figure 2). In the two ordered domains, connections between a central director and its constituents are strong, often

**Table I**

| | Chaotic un-order | Complex un-order | Hidden order | Visible order |
|---|---|---|---|---|
| Decision model | Act-sense-respond | Probe-sense-respond | Sense-analyse-respond | Sense-categorise-respond |
| Practice | Novel practice | Worst practice | Good practice | Best practice |
| | Avoidance of failure | | Imitation of success | |
| Related techniques | Cynefin development area: sense making, narrative and network mangement | | Systems thinking<br>Scenario planning<br>Market intelligence | Process re-engineering<br>Standard operating Procedures |
| Nature of knowing | Emergent, experimental, uncertain, knowledge of conditions but not outcomes | | Empirical, hypothesis based, objective validation or refutation | |
| Nature of management | Decisive-directive | Information-consensual | Oligarchic-consensual | Hierarchical-directive |
| Network | No connections | Tightly connected network, loosely connected centre | Tightly connected centre, tightly connected network | Tightly connected centre, network connections irrelevant |
| Diagnostics | Every diagnostic action is an intervention and every intervention a diagostic | | Diagnostic can be isolated from intervention and do not impact on system behaviour | |
| Illustrative legitimate domain use | As a source of innovation and new perspective | To enable self organisation | Use of expert knowledge | Process control to for safety |
| Illustrative illegitimate domain use | Accidental precipitation into a crisis | Anarchy without control of any time | Refusal of experts to accept new ideas | Over control preventing progress |
| Focus | Effectiveness: allowing a degree of redundancy to create adaptive capacity | | Efficiency: stripping away superfluous functions to maximise productity | |
| Nature | EXPLORATION | | EXPLOITATION | |

in the form of structures that restrict behavior in some way: procedures, forms, blueprints, expectations, and pheromones.

For un-order, central connections are weak, and attempts at control through structure often fail from lack of grasp or visibility. In the complex and hidden domains, connections among constituent components are strong, and stable group patterns can emerge and resist change through repeated interaction, as with chemical messages, acquaintanceship, mutual goals and experiences.

The visible and chaotic domains share the characteristic that connections among constituent components are weak, and emergent patterns do not form on their own.

The network models shown in Figure 2 also assist us in understanding and then designing interventions to manage movements between domains; these are known as Cynefin dynamics and are the subject of the next section

### Cynefin dynamics

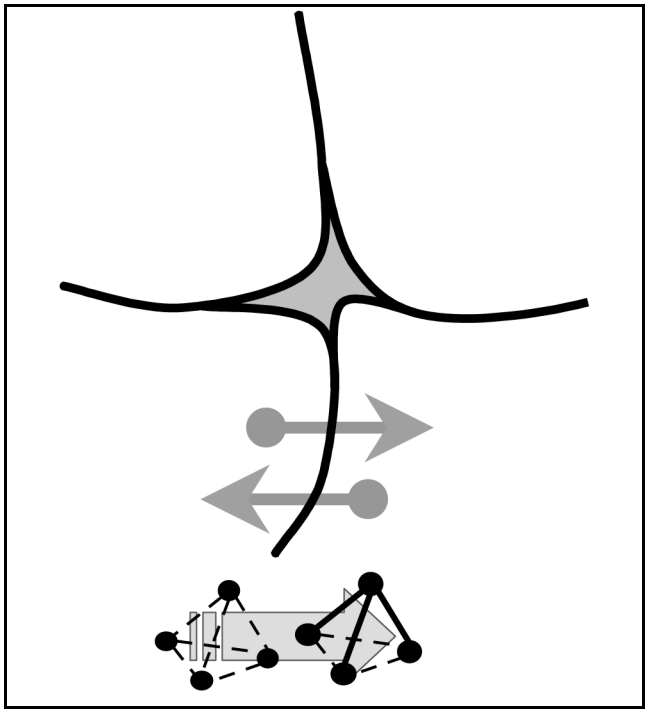
As of the date of writing this paper, some 16 different types of dynamic have been identified and illustrated. It is beyond the scope of this paper to detail all of these, but we can illustrate their use in two examples, crisis management and innovation.

Most crises arise as a result of some form of collapse of order, most commonly from visible order. Best-practice approaches have led to a set of conditions where weak signals of a context change are not seen. Consequent collapses are catastrophic in nature and generally result in the rapid and decisive imposition of order by someone or something taking a single, dictatorial approach to stabilization. As shown in Figure 3 the network conditions having dissolved, are re-established into the centre. If it stays in effect, then the controlling entity is stressed to the point where it either collapses, or establishes various bureaucratic controls which turn lead to an over structured system that collapses in turn.

An alternative is shown in Figure 4, where instead of a single decisive act of control we create multiple ''attractors'' in some case these may even be competing. Each attractor, like a large boulder thrown into a turbulent river, creates patterns which shift the problem to the complex domain (we have ACTed), the emergent patterns can then be monitored and the beneficial patterns stabilized and through further investment shifted into the ordered domains where they can be better exploited. Undesirable patterns can be rapidly destabilized, and it is easier as we created their attractor so it can monitor in a focused way.

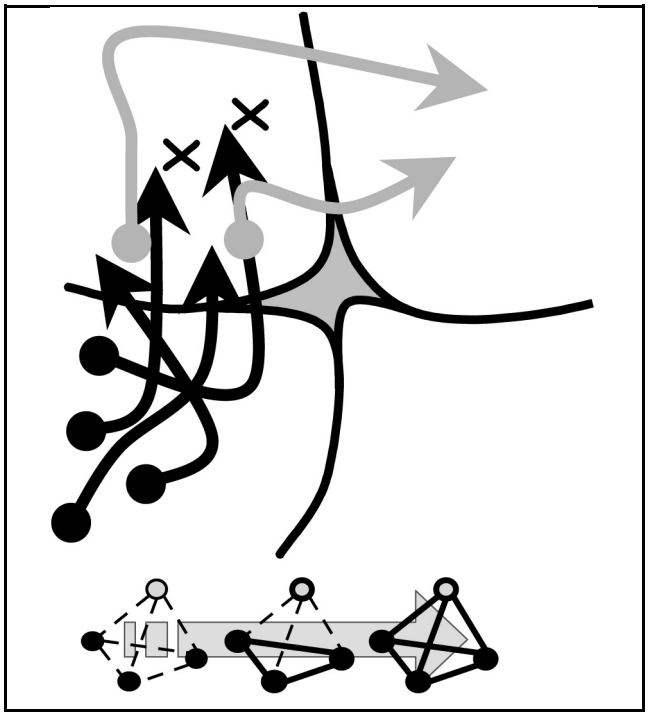
The second example is that of innovation and two types are illustrated. Both are based on the need to create conditions of

**Figure 3** Single attractor stabilisation



starvation, perspective shift and pressure the three necessary but not sufficient conditions for innovation: creativity is always useful but is too often conjoined with innovation to the detriment of both.

**Figure 4** Multiple attractor stabilisation



In Figure 5 we see a common issue in organizations and the development of knowledge in society as a whole. To become an expert requires the acquisition and development over time of a sophisticated set of patterns through which the world can be viewed. That entrainment is very powerful until the context changes, at which point the experts become a force for conservatism, re-interpreting new data in the light of old knowledge.

This is a particular issue in policy departments, especially when there is a prior pattern of success to increase the entrainment. The objective is to take a group who has moved into the illegitimate extreme of hidden order to complex un-order, i.e. to open them up to more possibilities.

Unfortunately such a move is difficult as complex un-order is retrospectively incoherent and can therefore be readily interpreted to justify the entrained patterns we seek to disrupt. It is therefore necessary to first shift the group into a chaotic environment in which the old patterns are no longer valid, before new patterns can form.

There are a variety of ways of doing this, ranging from trans-disciplinary exposure, for example taking retail marketing people and throwing them into a military environment. In one Cynefin project this process identified that there is no difference between an outgoing disloyal customer and an incoming ballistic missile, creating an opportunity to move an existing "out of discipline" technology sideways to create effect.

**Figure 5** Innovation by breaking entrained expert opinion

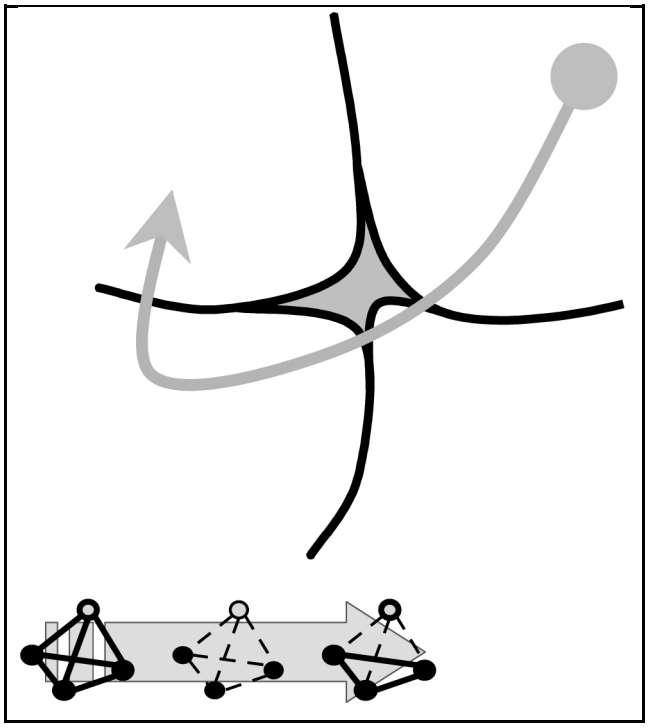


Figure 6 demonstrates the other form of entrainment, the over-confident bureaucracy, where legitimate control has reached the point of being so rigid as to be counter productive. The goal is to shift the problem from visible order, where there is one right answer, to hidden order where there are several possible answers.

### Opening up possibilities

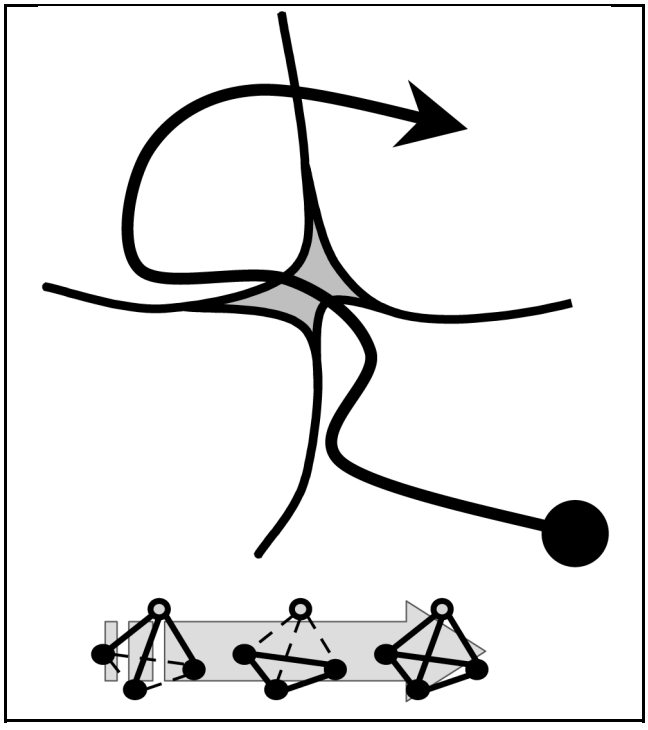
Again, the direct move is difficult, as hidden and visible orders are very similar. A shift to chaos is too disastrous, so we take the entrained bureaucrats to the very edge of chaos (so they can see just how bad it might be) but then shift them through complex un-order to open up multiple possibilities, before stabilizing the desirable patterns that resulted and shifting the problem into hidden order, our original goal.

In both cases the network diagrams illustrate the changes that are taking place. There is, of course, a third innovation dynamic: namely exploiting any crisis to create new thinking and ideas. One of the impacts of utilizing this approach in organizations has been to allow the creation of innovation teams ready to move in parallel with any crisis management team.

### Discovery to date

Research and results are still a work in progress. Our approach has been successful and has developed to the point where we can reach the following conclusions:

**Figure 6** Innovation by breaking bureaucratic entrainment



- Ontological sense-making, (in particular the creation of the Cynefin framework as an emergent process) is possible without the need for sophisticated understanding of the theory. Over three years we have moved from a complex three-day process requiring sophisticated facilitation to a one-day workshop capable of facilitation by several hundred practitioners who have received basic training. The experiments have worked in similar ways in the USA, the UK, Singapore, Australia and South Africa. We need to further experiment in different cultures and we expect to make amendments. But the shift to a scalable solution is a significant validation of the ''common sense'' aspects of the framework. Uses include foreign policy at a Government level, product launch strategy on agro-chemicals and market awareness in banking.
- The dynamics are intuitive as a problem-solving device: where am I placed, where I want to go, what is the optimal path to get there. The crisis management and innovation dynamics in particular have proved susceptible to rapid adoption and have changed policy formation in public sector projects as well as the pharmaceutical and manufacturing sectors.
- Complexity techniques provide a significant opportunity to cost reduction and rapid response. The process of managing on the basis of order involves defining desired output, current state and interventions with staging points to achieve that output. This is expensive and time consuming.
- There is a gulf between practicing managers and management science, but complexity science is showing promise in bridging that gap. Practicing managers intuitively use many of the concepts but without knowing why and without guidance; complexity and sense making provide a scientific basis for sound common sense[1].

If the situation is un-ordered it involves the creation of boundaries and the stimulation of the environment using attractors. We then monitor for the emergence of good and bad patterns that can be re-enforced or disrupted. Rather like managing a birthday party for children, managing through boundaries and attractors is a sensible strategy. At the end of the party we know if it was successful or not, but we could not precisely determine the nature of that success in advance. If I manage the party on the basis of learning objectives, measurable milestones and targets for the creation of best practice I will have chaos at best or expensive conformity requiring massive control at worst. That metaphor can be extended to many a foreign policy situation. Complexity offers the very real prospect of achieving more with less, and by reflecting and reinforcing natural co-evolutionary processes rather than the attempted imposition of a mechanical and predicative model. ■

## Note

1 I acknowledge the contributions of this point from my colleague Mark Anderton.

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