

Emergence in Organisations

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Emergence is a key property of complex systems. It is also, many believe, the key to fundamental change in human organisations. In this article I will propose that while emergence is neither predictable nor controllable there are some factors which predispose an organisation towards emergent change. I will also argue that these factors can be 'tuned' in such a way that not only is the emergence of new patterns made more likely but also that these patterns will be similar to the patterns which are desired by the members of the organisation.

The nature of emergence

According to Jeffrey Goldstein's helpful overview (1999), the term 'emergence' was first used by the English philosopher G. H. Lewes well over 100 years ago. The term was taken up in the 1920s by "a loosely joined movement in the sciences, philosophy and theology known as emergent evolutionism..." (Goldstein 1999:53). But the process of emergence itself remained, for them, unknown and unknowable. It was not until the advent of 'complexity theory' (see Waldrop 1993 or Lewin 1993 for a popular introduction) that emergence became prominent again. Experiments with computer programs known as cellular automata showed that simple interactions between simple 'agents' could give rise to surprisingly complex behaviour (Langton 1986, Holland 1995, Kauffman 1996).

Emergence became thought of as one of the defining properties of complex systems and over the last twenty years there has been a wide-ranging debate about its nature and causes. However, although emergence may be a defining property of complex systems it is itself far from easy to define. Despite the title of his book (*Emergence* 1998), John Holland declines the challenge:

It is unlikely that a topic as complicated as emergence will submit meekly to a concise definition, and I have no such definition to offer. (Holland 1998:3)

Kevin Mihata and Ralph Stacey are braver and come up with some striking similarities:

...the process by which patterns or global-level structures arise from interactive local-level processes. This "structure" or "pattern" cannot be understood or predicted from the behavior or properties of the component units alone. (Mihata 1997:31)

Emergence is the production of global patterns of behaviour by agents in a complex system interacting according to their own local rules of behaviour, without intending the global patterns of behaviour that come about. In emergence, global patterns cannot be predicted from the local rules of behaviour that produce them. To put it another way, global patterns cannot be reduced to individual behaviour. (Stacey 1996:287)

Emergence, then, cannot be control, predicted or managed. There are no 'levers' which can be pulled to give us a particular kind of emergent result. But still two questions remain, which are key for those interested in organisational life and change: can emergence be facilitated and can it be influenced?

'Conditions for emergence'

Some writers have associated emergence with 'criticality'. Per Bak (1997) popularised the notion of self-organised criticality in his work on the dynamics of sand piles to which individual grains of sand are added at the top. The pile continues to grow until it reaches its critical state. Then avalanches will start to

occur; most of these will be small and local but occasionally there will be a huge one which will collapse the whole pile:

The addition of grains of sand has transformed the system from a state in which the individual grains follow their own local dynamics to a critical state where the emergent dynamics are global. (Bak 1997:51)

Bak showed that the avalanches follow a power law, in which there are lots of small avalanches, fewer middle-sized ones, and a few which are very large. This sort of distribution is common in nature and Bak argues that it is a kind of signature which betrays the presence of self-organised criticality.

Bak's work is not without its critics, especially when extended to other fields such as palaeontology (Plotnick & Sepkoski 2001), but the notion that when certain conditions are fulfilled a system is able to display emergent phenomena is worth pursuing. Drawing on work done in a number of different fields I would like to propose a number of such 'conditions' which might be relevant in any consideration of whether such a critical state could occur in an organisation. Those factors which seem to me to be worthy of further investigation are outlined in the pages which follow.

I once had a debate with another consultant about a piece of work I was doing. "This is not a change-ready client", she claimed and therefore I should not be attempting a major intervention. I agreed with her diagnosis but not her conclusion. The purpose of the intervention was not to 'change' the client, but to help it become change-ready. In other words, I identify the notion of 'change-readiness' with criticality. If an organisation is change-ready, even a small stimulus can bring about major change. What follows is an attempt to suggest some of the things to which we might pay attention in order to help an organisation become 'change-ready'.

1 Connectivity

The first three factors—connectivity, diversity of agents, and rate of information flow—are suggested by Ralph Stacey and derived from the work done on agent-based simulations by people such as Chris Langton (1986), Stuart Kauffman (1996) & John Holland (1995, 1999) and largely associated with the Santa Fe Institute.

I am working on the premise that change in an organisation is a change in the patterns of relationships between those who are members of the organisations (together with new patterns of interaction with the environment). Connectivity thus becomes crucial. Existing patterns of connection 'ossify' and without more connectivity they cannot change.

Stuart Kauffman worked with what he called Boolean networks (1996:74ff) in which the elements can be in either one of two states and where the state of any given element is affected by those to which it is connected. He found that even if the elements are connected at random, ordered patterns can emerge. He found that both too little and too much connectivity can inhibit emergence. Though too much connectivity is rarely an issue in organisations as a whole it can frequently be an issue in very tightly bonded teams. When connectivity is too high, diversity is excluded and groupthink is a very likely outcome (see below).

But in general organisations suffer from too little connectivity and building connections—especially across boundaries—becomes vital for preparing an organisation for change. Some recent work on networks may have a bearing here (Barabási 2002, Watts 2003; for a somewhat more technical account of the background see Hayes 2000 a & b). It appears that in many networks connectivity is not evenly distributed. Instead, most 'nodes' in the network have few connections, while a few have many connections. In many networks this appears to conform to some kind of power law, just as in Bak's sand piles (though not necessarily for the same reasons). Many researchers argue that this leads to stability, since removing a node at random is not likely to affect many other nodes (since most nodes have few connections).

Most of the organisations I have worked with, especially those with more than a few hundred employees seem to have tightly connected groups with few connections between the groups. The term 'silos' seems to be commonly used to describe such groupings and there is generally a sense that if we could remove the silos and everybody communicated better the organisation would thrive.

However, this is not necessarily the case. For a start, no organisation is uniform; there are lots of groupings, many of which develop their own subcultures. This is very useful—if the sales department had the same culture as health and safety things would either be very unsafe or very unprofitable! In fact, it appears that a 'small world' may come about when there are just a few well-connected people who can perform the role of connecting the different silos sufficiently well.

There is an increasing interest in Social Network Analysis in organisations (Cross & Parker 2004), an approach which attempts to map some of the networks of connection between people and to offer a tool which can be used to describe and change the way people inter-relate. Their value has yet to be fully assessed but there is some promising work being done.

2 Diversity

Diversity is crucial for emergent change to occur. Strictly speaking, it is an *increase* in diversity which is required for change to occur. The greater the diversity in an organisation, the greater the 'possibility space' which it can explore. What is needed is diversity of all kinds—cultural, intellectual and emotional. Diversity, on its own, will not give rise to emergent patterns; indeed, it can lead to anarchy and conflict. But in concert with the other conditions it has a vital part to play.

It is well-known that, though important, equal opportunities policies do not guarantee diversity. Consider, for example, the board of a hypothetical company. They are all white, male, middle aged and middle class. Their routes to the board were similar and they have fallen into a kind of 'groupthink' (Janis 1972). As a result their business is failing to adapt to a changing world.

It's a familiar story, but consider two things. Firstly, that this group is actually very diverse (outside the boardroom Ron is a marriage counsellor, Jack is a radio ham, George preaches in his local church, Jim runs the local youth football team, Patrick is a magistrate, and so on) but the culture of the organisation does not permit them to bring this into work. We might profitably speak of 'potential diversity' and 'actual diversity'. Secondly, suppose a young black working class woman was appointed to the board in order to help increase its diversity. In all probability she would either be so different that she would be rejected by the others or she would be assimilated into the prevailing mindset and would fail to make any significant impact.

We come face to face here with one of the fundamental paradoxes of transformational change in organisations: *if the stimulus to change is too great it will be rejected, if it is too small it will be assimilated*. There is no scientific way of determining the 'right' stimulus and approaches to emergent change in organisations will necessarily rely as much on intuition as on rational inquiry.

3 Rate of information flow

If connectivity specifies the *possibility* for effective communication, it is still necessary for actual transactions to take place between individuals. John and his manager are connected if they meet once a year for a so-called 'appraisal'. But unless the frequency and quality of interactions are high enough they are not connected in any meaningful sense.

It would seem that organisations are analogous to 'dissipative systems' (Prigogine & Stengers 1984). In such systems, there is a constant throughput of energy and stable(ish) structures are able to form in far from equilibrium conditions. Think of a vortex, such as that created when the water rushes through the plughole in your bath. As long as the water pours out at a sufficient rate the whirlpool will remain; its detailed shape and size quite unpredictable but its overall pattern instantly recognisable. But when the flow of water diminishes the vortex will collapse and become a relatively orderly flow.

When a dissipative structure leaps into a new order, it requires more energy or information to sustain it than the simpler structure it replaced. In terms of the flow of information, a stable system can be sustained with a sluggish flow, but a much more vigorous and richer flow is necessary for a system operating far-from-equilibrium. It is at these far-from-equilibrium conditions that effective organisations operate, having both sufficient stability to survive and retain their identity and sufficient variety and unpredictability to be able to innovate and adapt as their environment changes.

In most organisations the rate of information, energy and resource flow is too small and so the challenge is to help increase them. But there are times when it can become too great and then the challenge is in the opposite direction. One example of the latter is the fashion, still common in many organisations, of 'cc-ing' e-mails to everybody who might have even a slight interest in the subject. This is usually done as a defensive manoeuvre in organisations where a blame culture is strong.

The first three conditions are derived from work on computer simulations and observations of physical systems. They seem to apply to any complex system. The rest of the list are more specific to living systems, and human systems in particular. The next two come from Ralph Stacey's work on complexity in organisations (1996:179-183).

4 Anxiety containment

Stacey argues that too much or too little contained anxiety inhibits emergence. Psychodynamic perspectives on organisational life can help us make sense of some otherwise perplexing behaviour. My own 'Anxiety and Incompetence in the Large Group' (Seel 2001a) gives some background to the theory with an illustration from a large group event. Other writers have looked at the effect of anxiety on organisational structure and process (see, e.g., Hirschhorn & Barnett 1993).

In essence the argument is that we can only cope with a certain amount of anxiety. If our levels of 'uncontained' anxiety rise too high we will construct defences against it. This is true at both individual and organisational level, leading to both dysfunctional work practices and rituals which serve no purpose other than to protect against anxiety. Bureaucratic rules and regulations are often a symptom of attempts to guard against uncontained anxiety. These defences will nearly always work against change.

On the other hand, if there is too little anxiety—and therefore too much comfort—the incentive to challenge and innovate may be missing. Working with anxiety in organisations can be both difficult and fruitful. For instance, health care systems are prone to high levels of anxiety. After all, one mistake can be fatal for a patient. Practitioners have to live with this anxiety and to cope with it effectively. It is no coincidence that bureaucratic and autocratic behaviours are commonplace in hospitals. Change is not easy or straightforward; staff may wish to work more collaboratively and creatively but the patterns of anxiety avoidance will keep trying to reassert themselves. Helping such an organisation become change-ready takes patience, courage and a great will to change. It can be done but it is not an overnight phenomenon.

5 Proportionate power

If the levels of power differentials in the system are too high or too low, emergence can also be inhibited. The case where the power differentials are too great is perhaps closer to most people's experience. Those who have power and who feel threatened (possibly accurately) by the possibilities implicit in new forms of organisation will often act to suppress emergence. In my experience, while it is not usually possible for the senior managers in an organisation to ensure change, it is possible for them to inhibit it. For this reason, any change must have the positive support of a large proportion of the senior management; otherwise it is likely to fail.

On the other hand, if there is no good leadership; if there are no clear power relationships; if the ethic of egalitarianism stretches so far that no-one is prepared to take responsibility then emergent change within the system is also unlikely—though change from outside may be inevitable.

6 Identity maintenance

One reason why change—especially unpredictable emergent change—can feel threatening is because it may seem to challenge the very identity of the organisation itself. Just as people invest considerable emotional energy in their personal sense of identity, so do people in organisations. Even if I don't like the place in which I work and want it to change I still want it to keep its essential identity. Takeovers and re-brandings can be very difficult for workers and they will often do whatever they can to subvert and resist this sort of change.

Organisational identity is often vested in symbols and rituals. A problem can occur when a desired change starts by discarding some of these. They may, in themselves, be of little value but if significance has been vested in them, their disappearance can lead to a lot of resentment and resistance.

7 Good boundaries

Good boundaries seem to be necessary for emergence to occur. These may be deadlines, clear goals and intentions, prescriptions about length or size, and so on. The common factor seems to be that there is a well-bounded 'space' within which the emergence can occur.

An example from my editing experience may help indicate this. Documentary film editing is essentially the process of 'discovering' the story which lies latent within the rushes. This may match the director's intent very closely or it may be quite different. The process is one of facilitating the emergence of form and I have learned a lot about emergence from my own experiences as an editor.

When editing a fifty-minute documentary, it was quite common for an apparently finished structure to end up at about sixty minutes. Neither the director nor I could see any way to shorten the film without doing serious damage to its integrity.

The solution was to apply for an expanded transmission slot. Occasionally this was granted but the more common response was a simple 'no'. Strangely enough, when this decision was made it suddenly became clear how to cut the film down. The new structure seemed no worse than the previous—and in many cases was tighter and flowed better.

I believe that it was the clarity of the boundary which aided the process of creativity. Before, there was always the possibility of running at the longer time and so the emergence of the shorter form was more difficult to facilitate. Once the edict had been given the new pattern seemed to present itself with little difficulty.

There is, for me, some link here with Transactional Analysis—at least as an explanatory mechanism. The creative artist cannot create without giving the Child free rein. Yet if the demands of the Parent are not heard and taken into account there is likely to be self-indulgence rather than art. The role of the Adult is to freely let go of control and yet to still retain enough autonomy to be able to 'referee' when required.

In an organisational context, my experience is that the giving of clear boundaries can be liberating. A simple example may suffice. I recently facilitated a meeting of the 'top fifty' managers in a local authority. I arranged the seating in the room in ten circles, each with six chairs. Naturally, as people came in, they tended to sit with people they knew. Since I wanted to get the maximum diversity and connectivity in the room (the events had always been very formal before, chairs in rows, etc.) I needed to find a process to form new groups. I gave some simple rules:

- λ In ten minutes' time everybody must be in a group.
- λ No group may have more than six members.
- λ No group may have fewer than four members.
- λ Each group must be as diverse as possible in terms of grade, age, length of service, department, etc.

It took just seven minutes for everyone to be in a group. The noise and energy in the room was wonderful to behold. Everyone was having brief conversations, sharing information and generally having

a good time. In the afternoon I repeated the exercise—only this time I only gave the rules were slightly different:

- λ In five minutes' time everybody must be in a group.
- λ No group may have more than six members.
- λ No group may have fewer than four members.
- λ No-one may work with the same people they worked with in the morning.

This time it took three minutes! This is not an example of emergence as such because the desired pattern was prescribed but it is an example of self-organisation. I am convinced that it is facilitated by a combination of two things: the unambiguous boundary conditions (the first three prescriptive rules in each case) together with the permissive fourth rule which gives a clear goal but leaves all details of operation to the participants.

In fact, I believe that this is a crucial principle for the management of self-organisation in corporate life. It is closely related to Mark White's (1999) notion of 'Common Law' rules. White suggests that the difference between Roman Law and Common Law can be characterised as "Whatever is not permitted is prohibited" versus "Whatever is not prohibited is permitted". The latter is equivalent to my formulation for self-organisation in adaptive organisations: that is, lay down very strict boundaries specifying what is not permitted, add a clear goal, and then give freedom to experiment within those parameters. Great Harvest Bakery in the US is an example of an organisation which is explicit about this way of organising. Its 'freedom franchise' agreement states that, "ANYTHING not expressly prohibited by the language of this agreement IS ALLOWED."

8 Intentionality

Intention seems to play a part in emergence in human systems, especially in encouraging a particular kind of outcome. David Cooperrider's work (1990) on the way positive intentions can lead to positive outcomes suggests that it is possible to influence the broad general direction of emergence although not to control or specify it. Indeed this is the whole basis of Appreciative Inquiry (Watkins & Mohr 2001).

However, it has to be recognised that intention is not a simple intrinsic property of human agents. Instead, it is often—perhaps always—co-created as a result of interactions with other people. Intention, therefore, can be thought of as an emergent property created from the interactions within a human system which then feeds back into the system and influences its future development.

In organisational terms, emergent change is more likely if there is a compelling vision (Seel 2001b) which engages the majority of the people involved. For many, the term 'vision statement' conjures up pictures of a series of bland or wordy vision statements posted on the walls or promulgated through company newsletters. In practice, these statements rarely have any effect. They may energise and motivate the senior team which put them together but most others in the organisation will remain unmoved; indeed, cynicism and scepticism may easily be increased.

To be really effective a vision must be communicated in the stories people tell one another. A new vision implies new stories. Stephen Denning's notion of the Springboard story is one way to approach this (Denning 2001). Stories have two great advantages over other forms of communication: firstly they engage the heart as well as the head and secondly they offer the possibility of participative co-creation. When someone hears a compelling story about the future of the organisation, their first instinct is to re-tell the story in their own particular context.

Indeed, this is how Stephen Denning's springboard approach got started. He was trying to persuade the World Bank to become more involved in the dissemination of knowledge to developing countries. His presentations were received with polite respect but no action until he told a story about a health worker in Zambia who was able to solve a problem by being connected to the internet. Immediately his listeners translated that into their own situation: "Maybe we could do the same sort of thing with our financial

knowledge...” The story proved to be a much more powerful catalyst for change than any amount of PowerPoint presentations. (For more on storytelling in organisations see Seel 2003.)

9 Positive emotional space

Research by Marcial Losada (1999), further developed by himself and Emily Heaphy (2004) shows that high performing teams have a high ratio of positivity to negativity. They observed teams in action, measured their interactions and coded them according to a number of criteria. One of these was to mark comments as either positive, negative or neutral. The ratio of positive to negative comments is known as the *emotional space* and the highest performing teams had far more positive comments than negative. From their work it seems that emergence is much more likely if there is a positive emotional space.

10 Watchful anticipation

Finally, but not least in importance, is the need for watchful anticipation. Premature closure can inhibit emergence, or at least prevent its full blossoming and subsequent feeding down into the continuing development of the system. The desire for action in human systems may be almost overwhelming but emergence cannot be rushed; it requires a kind of expectant waiting and a sensitivity to the unfolding moment—a state often referred to in the literature on creativity.

In an organisational context this condition is the hardest of all to find. Most organisations have some deep seated cultural rules which say things like, “Be busy”, “Never leave first” or “Long hours are heroic”. One of my favourite slogans is, “Don’t just do something, stand there!” but it is really hard in modern organisational life. The problem is that most organisations are only prepared to attempt the path of change if they can travel in ways which actually reinforce the existing patterns—to do different and be different is really hard.

An example

In an article on creativity in organisations (Seel 2005) I have used the above framework to suggest some of the reasons why a particular organisation—BBC Television in the 1960s and 1970s—was able to flourish and to be the world leader in creativity and new ideas in television documentary.

Part Two: Practical implications

Suppose for a moment that the conditions for emergence outlined above have some validity; what are the practical implications? How might we go about bringing an organisation to change-ready criticality? One approach could be to devise diagnostic tools to explore the organisations position with respect to the variables above. We could then design interventions intended to create positive change on the variables as necessary.

There are two disadvantages to this approach. Firstly, we have no numbers. For instance, we simply don’t know how much connectivity would be needed for emergence in any given organisation. The same is true for most of the other conditions. So any questionnaire or other diagnostic approach might offer a semblance of scientific rigour but would actually be built on very uncertain foundations.

Secondly, such an approach would be rather mechanical and contrary to the spirit of emergence. I am not denying the possibility of a structured approach to facilitating emergence but at the present state of our knowledge this seems all too likely to be offered as a consultants’ fad rather than anything else. Instead, I suggest that collaborative inquiry offers the best current approach to enabling and encouraging emergence in organisations.

Collaborative inquiry

Collaborative inquiry is a generic term which covers a number of approaches to change in organisations ((Reason 1994, 1997; see also Bunker & Alban 1997 for a review of some of these). The collaborative inquiry has a number of characteristics:

- λ There is an attempt to engage the ‘whole system’, either by including everyone or by selecting a representative sample of the whole organisation.
- λ Large numbers of people, often a hundred or more, are involved.
- λ The predominant mode is inquiry rather than advocacy.
- λ Everyone’s contribution is assumed to have validity because people are encouraged to speak from their own experience.

Collaborative inquiries seem to have the potential for facilitating emergence. They increase connectivity and diversity, often focus on a positive core and can fulfil other ‘conditions’ as well. Rather than go into detail here I will instead present the outline of a kind of collaborative inquiry which I designed specifically from an emergent perspective.

Emergent inquiry

I have been using what I currently call *emergent inquiry* to explore the possibilities of facilitating emergence in an organisational context. Emergent inquiry is a form of participative collaborative inquiry which takes the some of the conditions above and tries to apply them to, at present, small-scale inquiry. Table 1 gives an overview of the procedure. Behind this lies one fundamental injunction:

Do not try to answer the question; wait till the question answers itself.

	Process	‘Condition’
□	Everyone speaks with many others	Connectivity
□	Relevant & ‘irrelevant’ inputs	Diversity
□	Many short ‘rounds’	Rate of information flow
□	Safe, egalitarian environment	Lack of inhibitors
□	Clear question, tight time-keeping	Good boundaries
□	Relevant topic, desire for answer	Intention
□	Wait for the question...	Watchful anticipation

Table 1 Emergent inquiry characteristics

So far the experiments have been small-scale but the results have been promising. For instance, a colleague and I were working with a team of eight managers responsible for implementing a new organisation. They had previously decided that self-managed teams were the way ahead for the organisation but were obviously still very hazy about the concept. I suggested an quick emergent inquiry and they agreed to give it a try.

They agreed on a relevant and specific question: “How do we enable self-managed teams in the organisation?” We then gave them a brief handout on self-managed teams. They had two minutes to scan it and then broke into pairs for five minutes (exactly) to discuss the issue. We gave them another handout on the same topic, another two minutes to scan, then five minutes in a different pairing.

Next we brought everyone together and I offered some ‘diverse’ input on ‘simple rules’ by way of *Boids* (Reynolds 1987) and also on the conditions for emergence. I made no connections with the task in hand, so in one sense these offerings were a *non sequitur*. However, a spontaneous discussion started about whether the question should really be, “What is a self-managed team?” I said that this might come up in their discussions. My colleague then offered a third question: “Why self-managed teams?”

Two more five-minute rounds followed, each with a new partner. When they reconvened we debriefed each of the three questions. They had lots of clarity about the ‘what’ (which had not been true in previous discussions), a good sense of the ‘why’ (also a first) and some clear and practical steps to start the ‘how’.

The whole inquiry took thirty minutes and produced some impressive results, given the lack of clarity and consensus which existed before it was undertaken.

Implications for organisations

Emergent inquiry is still in its infancy. Applying the 'emergent perspective' to wider organisational change is even further off. The command and control paradigm, with its desire for certainty and belief in the possibility of 'making things happen' is still dominant. The process of working out the practical implications of the 'emergent organisation' paradigm is still under way. The table below offers some indications of the sorts of changes which will be required to shift from one to the other. Some are being tried—some are being implemented—in organisations. What has been lacking is an overarching framework to justify them. This paper hopes to offer 'one more brick in the wall.'

Command & control paradigm	Emergent paradigm
Keep people in 'silos'	Build connectivity (1)
Ensure everyone 'salutes the flag'	Encourage diversity (2)
Manage communication initiatives	Have conversations in corridors (3)
Create bureaucratic processes	Acknowledge & deal with anxiety (4)
Make it clear who's in charge	Give everyone leadership opportunities (5)
Announce new brand identity	Consult on identity change (6)
Tell people what to do	Tell people what not to do (7)
Set objectives	Agree energising goals (8)
Blame people for failures	Learn from events (9)
Keep busy	Wait expectantly (10)

Table 2. Command & Control vs. Emergent Organisations. The numbers in parentheses refer to the 'ten conditions'.

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