

Complexity and clinical governance: using the insights to develop the strategy

Kieran G Sweeney and Russell Mannion

K G Sweeney, MA, MPhil, FRCGP, lecturer in primary care, Research and Development Support Unit, University of Exeter. R Mannion, PhD, senior research fellow, Social Policy Research Unit, University of York.

Address for correspondence

Dr Kieran G Sweeney, Research and Development Support Unit, Noy Scott House, Haldon View Terrace, Exeter EX2 5EQ. E-mail: K.G.Sweeney@exeter.ac.uk

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SUMMARY

There is increasing interest in complexity as an explanatory model to help understand how health care organisations operate and change. In this article, we present a brief introduction to some of the basic ideas in complexity and illustrate how these might be relevant to the process of implementing clinical governance. The implementation of clinical governance can be seen as a complex adaptive system: as such, we must accept that uncertainty and unpredictability are inescapable. This makes life uncomfortable for managers, but an understanding of how complex adaptive systems work helps us explore a range of management styles and practices, depending on how the 'system' — in this case the implementation of clinical governance — is developing.

Keywords: complexity; clinical governance; complex adaptive systems; chaos.

'The NHS is the epitome of a complex adaptive system. Such systems do not always respond well to mechanistic formulae.'

David Fillingham, director, NHS Modernisation Agency.
(*Health Service Journal* 7 February 2002, page 27)

Introduction

COMPLEXITY has widespread currency in the natural sciences and has recently influenced developments in the social and organisational sciences. Drawing on such developments, this article will illustrate how the implementation of clinical governance constitutes a complex adaptive system (CAS) and shows how understanding some of the key features of complex adaptive systems can help us understand better how the process of implementing clinical governance works.

Changing metaphors

Since its inception over 50 years ago, the dominant metaphor underpinning management and reform of the NHS has been a mechanical one: the machine with its component parts harnessed into efficient working order.¹ The assumption has been that activity and performance can be precisely controlled via rational 'technical fixes' — a policy lever pulled here, a management cog turned there will have entirely predictable outcomes. The mechanical model has provided the guiding logic for the introduction of supply side competition, the 're-engineering' movement, and traditional hierarchical 'command and control' systems. This approach remains immensely influ-

ential, not least because it appears to offer the architects of reform the seductive promise of tightened control over the performance of organisations and professionals

Mechanistic approaches are known to work well in situations where machines work well; that is, production is simple and programmable, a standardised output is required, the transformation process (by which inputs are converted into outputs) is well understood, and when human factors are malleable and compliant. In situations where these conditions do not prevail, (as in many areas of health care), mechanised practices are less effective. Indeed, at the extreme they may even induce serious dysfunctional consequences; for example, the range of adverse behaviours that have been prompted by the recent proliferation of performance targets and indicators in the NHS.² In response to the perceived limitations of the 'hamburger science' approach to delivering health care, policy and practice in the NHS appears to be increasingly inspired by insights from the emerging science of complexity.³

In complexity, the dominant metaphor is the living system — organic, dynamic, unpredictable, and constantly adapting to its environment. This is more suited to a large complex organisation, such as the NHS. This is an organisation constantly adapting itself to the ever-changing political, societal, and financial environment; dynamic in its struggle to re-fashion relationships between professionals and create new partnerships with stakeholders; and continuously prone to non-linear change — think of the relatively small output from the Health of the Nation Agenda (a large input), or the large effect produced by a tiny input: the observational study questioning a possible link between autism and measles, mumps and rubella (MMR) vaccine.

Complex adaptive systems

There is no single discipline or unified theory of complexity. Complexity is one way of describing how a system behaves. Here, we use the term 'system' to indicate the coming together of elements that share an environment, their interconnections, and purpose.⁴

Complexity itself refers to one of four generic types of dynamic behaviour that a system can exhibit. The first two system behaviours are *stasis* and *order*. 'Stasis' depicts the absence of dynamic behaviour, and 'order' depicts a behaviour that is predictable, linear, and stereotypical. 'Chaos' refers

to a system which appears random but within which there is determinism and hidden order. 'Complexity' is the dynamic state between order and chaos. Battram gives the analogy of the breaking surf wave.⁵ The tube in such a large curling wave can be regarded as the complex phase of the wave's behaviour, the phase in the wave's development before it crashes — into 'chaos' — on the beach: complexity exists at the edge of chaos.

In complex systems — as opposed to linear systems, in which the outputs are proportional to the inputs — each element has some freedom to act independently, and each element of the system can change itself. In complex adaptive systems (CAS), the *non-linear interaction* of the elements or agents enables the system to adapt to its environment. During this process of adaptation, CAS produce *emergent behaviour*, which could not have been predicted by understanding how each of the elements in the system work separately. Over time, the process of creating such behaviour constitutes what is called *self organisation*: when stock markets shift in response to financial pressures, they are exhibiting a form of self-organisation; a new order better adapted to the financial environment. The pattern of behaviour of any CAS observed over time is said to describe the systems 'attractor'. Box 1 sets out the main features of CAS.

CAS and change in organisations

Several authors have proposed that complexity can help us understand how change occurs and can be facilitated in large organisations.⁶ There are numerous examples of large commercial organisations using complexity successfully to inform large-scale change to help them adapt to rapidly changing commercial environments.⁷ In health care, Zimmerman *et al* have described how a range of healthcare organisations in the USA usefully applied complexity insights to understand why things were happening as they were, or could be improved.⁸ Within the NHS, one of the authors (KS) has proposed that the elements of complex adaptive systems can be seen at work when clinical governance is implemented.⁹ Drawing on this work, Table 1 sets out the features of CAS referred to in Box 1 and describes how they correspond to the features of a clinical governance programme.

In the remainder of this article we will develop this thinking for clinical governance, describe how a number of features of CAS correspond to familiar activities which form part of the implementation of a clinical governance programme, and illustrate how applying the insights from complexity can help health care professionals understand organisational change.

CAS and clinical governance

We argue that the three key features of CAS can help health care professionals in the NHS understand better how clinical governance is implemented. Our proposal is guided in part by a discussion of 'live' management issues by NHS managers, facing a huge change agenda in an uncertain environment.¹¹ These features are:

- The *interaction* between agents in system. In clinical governance these will be the professionals and public actively involved in the system.
- From the nature and intensity of that interaction arises the

- Complex adaptive systems are understood by describing not just its structural components, but also the relations between those components.
- Sensitivity to initial conditions
- Non-linearity
- Complex systems create emergent behaviour and are capable of self-organisation
- In complex systems, the emergence of such behaviour is unpredictable
- Complex systems incorporate the observer as part of the system: observation implies participation in the system.

Box 1. Attributes of complex systems.

second important feature, the *emergent behaviour* of the system. In clinical governance, examples of such behaviour could be half-day workshops in risk management, or strategies to develop interagency partnerships.

- Third, over time, the emergent behaviour defines the system's *attractors*, or in more prosaic terms 'the ways things work round here'. Attractors can be conceptualised as those patterns of behaviours or activities that become discernible over time.

What can these terms help us to understand how clinical governance 'works'? First, the clinical governance system's attractor state is found in the sense of purpose, direction or vision embraced by the organisation. In practice, this requires clinical governance leads to identify the core values that are used to anchor the system (here the community of health professionals) and thereby build a platform for progress. One can make a useful distinction between an 'ideal attractor', which might be the NHS plan, or a grandiose vision set out in the organisation strategy documents, and the 'real attractor', or what actually happens in real life. The notion of an attractor, we argue, invites the professional to get the big picture view by standing back and seeing just how the organisation works. If the agents in the system don't share the attractor, the system will not function coherently.

Similarly, the emergent behaviour of the system can be influenced by nurturing a common understanding (although this does not necessarily require a uniform consensus) of the global sense of the direction of travel that constitutes the attractor. One can, for example, remind the agents in the system about the attractor, which they all support in order to develop an appropriate behaviour. To achieve this, the clinical governance lead needs to be aware of a range of management styles, depending on the particular aspect of clinical governance being developed. There may be times when an old-fashioned command-and-control approach will be needed; for example, helping the public health team vaccinate an at-risk population in a meningitis outbreak. At other times, the clinical governance lead will be better advised to adopt the role of a *partisan negotiator* rather than *enforcer* in order to best influence the nature of the emergent behaviour. The lowest level of complexity in the clinical governance system is the product of the interaction of the agents (the professionals who constitute the healthcare workers in a community). This is really the currency with which the system operates. One can ask: is the interaction of the agents in this system really compatible with realising the attractor, or are there factions within this group acting

Table 1. Clinical governance as a complex adaptive system. (Derived and adapted from reference 9.)

| Characteristics of a complex system | Corresponding features of a clinical governance programme |
|---|--|
| Complex systems have a large number of components | Clinical governance is implemented by a large number of agents from a range of professions who try to integrate the seven key components. The agents can act at various levels of the system, from the centre (Department of Health) to regional and then local level, right down to the individual practice level |
| The interaction of the parts of the system is rich and diverse. Any element in the system can be influenced by and can influence many others. The interactions are non-linear | Because a large number of elements are involved and an even larger number of agents associated with developing clinical governance, their interaction is rich and diverse. Within a clinical governance system, small influences may have a large impact and vice versa. One example is the launch of a report linking autism with MMR vaccine which had a large impact on vaccination rates ¹⁰ |
| Complex systems have a history which co-creates their present | At the macro-level, the history of clinical governance arises from political dissatisfaction with the historical development of the National Health Service. At the local level, it will be implemented in localities in different ways depending on the local context and history |
| Complex systems are capable of self-organisation under conditions far from equilibrium | As PCGs developed, their structure was influenced and changed along with the local complexion of clinical governance; constituent practices developed their own inhouse structures and approaches to clinical governance |
| Complex systems are open, they interact with their environment, and it is sometimes difficult to define their boundaries | Clinical governance develops a quality that reflects the special characteristics of that organisation, its history, priorities and needs. This can change unexpectedly; for example, in response to political changes in policy, (the request for mandatory data for NSFs). Ask yourself what, in domiciliary care, distinguishes a 'social' bath from a 'medical' bath? |

against it? At this level, healthy conflict is accepted as part of the fabric of organisational life, which places an onus on clinical governance in leading and skilfully navigating a course between competing and overlapping interests of different sub-groups and professional enclaves. Table 2 summarises how these features of CAS relate to the implementation of clinical governance.

Further insights from complexity for clinical governance

We now consider two further insights generated by complexity, relate them to clinical governance, and assess how these might be of value to staff implementing a clinical governance agenda for a PCT. These insights are:

- The *systems tree*, which captures the multi-level nature of complexity in living systems; and
- The *agreement certainty matrix*.⁷

Systems trees

A systems tree is one way of mapping various levels of complexity in a system. Figure 1 is a graphical representation of a systems tree. Our example depicts a living organism with complexity, beginning at the level of individual cells and continuing up to the level of the whole organism and beyond. The tendency of living systems to form structures with multiple levels, each of which constitute a different degree of complexity is a key factor in any living system's ability to self-organise (the ability to develop and exhibit behaviour beyond that which could be anticipated by examining the individual potential of each element within the system). At each level of complexity within the organism, complex systems can be observed that are simultaneously integrated, but also parts of larger wholes. Thus there exist continuous and essential interdependencies between the levels, as well as interactions between each element and the environment.⁹

For clinical governance we think this insight is helpful because:

- it introduces the notion of levels of complexity in a system, which are simultaneously whole and interdependent; and
- it stresses continuing, adaptive interaction with the environment.

The NHS operates like a living systems tree. Within the NHS system, the agents (professionals and other employees) interact at a number of levels of complexity within a range of complex adaptive systems. Doctors and nurses will have their own professional 'systems' (their Royal Colleges, for example). But these professionals will also interact locally at practice and PCT systems levels, and beyond that again in clinical networks, regional, and national organisations. Each of these groups constitutes an integral CAS, but within the larger picture — or to continue our analogy, further up the systems tree — these CAS will interact as agents in more complex systems. Each level will have its own attractor, and will exhibit its own emergent behaviour, self-organisation, and adaptive strategies.

What does this mean for the clinical governance lead? Seeking to purposefully manage such a system will be inherently difficult, as traditional 'top-down controls' are likely to prove ineffectual, since it is not possible to predict with any degree of precision the emergent behaviour in advance (in this case, the community of health care professionals constituting the PCT). The systems tree metaphor therefore directs our attention towards trying to understand the multiplicity of ways in which agents interact at each level. This begs a number of questions for clinical governance leads. What attractor is created at each level in the system? What is the behaviour of each level? How can the lead influence the attractor of the system?

The Stacey diagram

A second insight from complexity that we consider useful to implementing clinical governance is the agreement certainty matrix, as set out by Stacey.¹³ Stacey was interested in how the managers could deploy a range of management approaches

Table 2. Key features of complex adaptive systems for clinical governance.

| Element of complexity | Operating principle | Clinical governance activity |
|---|---|--|
| Establish the attractor | Develop and disseminate an overall strategy describing the direction for clinical governance | Established core values that anchor the system — the community of professionals — to create a platform for progress of clinical governance. Set the clinical governance agenda by advocating a focus on issues of immediate importance; for example, clinical audit and risk management |
| Influence the emergent behaviour | Encourage shared understanding of a global sense of direction, even without total consensus, accepting an 'agree to disagree' position | Recognise that, as clinical governance lead, one is a partisan negotiator, rather than an enforcer. Use the formal position of clinical governance lead to steer the authority of informal negotiations. Relinquish control over detail, negotiate grounds for moving forward generally. Ask for evidence of performance, rather than conformance |
| Recognise the importance of the interaction of agents | Healthy conflict is endemic in an organisation. It is desirable and can be creative and productive. Ask: will the actions of these agents produce behaviour consistent with the agreed attractor? | Think how the various subgroups of agents in your clinical governance system operate. Is this consistent with the agreed attractor, or is there a 'shadow' system operating within another conflicting attractor? An example might be a written policy committing the organisation to public involvement, but no activity on the ground consistent with this aim |

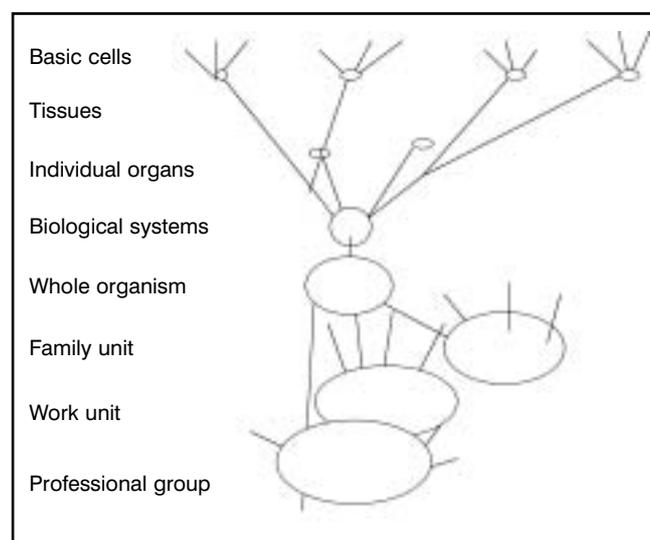


Figure 1. System tree.

and he sought ways of depicting systems in a way that would help managers choose the style of management best suited to the degree of uncertainty in any system. Stacey devised a matrix (Figure 2) to help the system operator (a clinical governance lead) to assess the degree of uncertainty within a given system. Figure 2 shows Stacey's matrix: the vertical axis indicates increasing agreement as one travels down towards the origin (the intersection with the horizontal axis), and the horizontal axis indicates increasing certainty as one moves from right to left and towards the point of theoretical intersection with the agreement axis. The space thus depicted can be seen as a way of representing the dynamic behaviours already referred to previously. Order is situated in the bottom left hand corner of the diagram — the area of rationality and linearity; as we move to the right and upwards, we enter complexity, where there is less agreement and certainty about how the system will proceed; in the top right-hand corner is chaos, the area of greatest dynamic instability and least agreement and certainty.

How does this diagram help us select from a range of management strategies? In Figure 2 we have highlighted a number of locations within the Stacey space. The area highlighted by the diamond indicates an issue where there is considerable

certainty about how outcomes are produced but a lack of consensus about which outcomes are desirable. Political decision making, which is characterised by dialogue and coalition building, fall into this area. The area highlighted by the triangle represents a second area of complexity in which the issues have a high level of agreement but little certainty about how desired outcomes are created. In this situation, it is unwise to rely on a preset plan, as the future is fundamentally uncertain and therefore defies prediction. In this area ideological clarity or dogma may be at a premium. The aim is to head towards an agreed direction of travel without specifying the vehicle to get there. The fourth area, indicated by the star, is termed the area of chaos and anarchy. In this space there is very little certainty or agreement about how a system should operate and therefore traditional methods of planning and performance management are inappropriate. In such a situation there is little alternative but to try and identify patterns of repeating configurations in the hope of pushing the system to a new position where patterns are more certain and predictable.

We think this insight is useful for clinical governance, because it may help the clinical governance lead to decide whether a particular issue can be purposefully managed in a linear and deterministic fashion (the area of rationality in the bottom left-hand corner of the matrix), or requires careful negotiation and dialogue between agents (the complexity area), or merely described (the chaotic area identified by the upper right-hand corner).

Let us now consider some familiar issues involved in implementing clinical governance that might be located in this matrix. For example, the area of rationality highlighted by the circle may represent the process of implementing a National Service Framework. Here, the choice of management techniques is relatively straightforward as there is agreement about the direction of policy (achievement of NSF milestones) and a fair degree of certainty of how to proceed. Similarly, the recent controversy over the combined MMR vaccine is an example of an issue that could be represented by the triangle in Figure 2. Here, there is considerable agreement among stakeholders about where the system should go (towards a situation where children are protected from these infectious diseases), but there is less certainty about how to achieve this. Traditionally the medical profession has relied on hierarchical methods of intervention, which assumes that there is only one way to vac-

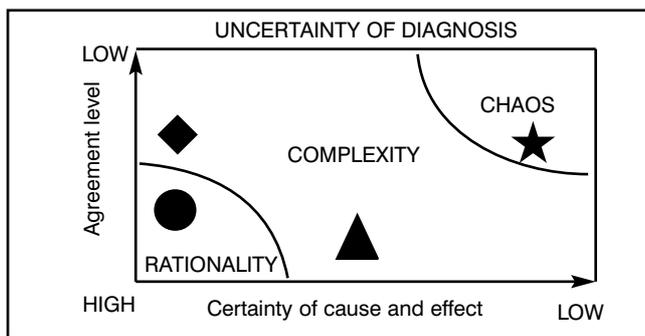


Figure 2. Stacey diagram.

ciate children. But that is likely to prove an unsuccessful management strategy. Complexity theorists often use the phrase 'muddling through' to describe the management strategies that should be used in this situation. This may require a range of negotiating skills and strategic alternatives, ranging from continuing to stress the importance of scientific evidence, offering alternative ways to achieve the vaccinated state, and confirming the societal importance of immunity, while recognising the plurality of views on the subject. In general, this is the area of uncertainty where the healthy partisan conflict we referred to earlier will be found. Think of what the shared attractor is for this issue — in other words, children protected from serious infectious disease — and then plan what range of behaviours might be best suited to achieve that, rather than imposing a single behaviour that will splinter the system.

Finally, policy relating to the contractor professions (dentistry, pharmacy, and optometry) may provide an example of the area of organisational chaos indicated by the star in Figure 2. Such professions have only recently been introduced to the principles of clinical governance and may find it bewildering and alien to their professional ethos and autonomy. In this situation there may be little point in applying the same monitoring parameters on a community of professionals who feel that they are not yet integrated into the system. Tightly crafted plans and monitoring against performance are clearly going to be inappropriate. Further negotiation is called for, to allow time to chart how the system of these professional groups develops and continues to influence the professional groups' behaviour in ways that are compatible with the attractor — in this case, the integration of these professions into the clinical governance agenda.

Summary

Policy experts worldwide are turning to complexity as a way of expanding the array of instruments and tools available for managing quality.¹⁴ In this paper, we have drawn on insights from complexity to show how they may inform the implementation of clinical governance. We acknowledge that relational metaphors, which stress the complex nature of organisational interaction, emergent processes and fundamental uncertainty, makes the future a far more uncomfortable place for managers who labour under the pressures of increased accountability but who lack appropriate levers to deliver the desired outcomes.⁸ A number of theorists are beginning to develop new strategies for this new era of post-normal medicine.¹⁵ For clinical governance leads we argue that such approaches,

although embryonic, offer new opportunities for reframing and addressing hitherto intractable problems.

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