

Chaos Theory and IT Service Management

Journal of the IT Service Management Forum February 2003

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The ideas of chaos theory have been around some time. It was in the 1960s that Edward Lorenz, developing computer simulations of weather discovered that very small changes in an input to a simulation could produce dramatic differences in outcome. Lorenz coined the term, 'butterfly effect'. The flapping of a butterfly's wing produces a tiny change in the state of the atmosphere and, over time, causes a hurricane in Florida.

The ideas of chaos theory, originating in physics and mathematics, have spread to other disciplines, for example, economics and ecology. In management studies, chaos theory has been used to explain the complex dynamics of the supply chain of a personal computer company. More recently, the ideas of chaos theory have been used to suggest approaches to management decision making and to explain the phenomena of strategic management. In this brief article, I'll pick out some of the concepts of chaos theory and suggest how they might help in dealing with the difficult managerial and organisational issues faced in implementing ITIL within organisations.

Chaos theory is about the 'qualitative study of unstable aperiodic behaviour in deterministic nonlinear dynamical systems'. Most organisational behaviour is non-linear systems. Organisations don't operate in easy linear ways. In linear systems, the relationship between an environmental factor and system behaviour may be represented by a straight line: as the presence of an environmental factor increases, so does the change of behaviour in response to it. It's easily predictable - do X and the result will be Y.

In contrast, behaviour in chaotic systems may be perceived as unpredictable. Periods of inactivity may be punctuated by sudden change, apparent patterns of behaviour may disappear and new patterns unexpectedly emerge. It's more a case of do X and A may happen, but not when you might expect. This chaotic behaviour does not indicate a lack of order. Rather, the order is difficult or impossible to describe in simple terms and cannot be broken down into simple relationships.

Nonlinear dynamic systems show complex patterns of behaviour. These patterns are often repeated, but never in exactly the same way. Discerning these patterns, and understanding the lessons that can be learnt from them can be immensely helpful in trying to obtain organisational change.

Initial Conditions

A key idea of chaos theory is that small variations in the initial state of a system have profound effects on the final state of the system. Little changes, which may seem insignificant, can determine the success or failure of an organisational change program. Hence, what we decide at the start of an ITIL project needs to be carefully thought out because the effect of any decision may be amplified. Furthermore, the initial decisions and the initial conditions in the organisation may result in unexpected emergent behaviour.

Initial decisions may include, for example, who's involved in the ITIL project, who sponsors it, and what the attitudes to IT within the organisation are.

Emergent Behaviour

Emergent behaviour is another important idea in chaos theory. The overall behaviour of an organisation emerges as a result of lots of small events. And what emerges may not be easily related in a cause effect chain to the initial conditions. We must be ready for unexpected outcomes of ITIL, some positive, some negative.

Positive Feedback

Small changes in initial conditions have massive effects on the outcome of the project through positive feedback. Negative feedback dampens down changes in a system and returns the system to a stable state. Positive feedback amplifies change and moves the system towards an unstable state. This is the way rumours are spread and reputations made or lost. A small comment on, for example, the value of a service catalogue, or one person's positive experience of using the catalogue, gets amplified to the point where it determines the whole outcome of the project.

Strange attractors

Strange attractors are characteristic patterns of behaviour which organisations exhibit over time. Point attractors, as illustrated by a single pendulum, show stable and repeatable behaviour. Strange attractors are never exactly repeated. While general patterns of behaviour may be discerned, individual patterns always differ as a result of the complexity of the organisation. Repeated criticism of a user interface and failure of attempts to correct the interface or repeated failure to gain acceptance for a particular project may be viewed as strange attractors, patterns of behaviour occurring many times but not in exactly the same form. Recognising these patterns of behaviour is the first step to changing them. But changing them may need a more radical approach. The system must be pushed out of one type of behaviour into another.

Edge of Chaos

The edge of chaos is the point at which the system may shift from one set of strange attractors to another. When the organisation is on the edge of chaos, its behaviour can potentially take one of many directions as it shifts to a new set of behaviour. At this point

there may be wide fluctuations in behaviour. Taking the right decisions will be key to driving the organisational behaviour towards the desired strange attractors.

Lessons from Chaos Theory

Implementing an ITIL project is clearly an exercise in implementing organisational change. Implementing change in an organisational system which is essentially non-linear, unpredictable and uncertain is not an easy matter. Perhaps these concepts from chaos theory provide some issues to think about or at least some questions to ask:

What are the initial conditions in our organisation? What are the attitudes to IT? What managerial prejudices exist? Who has been made available for the ITIL project? What problems with the current IT platforms and current services may impact ITIL implementation? What are the key decisions that need to be made that might have a significant impact on the implementation? In past projects, what were the key decisions which, while seeming insignificant at the time, had a large impact on the outcome of the project? Have we paid sufficient attention to the current conditions in the organisation and the barriers to ITIL implementation that need to be overcome?

What patterns of organisational behaviour exist? Have there been repeated failures to implement organisational change in the past and what strange attractors can be discerned? What choices and actions may be needed to disrupt those patterns of repeated behaviour, to move the organisational behaviour to the edge of chaos and hence to create an opportunity to establish new patterns of repeated behaviour which are more conducive to the successful development of ITIL in the organisation?

What choices concerning organisational change and its implementation have been made in the past? What unexpected behaviour or effects of decision have emerged as a result of these choices? Were the effects good or bad? How did interventions affect the success of other organisational change projects? How can we promote positive feedback and amplify behaviours, views and attitudes which we would like to spread throughout the organisation?

Chaos theory suggests that paying attention to the initial conditions at the start of a project, examining the impact of choices made both at the start of the project and during the project, and considering repeating patterns of behaviour in the organisation may provide useful information to help in the process of managing change whether in the IT services department or the whole organisation.