Applying Principles of Complexity Theory in Practice

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Maybe you are one of those people who like to keep things simple and see complexity as something to be avoided wherever possible. However, it is getting harder to deny that the environment in which we all live and work is becoming increasingly uncertain and unpredictable. The way I see things is that, as we undertake meaningful activities, we use information and knowledge to make sense of the situations we find ourselves in and the problems we face. We then make decisions on what to do and find decision-making gets harder as things get more complicated.

It may seem strange to many of you but I revel in complexity; I like to take a big-picture holistic view of life. I expect the unexpected and know that what I do often has the opposite effect to what I intended. I have had a lot of experience bringing up teenage kids and managing academics! My skill set includes ways not only of dealing with chaos, but turning the complexity of a situation into an advantage. For example, if a responsible set of professional academics want to use different approaches to their work than those mandated by the existing rules, why not relax the rules and not spend so much time and effort insisting they conform. There may be a need to set some basic goals, guidelines and budget constraints, but these can be far less onerous for everyone, produce better outcomes and happier staff.

My area of expertise is Information Systems, a field of research which was formed to study the way that Information Technology can be used to help organisations more efficiently process business transactions and the data associated with them. Initially, information systems were only found in large organisations and automated routine aspects of work. However, that changed with the advent of the personal computer. Further change came in the mid-1990s with the exponential rise of the Internet, which quickly became the world's largest information system, a system of systems.

> *The Internet is the first thing that humanity has built that humanity doesn't understand, the largest experiment in anarchy that we have ever had*
> *."*Eric Schmidt, former CEO of Google.

The Internet, with the convergence of all digital media and easy to use mobile devices, means that we are now dynamically connected with people everywhere. We have instant access to information and applications that enable us to do things we could not imagine even one decade ago. This exciting, dynamic, uncertain and complex environment presents many challenges.

The trend to greater uncertainty and complexity has been accentuated by factors such as globalisation, technological advances, changing political landscapes, shifting balances of power, as well as unpredictable threats of natural and human origin. Having studied complexity for many years I now choose to do my research into these really big challenges that now need our attention. Not every situation or problem is complex, but complex ones need to be identified and no attempt made to simplify them. I believe that keeping things complex can be an advantage if you know how to deal with complexity. I appreciate that, in general, most human enterprises crave order and stability – they do not deal well with complexity. Discovering how to do so is a very useful accomplishment.

In explaining my love of complexity to others I like to start with the following quote:

> *When you make the complicated simple, you make it better, but when you make the complex simple, you make it wrong* (Gray 2009).

I then turn this statement around to define a complex situation or wicked problem as one that is made 'wrong' by simplification.

A complex problem is often referred to as 'wicked' because it is difficult or impossible to solve because of incomplete, contradictory, and changing requirements that are often difficult to recognise. Moreover, because of complex interdependencies, the effort to solve one aspect of a wicked problem may reveal or create other problems. Most wicked problems cannot be resolved by people working on their own. They require the bringing together of groups of people with differing knowledge and skills and with the disposition to respect others who think and do things differently from themselves.

Complexity Theory, as discussed in other chapters of this book, can be used to make sense of complex situations and resolve complex problems, many of which typify contemporary life. Applying Complexity Theory to such challenges in practice involves the following:

- Recognising situations and problems that are complex;
- Identifying the core problem(s) and determining the high-level aims and objectives
- Understanding relevant Complexity Theory principles, particularly, emergence and self-organisation;
- Choosing and applying suitable attractors and setting appropriate boundaries;
- Continually observing and evaluating emergent patterns of behaviours;
- Rewarding and encouraging those patterns of behaviour that show promise;
- Allow 'safe-fail', i.e. do not punish those who try something promising that does not work as intended;
- If appropriate, standardise or systematise any emergent patterns and embed in practice; and,
- Continually iterating the application of attractors and re-evaluations to allow further emergence.

Outside work, most social groups are self-organising and self-directed and their behaviour co-evolves as they interact and adapt. Traditional organisational bureaucracies are not well equipped to deal with complexity in this way. At work, the daily routine is usually well planned. However, workplace processes such as *emergence* and *co-evolution* cannot be planned, but they can be encouraged through the intervention of *attractors* with suitable *boundaries*. An *attractor* may take the form of an incentive, award or the freedom to spend some work time on their own pet project, within the *boundary* of company policies and regulations. These ideas are discussed in more detail in other chapters.

In summary, I seek ways that organisations can meet the challenges of wicked problems using principles from Complexity Theory to develop solutions that are innovative, creative, flexible, agile and adaptable.

References and links

Gray, D2009,'Complicated vs. Complex', <http://communicationnation.blogspot.com/2009/11/complicated-vs-complex.html>.

The Santa Fe Institute <www.santafe.edu/>.

The LSE Complexity Research Programme, <http://www.psych.lse.ac.uk/complexity/>.

Twyfords Consulting, <http://www.twyfords.com.au/>.

Cognitive Edge - Dave Snowden and the Cynefin Sense-making Framework, <http:/cognitive-edge.com/main>.

Some of my work in the area:

Hasan, H 2012, 'Unordered Business Processes, Sustainability and Green IS', in J Van Brocke, Seidal S Recher J (eds), *Green Business Process Management: towards the Sustainable Enterprise*, Springer-Verlag, Berlin, pp. 39-58.

Warne, L, Hasan, H & Linger, H 2008, 'Complex Organizations and Information Systems', E*ncyclopedia of Information Science and Technology*, 2nd edn, M Khosrow-Pour (ed.), IGI Global, Information Science Reference, Hershey.

Smith, S & Hasan, H 2012, 'Increasing Demands on Information Systems and Infrastructures for Complex Decision-Making', in *Proceedings of PACIS2012*, Ho Chi Min City.

Hasan, H, Kazlauskas, A & Crawford, K 2010, 'Blending Complexity and Activity Frameworks for a Broader and Deeper Understanding of IS', in *Proceeding of ICIS*, St Louis, December.

Hasan, H 2006, 'Design as Research: Emergent Complex Activity', *Proceedings of the Australasian Conference of Information Systems,* Adelaide, December

Hasan, H & Crawford, K 2006, 'Innovative Socio-Technical Systems for Complex Decision-making', in IFIP8.3 DSS Conference, London.