Guest editors’ introduction (8.1)

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Introduction

In this special issue, we have drawn upon contributions to the Strategy, Innovation and Change stream of the Complexity Science and Society conference which was held in Liverpool in September 2005. The papers presented covered a wide variety of topics. These included leadership in the public and private sectors, corporate social responsibility, modeling and organizational crisis management, to mention a few. However, innovation proved to be the topic which attracted the most number of papers. The discussions which followed the presentations highlighted the fact that complexity science has a great deal to offer to both academics and practitioners. Therefore we chose ‘complexity and innovation’ as the theme for this special issue. The contributions are addressed to both ‘macro’ (exogenous) environmental and ‘micro’ (endogenous) organizational levels of analysis, and innovation in both the public and private sectors.

In the academic section we present two papers. The first (Carlisle & McMillan) discusses requirements for innovation from the ‘micro’ organizational standpoint. The second (Peltoniemi) offers a more ‘macro’ level discussion in considering how the actions of individual innovating organizations can contribute to nonlinear unpredictable evolutionary development within business ecosystems.

Carlisle and McMillan note that in the rapidly changing environments of the latter part of the 20th century, there was a resurgence of interest in the phenomenon of radical innovation (e.g., Peters, 1999; Hamel, 2000) at the micro level of the firm. The Schumpeterian notion of “creative destruction” (Schumpeter, 1934) is prominent in the literature on radical innovation. It suggests that radical innovations in a competitive sector threaten the market positions of companies that continue to incrementally improve upon old technologies and products. The implication is that the development (or early adoption) of radical innovation is an essential condition for the longer term survival of a company.

At the macro level of the global economy, Halal and Taylor (1999) project that during the 21st century, increasing globalization and deregulation coupled with ever more sophisticated information networks and social disorder, will lead to a new order creation world wide. Conventional analysis in the light of such a scenario would support the Schumpeterian position and advocates for a focus upon radical innovation. For example, the ‘S’ curve (Figure 1) is an established framework in the technological innovation literature.

At time A, a new technology emerges in the market. At first, it performs less well than the existing technology, but the marginal rate at which the performance of the old technology increases soon starts to fall, whereas the marginal rate at which the performance of the new technology increases rises. At time B the performance of the new technology begins to exceed the old technology, a point which is reached very quickly (Golder & Tellis, 1997). The implication is that those who innovate first or adopt quickly will fare better.

Notwithstanding the continued relevance of such an analysis, as Carlisle and McMillan point out, 20th century writers (e.g., Getz & Robinson, 2003) have challenged the tendency to focus attention too exclusively on radical innovation. They question the dichotomization of radical and incremental innovation. These two types of innovation are not alternative options. Both are required for success and survival, sometimes simultaneously. Schumpeterian innovation has been linked to complexity science (e.g., Fuller & Moran, 2000). It has also been linked in the context of far from equilibrium systems at the edge of chaos state. Carlisle and McMillan build on Stacey’s (1995) work to suggest that complex adaptive organizations coevolve with their environments within a ‘zone’ of complexity in which they may need to veer between far from equilibrium ‘edge of chaos’ states and the ‘edge of stability’ to coevolve successfully in their environments. This leads them to challenge the concept of ‘balance’ which has conventionally been used in describing organizational requirements for incremental and radical innovation. Organizations evolving in nonlinear unpredictable environments are likely to require both radical and incremental innovation with different emphases at different times. This will not necessarily be in a ‘balanced’ fashion.

Peltoniemi in some ways provides a complementary analysis at the macro level of business ecosystems in which the notion that
organizations are integral, complex adaptive, organic parts of their environments (Yli-Renko & Autio, 1998) is taken as given. Business ecosystems consist of several companies, each at a certain position within their particular landscapes. Landscapes themselves may also be interlinked such that changes in one can affect others in which competitors, collaborators and complementors exist (Lewin, 1999). Peltoniemi offers a description of the business ecosystem concept which she links to key ideas from complexity science, namely: coevolution, self-organization and emergence.

In the framework she offers, complex organizations are not merely adaptive they are also an active formative force for changes in their environments. Her framework begins to offer an appreciation of some of the ways in which the actions of individual organizations contribute to the nonlinear, non-deterministic and often unpredictable futures of business ecosystems. One of the emphases made is that the key to emergence is the link between macro and micro behavior. This is an important point in the light of work which suggests that innovation outcomes often emerge from network relationships (Powell, et al., 1996). These include external networks to which organizations belong. Innovation is often emergent from interactions which extend beyond the boundaries of one individual firm which itself is a part of a web of socio organizational relationships. The literature on innovation and networks (see, e.g., Soh & Roberts, 2003; Pittaway, et al., 2004) is indicative of the need for a better appreciation of network dynamics, a need which a focus on business ecosystems from a complexity standpoint may help to address.

Our practitioner section consists of three papers which mirror those in the academic section in that the first two are addressed to specific innovation issues at the micro level of the organization while the third considers at a more ‘macro’ level networks of ‘communities of practice’ responsible for innovations in the Dutch polder. This is a public policy arena in which spatial planning, water management and nature preservation are all crucial interests and networks of stakeholders participate in management.

In the first practitioner section paper, Van der Walt is concerned with knowledge innovation which can be considered to be an essential adaptive process in complex dynamic environments. The resource-based view of strategy established knowledge as a central resource in innovation (e.g., Grant, 1996, 1997). Sanchez (1997) categorized knowledge into three categories: description (know-what), explanation (know-why) and design (know-how) (Cool, et al., 2002). Know-how, or practical knowledge about products, processes and markets, which is gained from experience, is considered to be a key success factor in stable markets. When markets are stable, product cycles are long, process technology has been incrementally improved to the point of near perfection, and technical progress is steady and its directions largely predictable. In dynamic environments these conditions no longer apply and this type of knowledge is of limited relevance. It may secure short term performance, but success in the longer term requires an adaptive process of continual re-orientation towards new market challenges and changing circumstances. ‘Know-what’ becomes more significant. Van der Walt introduces and builds upon the ‘Cynefin’ framework (Kurz & Snowden, 2003) and cites a case study in which the ideas presented in the paper were successfully used to develop new organizational capabilities suited to a complex environment. In conjunction with this framework she offers some discussion of the problem of what perspectives to develop in new knowledge creation (i.e., know-what).

The second practitioner paper draws upon work done by Webb, Lettice and Lemon who set out to develop a range of tools based upon complexity principles to facilitate sensemaking, learning and innovation in organizations. They have called their range of tools “The Complexity Starter Kit.” The starter kit has been developed and tested in a number of practical sensemaking situations. In this paper, the authors aim to present “a set of tools to help initiate, and begin to facilitate, learning about complexity science in a way that will enable individuals in the context of innovation to understand their work and interactions with others by means of it.” The processes in which starter kit users engage are briefly described, linked to the problem of innovation and contextualized in the context of learning theory.

The final paper in the section has a public sector focus and adopts a coevolutionary systemic perspective on innovation. It presents case study findings of how communities of practice in the Dutch polder coevolved with their dynamic environment at the edge of chaos and offers insights based upon empirical study. The authors, Van Buuren and Edelenbos, have located their paper in relation to Mittleton-Kelly’s (2003) distinction between endogenous (within entity) and exogenous (between entity) coevolution. Their focus is exogenous (in common with that of Peltoniemi in the academic section). The importance of networks to innovation has already been noted, and in this respect the paper aims to make an empirical contribution to our understanding. It is also of relevance to policy analysis. In the public sector, complexity science is leading to important changes as evidenced in a recent special edition of this journal (E:CO 7.1, 2005). Their exogenous empirical study of communities of practice in the policy arena should provide interesting insights to practitioners. It also lends some evidential support to the conjectures of Dennard, Richardson and Morçöl, guest editors of the “Complexity and Policy Analysis” special edition noted above, that complexity may be the new “code word” for “the dynamic emergent system of relationships that characterizes both public and private sectors” (Dennard, et al., 2005: v). Irrespective of sector, innovation and change involves networks and communities of practice which are constantly changing and adapting to circumstances (Steiner & Greenwood, 2000; Koch, 2003) and as we have already noted, these dynamics are not yet well understood.

The selected contributions are indicative of the importance of complexity thinking and principles in both the micro (endogenous) and macro (exogenous) spheres of innovation and coevolutionary change. Gareth Morgan, quoted by Picard (1996), comments that “innovation emerges… you cannot create innovation by having a good innovation programme.” The implication is that innovation is an emergent property, emerging from a complex network of interactions and that radical innovation in particular emerges from unsettled times. If innovation is understood in this way, complexity science may hold the key to our appreciation
of the process of successful innovation, especially in turbulent environments.
References


