Feature

Complex Acts of Knowing: Paradox and Descriptive Self-Awareness

by Dave Snowden

Dave Snowden is director of IBM's newly created Centre for Action Research in Organisational Complexity (CAROC) and was formerly a Director of IBM's Institute for Knowledge. He is a fellow of the Information Systems Research Unit at Warwick University. He can be contacted via e-mail at snowded@uk.ibm.com

Editor's Note: This article has been extracted and condensed from one that first appeared in the *Journal of Knowledge Management*, v. 6, no2 (May 2002), p. 100-111. A copy of the original article also appears on the Cynefin website (http://www-1.ibm.com/services/cynefin/). The *Bulletin* wishes to thank Emerald (publisher of the *Journal*) and the author for permission to publish this version.

The contention of this paper is that we are entering a third age in the management of knowledge. Further, that the conceptual changes required for both academics and management are substantial, effectively bounding or restricting over a hundred years of management science in a way similar to the bounding of Newtonian science by the discoveries and conceptual insights of quantum mechanics. These changes are not incremental, but require a phase shift in thinking that appears problematic, but once made reveals a new simplicity without the simplistic and formulaic solutions of too much practice in this domain.

The First Age: Information for Decision Support

The first age, prior to 1995, sees knowledge being managed, but the focus is on the appropriate structuring and flow of information to decision makers and the computerization of major business applications leading to a revolution dominated by the perceived efficiencies of process reengineering. For many, reengineering was carried out with missionary enthusiasm as managers and consultants rode roughshod across pre-existing "primitive" cultures with positive intent that too frequently degenerated into rape and pillage. By the mid- to late-90s disillusionment was creeping in. Organizations were starting to recognize that they might have achieved efficiencies at the cost of effectiveness and laid off people with experience or natural talents vital to the operation of which they had been unaware. The failure to recognize the value of knowledge gained through experience, through traditional forms of knowledge transfer such as apprentice schemes and the collective nature of much knowledge, was such that even the word *knowledge* became problematic.

1995: The Transition to the Second Age

To all intents and purposes knowledge management started circa 1995 with the popularization of the SECI model (Nonaka & Takeuchi, 1995) with its focus on the movement of knowledge between tacit and explicit states through the four processes of socialization, externalization, combination and internalization. An irony is that Nonaka and Takeuchi were only seeking to contrast a claimed Japanese tradition of "Oneness" with a rational, analytical and Cartesian western tradition. Their work derived in the main from the study of innovation in manufacturing processes where tacit knowledge is rendered explicit *to the degree necessary to enable that process to take place*; it did not follow that all of the knowledge in the designers heads and conversations had, should or could have been made explicit. In partial contrast, early knowledge programs attempted to disembody all knowledge from its possessors to make it an organizational asset. Nonaka attempted to restate his more holistic and dialectical view of tacit and explicit knowledge (Nonaka & Konno 1998), but

by this time the simple two by two of the SECI model was too well established to be restored to its original intent.

The Paradoxical Nature of Knowledge

Some of the basic concepts underpinning knowledge management are now being challenged: "Knowledge is not a 'thing,' or a system, but an ephemeral, active process of relating. If one takes this view then no one, let alone a corporation, can own knowledge. Knowledge itself cannot be stored, nor can intellectual capital be measured, and certainly neither of them can be managed." (Stacy 2001).

Stacy summarizes many of the deficiencies of mainstream thinking and is one of a growing group of authors who base their ideas in the science of complex adaptive systems. That new understanding does not require abandonment of much of which has been valuable, but it does involve a recognition that most knowledge management has been content management. In the third generation we grow beyond managing knowledge as a *thing* to managing knowledge as a *flow* and *thing*, which requires focusing more on context and narrative than on content.

The question of the manageability of knowledge is not just an academic one. Organizations have increasingly discovered that the tacit and explicit distinction tends to focus on the *container*, rather than *the thing contained* (Snowden, 2000). Three heuristics illustrate the change in thinking required to manage knowledge:

- Knowledge can only be volunteered; it cannot be conscripted.
- We can always know more than we can tell, and we will always tell more than we can write down.
- We only know what we know when we need to know it; that is human knowledge is deeply contextual – it is triggered by circumstance.

The three heuristics partially support Stacy's view of knowledge as an active process of relating. However, it does not follow that we have to abandon second-generation practice, but we must recognize its limitations. We can encompass both Stacy and Nonaka if we embrace knowledge as both a *thing* and a *flow*. In the second age we looked for things and in consequence found things; in the third age we look for both in different ways and must therefore embrace the consequent paradox.

Context: The Dimension of Abstraction

The issue of content and context, which runs through all three heuristics, is key to understanding the nature of knowledge transfer. At the highest level of abstraction, in a context where I share knowledge with myself, there is a minor cost; I may keep notes but no one else has to read them. At the other extreme if I want to share with everyone the cost becomes infinite, as the audience not only needs to share the same language, but also the same education, experience, values, etc.

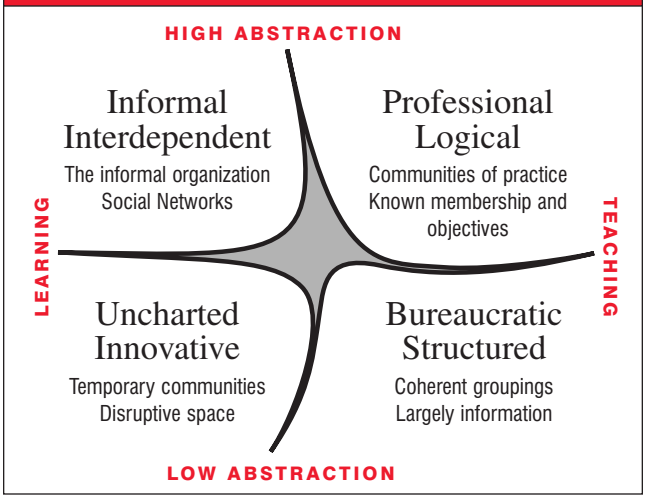
Context: The Dimension of Culture

Abstraction is one dimension of context; the other is culture. The term *culture* is used both to describe socio-cultural systems, which are artifactual and knowable, and ideational systems, which are systems of shared ideas, rules and meanings that underlie and are expressed in the way that humans live (Keesing & Strathern, 1998). Both cultures are key to the flow of knowledge within an organization. We need to transfer to new members, in both society and the organization, knowledge that has been painfully created at cost over previous generations.

Cynefin: Diversity over Time and Space

The dimensions of abstraction and culture create the sense-making model, shown below in Figure 1.

Figure 1. Cynefin: Common *Sense* Making



Cynefin (pronounced kun-ev'in) is a Welsh word with no direct equivalent in English. As a noun it is translated as *habitat*, as an adjective *acquainted* or *familiar*, but dictionary definitions fail to do it justice. It links a community into its shared history – or histories – in a way that paradoxically both limits the perception of that community while enabling an instinctive and intuitive ability to adapt to conditions of profound uncertainty. In general, if a community is not physically, temporally and spiritually rooted, then it is alienated from its environment and will focus on survival rather than creativity and collaboration. In such conditions, knowledge hoarding will predominate and the community will close itself to the external world. If the alienation becomes extreme, the community may even turn in on itself, atomizing into an incoherent babble of competing self interests. Critically it emphasizes that we never start from a zero base when we design a knowledge system, all players in that system come with the baggage, positive and negative derived from multiple histories.

Cynefin creates four open spaces or domains of knowledge, all of which have validity within different contexts. They are domains, not quadrants, as they create boundaries within a center of focus, but they do not pretend to fully encompass all possibilities.

Bureaucratic/Structured: Teaching, Low Abstraction. This is the formal organization, the realm of company policy, procedures and controls. It is a training environment. Its language is known, explicit and open. It is the legitimate domain of the corporate intranet and its shared context is the lowest common denominator of its target audience's shared context.

Professional/Logical: Teaching, High Abstraction. Commonly professional individuals, who through defined training programs, acquire a specialist terminology; codified in textbooks. The high level of abstraction is teachable given the necessary time, intelligence and opportunity. This is one of the most important domains as knowledge communication is at its most efficient due to the high level of abstraction; in second generation thinking this is the domain of communities of practice.

Informal/Interdependent: Learning, High Abstraction. In this domain we have the abstraction of shared experiences, values and beliefs. This is the domain of the shadow or informal organization, that complex network of obligations, experiences and mutual commitments without which an organization could not survive. Trust in this domain is a naturally occurring phenomenon as all collaboration is voluntary in nature. In some primitive societies the symbols are stories, often unique to a particular family who train their children to act as human repositories of complex stories that contain the wisdom of the tribe. The ability to convey high levels of complexity through story lies in the highly abstract nature of the symbol associations in the observer's mind when s/he hears the story. It triggers ideas, concepts, values and beliefs at an emotional and intellectual level simultaneously. A critical mass of such anecdotal material from a cohesive community can be used to identify and codify simple rules and values that underlie the reality of that organization's culture (Snowden, 1999). At its simplest manifestation this can be a coded reference to past experience. "You're doing a Margi" may be praise or blame – without context the phrase is meaningless, with context a dense set of experiences is communicated in a simple form.

Uncharted/Innovative: Learning, Low Abstraction. We now reach a domain in which we have neither the experience nor the expertise because the situation is new, the ultimate learning environment. The organization will tend to look at such problems through the filters of past experience. But here we can act to create context to enable action through individuals or communities who have either developed specific understanding or who are comfortable in conditions of extreme uncertainty. Such individuals or communities impose patterns on chaos to make it both comprehensible and manageable.

The Third Age: Complicated, Complex and Chaotic

The above description of the Cynefin common-sense making model relates to its use in the context of communities. It is based on an understanding of the distinctiveness of three different types of system – complicated, complex and chaotic, best understood through two distinctions.

Complex vs. Complicated. An aircraft is a *complicated* system; all of its thousands of components are knowable, definable and capable of being catalogued as are all of the relationships between and among those components, while human systems are *complex*. A complex system comprises many interacting agents, an agent being anything that has identity. We all exist in many identities in our personal and work lives. As we move among identities, we observe different rules, rituals and procedures unconsciously. In a complex system, the components and their interactions are changing and can never be quite pinned down. The system is irreducible. Cause and effect cannot be separated because they are intimately intertwined (Juarrero 1999).

Two examples make this clearer:

- When a rumor of reorganization surfaces: the complex human system starts to mutate and change in unknowable ways; new patterns form in anticipation of the event. If you walk up to an aircraft with a box of tools in your hand, nothing changes.
- Another feature of a complex system is *retrospective coherence* in which the current state of affairs always makes logical sense, but only when we look backwards. The current pattern is logical, but is only one of many patterns that could have formed, any one of which would be equally logical.

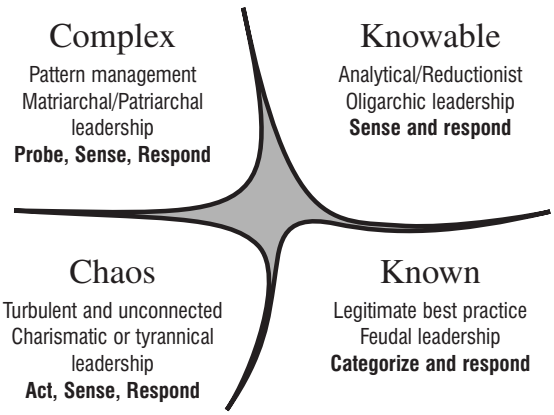
Scientific management served well in the revolutions of total quality management and business process re-engineering and continues to be applicable in the domain of the complicated; however, just as Newtonian physics was bounded by the understandings of quantum mechanics, so scientific management has been bounded by the need to manage knowledge and learning.

Complex vs. Chaotic. A complex system comprises many interacting identities in which, while I cannot distinguish cause and effect relationships, I can identify and influence patterns of interactivity. With a chaotic system all connections have broken down and we are in a state of turbulence. In a complex domain we manage to recognize, disrupt, reinforce and seed the emergence of patterns; we allow the interaction of identities to create coherence and meaning. In a chaotic domain no such patterns are possible unless we intervene to impose them; they will not emerge through the interaction of agents.

System States and the Cynefin Model

The three types of system map on to the Cynefin model, with a separation of complicated systems into those in which we know all of the cause and effect relationships and those

Figure 2. Cynefin: Decision making



that are knowable if we had the resource, capability and time (Figure 2). Each of the domains contains a different model of community behavior; each requires a different form of management and a different leadership style.

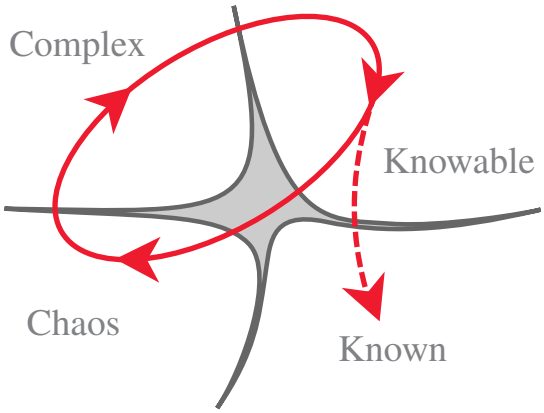
Known space is the only legitimate domain of best practice. Within known limits we can both predict and prescribe behavior. Humans, acting collectively, can make systems that might otherwise be complex or chaotic into known systems; we impose order through laws and practices that have sufficient universal acceptance to create predictable environments. On the negative side, the imposed structure can continue beyond its useful life. In this domain we categorize incoming stimuli, and once categorized we respond in accordance with predefined procedures. Leadership tends to a feudal model, with budget having replaced land as the controlling mechanism.

Knowable space is the domain of good practice. We do not yet know all the linkages, but they can be discovered. This is the domain of experts, whose expertise enables us to manage by delegation without the need for categorization. Again there is a human imposition of order but it is more fluid than in the space of the known. A major issue in the space of the knowable is entrainment of thinking. The very thing that enables expertise to develop, namely the codification of expert language, leads inevitably to entrainment of thinking. Exhortations to remain open to new ideas are unlikely to succeed. Management of this space requires the cyclical disruption of perceived wisdom. The common context of expertise is both an enabler and blocker to knowledge creation, and from time to time context must be removed to allow the emergence of new meaning. In this space we sense and respond based on our expert understanding of the situation while the leadership models are oligarchic – requiring consent of the elders of the community and interestingly oligarchies are often less innovative than the idiosyncrasies of feudalism.

The nature of the complex domain is the management of patterns. We need to identify the early signs of a pattern forming and disrupt those we find undesirable while stabilizing those we want. If we are really clever then we seed the space to encourage the formation of patterns that we can control. These patterns are emergent properties of the interactions of the various agents. By increasing information flow, variety and connectiveness either singly or in combination we can break down existing patterns and create the conditions under which new patterns will emerge, although the nature of emergence is not predictable. Entrepreneurs manage in this space instinctively while large organizations find it more uncomfortable. In this domain leadership cannot be imposed, it is emergent based on natural authority and respect but it is not democratic, it is matriarchal or patriarchal.

Chaos represents the consequence of excessive structure or massive change, both of which can cause linkages to sunder. As such it is a space that requires crisis management and is not comfortable or entered with any enthusiasm by other than the insane. However it is one of the most useful spaces, and one that needs to be actively managed. It provides a means by which entrainment of thinking can be disrupted by breaking down the assumptions on which expertise is based. It is also a space into which most management teams and all knowledge programs will be precipitated; however, regular immersion in a controlled way can immunize the organization and create patterns of behavior that will pay dividends when markets create those conditions. We also need to remember that what to one organization is chaotic, to another is complex or knowable. In the chaotic domain the most important thing is to act, then we can sense and respond. Leadership in this domain is about power – either tyranny or charisma. Both models impose order, and if order is imposed without loss of control, then the new space is capable of being used to advantage.

Figure 3. Cynefin: Knowledge Flows



The Knowledge Spiral and Cynefin

The Cynefin model allows us to see knowledge as both *thing* and *flow*, and this allows us to continue to use the insights and practices of scientific management, while embracing the new learnings and insights from the new sciences of complexity and chaos. Cynefin focuses on creating the conditions for the emergence of meaning. In its two *complicated* domains – known and knowable – these conditions are rationalist and reductionist, and the SECI model works. In the *complex* and *chaotic* domains new science and new approaches are required. The range of possible flows within the Cynefin model across its various boundary transformations is large, but here we will look at an idealized model of knowledge flow involving three key boundary transitions: the just-in-time transfer of knowledge from informal to formal, the disruption of entrained thinking and the creation and stimulation of informal communities. These transitions are shown in Figure 3.

Just-in-Time Knowledge Management: From *Complex* to *Knowable*

Like manufacturing before just-in-time (JIT) inventory management was introduced, second-generation knowledge management tries to anticipate demand. In the third generation we create ecologies in which the informal communities of the *complex* domain can self-organize and self-manage their knowledge in such a way as to permit that knowledge to transfer to the formal, *knowable* domain on a JIT basis.

The sheer number of informal and semi-formal communities within an organization is too great to permit formal management. The informal, complex space also contains much knowledge that never needs to be an organizational asset; the issue is that even if we knew what we know, we cannot distinguish in advance what we need to know as an organization, and critically when we need to know it. Techniques for the informal-formal JIT transfer include:

- Flagging by subject matter. To take an example from the author's own experience, during the early stage of pioneering work on narrative techniques for knowledge disclosure a private collaboration space was created within IBM's network, but not as a part of a formal community of practice. This contained a record of significant mistakes and associated learning that would only be shared in a small trusted community. The subject matter was flagged in the formal community under the more colloquial label of "organizational story telling." When story telling became fashionable, e-mail volume increased to a painful level. At this point a document answering the most frequently answered questions was written in self-defense. The socialization pressure of the ecology forced the voluntary codification of knowledge and provided the context that allowed the production of material at an appropriate level of abstraction.
- Expertise location systems replace the second-generation technique of yellow pages making connections between people and communities. One example, "Tacit" will trawl e-mail records to identify where expertise lies, but allow the individual knowledge holder to determine if his or her expertise is to be public, which has many advantages in building context and trust.
- We can use the complex domain as a means of creating communities in the formal space. *Clustering* is the identification of like-minded or like interested individuals within the organization, who already form the nucleus of a community. Such clusters will have already worked out the upper and lower levels of acceptable abstraction and will have sufficient shared context to create a sustainable, low cost formal community. *Swarming* is used where no naturally occurring cluster can be found, either to create a cluster or make one visible. Swarming involves creating the equivalent of a bright light and seeing what comes to it – a Web discussion group, evening lecture series, an open competition. Only if we cannot either find a cluster or a swarm do we build a formal community with all the associated costs of creating something from scratch.

Organizations need to realize the degree of their dependence on informal networks. The danger is of chronic self-deception in the formal organization, partly reinforced by the camouflage behavior of individuals in conforming to the pseudo-rational models. A mature organization will recognize that such informal networks are a major competitive advantage and while ensuring scalability through automated process and formal constructions will leave room for the informal communities to operate.

Disruption: From *Knowable* to *Chaotic*

The second key transition is to provide cyclical disruption of the entrained thinking in expert communities. Perspective shift, when necessary, is not easy to achieve and needs to be handled with care if operational efficiency is to be maintained. However there are various techniques that do work, such as taking deep experts in one field and linking them with experts in a radically different field, which will challenge their assumptions. Often it is sufficient to take only the leadership of a community into a chaotic environment. The ritual is important – humans manage boundary transitions through rituals that create awareness of the transition, but equally awareness of the new roles, responsibility and social mores associated with the new space. If the disruption is cyclical and expected, then we are closer to a learning ecology, and we have also to some degree immunized the group in respect of involuntary moves into the chaotic space.

Creating New Identities and Interactions: From *Chaotic* to *Complex*

We use the domain of chaos to disrupt in advance of need, in order to break down inappropriate or overly restrictive mod-

els, combined with constrained starvation, pressure and access to new concepts and ideas. As a result we create radically new capability within the ecology, which will both transform the *knowable* domain of experts and stimulate the creation of new networks, communities and trust/experience relationships, while new alliances and relationships form from the creative stimulus of chaos.

The chaotic space is not of itself the only source of natural communities; new people join the organization, existing projects create new informal communities and trusted links; the normal day to day interaction of human agents is a constant source of new communities. Chaos is particularly productive, but is not the only source.

The Natural Flow of Knowledge

We can now see the sensible pattern of flow of knowledge within an organization. Communities form naturally in the complex domain and as a result of activity both voluntary and involuntary within the domain of chaos. JIT techniques allow us to use the complex domain to create through a process of formalization, more natural and sustainable communities in the *knowable* domain. We can also commence operations here, but the cost will be high. A limited amount of codified knowledge can be fully separated from its owners and transferred to the best practice domain, that of the *known*. On a cyclical basis we disrupt the assumptions and models of the *knowable* domain of experts allowing new meaning to emerge. From this perspective we see knowledge as flowing between different states, with different rules, expectations and methods of management. We do not have to choose between views and approaches, but we bound those approaches to their appropriate domains. The Cynefin model allows the creation of multiple contexts.

Conclusion

We are reaching the end of the second generation of knowledge management, with its focus on tacit-explicit knowledge conversion. Triggered by the SECI model of Nonaka, it replaced a first generation focus on timely information provision for decision support and in support of business process re-engineering. Like re-engineering it has substantially failed to deliver on its promised benefits.

The third generation requires the clear separation of context, narrative and content management and challenges the orthodoxy of scientific management. Complex adaptive systems theory has been used to create a sense-making model that utilizes self-organizing capabilities of the informal communities and identifies a natural flow model of knowledge creation, disruption and utilization. Knowledge is seen paradoxically, as both a thing and a flow requiring diverse management approaches.

In the new, "complexity informed" but not "complexity constrained" third generation, content, narrative and context management provide a radical synthesis of the concepts and practices of both first and second generation. By enabling descriptive self-awareness within an organization, rather than imposing a pseudo-analytic model of best practice, it provides a new simplicity, without being simplistic, enabling the emergence of new meaning through the interaction of the formal and the formal in a complex ecology of knowledge.

Additional Acknowledgements

Some parts of this paper were originally published in the conference proceedings of KMAC at the University of Aston, July 2000. The idea of "knowledge" becoming a problematic concept comes from J C. Spender.

The views expressed in this paper are those of the author and are not intended to represent the views of either IBM or IBM's Institute for Knowledge Management.

The Cynefin Centre

Membership of the Cynefin Centre, which focuses on action research in organizational complexity, is open to individuals and to organizations. It focuses on high-participation action research projects seeking new insights into the nature of organizations and markets using models derived from sciences that recognize the inherent uncertainties of systems comprising interacting agents. The basis of all center programs is to look at any issue from multiple new perspectives and to facilitate problem solving through multiple interactions among program participants. Programs run on a national, international and regional basis and range from investigation of seemingly impossible or intractable problems to pragmatic early entry into new methods and tools such as narrative databases, social network stimulation and asymmetric threat response.

References

Juarrero, A (1999). *Dynamics in action: Intentional behaviour as a complex system.* Cambridge, MA: MIT Press.

Keesing, R. & Strathern, A. (1998). *Cultural anthropology: A contemporary perspective*. Orlando, FL: Harcourt Brace.

Nonaka, I. & Konno, N. (1998). The concept of "Ba": Building a foundation for knowledge creation. *California Management Review*, *40*(3), 40-54.

Nonaka, I. & Takeuchi, H. (1995). *The Knowledge-creating company.* London: Oxford University Press.

Snowden, D. (1999). The paradox of story. *Scenario and Strategy Planning, 1* (5).

Snowden, D. (2000). Organic knowledge management: Part I The ASHEN model: An enabler of action. *Knowledge Management, 3* (7), 14-17.

Stacey, R. D. (2001). *Complex responsive processes in organizations: Learning and knowledge creation.* New York: Routledge.