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2000

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Abstract

This paper continues the tradition (Courtney et al. 1996, 1997, 1998, 1999) of using the principles of inquiring systems design (Churchman, 1971) to suggest how effective learning organizations might be developed. Specifically, the paper proposes that Hegelian inquiring systems are well suited for "wicked" problems and knowledge work, and therefore that Hegelian inquiring organizations are well suited for the wicked environments of the new world of business (Malhotra, 1997, 2000). In addition, the paper shows how extant information technologies can support Hegelian inquiring organizations.

Introduction

Courtney et al. (1996, 1997, 1998, 1999) provide a new perspective on learning organizations by viewing them as inquiring systems or systems whose actions create knowledge. The Churchmanian inquiring models (1971) are interpreted in the language of the design of learning organizations, which are referred to as "inquiring organizations."

Within the context of inquiring organizations, Malhotra (1997, 2000) defines today's organizational environments as increasingly more "wicked," and suggests the need for consideration of Hegelian models that can provide an organization or organizational unit(s) with multiple, diverse, and contradictory interpretations of data. Today a growing number of researchers agree that organizations must form a new appreciation for increasingly dynamic, discontinuous environments.

This paper continues a theme of adapting Churchman's models of inquiring systems by exploring the Hegelian model as it relates to inquiring organizations. This paper contains the following sections: Hegelian inquiring systems (HIS); wicked problems, knowledge work & HIS; toward wicked learning; diverse, contradictory interpretations; IT support; and summary.

Hegelian Inquiring Systems (HIS)

Hegelian inquiring systems are based on dialectic, a participative process meant to dissolve conflicts rather than to find compromises. Suppose X, Y, and Z represent three purposeful individuals or groups; X and Y represent diametrically opposed thesis and antithesis concerning the issue, and Z is the third person or group, who observes a debate between X and Y. X and Y's views are characterized as Weltanschauungen (worldviews or a set of models). Both X and Y argue their views with the same data set. The data only take on meaning through the model; the data itself have no meaning. This means the data become transformed into conclusions through operations. The purpose of the data is not to settle issues, but rather to surface the intense differences in background assumptions and interpretations between two (or more, in our view) divergent positions.

Observing the debate allows Z to form a synthetic view of the issue. The debate is not over conclusions but over the Weltanschauungen. The Weltanschauungen constitute the basis of a world-view, an image of reality, a belief-system, or a theory from which conclusions can be derived or inferred. Churchman (1971) asserts that in Hegel, the antithesis is not the contradiction of the thesis, but rather its "deadliest enemy" (p. 172), whose instantiation can be found clearly in politics. When the thesis is a plan (underlying assumption), the antithesis is a counterplan (Mason and Mitroff, 1981). The synthesis is a new and expanded worldview (Weltanshauung). Thus, it is something over and above the pure combination of the opposites. Churchman describes it as a "bigger mind" (p. 174).

The inputs into the dialectic are complex and consist of the common data set plus the opposing assumptions (views) that characterize the deeply held positions of the two proponents. The operator in the system is the decision-maker or observer of the debate. The observer must adopt one of the two pure positions (sets of assumptions) or form a new position through synthesis or some other process as a result of witnessing the debate (Mitroff and Linstone, 1993).

The guarantor of this system is intense conflict. In fact, conflict is a fact of life. Ideally, the two adversarial views (assumptions) have no overlap (Mitroff, 1974). It is hoped that as a result of witnessing an intense, explicit debate between two polar positions the observer will be in a much stronger position to know the assumptions of the two adversaries and thus clarify his or her own assumptions (Mtroff and Linstone, 1993). It is likely that

the observer or decision-maker will be in a stronger position to form his or her own position on a key issue. Mitroff (1971, p. B-634) states that in the dialectical inquirer, "disagreement is no longer the necessary mark of subjectivity, but rather a necessary component of the process leading toward objectivity."

Wicked Problems, Knowledge Work, & HIS

Mason and Mitroff (1973, p. 482) note that Hegelian inquiring systems seem to be best suited for what Rittel and Webber call "wicked" (highly ill-structured) problems (1973).

Wicked Problems and the Dialectic

Some important features of wicked problems are:

- There is no definitive formulation of a wicked problem.
- Wicked problems have no stopping rule.
- Solutions to a wicked problem are not true-or-false, but good-or-bad.
- There is no immediate and no ultimate test of a solution to a wicked problem.
- Every solution to a wicked problem is a "one-shot" operation.
- Wicked problems have no single solution - there may be no solution.
- Every wicked problem is essentially unique.
- Every wicked problem can be considered to be a symptom of another problem – wicked problems are highly interconnected with other wicked problems.
- The existence of a discrepancy can be explained in numerous ways.
- The planner has no right to be wrong.

Mason and Mitroff (1981) also identified characteristics of wicked problems found in strategic planning and policy making. These characteristics include interconnectedness, complicatedness, uncertainty, ambiguity, conflict and social constraints. Wicked problems are accompanied by conflict of interest among individuals and teams. Wicked problems are intimately connected to each other. Therefore there is no one single solution that can satisfy a wicked problem because it must also satisfy all other wicked problems. Most importantly wicked problems exist, not in a stable and predictable environment, but in a dynamic, complex and unpredictable situation. Wicked problems require multiple interpretations since there is no knowable "correct" answer. To Ackoff (1999b) real organizational problems are wicked, and may be regarded as "messes". Messes interact with each other and thus cannot be understood independently from other messes. They must be understood as highly complex, ill-structured systems with strongly interacting components.

A number of researchers (e.g., Rittel and Webber, 1973; Buckingham Shum, 1996a, 1996b, 1997; Gordon and Karacapilidis, 1997; Mason and Mitroff, 1981) suggest dialectics, argumentation and negotiation as dealing with wicked problems. Ackoff (1999b) notes that effective management of "messes" requires dissolving, not solving or resolving problems.

Knowledge Work as a Wicked Problem

We argue that knowledge work involves wicked problems. Many researchers distinguish knowledge work from service work or procedural work. Knowledge work produces and reproduces information and knowledge (Schultze, 1999). Even though it is difficult to define the concept of knowledge work we may agree that the object of knowledge work is abstract and ill-defined rather than concrete and well-defined.

Buckingham Shum (1996a, 1997) believes that knowledge work and wicked problems have similar properties, which are described as follows:

- Knowledge work is team work and is dominated by negotiation and argumentation.
- The space of knowledge work is unstable and thus goals, constrains and solutions must be open to change.
- Knowledge work is interdisciplinary so that multiple assumptions and interpretations are inevitable.
- Knowledge work leads to cross-functional teams and flatter organizational structures.

We argue that knowledge work exists, not due to tame problems, but due to wicked problems. That is one of the reasons we can find knowledge workers in the areas where examples of Hegelian inquiry can be found such as strategic planning, policy formulation, system design and analysis, competitive intelligence, legal issues and collective bargaining. Thus we propose that many knowledge problems can be addressed with the Hegelian conflictual approach, and that ideal knowledge workers should possess the characteristics of the Hegelian "synthesist" (Kienholz, 1999). The synthesist asks "why not" (Kienholz, 1999) and "so what" (Churchman, p. 174), seeks conflict and synthesis, and sees likenesses in things looking unalike.

We conclude then, that Hegelian inquiring systems may be well suitable for wicked problems and knowledge work and that it may be fruitful to deploy Hegelian inquiring systems within an organization.

Toward Wicked Learning

The Hegelian synthesis, based on intrinsic motivation for change, is the epitome of generative learning (Courtney et al., 1996). In dynamic and uncertain environments, organizational learning becomes more and more complex.

Thus many researchers believe that learning organizations need double-loop learning (Argyris and Schon, 1978; 1996), generative learning (Senge, 1990), higher-level learning (Fiol and Lyles, 1985), and strategic learning (Mason, 1993). Double-loop learning occurs when underlying assumptions, norms, and objectives are open to debate and change (Argyris and Schon, 1978). Mason (1993, p. 843) defines strategic learning as "the process by which an organization makes sense of its environment in ways that broaden the range of objectives it can pursue or the range of resources and actions available to it for processing these objectives." To Ackoff (1999a) learning how to learn and adapt is double-loop learning. Generative learning requires new ways of looking at the world (Senge, 1990). It emphasizes continuous experimentation and feedback in an ongoing examination of the way of organizations. Underlying assumptions and governing variables cannot be effectively questioned without another set against which to measure them. In other words, generative learning always requires an opposition of ideas (the dialectic) for comparison.

We argue that the more dynamic and uncertain organizational environments are, the more complex and radical organizational learning becomes. In this sense organizational learning seems to be "wicked." We view single loop learning as tame learning and double loop or generative learning as wicked learning. Tame learning seeks incremental change. In contrast wicked learning seeks radical change. Therefore wicked learning is suitable for today's wicked environments, characterized not only by rapid, but discontinuous change (Nadler et al., 1995). Consequently wicked learning results in a major change in strategic direction. Knowledge created in Hegelian inquiring organizations may result in an entirely new strategic direction for the organization (Courtney et al., 1996).

Knowledge that Hegelian inquiring organizations deal with and create tends to be tacit, episodic, idiosyncratic and abstract rather than explicit, semantic, communal and concrete. Thus, it is short-term, dynamic and unsanctioned. Hegelian knowledge must be dynamic because it exists in an environment of rapid change. It is unsanctioned because it may not be based on consensus. These aspects of Hegelian knowledge increase the importance of "unlearning" and selective "forgetting" the past. Wicked learning involves unlearning and forgetting.

Unlearning implies discarding obsolete and misleading knowledge (Hedberg, 1981). Unlearning does not mean "not learning". It actually means more genuine "learning" through discarding obsolete and misleading knowledge. Huber (1991) believes that unlearning provides a chance for new organizational learning to take place. Also dialogue offers a path for successful "unlearning" (Fulmer, 1998). Forgetting is a process of deleting old knowledge and outdated assumptions from organizational memory. The process of forgetting keeps organizational memory updated. "Selective" forgetting can decrease irrelevant information and increase relevant information in organizational memory.

DeGeus (1988) believes that the ability to learn faster than competitors is the only competitive advantage. Without "appropriate" unlearning and "selective" forgetting, learning in Hegelian inquiring organizations becomes slower and organizational memory suffers from lack of relevant information and overabundance of irrelevant information. Consequently slow learning will result in organizations losing their competitive edge.

Diverse, Contradictory Interpretations

The existence of different views of the world is a natural phenomenon. People have different mental models and different experiences that influence their understanding of reality. By seeing explicitly two or more positions operating on the same data set, we have the opportunity to witness systematically the background assumptions that the proponents of different positions bring with them to convert data to information and knowledge. Huber (1991, p. 90) notes that "because such development changes the range of the organization's potential behaviors", the more varied interpretations that are available, the more learning occurs. The greater the degree of uncertainty, the greater the need for more varied interpretations.

For more interpretations, thus, the role of the leader is that of teacher who brings to the surface people's mental models of important issues and encourages members to develop their inquiry skills (Senge, 1990). Mental models are ingrained assumptions that tell us why two people may interpret and react differently to the same event (Kienholz, 1999). Hegelian inquiring organizations must not follow the adherence of the organization's view of "how things are done here" or current practices. Instead such ways and practices must be reexamined and reassessed from multiple perspectives for their alignment with changing environments.

Senge states that one reason many of the best ideas in organizations never get into practice is that new insights conflict with the existing mental models. Therefore Hegelian inquiring organizations need a knowledge-sharing, open culture that encourages people to surface their underlying assumptions and to develop diverse, contradictory perspectives. Courtney (1999) notes that as perspectives are developed, insight is gained and the mental models are updated. Further, as learning occurs

and new knowledge is created, more intellectual solutions are available to the organization.

Churchman (1971) points out that knowledge resides in the user. It is not computers but human beings that provide multiple, diverse interpretations. Thus Hegelian inquiring organizations require much greater involvement of human imagination and creativity than other inquiring organizations in order to facilitate multiple, contradictory interpretations of the data. Without them there is no intense conflict, no synthesis and no progress.

IT Support for Hegelian Organizations

Information systems for supporting the Hegelian model have been the concern of both Mitroff and Mason. Mason (1969) introduced the Hegelian approach to strategic planning. Mitroff (1971) develops a mathematical model of the Hegelian Dialectical Inquirer using Bayesian probability theory and Ackoff's Behavioral Theory of Communication. Nelson and Mitroff (1974) introduced an experiment concerned with the investigation of presentation formats for Dialectic Information Systems (DIS) that generate information for a decision maker by means of intense conflict between proponents of two radically opposing positions, theories, points of view, etc. Mason (1981) introduced systemic information systems whose purpose is to expose assumptions or views-of-the-world so that they may be examined and reconsidered. In addition, Hodges' Dialectron (1991) is a prototype system to manage the dialogue necessary to generate synthesis.

Visual tools are extremely useful in helping to see the processes and interactions within complex systems such as Hegelian inquiring organizations. For example, cognitive mapping is a technique for representing peoples' perceptions about their environment. These perceptions are caught graphically in the form of a diagram that shows concepts and relationships between concepts (Sheetz et al., 1994). This "mental map" represents their mental model that explains perceptions of the world. Cognitive maps are valuable tools for making thinking visible and they are very effective in working with groups to discover all the members' perceptions. The role of cognitive maps goes beyond the representation of thinking and learning of an individual. Cause maps can be developed for groups and organizations by aggregating maps of individuals, by direct group mapping, and by inference from documentary evidence that relates to an organization (Eden, 1992)

In general cognitive mapping techniques consist of three major phases: Eliciting concepts, refining concepts, and identifying assertions (Sheetz et al., 1994).

There are a variety of computer tools that have been developed for cognitive mapping and illustration of feedback loops (e.g., Belvedere developed by Learning Research and Development Center, University of Pittsburgh, COPE software [Sheetz et al., 1994], Decision Explorer by Scolari Software).

Some information systems have been designed to support argumentation and negotiation in groups using several different information technologies and techniques such as hypertext, Internet technology, multimedia and artificial intelligence. These systems help produce free debates and encourage dialogue in groups. Ideally they provide more multiple, diverse perspectives on the focal information and thus group members find the differences among mental models of members. Finally the group comes up with a new, expanded solution to the problem.

For example, Rittel (1970) developed the IBIS (Issue-Based Information Systems) notation to encourage debates among members by raising new issues. IBIS starts with a Question. The response to the Question is one or more Ideas. An Argument is an opinion about the Ideas. Based on Rittel's work, Conklin and Begeman (1988) designed the gIBIS hypertext system to facilitate a team conducting debates by building a graphical argumentation structure. The gIBIS is a hypertext prototype of IBIS.

CMSI (Corporate Memory System, Inc.) (1993) developed a commercial collaborative hypermedia system "QuestMap." QuestMap is a hypertext groupware system. In this system, rationale and debates are stored as audio, video, report, spreadsheets, and more. Hypermedia integrates all different forms of artifacts together. This kind of system not only facilitates open debates about wicked problems, but also makes it easy to capture the debates so that they are available to support future decisions.

In the field of Human-Computer Interaction there is ongoing research about an argumentation-based design rationale. Different argumentation-based decision rationale notations have been suggested. DRL (Decision Representation Language) and the QOC scheme (Questions, Options and Criteria) are examples (Buckingham Shum, 1996a, 1996b). The heart of the DRL is Alternatives, Claims, and Questions. The DRL allows participants to explore Alternatives, back up them by Claims, and argue through Questions and counter-Claims (Buckingham Shum, 1996a). The QOC scheme is very similar to IBIS. The QOC starts with Questions. Options are alternative answers to the Questions. Criteria are used to assess the relative superiority of options (Buckingham Shum, 1996b).

There also is ongoing research on negotiation support systems (NSS) (See Jarke et al., 1996) to support, formalize, and help visualize heterogeneous viewpoints. Different systems and dialectical, structured languages to support argumentation and negotiation have also been developed. For example, ARBAS (Action-Resource Based Argumentation Support) was developed to provide a computer-based platform for exchange of dialectical arguments between parties involved in a negotiated situation (Bodart et al., 1997).

Among available information technologies, hypermedia may be ideal for capturing knowledge that is hard to formalize and for linking ideas raised by team members (Buckingham Shum, 1996a). Multimedia databases and advanced case based reasoning techniques may be helpful for storing and retrieving dynamic and unsanctioned knowledge gained in Hegelian inquiring organizations. Multimedia databases store knowledge in the smallest semantic forms and in the largest semantically ambiguous components (such as voice recording, concept maps, and images), and use the fixed components for retrieval (Tuomi, 1995). Further combining multiple technologies, such as video-conferencing systems, multimedia communication and multimedia databases, may offer the opportunity to produce more "stories", capture them with their "drama" and emotion", and make them assessable by organizational members, thus leading to more effective debates.

Summary

In summary, we have argued that:

- Organizations today face many wicked problems and wicked environments.
- Wicked problems and wicked environments require multiple, diverse and contradictory interpretations of data and reality;
- These problems and environments require wicked learning (double loop learning, strategic learning, generative learning and higher level learning).
- The Hegelian model is well suited for wicked learning environments.
- Information technology to support cognitive mapping, negotiation and argumentation may be helpful in creating and capturing diverse, contradictory interpretations of data, leading to more effective forms of wicked learning.

We thus believe that organizations should consider an Hegelian approach to problem solving and relevant information technology to support the dialect approach.

Acknowledgements

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