Sensemaking about technological change

by employees at a remote branch campus

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by

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Lantry Vaughan, August 2004

"The folly of mistaking a paradox for a discovery, a metaphor for a proof, a torrent of verbiage for a spring of capital truths, and oneself for an oracle, is inborn in us."

Paul Valery

Contents

Abstract

Following Weber and Manning's (2001) demonstration of the Self-Q interviewing technique, this explanatory case study sought to confirm the validity of that technique for exploring the sensemaking of employees around impending technological change. Using Weick's (1979) Organizing Theory, the study further sought to explore the processes through which individual employees begin to make sense of impending technological shifts, both individually and as a collective. The case was framed at a remote branch campus of a community college in Northern Alberta, and the technology under consideration was the Alberta Supernet Project, which is expected to have considerable impact on the operation of the campus. Weick emphasizes the role of the individual employee in the process of organizational adaptation to environmental change. Each employee will construct a cognitive schema in an attempt to make sense of the ongoing, continuous stream of events which makes up his or her working reality. At the same time, as employees at different organizational strata interact and exchange ideas, they will influence each others' individual schemata and begin to construct a collective scheme as an organization. Would a case study such as this be able to capture the individual and collective beginnings of sensemaking about an organizational change that had not yet occurred?

Weber and Manning (2001) carried out an early trial of Bougon's Self-Q technique (1983) to examine a planned, mandated organizational change (implementation of Total Quality Management) in a traditionally-structured hierarchy over a six-month period. Using the data obtained with this method to construct cognitive maps for individuals in the organization, they claimed a high degree of content validity, and offered an integrated model of sensemaking during organizational change. They stressed the need for further studies to expand on the use of

the technique and to substantiate relationships proposed in their model. They also speculated on whether such factors as individual characteristics, hierarchical level and organizational culture would restrict or alter sensemaking processes in other organizations.

This study sought to further explore the work of Weber and Manning in the setting of a remote branch campus of a community college. Five employees at the campus were interviewed concerning their perceptions about the Alberta Supernet, using the Self-Q interviewing technique. These interviews resulted in a series of individual cognitive statements about the new technology which proved to fall into three emergent categories similar to those discovered by Weber and Manning - *Self, Other,* and *Technology*. Subsequently the statements were combined into an aggregate cognitive grid, which revealed content clusters relating both to the importance of individual items and to the degree of personal influence felt by the subjects. The aggregate map shows that of the three statement categories, front-line individuals felt they had most influence over *Self* statements, less over the *Other* statements, and least of all over *Technology* statements. The supervisor's grid, on the other hand, showed different characteristics.

To summarize, results would suggest that technology is an important but remote factor in the working lives of the subjects, while perceived individual influence on potential organizational change is seen as localized to individual issues. Results also suggest that characteristics of a management position, such as enhanced access to information, may distinguish cognitive frameworks from those of front-line staff.

introduction

studying organizations

The study of organizations is a continually evolving arena of inquiry. Organizations have been continually reinventing themselves based on the latest available research, beginning with Samuel Taylor's time-and-motion studies around the turn of the last century. Taylor's task analysis studies of factory workers led to the first great modern management paradigm, which was later called Scientific Management (Daft, 2001). From early mechanical models derived from the factory floor, concepts of organizations have shifted to reflect the times in which they existed. Organizations have been compared to armies, factories, towers, electronic systems, tribes, organisms, power structures and many other metaphorical concepts which have sprung from the minds of those who live in and study them.

One shift in the study of organizations has been to increasingly focus on individual employees, for several schools of thought have come to emphasize the important role of the individual in the successful organization. For example, much has been written about where the real value, or capital, lies within an organization. Capital was traditionally defined in strictly economic terms as the tangible assets held by an organization in the form of money, land, buildings and equipment. But now theorists are coming to understand the importance of what has become known as *intellectual* capital (Stewart, 2003). Experts like Stewart state that the true value in organizations lies in what individual employees know, for that is the source of competitive advantage and corporate survival. One of the greatest challenges facing organizations today is how to capture the tacit knowledge held 'between the ears' of their employees so that it may be

shared with others, codified and retained. Thus information and knowledge management have become not only buzzwords but strategic issues for managers and academicians.

As the pace of business and modern life seems endlessly to accelerate, another issue for organizations is the necessity of adapting to constant change, as market trends sweep around the globe at the speed of mass communication. So in addition to the relatively new field of knowledge management, change management is seen as another essential process for the modern organization to master if it is to survive. But organizations, according to theorists such as Karl Weick (1979), are not armies of automatics which can turn on a dime *en masse;* they are collections of individual employees who must each come to terms with change as they are able.

Weick states that employees are constantly engaged in organizing and communicating to deal with new, equivocal information until it is understood and accommodated within their realms of operation. He further asserts that the communication acts and interacts carried out by employees as they come to terms with incoming equivocal information result in cycles and processes, which themselves constitute an organization. (Weick, 1979, p. 91) Employee sensemaking, then, is a crucial phenomenon for the organization to understand if it is to survive. In fact, according to Weick, sensemaking *is* the organization and so is of fundamental importance. But, since sensemaking occurs one individual at a time, does it always happen in the same way? Do different individuals ‘make sense’ in different ways? What effects do position in the corporate hierarchy, length of employment, authority and access to information have on the sensemaking process? And how might it be possible to ‘make sense’ of the sensemaking process itself?

approaches to research

One problem with this exploration is that there are historically differing opinions about how best to find the answers to questions such as these. The academic disciplines involved in such a quest can span the range of faculties, from anthropology, psychology and sociology to business and organizational theory. Another area of much discussion is the relative value of quantitative vs. qualitative research methodologies, and their respective emphases on statistical/numerical vs. descriptive/ethnographic approaches to seeking answers to research questions. Researchers in the positivist tradition (derived from the natural sciences) will insist that 'hard' data derived from experimentation is the only trustworthy, replicable and scientific form of information. Others who value methods based on traditions of sociology or ethnography may insist that subtle and complex processes such as individual sensemaking can only be illuminated by understanding derived from lengthy interviews and field work which provide us with rich and "thick" descriptive evidence (Neuman, 2003). This interpretive approach looks for answers by observing people in their natural settings to try to understand how 'real world' situations unfold. Other, not necessarily exclusive, approaches to methodology (and philosophy) may be found among devotees of feminist, Marxist and postmodern schools of research, to name a few.

adopting a research stance

In fact, the boundary between quantitative and qualitative approaches seems over time to have become less and less like a wall and more and more like a permeable border crossing. The relativism of modern physics and postmodern uncertainty about the very nature of reality, among other phenomena, are blurring many boundaries which formerly were thought to be fixed, definable and certain. Along with a growing acceptance of the validity of qualitative social

research (Denzin and Lincoln, 1998), practices employed by qualitative researchers seem increasingly to include more rigorous bounding mechanisms, such as case study frameworks, and improved data-gathering techniques such as Bougon's. With techniques such as these, results may not be exactly replicable in the traditional positivist sense, yet approaches to research can be more uniform and consistent. Thus, rather than being an either/or proposition, the quantitative-qualitative spectrum seems to be viewed with more frequency as a well-equipped workshop with an expanding complement of tools for analysis and research.

defining a personal research stance

My engagement with this research stems from a number of factors. First, I am interested in the Alberta Supernet project. As Project Manager for an Industry-Canada funded public Internet access project in another area of the province, I had first-hand experience of the impact of high-speed Internet connections on small organizations. I found that agencies which acquired high-speed Internet, and appropriate training in its use, tended to thrive as they were able to offer an enhanced array of resources to their clients as well as vastly improved communication for the agency itself. As an instructor in the remote branch campus which is the locus for this study, I had been frustrated by our slow, unreliable Internet connection and felt that the Supernet would benefit our campus and its students in a similar fashion. The campus has a small library, no access to cable or satellite television, and a limited number of textbooks, so high-speed Internet could make an enormous difference to the resources which we could offer to our students. Although the campus has a computer network and a computer lab, the infrastructure is a patchwork of ageing hardware and software components, which is more or less neglected by the small, overworked IT staff at the main campus, an hour away by air. This situation is emblematic

of the nature of our isolation, whose physical origin leads to a mental distancing both here and at the central campus. We are not only ‘out of sight, out of mind’, our situation is so different as to be incomprehensible to one who has not traveled to our location. It has historically been difficult for our campus to appear on the ‘radar screen’ of staff at the main campus. Thus Supernet will not only benefit us directly, it will also help to demand attention from the main campus, as our network infrastructure will have to be upgraded to accommodate the new service. In a community whose residents will be stuck with dialup Internet for the foreseeable future, the appearance of high-speed Internet facilities at our campus could also prove to be a powerful draw for community members and potential students, which the campus needs to attract in order to survive. Finally, I am interested in the technical aspects of Supernet, whose installation in our community is challenging enough to have warranted an article on the IEEE (Institute of Electrical and Electronics Engineers) website because of the unique technical problems which must be overcome. It is possible, because of distance and technical difficulty, that our community will be the last in the province to receive Supernet. The juxtaposition of a high-speed, high-tech network and an isolated, largely Aboriginal community where many people still run traplines in the winter and earn their living by fishing in the summer creates, for me, some fascinating and resonant vibes.

As one who has used, earned a living from, and taught, computers and software for more than twenty years, I also have a general interest in computer technology and its effects on people. I have been an early adopter of technology, and feel that I am a competent user who is aware of its potential. My expectations about Supernet are based on my past experience, my general attitude towards computer technology, and the uses I expect to make of it. My colleagues, however,

come from a diversity of backgrounds and experiences. Some are advanced computer users and some are not; some use the Internet as a class resource and some do not. What do they feel about the impending arrival of Supernet? In what ways are they making sense of this impending shift in technology, as individuals and as teachers? These, I felt, were questions worth exploring.

Finally, many organizational studies (Isabella (2000), Weick (1979, 1995) have posited differences in attitude between individuals at different strata within organizations (i.e., management vs. front-line staff). Weber and Manning (2001), for example, noted that differences in individual cognitive map content may be influenced by position level in the organization (p.235). The subjects of their study were twenty-eight individuals (out of a total of ninety-one) from three levels in that organization's hierarchy (top management, supervisory, and first-level employee) (p. 231). How would these findings translate to the setting of our branch campus? I wondered how – or if – these findings would translate to a small, remote branch campus with nine employees. Although the total number of employees at the college is three hundred and seven, the distance and location of our campus give it a unique identity which is recognized throughout the organization. As a distinct unit of one of the five program areas at the college, the campus operates autonomously within departmental and college guidelines, and annually enrolls more students in its main program areas than are enrolled at the main campus in those programs. The Chair, therefore, enjoys a relative free hand in the conduct of the campus' day-to-day operations. Senior executives from main campus visit one or two times during the fall and winter terms but are otherwise not present in person. The Chair travels to the main campus for meetings two or three times per month, and so has access to information on a regular basis; all other communication is by fax, telephone, or Intranet (when it is running). Besides the Chair

there are five instructors, an office manager who also functions as the librarian, and two other support staff, for a total of nine. Due to the Chair's easygoing and collaborative manner, the feeling at the campus is collegial and relaxed. Most of the time all of the staff work as equals on a team, and are very supportive of each other. The fact that staff belong to different bargaining groups sometimes leads to friction, but these threads of dissent are usually well below the surface of daily life. The Chair teaches five classes per week, which serves to further blur hierarchical boundaries within the unit. Given the flat, isolated and apparently cohesive nature of the campus, would any evidence emerge to support the claims of earlier studies about the distinctiveness of cognitive schemes at different hierarchical levels? Would branch offices, branch campuses or other organizational subunits fit previous organizational theories, or might they emerge as unique entities? These organizational issues were fascinating in their own right; together with questions of technology, sensemaking and research methodology, they formed an irresistible combination of interest, opportunity and exploration.

complementarity of research

Most of the early studies about broadband were done by governments and telecommunications companies, and were quantitative in nature[1]. While these studies were necessary and useful, there still remained a void for me when trying to understand how summary data would translate into a realistic picture of remote northern communities, some of which have populations of less than 100. I was interested, therefore, in exploring the detail that might result from a qualitative study obtained through interviewing residents of a remote community. I felt that this would augment the quantitative studies done previously by providing a more detailed picture of the

[1] See for example *Report of the National Broadband Task Force*

social realities constructed by individuals in a particular setting. The two approaches might, when viewed together, provide a more complete sense of technology in the north than either one in isolation. Thus I found myself squarely in the ranks of researchers who subscribe the validity of qualitative social science methods which provide rich details and individual contextual perspectives on technological issues.

As a constructivist researcher, therefore, I believe that our reality is socially constructed by individuals and their peers as they continually bring into play Weick's communication model of enactments. The more I lived in, and pondered, the technological event horizon of Supernet's arrival in my community and branch campus, the more appropriate Weick's (1979) theoretical approach seemed for the case I was considering. Would I find evidence of enactments, double interacts, and the other communication events documented by Weick, or was it too early in the stream of events for this to occur, since Supernet was not scheduled for installation until the late summer of 2004? What evidence might appear of the college as an open or closed system within its environment, in Weick's terms? Would this research produce any new information about the unique situation of a semi-autonomous organizational subunit, such as the branch campus under consideration, both in its host community and in its relations with the parent college? Finally, in what ways would this research refute, confirm or build on previous work by Weber and Manning (2001) which involved individual responses to organizational change?

Having arrived at a topic of interest, a location, a philosophical stance of inquiry and a theoretical approach which seems engaging and fruitful, what remains is to define the research question, and the methodology with which to explore the answers.

Problem and Research Question

problem statement

Following Weber and Manning's (2001) demonstration of the Self-Q interviewing technique, this explanatory case study sought to confirm the validity of that technique for exploring the sensemaking of employees around impending technological change. Using Weick's (1979) Organizing Theory, the study further sought to explore the processes through which individual employees begin to make sense of impending technological shifts, both individually and as a collective. Weick emphasizes the role of the individual employee in the process of organizational adaptation to environmental change. According to Weick (1995), each employee will construct a cognitive schema in an attempt to make sense of the ongoing, continuous stream of events which makes up his or her working reality. At the same time, as employees at different organizational strata interact and exchange ideas, they will influence each others' individual schemata and begin to construct a collective scheme as an organization. Would a case study such as this be able to capture the individual and collective beginnings of sensemaking about an organizational change that had not yet occurred?

Weber and Manning (2001) carried out an early trial of Bougon's Self-Q technique (1983) to examine a planned, mandated organizational change (implementation of Total Quality Management) in a traditionally-structured hierarchy over a six-month period. Using the data obtained with this method to construct cognitive maps for individuals in the organization, they claimed a high degree of content validity, and offered an integrated model of sensemaking during organizational change. They stressed the need for further studies to expand on the use of

the technique and to substantiate relationships proposed in their model. They also speculated on whether such factors as individual characteristics, hierarchical level and organizational culture would restrict or alter sensemaking processes in other organizations. This study sought to refute, confirm or build on the work of Weber and Manning through a case study in the setting of a remote branch campus of a community college. Using a theoretical framework established by Weick (1979, 1995) involving individual and collective sensemaking by individual employees within organizations, the study sought to answer the following questions:

research question

1) Would Bougon's (1997) Self-Q interview technique prove, as claimed by Weber and Manning, to be a valid and robust means of gathering data for qualitative studies involving individual sensemaking and organizational change?
2) Would the Self-Q technique produce common categories, or themes, among employee statements, as had occurred in Weber and Manning's study?
3) Following Weber and Manning's predictions, would supervisory employees produce different results than front-line staff? Could evidence be found of differences based on gender, tenure or other factors?
4) Would a study carried out prior to a publicized organizational change event produce evidence of employee sensemaking activity, or provide information about the threshold of such activity?

Literature Review

organizational studies

Karl Weick's important work *The Social Psychology of Organizing* (1979) has been seen by some of his contemporaries as the genesis of a new paradigm in social and organizational research[2]. In the past, intellectual paradigms have been characterized as armies warring before the ramparts of truth and scientific knowledge. Yet the march of organizational studies, especially in the past several decades, has become more eclectic in nature, as researchers have tended to focus on adding to the range of available tools, rather than spending their time rejecting specific ideas which are seen as no longer applicable in our post-mechanistic age. The western canon of organizational theory began with Taylor's Scientific Management theory, an outgrowth of the post- Industrial Revolution factory system which, according to Guillèn (1994), was followed by two more major organizational system paradigms.

The post-World War II era saw an economy which had grown enormously complex as a result of the massive production efforts generated by war needs. One response to the increasing complexity faced by workers and management was the Human Relations paradigm, which saw the organization as a social system depending on leadership and communication, as opposed to the simple hierarchical authority system of Scientific Management. Still later, when product diversity and multinational growth became dominant, Structural Analysis sought to deal with the problems of productivity, control and adaptability. Guillèn (1994) notes that these paradigms were not adopted at the same rate throughout the world; different political/economic systems and cultures meant that not all post-industrial ideas took root to the same degree throughout the globe. As well, the growth of new ideas did not mean abandonment of the old, as many instances

[2] See, for instance, Magala (1997).

of Scientific Management and Human Relations can be seen to exist contemporaneously with Structural Analysis. Later iterations of management practice, such as Lean Production, Quality Control Circles (QCC), and Total Quality Management (TQM), are seen less as cyclic reiterations of the earlier management models and more as eclectic adaptations of specific desired features. As Weick would no doubt agree, the closer to our present day events occur, the less capable of analysis they seem to be. Total Quality Management, for instance, is seen by Guillèn (p. 80) as borrowing elements from all three of the earlier schemes, with an emphasis on shared responsibility and worker participation in driving quality and productivity. The implementation of TQM in an organization was the setting for Weber and Manning's (2001) work on employee sensemaking during a planned organizational change. But what, exactly, is sensemaking? This deceptively simple term seems intuitive, yet stems from complex and fundamental elements of the human condition, as we navigate the sometimes stormy waters of life both individually and in groups.

It is worth noting that all of the above approaches to organizations are management-based, seeking to optimize production and establish control systems over workers, whether through the forces of authority, monetary incentives, structural manipulation or an emphasis on responsibility and common goals. This is still an important factor in organization theory today, for as Stern and Barley (1994) point out, research which can be applied by management often means both increased access to organizations for research, and improved possibilities for funding, for researchers. There are, however, other approaches to organizational research, including those which seek to explore organizations as social systems in which webs of meaning are constantly negotiated among the participants.

Karl Weick

The fact that we continually use the term *organization* to describe our workplaces seems to suggest that they are organized and static; yet no organization is truly the same from day to day. It seems that organizing is an activity or process, rather than a fixed state, since all individuals and groups operate in an endlessly changing environment which produces the raw material of organizing. So if organizing is what organizations continually do, just how does that activity come about? The answer, harkening back to this paper's introduction, must lie in an organization's employees rather than in its buildings, brands and equipment; it is the individuals in an organization who hold the knowledge and energy to move the organization in the direction of its stated goals. The effect of all these individual actions, which move through cycles of interlocked behaviors, says Weick (1979, p. 113), is to create processes of understanding which in turn constitute the organization itself. In the course of the stages of *enactment, selection* and *retention*, individuals in groups are continually organizing to make sense of new and equivocal environmental conditions through acts of communication. These cycles, says Weick, are what constitute organizations (p. 112) as processes of continual organizing around equivocal information.

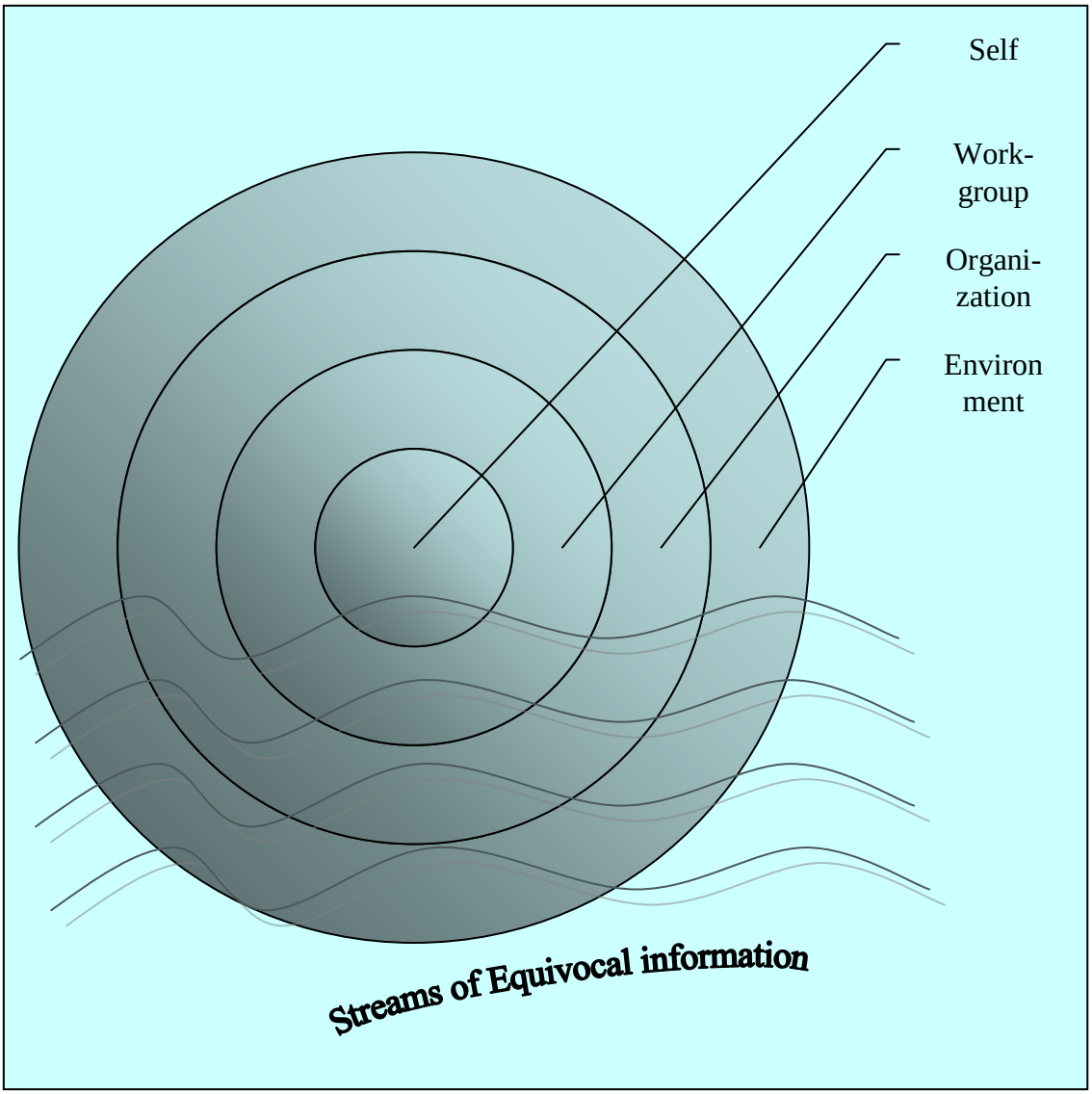

Figure 1 – the Self and the Environment

As *Figure 1* suggests, we and our organizations exist in a constant stream of changing and contradictory information. The nature of equivocality is not lack of information, but information which has many possible interpretations among which to choose. In order to deal with this constant stream, individuals must perform what Weick calls *enactments*, or interactions with the environment, in order to isolate segments of this raw material for further consideration. What has happened at this stage is that we have engaged with information which has caught our attention.

This usually means that we have encountered something we perceive either as an opportunity or a threat, about which we must make some interpretive decision. For something to appear on our radar screen, it must be important to us in some way, for we routinely ignore vast amounts of inconsequential equivocal data. This data also must appear novel enough that it does not readily fit into our existing personal schemata, or organizational standard operating procedures; otherwise it would fit into existing processing cycles and require little of our attention. As Weick says about 'ecological change' in general, ". . . people normally are not aware of things that run smoothly." (p. 130). It is tempting, therefore, to label these intellectual intruders 'problems'; but the truth about significant change is that it can be either, or both, bad or good, threat or opportunity. These events are equivocal precisely because we can't decide (and can't yet know) which they are.

Once we have become aware of new and equivocal information in our environment we may move on to the second stage, which Weick terms *selection* (p. 130). At this point we may sift through our existing schemes of interpretation to see if any of them come near to dealing with the new information. This process is described by Weick as that of working to convert raw data into information which can become intelligible to us, as we begin to separate the 'figure from the ground' of background noise (p. 114). This, in essence, involves beginning to decide what the new thing is, and is not. One aspect of this stage is often the construction (or re-construction) of individual cognitive maps, which can serve to re-order our view of the world in light of this new and equivocal information. A large part of this 'trying out' process is usually social in nature, as individuals may try ideas out on their colleagues, receive feedback, and then possibly modify or restate their positions. Weick identifies this process as a cyclical series of *acts, interacts* and

double interacts (p. 89). We have seen that the mere process of noticing environmental change involves the act of engaging with our environment, of becoming aware that things are not as they were. Individuals also *act* by communicating with other individuals. When one individual receives information from another, s/he will respond in one of several ways, producing what Weick labels an *interact* (p. 89). When the originator responds to that feedback by modifying the original communication, a *double interact* is formed, which Hollander and Willis (1967) (quoted by Weick, p. 89) claim is the building block of interpersonal influence. This pattern of interactions occurs again and again in human discourse, throughout organizations and society in general. These sets of interacts, in Weick's view, form processes, which are the essential building blocks of organizations.

At some stage, then, this process of sensemaking is very much a social process, involving communication between individuals and groups. The final stage in the sensemaking process, *retention*, is simply the storage of successful pattern-matching or sensemaking, which in turn forms our newly-built *enacted environment* (p. 131). Weick, I believe, calls it thus because by engaging with our environment we have imposed our own sense of order upon it. "Believing is seeing", to Weick, means that we will see what we are prepared to see after having lived the enactment-selection-retention cycle one or more times (p. 165).

Weick seems to take some delight in questioning our fundamental notions about the nature of self, other, the environment, and reality itself. We may assume that our environment is external, flows implacably around us, is concrete and knowable. Weick argues, however, that we construct our own cognitive maps and then impose them on the environment (p. 165). Interestingly, this

does not seem to matter, because any form of action is preferable to inaction, the future is unknowable in any case, and sensemaking is a retrospective activity. Further, accuracy does not seem to be required for purposeful action. A schema, cognitive map or plan of action need not be accurate, it only needs plausibility. In *Sensemaking in Organizations* (1995), Weick offers a telling example of a Hungarian Army unit wandering in the Swiss Alps in bad weather (p. 55). The unit, lost in a blizzard in unfamiliar terrain for two days, gave itself up for lost until it located a map of the area. Calmed and encouraged, the unit managed to find its way back to the main unit, to the relief of everyone. When the commanding officer later examined the map in question he discovered it was a map not of the Alps, but the Pyrenees. The value of the map, Weick suggests, is that it energized the group and enabled action, which allowed it to work together to a meaningful outcome. The plausibility of the map, not its accuracy, enabled the group to make sense of its situation and take action to survive. Our *enacted environment*, upon which we have imposed our own sense of things, is the result of action, not merely thinking; otherwise, suggests Weick, the proper descriptive term would be "enthinkment" (p. 168).

The messy, retrospective and cyclical nature of human understanding, imperfect though it is, nevertheless serves as a motivator for action, which is necessary to understand any situation. The paralyzing nature of equivocality lies in the overwhelming number of possible interpretations it contains. Weick seems to suggest that picking a map – any map – and beginning to act is at the heart of successful interaction with our environment. As human beings and employees, we may have any number of maps in our repertoire of coping mechanisms, of which we may be entirely unaware, until an ecological change forces us to revisit established relationships in order to accommodate new information. So maps are convenient tools, which provide us with a

framework in which to extract and make sense of new information. Weick (1995, p. 110) makes clear that the frame, while important, is only one of the necessary elements to sensemaking: "A cue in a frame is what makes sense, not the cue alone or the frame alone." The frame provides what I consider a workspace for *selection*, so the mental act of placing a cue in a frame is *enactment*; moving the cue around in the frame to see where it best fits is *selection*. The resultant new framework is the *retention* of the sensemaking activity; an output. Weick's formula is *cue* + *relation* + *frame* (past moment plus connection plus present moment) (p. 110).

Remembering the Hungarian soldiers in the Alps, we are cautioned repeatedly not to take these maps too seriously as artifacts. Our frames of reference all come with powerful filters deriving from our beliefs and values. We are reminded that maps can be traps as well as tools, and that the words with which we paint meanings on things only ". . . approximate the territory; they never map it perfectly." (1995, p. 107). So we will take the soldiers with us when we visit our subjects' cognitive maps, to remind us to take what they will readily give us, and not demand more.

historical roots of sensemaking

Although, in *Sensemaking in Organizations* (1995, pp. 64-69) he discusses the historical roots of sensemaking, Weick cautions that "In the case of sensemaking . . . these roots are sufficiently diverse, recent, discipline specific and contested that any attempt at conventional representation of history could be misleading." He goes on to say that history and tradition are less important to jazz musicians and organizational theorists than recent examples of one's skill, and goes on to list fifty-five individuals and works spanning more than a hundred years, from philosopher and psychologist William James (1890/1950), who wrote that "selectivity is an essential character of

consciousness" (paraphrased on page 65), to his own famous study of the Mann Gulch Disaster (disintegrating role structures inhibit sensemaking) from 1993, and finally Elsbach (1994), who studied the behavior of spokespersons for the cattle industry (showing that individuals can influence organizational behavior). This diverse, sprawling list suggests that the very eclecticism which I claimed as a virtue for the modern researcher in organizational studies may also work against the notion that a well-formulated canon of work exists in a single field of inquiry. Weick comments as follows:

> There is no such thing as a theory of organizations that is characteristic of the sensemaking paradigm. Nevertheless, there are ways to talk about organizations that allow sensemaking to be a central activity in the construction of both the organization and the environments it confronts (p. 69).

Similarly, Meindl *et al* (1994) concur with Weick's earlier assessment of the field:

> "… the literature on managerial and organizational sensemaking is still in its early stages. The area contains few widely shared methodological or conceptual standards." (p. 289).

Weick and Bougon

Michel Bougon, who for a time was Karl Weick's research assistant, co-authored several often-quoted studies with Weick. He stated (1983) that he ". . . found that Karl's ideas on cause maps, organization, and evolution resonated with what I knew of Piaget's[3] psychology. … It soon dawned on me that if I wanted to read on this topic, I would have to write it myself (p. 188)." This would lead him to important work on causal mapping and the Self-Q technique, among other things.

[3] Jean Piaget (1896-1980) is renowned for constructing a model of child development and learning, based on the idea that the developing child builds cognitive structures for understanding and responding to environmental experiences. (from http://www.funderstanding.com/piaget.cfm)

Bougon, Weick and Binkhorst (1977) conducted a famous study of the Utrecht Jazz Orchestra, wherein they constructed cause maps through lengthy interviews with individual orchestra members and subsequently assembled an aggregate organizational map in order to establish relations of causality between statements as *givens*, *means* or *ends*. During this process the researchers focused strictly on chains of causality and ignored the actual content of the statements. In this process they found evidence of inconsistencies in individual decision-making; confirmation that sensemaking is a retrospective process; that *crediting* and *discrediting* activities often lead to equivocality within participants' own cause maps; and that the process of sensemaking itself requires this equivocality, "…since to make new sense one has to be inconsistent in that he [sic] must actively discredit past wisdom." (p. 621). This suggests that the process of sensemaking involves, first, the internalization of equivocality from the environment (enactment) into our pre-existing cognitive frame, where we must rearrange or discard existing elements (selection) in the construction of a new or altered framework (retention). The authors conclude that:

> "…in a social structure it is not the objective content of variables, but the structure of causality among them that determines the fate of the system. This theory also asserts that 'the organization' and 'the environment' – together and undifferentiated – are stored in the minds of the participants in the form of cognitive maps, and particularly in the form of cause maps. Thus, what ties an organization together is what ties thought together."
> (p. 626).

Since, according to Weick, we see what we believe, and so construct our own reality, the very notion of objectivity is called into question – can there be such a thing? – especially if we agree

that our ‘environment’ is contained within our own cognitive maps. We construct our own environment retrospectively by engaging with manageable ‘chunks’ of the ongoing stream of experience. The power of our fuzzy, inconsistent cognitive maps may lie in the fact that they are individual reflections of our environment, our organization, our selves. If, by examining cognitive maps constructed by several individuals within an organization, we were to discover evidence of independently emerging patterns of perception, we might take pause and consider the importance of those patterns. Bougon’s use of mathematical graph theory and the design of his own software enabled the construction of computer-generated causal maps, as partially demonstrated by Weber and Manning (2001). The Utrecht Jazz Orchestra study proved the value of extracting the causal flow of ideas to reveal clues to the underlying cognitive structure of an organization.

Bougon (1983) contains the first comprehensive discussion of his Self-Q interview technique, which was used to elicit cause maps from the Utrecht Orchestra members. Here he more fully explains the significance of the technique as a “nondirective and nonreactive” method which will remove the threat of researcher bias in influencing subject responses. As practiced in full by Bougon, the process involves four successive interviews. The first is designed to establish a good sense of rapport between interviewer and subject, and to elicit a set of self-generated questions from the subject on a given topic. The second interview serves to verify the recorded list of questions with the subject and to obtain a ranking of the items by importance. The original questions are written on 3 X 5 cards in the form of statements and ranked by the subject. Any additional ideas which may have occurred to the subject in the interim are also added at this time. In the third interview the subject is presented with a special questionnaire to finish at home,

which asks the subject to rank the statements in terms of both causality and influence, with a page for each statement. The fourth interview presents the subject with "graphical representations" (p. 186) of the resultant cause map, constructed by Bougon's graph analysis software. At this final stage the subject is asked to confirm whether the constructed maps make sense in order to validate the construction. Bougon's goal, quoting Filstead (1970:4) is "… to picture the empirical world as it actually exists to those under investigation, rather than as the researcher imagines it to be." (p. 186.)

Weick and Bougon (1986) continue their discussion of Self-Q interviewing (p. 115) and the Utrecht findings by once again asserting that "Organizations exist largely in the mind, and their existence takes the form of cognitive maps." (p.102). They go on to discuss the problems of obtaining valid evidence of individual cognitive statements in documents, meeting transcripts and personal interviews, due to factors of personal vulnerability and sincerity. An important point raised here is that it is less threatening for individuals to express questions about a topic than to make declarative statements, which later may have to be defended, be subject to accusations of political correctness, etc. The method is therefore defended as nondirective, practically free from the effects of researcher bias, and providing a method for validation of content with the subject.

Weber and Manning

Weber and Manning (2001) further explored the use of Self-Q interviews in eliciting cognitive maps as they studied the role of individual sensemaking in a planned organizational change (the adoption of TQM, or Total Quality Management, throughout an organization). In the framework

of seeking to understand cognitive processes involved in successful organizational change, they suggest that "… how organization members acquire, organize, and make sense of changes in the environment is a key to understanding organizational change." (p. 228). In their search for "nonintrusive" methods to capture individual sensemaking in periods of transition, they turned to Bougon's Self-Q technique in an exploratory fashion. This longitudinal study collected data on organization member sensemaking among different hierarchical levels (top management, supervisory, and first-level employee) (p. 231) at two different points in time. Time 1 was a few months after the arrival of a new CEO but before initiation of the TQM model; Time 2, about six months later, was after the completion of TQM training. Although in terms of organizational change six months may not be considered a significant time frame, the authors were trying to discover whether cause-mapping techniques could record differences in employees' sense-making processes immediately after training occurred.

The study used a modified three-step process adapted from Bougon's original four steps: a) question generation, b) card sorting for importance and then for influence, and c) matrix analysis. This procedure was carried out both at Time 1 and Time 2, after which lengthy interviews were carried out with the majority of the subjects to capture both their reaction to the constructed cause maps as well as their perceptions of the planned organizational change. Weber and Manning were able to reduce the response categories to four primary categories: personal effect on self and job (*self*); training and implementation concerns (*training*); impact of TQ on others (*others*); and reasons for TQ implementation (*why*). This number was reduced, through successive refining, from at least ten categories. (p.232). the authors noted a shift in content of the majority of cause maps from focusing on *self* and *training* at Time 1 to focusing on *others*

and *why* concerns at Time 2. Weber and Manning found no significant differences in content based on organizational tenure, age or educational level, but did find some differences which might be explained by position level in the organization. (p.235). While none of the senior or supervisory maps focused on *self* questions at either Time 1 or Time 2, a significant number of first-level employee maps showed concerns with *self*. The authors concluded:

> "Organization members with less control over the change and less information about the change may tend to experience higher levels of anxiety. Thus, their sensemaking may be more focused on the personal impact of the change." (p. 235).

Subsequent to training, first-level employees showed a tendency to shift toward wondering about the reason for change as well as its impact on others, although they still exhibited concerns with self questions; management maps exhibited no such shifts. Thus, pre- and post-training map contents varied primarily by hierarchical level.

As well as analyzing map content, Weber and Manning followed Bougon and Weick's interest in structural analysis of cause maps to determine givens-means-ends linkages among participants. Their tentative conclusion was that most participants saw themselves as receiving influence, rather than exerting influence on, other actors or nodes in their causal maps. Finally, the authors suggest, map content (individual concerns or questions) changed from Time 1 to Time 2, while perceived influence did not.

The authors concluded that the Self-Q technique was quick and easy to employ, successful in delivering a high degree of content validity, and extended previous work by providing a means to explore content as well as the structure of cognitive and cause

maps. Perhaps the lone disadvantage of this technique was that the software was not widely available, and that maps were constructed only through the generosity of the software developers (presumably Bougon). The authors tentatively offer an integrated model of sensemaking processes during organizational change:

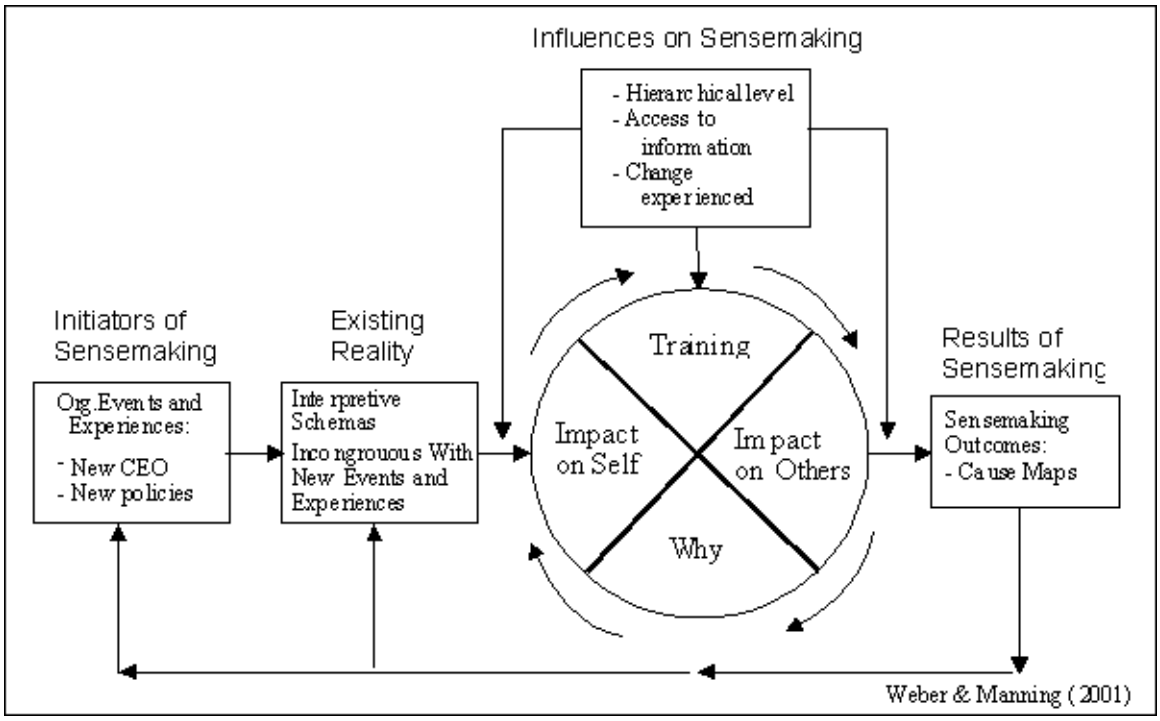

Figure 2- Weber and Manning's integrated model of sensemaking

The model contains a process diagram showing a suggested cyclical sequence of *Initiators of Sensemaking* impacting on *Existing Reality*, which then produces the four categories of response modified by *Influences on Sensemaking*, with Results of Sensemaking including outcomes such as cause maps, which then may generate additional cycles. Among the numerous theories which have been advanced in the literature to explain change processes in organizations, the authors find that Weick's (1979) theories of equivocality reduction best explain the data resulting from their study.

The diagram is in essence a schematic of Weick's sensemaking process, containing environmental change and a representation of the enactment-selection-retention cycle. The output of this cycle is a new cognitive frame, which is then subject to ongoing environmental changes and iterations of the sensemaking cycle. Other studies, such as Isabella's (1994) for example, found four distinct phases of change, as opposed to Weick's continuous cycles of sensemaking; yet her study, like much change literature, focused exclusively on managers who were themselves implementing change, and not on employees at all levels.

Finally, the authors tentatively suggest that factors such as hierarchical level in the organization, access to information and level of change experienced may influence the sensemaking of individual employees. The primary contribution of this exploratory study, claim the authors, is in providing insights into the methodological approach of the Self-Q technique and the subsequent production of cause maps. Subsequent studies, it is suggested, will help to expand the use of these techniques and possibly substantiate the authors' proposed integrated model of sensemaking.

a springboard for further research

This research provides a rich source of possibilities for further research, and provides a much-needed methodological and theoretical continuum from the work of Weick and Bougon. Although the Self-Q interview and sorting technique itself is well-documented here, the process of data analysis, software manipulation and subsequent construction of

cause maps is not.[4] Further, Weber and Manning do little to convince the reader of the utility of examining cause map structures in addition to map content, other than to confirm the lack of influence felt by the majority of respondents. The Self-Q technique and its ability to provide valid data in a nondirectional, nonintrusive manner seemed to offer exciting possibilities for future research in examining employee sensemaking.

[4] For a more thorough description of this process, see Laukkanen (1994).

Methodology

setting

The research was carried out in the early part of 2004 in a remote northern Alberta community, and focused specifically on employees within a community college branch campus. The community where the campus is located is approximately 250 kilometers from the nearest urban centre, and is reachable only by air for all but the four coldest winter months, when an ice road is maintained. Due to its remote setting, the branch campus relies heavily on telephone, fax and Internet connections for administrative and educational resources. To date these communication channels have relied on an older analog system which is microwaved over the considerable distance to the nearest centre, and which has historically been subject to breakdowns of varying natures. The aging nature of the telecommunications system also means that all Internet connections are limited to a 56K dialup connection, which is slow and easily overburdened by multiple users. Campus instructors rely on the Internet to provide interesting, timely and enriching resources not only for their students but for themselves. Frequently, however, both they and their students have been frustrated by slow, intermittent and unreliable Web access.

The Government of Alberta announced in 2000 that a province-wide infrastructure would be installed to link all provincial agencies to a broadband communications network. Residents of many isolated northern communities attended to the news with particular interest, since the new communications system would have the most dramatic potential impact in these areas. For an isolated campus such as the one in this study, the Alberta Supernet might offer a solution to long-standing frustrations felt by staff members and students. But how did the staff see this impending change? Further, how would their views change after the system had been installed and they had

lived with it for a few months or more? The time seemed opportune to conduct research on how staff members viewed an impending technological change as they attempted to come to terms with what it might mean for themselves and their work. Such a study might prove valuable for comparison with other studies conducted after the new technology had been in use for a period of time. This seemed to be an opportunity to provide a 'before' snapshot of individual and collective sensemaking at the threshold of technological change, an opportunity which would be lost with the installation of Supernet.

The location seemed ideal for a study of this kind for several reasons. First, in an isolated community such as this, the Supernet project was an important enough issue to be 'on the radar screen' of many individuals in the community, especially employees of a remote college campus which relied heavily on the Internet for communication as well as for course materials and activities. Second, the campus and its nine employees represented an accessible and manageable population around which to frame a case study, due to its small size and the fact that the researcher is a faculty member. The campus itself occupies ten rooms in a community multiplex occupied by First Nations administration offices and other municipal agencies. This situation allowed the researcher ready access to participants, and also served to minimize factors of alienation which may occur in situations where the researcher is an 'outsider' who may not be trusted or welcomed by participants. Third, the geographical isolation of the campus and its distance from the main campus serve to uniquely define its identity as a subunit of the college with a strong local identity.

research questions and design

A qualitative examination of individual sensemaking offered an approach which allowed for rich description of personal and organizational issues in this setting. The isolated setting at hand, and the ability to access a small population for personal interviews lent themselves to the framework of a case study. Finally, semi-structured interviews with the five employees should provide a substantial test bed for the validity of Weber and Manning's claims of efficacy for Bougon's Self-Q data gathering technique.

The research framework for this study was subsequently modeled on Yin's (1989) explanatory case study design for research and analysis. Weber and Manning (2001) do not explicitly term their study a *case study*; yet characteristics as presented by Yin would class it as such (pp. 15-22). The study is bounded by a single organization; the unit of analysis is individual employees; the study is stated to be exploratory in nature; is seeking answers into the *how* and *why* of organizational sensemaking; and is investigating contemporary events, over which the investigators have no control. Since the present study seeks to confirm or refute several of the findings in that earlier study, and because of the particulars of the location under consideration, a case study was explicitly chosen as the framework for conducting the present inquiry.

The case consists of a remote branch campus of a community college, and the unit of analysis is the individual employee within that unit. After the requisite project approval by the Ethics Committee, campus employees were queried and invited to participate in the study. Of the eight employees in the unit (not counting the researcher), five volunteered to be interviewed. Of those five interviewees, two were male and three female; three were instructors, one was a support

staffer and one was the Chair for the unit, who also is occasionally required to teach. One of the subjects had been employed for two years at that location, one had been employed for more than five years, and the remaining three had been employed for ten years or more. All but one of the subjects were interviewed in their classroom or office, to aid in the recall of how impending technological changes might impact the work they do; the support staffer could not be interviewed *in situ* because of the busy and public nature of the workstation, and so a quiet classroom was used instead. Each interview lasted about forty-five minutes, and was digitally recorded to provide audio documentation of the proceedings.

Following Weber and Manning's (2001) discussion of Bougon's (1983) Self-Q technique for gathering data using a structured interview process, a set of interview questions (see Appendix) was drawn up and reviewed. Following these scripted interview questions, each respondent was asked how they first became aware of the Alberta Supernet Project, and to identify questions which they had initially formed about how this technological change might affect the way they perform their jobs. The questions were then discussed for clarity and transcribed by the interviewer on individual 3 X 5 index cards in the form of statements. Once interviewer and subject were both comfortable that the interviewer had accurately recorded the subject's statements, the subject was asked to rank the statements on the cards, first by order of importance and then according to the degree of influence the subject felt s/he had over each of the statements. The index cards for each subject were marked with a unique code, and were numbered in two different colored pens to reflect rankings for both importance and influence. At the end of the five interview sessions, the researcher had accumulated twenty-three cards in all which, in addition to the interview transcriptions, formed the dataset for subsequent study and

analysis. All of the subjects but one identified five questions during the interview which they deemed of importance; one subject identified three assumptions about the new technology which were expressed during the interview in the form of statements.

The Self-Q interviewing technique was chosen because it offered the researcher a well-documented method of eliciting high-quality subject responses while avoiding the influence of researcher bias or leading questions. This was accomplished by asking the subjects, in a non-directive manner, what questions they had formed about the impending arrival of the Supernet, in terms of how it might affect themselves and their work. During this process the researcher functioned simply as a non-judgmental recorder, noting the subject's questions and subsequent rankings. Armed with the three pillars of a theoretical basis, a framework for carrying out the project, and a data-gathering methodology, the researcher felt assured of the validity of this approach.

methodology of data analysis

Tables 1 – 5 display the contents of each subject's 3 X 5 card set, including the subject's ranking of each statement according to (a) importance and (b) personal influence.

Subject A (Instructor)		
Statement	Importance	Influence
I don't know what Supernet will do	1	5
The service's dependability and availability is not predictable	2	4
I need to know if access and user friendliness is going to happen	3	2
Student accessibility to Supernet is not known	4	3
Instructor training needs are unknown	5	1

Table 1

Subject B (Instructor)		
Statement	Importance	Influence
Ability to use Supernet at home as a class preparation tool is unknown	1	1
Effects of Supernet on me as instructor in classroom are unknown	2	2
It is unknown whether classrooms will be wired as well as admin	3	3
Actual installation of Supernet at the College is unknown	4	4
Bandwidth and connection speed of Supernet is unknown	5	5

Table 2

Subject C (Chair)		
Statement	Importance	Influence
I hope that Supernet will improve communication with the main campus in (community name)	1	1
I expect Supernet to provide us with a more reliable system of communication	2	2
I expect Supernet to make education more accessible to students in our community	3	3
I expect Supernet to improve the speed with which we communicate to the outside world	4	4
It is unknown whether Supernet will be provided to the community, or only to provincial institutions	5	5

Table 3

Subject D (Administrative Staff)		
Statement	Importance	Influence
Supernet needs to be reliable under all possible conditions	1	2
Supernet needs to work consistently to be useful	2	3
Supernet access speed is unknown	3	4
Supernet needs to be better than what we have	4	5
I may need training in order to use Supernet efficiently	5	1

Table 4

Subject E (Instructor)		
Statement	Importance	Influence
Supernet will be less frustrating (in terms of connection speed)	1	3
Supernet will be useful in my classroom	2	1
Supernet will be useful for online research	3	2

Table 5

Two things may strike the reader upon first viewing the tables.

a) With the exception of Table 5, all statements were originally listed as questions which the subjects had raised in connection with the Alberta Supernet Project. During Subject E's interview, however, the statements were expressed by the subject in the form of three declarative statements about what Supernet will mean for that instructor in the classroom.

b) Subject B's and Subject C's rankings for both Importance and Influence are identical. When queried about the interesting coincidence of the rankings, both subjects replied that the process by which they accorded importance to each item was in fact based on their felt influence on that item, and so the rankings are identical in each case. The rankings of the other subjects appear to follow a different pattern, which will be discussed under Findings, below.

Findings

categories of responses

Bearing in mind that no attempt was made to guide interviewees' questions into predetermined categories, Weber and Manning (2001) were nevertheless able to convincingly cluster individual responses in their study into four coding categories (*self, training, others and why*) (p. 234). In a similar fashion, consideration of the twenty-three participant statements in the study at hand revealed three consistent statement categories:

1) Statements about the individual (*Self* statements); for instance, "I need to know if user friendliness and accessibility is going to happen." (*Table 1*)

2) Statements about other people, whether students or community members (*Other* statements); for instance, "I expect Supernet to make education more accessible to students in our community." (*Table 3*)

3) Statements about the technology itself (*Technology* statements); for instance, "Bandwidth and connection speed of Supernet is unknown." (*Table 2*)

In any cases where categorization may have appeared ambiguous, interview recordings were reviewed for clarification. All of the twenty-three statements fit into one of the categories. These categories will subsequently be referred to as *Self, Other,* and *Technology*. Categorization is displayed in *Tables 6 – 10*.

Subject A			
Category	Statement	Importance	Influence
Tech	I don't know what Supernet will do	1	5
Tech	The service's dependability and availability is not predictable	2	4
Self	I need to know if access and user friendliness is going to happen	3	2
Other	Student accessibility to Supernet is not known	4	3
Self	Instructor training needs are unknown	5	1

Table 6

Subject B			
Category	Statement	Importance	Influence
Self	Ability to use Supernet at home as a class preparation tool is unknown	1	1
Self	Effects of Supernet on me as instructor in classroom are unknown	2	2
Tech	It is unknown whether classrooms will be wired as well as admin	3	3
Tech	Actual installation of Supernet at the College is unknown	4	4
Tech	Bandwidth and connection speed of Supernet is unknown	5	5

Table 7

Subject C			
Category	Statement	Importance	Influence
Tech	I hope that Supernet will improve communication with the main campus in (community name)	1	1
Tech	I expect Supernet to provide us with a more reliable system of communication	2	2
Other	I expect Supernet to make education more accessible to students in our community	3	3
Tech	I expect Supernet to improve the speed with which we communicate to the outside world	4	4
Other	It is unknown whether Supernet will be provided to the community, or only to provincial institutions	5	5

Table 8

Subject D			
Category	Statement	Importance	Influence[5]
Tech	Supernet needs to be reliable under all possible conditions	1	5
Tech	Supernet needs to work consistently to be useful	2	5
Tech	Supernet access speed is unknown	3	5
Tech	Supernet needs to be better than what we have	4	5
Self	I may need training in order to use Supernet efficiently	5	1

Table 9

[5] Subject D specifically stated that all of the Tech statements would rank 'at the bottom' in terms of personal influence.

Subject E			
Category	Statement	Importance	Influence
Tech	Supernet will be less frustrating (in terms of connection speed)	1	3
Self	Supernet will be useful in my classroom	2	1
Other	Supernet will be useful for online research	3	2

Table 10

summary and mapping of responses

Of the twenty-three subject statements, thirteen were categorized as *Technology* statements (57%), six as *Self* statements (26%), and four as *Other* statements (17%). Two of the respondents, both instructors, produced statements containing each of the three categories. Of the remaining three respondents, Subject B, an instructor, and Subject D, the department support staffer, produced no *Other* statements; Subject C, the department Chair, produced no *Self* statements. Following this, it became possible to construct maps of individual responses, mapping the categories using the two matrices of *Importance* and *Influence*, as shown in *Figures 1 – 5*.

Subject A (Instructor)					
Importance	**Category**				
(high) **1**					Tech
2				Tech	
3		Self			
4			Other		
(low) **5**	Self				
Influence	**1** (high)	**2**	**3**	**4**	**5** (low)

Figure 3 – Map of Subject A - Instructor

Subject B (Instructor)					
Importance	**Category**				
(high) **1**	Self				
2		Self			
3			Tech		
4				Tech	
(low) **5**					Tech
Influence	**1** (high)	**2**	**3**	**4**	**5** (low)

Figure 4 – Map of Subject B – Instructor

Subject C (Chair)					
Importance	**Category**				
(high) **1**	Tech				
2		Tech			
3			Other		
4				Tech	
(low) **5**					Other
Influence	**1** (high)	**2**	**3**	**4**	**5** (low)

Figure 5 – Map of Subject C - Chair

Subject D (Support Staff)					
Importance	**Category**				
(high) **1**					Tech
2					Tech
3					Tech
4					Tech
(low) **5**	Self				
Influence	**1** (high)	**2**	**3**	**4**	**5** (low)

Figure 6 – Map of Subject D – Support Staff

Subject E (Instructor)			
Importance	**Category**		
(high) **1**			Tech
2	Self		
(low) **3**		Other	
Influence	**1** (high)	**2**	**3** (low)

Figure 7 – Map of Subject E - Instructor

aggregate map of responses

The results of combining all twenty-three response statements into a single aggregate chart can be seen in *Figure 8*, below:

Aggregate Map					
Importance	**Responses by Category**				
1 (high)	**S T**		**T**		**T T**
2	**S**	**S T**		**T**	**T**
3		**S O**	**O T**		**T**
4			**O**	**T T**	**T**
5 (low)	**S S**				**O T**
Influence	**1** (high)	**2**	**3**	**4**	**5** (low)
S=*Self*; **T**=*Technology;* **O**=*Other*					

Figure 8 – Aggregate Map – All Respondents

From the above it can be seen that 50% of the *Self* responses and 54% of the *Technology* responses are found within the two highest rankings of importance. In terms of influence, however, 100% of the *Self* statements are found in the top two rankings, but only 15% of the *Technology* statements appear there. Of the four *Other* statements, 25% (one statement) appears in the top two orders of influence, and none appears above the median

in terms of importance. *Chart 1* and *Chart 2* show total response categories by degree of influence, and importance, respectively.

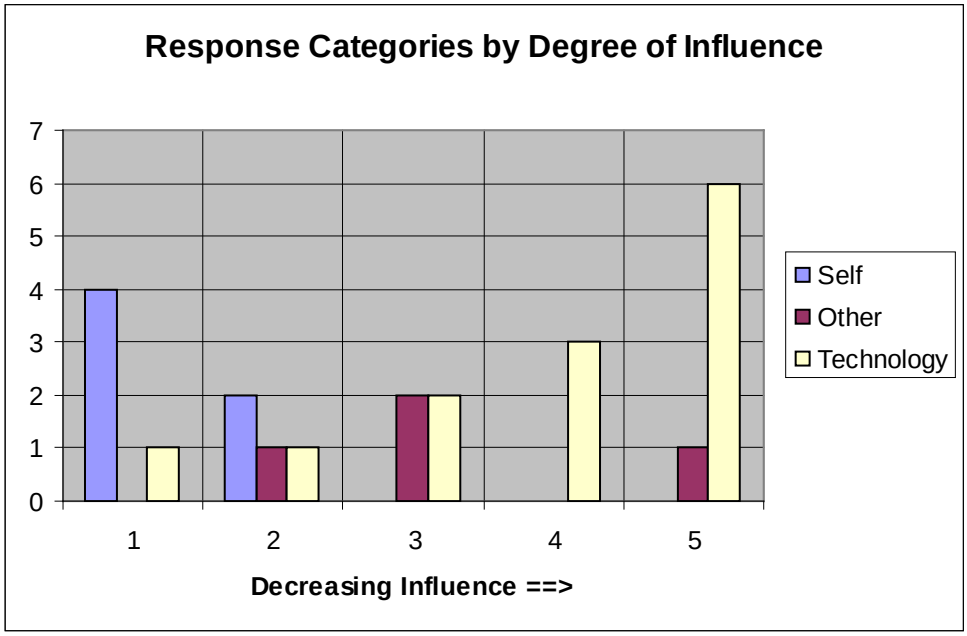

Chart 1

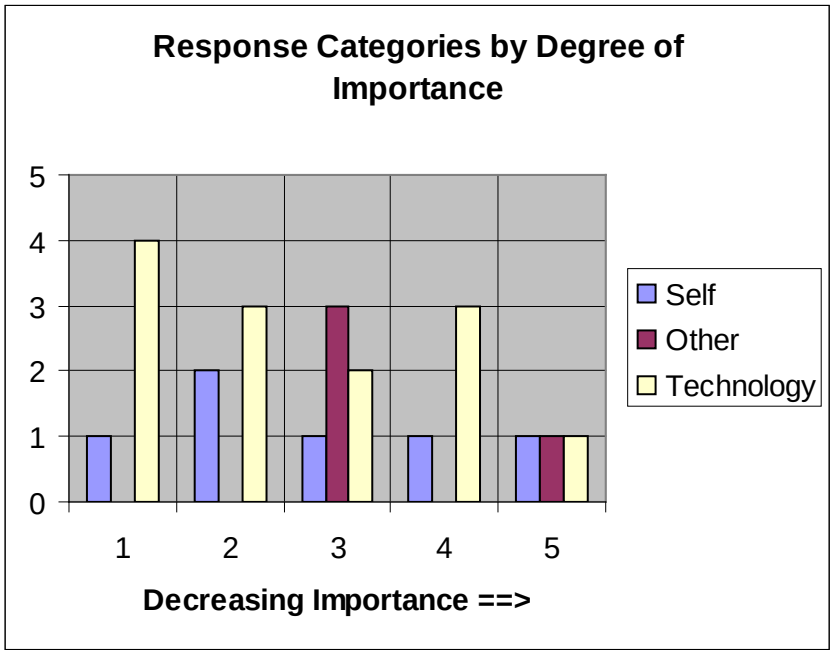

Chart 2

cognitive maps and organizational level

In reality, there are only two organizational levels represented at this campus. All but one of the employees would classify as front-line staff, according to Weber and Manning's' categories (pp. 233-235). The Chair alone would classify as either supervisory or top management, or a hybrid of the two. In the grand organizational scheme of the college he would be classed as supervisory; in the context of the branch campus, however, he is the sole administrator and decision maker, and so he might be classed here as top management. We have seen earlier that the Chair and the other male subject, an Instructor, both ranked their statements identically in terms of importance and influence. In fact, both stated that the degree of felt influence for each statement determined their rankings of importance, so that both were identical.

Significantly, the Chair was alone among the five subjects in expressing no *Self* statements during the interview. If we revisit the Chair's statements again *(Figure 3)* we can also note that he alone, of the five respondents placed *Technology* statements in the top two categories in terms of personal influence. This is interesting for two reasons: first, it may reflect the enhanced access to information enjoyed by the Chair alone; and second, it warrants revisiting the aggregate map (*figure 6)* and resulting *charts 1* and *2*. If we remove the Chair's responses from *Figure 6* the map now changes to the following:

Aggregate Map					
Importance	**Responses by Category – Front Line Staff**				
1 (high)	**S**		**T**		**T T**
2	**S**	**S**		**T**	**T**
3		**S O**	**T**		**T**
4			**O**	**T**	**T**
5 (low)	**S S**				**T**
Influence	**1** (high)	**2**	**3**	**4**	**5** (low)
S=*Self*; **T**=*Technology;* **O**=*Other*					

Figure 9 – Aggregate map – front-line Staff

Without the influence of the Chair's statements, the *Self* and *Technology* responses are bounded and do not overlap, while the remaining two *Other* responses straddle the boundary. Based on *Figure 7*, the resulting Charts for Importance and Influence would look as follows:

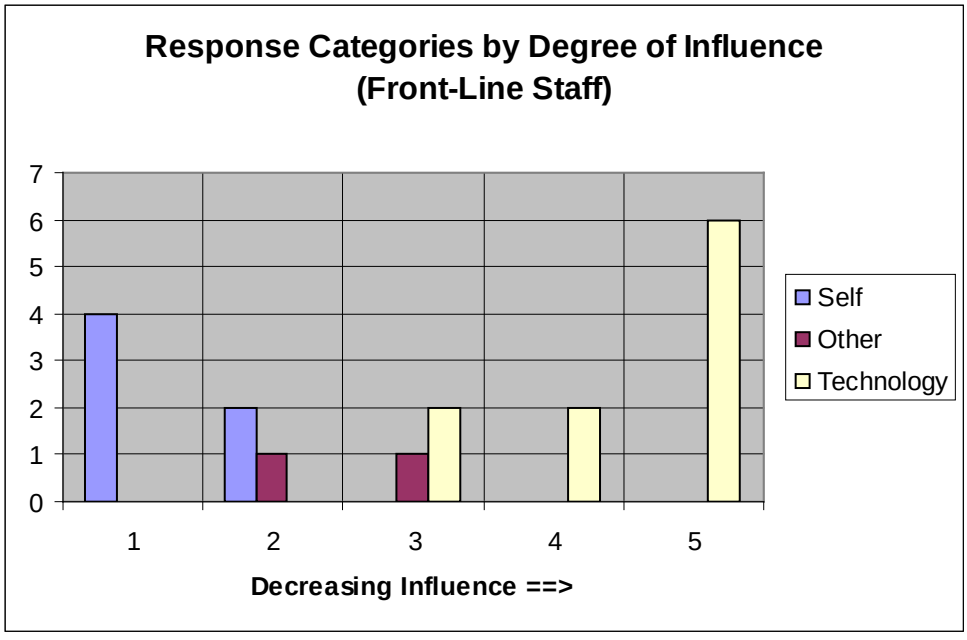

Chart 3

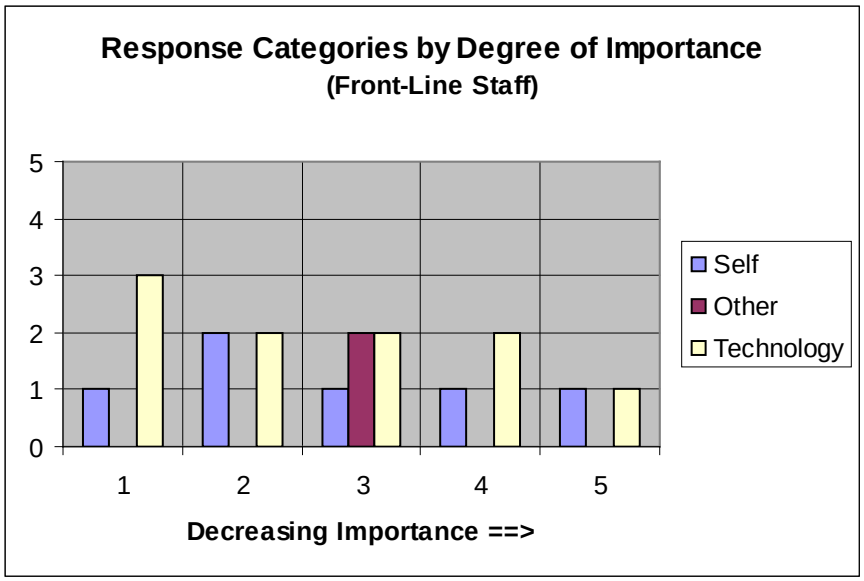

Chart 4

Note that in the above charts the relative importance rankings of the three categories change very little, since *Technology* is still ranked highest, with *Self* spread relatively evenly across the board. In terms of perceived influence, however, the split between *Self* and *Technology* statements appears clearly drawn. The absence of *Self* statements among the Chair's responses, and the relative lack of influence perceived by front-line staff may reinforce Weber and Manning's findings that lower hierarchical levels initially evidence more concern about how change will impact them, perhaps based on two factors. First might be that front-line staff initially see themselves as having low influence relative to organizational change. Weber and Manning's' subject organization attempted to remedy this issue with the implementation of staff training and the formation of employee volunteer groups to participate in the TQM change. Weber and Manning noted movement away from *self* statements toward *Other* statements in maps which were elicited after six months of training and activity had elapsed, since employees by then had received much more information about the nature and intent of the TQM initiative, as well as having

participated in the implementation of the change effort. The second factor evidenced by the above changes may be the enhanced access to information enjoyed by the Chair relative to front-line staff, which might dissipate initial concerns about his own personal situation. Weber and Manning similarly found far fewer *self* statements among top management and supervisors, which they attributed to the hierarchical flow of information in organizations. This additional access to information, as well as his position in the organizational hierarchy, may also have contributed to an enhanced feeling of influence on the part of the Chair.

cognitive maps as a measure of the enacted self in the enacted environment

(Bougon, 1983, p. 178-179).

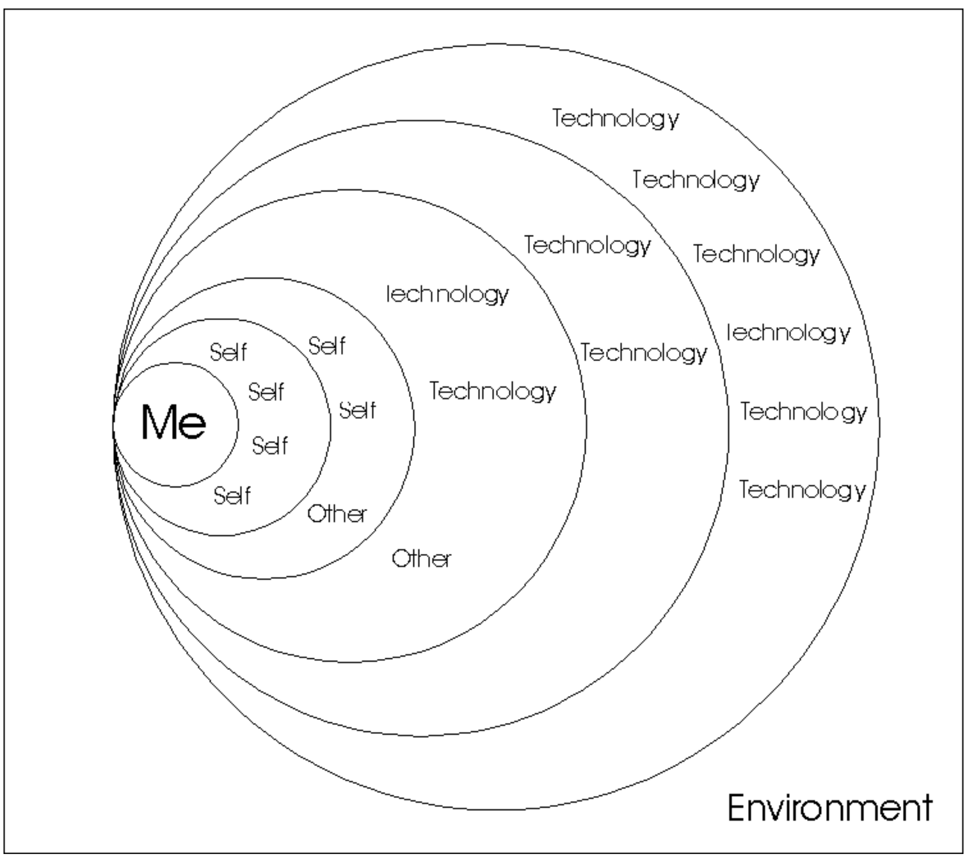

Figure 10 – the enacted self in the enacted environment

If we revisit *Chart 3*, and consider degrees of influence as a relative measurement of the perceptual distance of concepts to self, we might consider this to be a representation of the individual in his or her environment. Bougon (1983), quoting Weick (1977), states that constructing a cognitive map is one result of a long and abstract procedure which results in an image of ". . . the enacted self in the enacted environment." (p. 178). Bougon goes on to say that, when studying cognitive maps, we may declare concepts to be ". . . either remote, external and environmental . . . or near, internal, and personal . . .", and may find others which do not fall into either category. I find in Bougon's comments a correlation to *Figure 9*, in which the measure of influence is highest in individual, personal actions, less so in relation to others, and lowest in relation to distant technical issues, which are outside individual control and more environmental in nature.

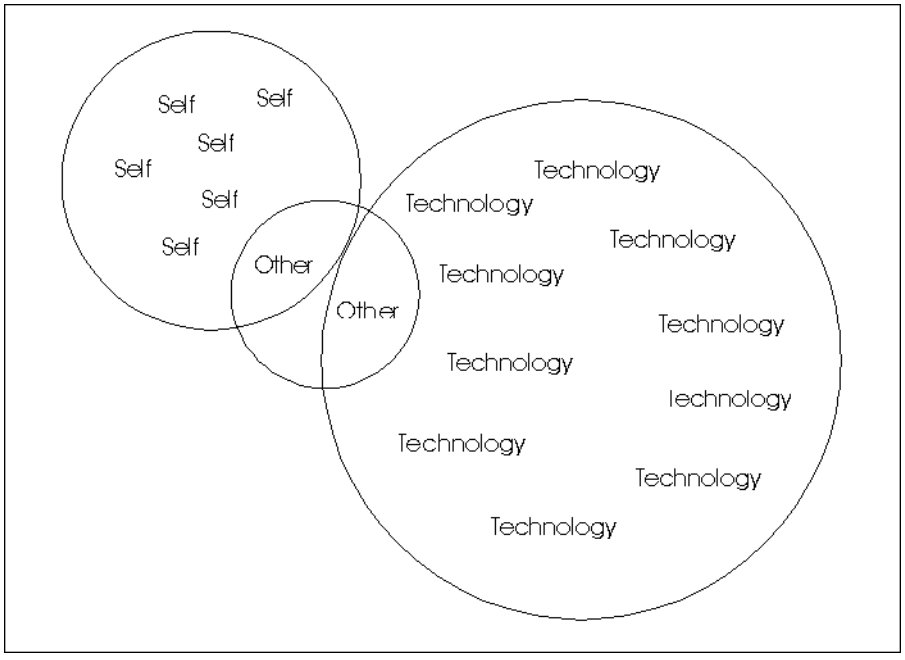

Figure 11 – Venn diagram of category linkages

Finally, if we consider *Figure 11*, a Venn diagram of overlapping category linkages extracted from *Figure 9*, we can see another graphical representation which captures both the number of responses and their relative placement on a scale of felt personal influence as expressed by front-line staff at the branch campus. There is a clear separation of the *Self* and *Technology* statements, bridged only by the two *Other* responses, which may suggest cognitive processes which loosely couple the proximity of concerns about *Self* in relation to the approaching technological shift to the more distant, impersonal and uncontrollable forces of *Technology*.

Discussion/conclusion

One purpose of this study was to confirm the validity of the Self-Q interviewing technique for exploring sensemaking efforts of employees around impending technological change. Results of data collection served to confirm Weber and Manning's findings that a rich stream of valid data results from the use of this method, even in a severe test offered by a case with only five participants. Bougon's nondirective interview and sorting techniques provided abundant evidence for analysis and reflection on the beginnings of sensemaking for five employees. A total of twenty-three cognitive statements about the impact of an approaching technological shift, along with rankings of both relative importance and personal influence, were provided by this method. As a data-gathering technique, the method was relatively easy to apply, even for a novice researcher, and provided substantial results.

Disadvantages of this technique centre on the lengthy, complex and at times unclear process by which causal maps are constructed through application of microcomputer software, which is not readily available. This important process, which seems to represent a fusion of qualitative with quantitative data analysis by quantifying qualitative data, deserves more attention and study to make the process more transparent. Nevertheless, a variety of valid cognitive representations were made possible by following the data collection steps of Bougon's methodology. Findings, therefore, affirm Weber and Manning's claim for the efficacy of this technique.

In the second area of interest, categories of subject responses, results of this case bore a striking similarity to the final four categories synthesized by Weber and Manning, which were classified as *Self, Others, Training* and *Why*. All of the twenty-three subject responses form this study were

found to fall into one of three classifications: *Self*, *Other* and *Technology*. Whereas Weber and Manning conducted a longitudinal study during an ongoing organizational change, this study sought to establish an initial benchmark prior to the implementation of an ecological change which will affect both the organization and its individual employees. Weber and Manning found a shift in map content (but not causal structure) before and after front-line employee training in the TQM process; it is probable that a second study done in future at the branch campus would reveal similar shifts after the change is initiated and the employees have received training or additional information about the new technology. Further work may shed new insights on the remarkable consistency of categories between the two studies.

Comparison of the above categories between front-line and managerial staff suggest that hierarchical level may indeed influence the individual perception of personal power, or of individual anxiety levels about organizational change, as suggested by Weber and Manning. This is another area that would require further study to reach any solid conclusions, but evidence in this case suggests that enhanced access to information by the department Chair may have resulted in less concern about the personal influence on him of the impending change. Other factors were suggested in a very preliminary way, such as gender (the two males ranked influence and importance in an identical cognitive process), job function (support staff vs. instructors), and individual feelings about technology/computers in general. Findings would appear to substantiate Weber and Manning's suggested effect of the role of hierarchy in individual sensemaking.

Evidence of consistent response categories and volume of responses by the subjects appear to provide proof of a substantial amount of sensemaking in advance of an anticipated technological change. This suggests that Weick's *enactment* phase of sensemaking is in various stages of advancement in all of the subjects. The lower response volume of Subject E may suggest that the anticipated ecological shift is just beginning to impinge on her cognitive frame, as she may not be as fully engaged as the other respondents. In fact, Subject E may represent what the researcher anticipated to find, as the study was conceived to occur on the very threshold of awareness, very early in the sensemaking process. What may be considered remarkable, besides the common emergent categories, is the degree to which *enactment* and *selection* are already progressing as revealed in individual and collective data from the staff. This may suggest the importance of the Supernet installation in the minds of employees in this case. This considerable body of information about the nature and progress of individual sensemaking also confirms the validity and usefulness of Weick's theoretical framework for helping us to understand the process by which we impose understanding on our environment. By examining the aggregate representations of staff cognitive frameworks, we have an opportunity to assess the state of organizational sensemaking in relation to the new technology. Further study to compare the state of sensemaking throughout the organizational hierarchy at the main campus to that represented by this organizational subunit would help to complete this picture, and to shed light on the impact of Supernet in locations where other high-speed options were available.

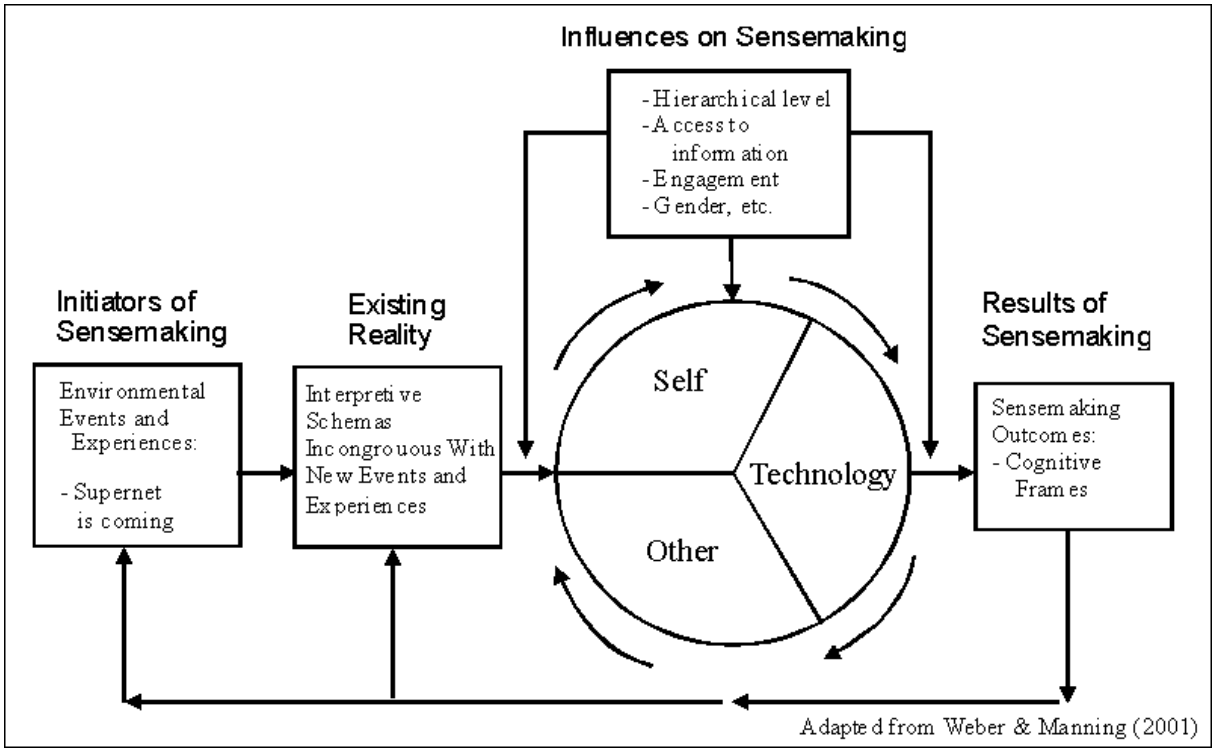

Figure 12- An integrated model of sensemaking

Figure 12 shows Weber and Manning's sensemaking model adapted to the present study. With minor changes in the model which reflect the circumstances of this case study, the model applies both to the current study, and to the cyclical sensemaking process as described by Weick. To that end, this study confirms the applicability of the model.

study limitations

The limited scope and sample size of this study mean that, while it can claim to be a valid representation of the processes of individual and organizational sensemaking at the isolated branch campus which serves as the case framework, the findings here should be taken as micro-level confirmation of many of Weber and Manning's findings. Thanks to the bounding mechanisms provided by Yin's case study approach, the location and size of the campus, Weber

and Manning's research leadership, the efficacy of Bougon's Self-Q technique, and the theoretical guidance of Karl Weick, this study proved to provide valid insights into research methodology and individual sensemaking in organizations.

implications of the study

As suggested by Weber and Manning, the Self-Q technique could provide a simple tool for managers to capture organization members' questions or concerns about organizational or environmental changes, even in advance of those changes. In this way, the study suggests, valid data could be quickly and easily captured about the state of the organization. Results from this study suggest, for instance, that the organizational leadership may want to provide training or communicate information to staff members about organizational perspectives on the implications of the Supernet project.

As suggested above, many opportunities are presented for future study in the areas of individual cognition and sensemaking as influenced by rank, gender, feelings about technology, etc. Follow-up studies on the branch campus would provide additional insights into the state of the individual and collective sensemaking process after implementation of Supernet, training initiatives, and staff experience with the new technology have had time to affect the cognitive frames of the employees. Finally, additional work and explanation in the areas of cognitive mapping and the sensemaking may enable future researchers to move further ahead in more closely integrating the insight to be gained from both qualitative and quantitative research and analysis.

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Appendices

Interview Questions

As we have discussed, the purpose of this research project is to learn about how individuals in community agencies have learned about, and come to understand, the Alberta Supernet Project.

1. Can you recall when you first became aware of the Alberta Supernet?

2. Can you recall how you first became aware of it?

3. What questions did you have initially about how Supernet may affect what you do and how you may do it?

4. For each question listed above–

    i. Why was that an important issue for you?
    ii. Has that question been resolved for you?
    iii. How has it been resolved; or if not, can you say why?
    iv. Have you taken any particular personal action in relation to this question?

(Researcher rewrites questions as declarative statements on 3 X 5 cards)

5. In thinking about the list of questions we have been discussing, have I accurately reflected what you were thinking?

    a. Could you arrange these 3 X 5 cards in order of importance?

    b. Now, could you arrange the cards again according to the degree of influence you feel you have had over each item? (Items are coded for each ordering process.)

6. Do you see this issue differently now than you did initially? In what ways?

7. Can you recall people, events or information that have influenced your views about Supernet? How did that come about?

8. Based on everything you have learned so far, how would you describe Supernet?

9. Have you heard it described in different terms? If so, do you think they are contradictory? How?

10. In reflecting on what Supernet will mean for you or your organization, do you have any other questions, or reflections?

Interview Consent Form

Lantry Vaughan
(address)
Email: lvaughan@ualberta.ca
(H) 123-4567 (W) 123-4568

Dear _____:

During our recent conversation you indicated your willingness to participate in a research project I am conducting in partial fulfillment of the requirements for my Master of Arts in Communication and Technology degree from the University of Alberta.

As I indicated, this project involves research into how employees in community agencies at (community) make sense of new communication technology, in particular the implementation of the Alberta Supernet Project. Besides fulfilling my degree requirements, I am interested in this project because I am an Instructor at (name) College's (name) campus and a resident of the community myself.

With your permission, I would like to arrange a time to conduct and record on audiocassette an interview on this subject, which will take about one hour of your time. The information from this interview will be extremely useful in the completion of my project, and to research in the north in general. If you wish, I will be happy to share my findings with you at the conclusion of my project.

I will strive, to the best of my ability, to keep your information private, anonymous and confidential, and to assure you that it will be used by no one other than myself for the purpose of completing my project. You of course have the right to not participate, to withdraw at any time without prejudice to pre-existing entitlements, and to continuing and meaningful opportunities for deciding whether or not to continue to participate. You may opt out without penalty, and any collected information will not be included in the study. I will strive to maintain the security of your information, which must be kept for a minimum of 5 years following completion of research. The sole purpose of this interview is to be the completion of my Master's project, although the information may appear in other forms at later date, such as in a magazine or journal article. Please note that privacy, confidentiality and anonymity will continue.

Should you have any concerns, complaints or consequences at any time, I can be reached as shown above. My Project Supervisor, Dr. Marco Adria, may be reached as follows:

Marco Adria, Ph.D.
Associate Professor and Director
Master of Arts in Communications & Technology
Faculty of Extension, University of Alberta
University Extension Centre
8303 - 112 Street
Edmonton, Alberta T6G 2T4
Telephone (780) 492-2254; Fax (780) 492-0627

This study has been reviewed and approved by the Faculties of Education and Extension Research Ethics Board (EE REB) at the University of Alberta. For questions regarding participant rights and ethical conduct of research, contact the Chair of the EE REB at (780) 492-3751.

If you agree to the terms of this interview as outlined above, please sign and date this letter below.
Thank you for your patience in contributing to this research.

Sincerely,

(signed)

Lantry Vaughan

I agree to participate in this interview according to the terms outlined above.

_____ _____
(Signed) (Date)