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Q-methodology for the active process of knowledge management

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Abstract

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Keywords

methodology, for, active, process, knowledge, management

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Q Methodology for the Active Process of Knowledge Management

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Abstract: Knowledge Management for the provision of Health Information Services is a developing field and one that is usefully informed by applied research. The current study is conducted with Intensive Care Unit (ICU) professionals to capture and distil their views in regard to a developing a Web-Based Information Service. This service is provided by a central coordination and monitoring unit for intensive care units across NSW, Australia. The study is part of a larger research initiative that is being done to advance the provision of health information in ICU's across the state. Given the complex and dynamic context of ICUs, there is still a challenge in understanding the active process of Knowledge Management in the healthcare environment. This research explores the use of Q Methodology as an integrated and practical approach to the acquisition and sharing and creation of knowledge in an organisational context. The use of Q Methodology is well established in several research communities including communication, psychology, political science and health research. The current manual method of concourse can be difficult in demanding environments, such as, health care services. Thus this study will trial a technology, Zing, that will partially automate the concourse process, and thereby enhance and integrate the active process of Knowledge Management.

Keywords: Knowledge Management, Q Methodology, Intensive Care Unit, Health Information Services, Australia

Introduction

GOVERNMENT HEALTH SYSTEMS have always been information intensive both in the dissemination of information to institutional providers and in the collection and processing of data for tracking and reporting. Knowledge has always been critical but has traditionally been made most explicit in an individual practitioner's learning of the accumulated knowledge of the profession. A consequent of the vast increase in the power to collect, process and disseminate information that has come with modern information and communications technology (ICT), has been the growth in the inter-disciplinary fields of Information Systems (IS) and Knowledge Management (KM). There is a growing body of literature, (Boland & Tenkasi 1995; Engestrom 1999; Toulmin 1999; Wenger et al 2002), which promotes a view of socially-constructed, collective knowledge as the predominant source of learning, creativity and innovation so vital for organisations in the current changing environment. Knowledge Management for the provision of Health Information Services is a developing field and one that is usefully informed by applied research as will be described in this paper.

The characteristic of IS that distinguishes it from other management fields in the social sciences is that it concerns the use of "artefacts in human-machine systems" (Gregor 2002). Conversely the characteristic that distinguishes IS from more

technical fields, such as Computer Science and Information Technology, is its concern for the human elements in organisational and social systems. As exemplified in the Australian Standard (AS5037-2005), KM has emerged from a variety of fields, in particular IS, Organisational Science and Human Resource Management. KM brings together opposing views of knowledge such as tacit and explicit, individual and collective, objective and subjective, active and passive. While technology solutions to KM problems have often been attempted, there is now agreement that a technology-based approach without taking into account all elements of an organisation's knowledge eco-systems (ibid) is doomed to failure.

Innovative ICT-based tools and processes can be applied together with human interventions and actions to carry out innovative KM projects such as the one reported here. Information systems that include a variety of people and technologies routinely adopt different social roles within an organisation and these roles have a major influence on a system's acceptability (Masterton & Watt 2000). People will develop and use the technical components of information systems in a purposeful way but the social system, which underpins most of the day-to-day operations, develops in an ad hoc fashion (Benson & Standing 2001). In particular, systems which connect people to people directly or indirectly, are best understood as the interrelationship of

organisational, cultural and technical elements (Boland & Tenkasi 1995).

This research explores the use of Q Methodology, with innovative ICT support, as an integrated and practical approach to the acquisition and sharing and creation of knowledge in an organisational context. The use of Q Methodology is well established in several research communities including communication, psychology, political science and health research¹. While this shows that the analysis of the Q-sort has been automated with ICT-based applications, the current manual method of concourse can be difficult in demanding environments, such as health care services. The pilot study reported here has trialled a technology that will partially automate the process, Zing technology, which can be used to facilitate the concourse process, and has the potential to be used in a network environment as well.

The current study was conducted with ICU, (Intensive Care Unit) professionals in a number of regional hospitals to capture and distil their views in regard to a developing a Web Based Information Service. The Web based information service is provided by a central Coordination & Monitoring Unit) of intensive care units across NSW, Australia. The study is part of a research initiative that is being done to advance the provision and exchange of health information and knowledge in ICU's across the state. This study shows the significant contribution of the automation of routine information gathering to the quality of the knowledge creation and sharing processes of KM.

Research Approach

The broader research, initiative of which this study is a component, deals with complex issues in the dynamic and high stress environment of intensive care. The ICU web-based information service is being developed by the central State-based authority to serve the needs of staff in various different hospitals and by members of the public at large who interact with the ICUs. Stakeholders include the Health Department staff of an Intensive Care Coordination and Monitoring Unit and those managing the provision of information systems at State level, clinicians in the hospitals' ICUs, as well as patients, their families and others. While data for the research needs to be collected and analysed from all stakeholder groups in an integrative and contextual manner, the particular focus of the study in this paper is the collection of subjective data from the ICU staff.

In searching for research methods appropriate to the study of active and collaborative KM in a complex distributed environment such as a public

health system, the authors are in accord with the notion of a "New Scholarship" (McNiff 2000) where there is a new way of knowing that meets the everyday needs of people working in real-life situations. Real-life practices are messy, uncontrolled and unpredictable and are seriously separated from the sanitised world of abstract theorising. McNiff (ibid) proposes that learning from real and active experience, although not highly valued by the academy, can be reinforced through intellectual study and contrasts this to traditional forms of scholarship, which values facts and information and is generated by conventional kinds of research which tests knowledge against standardised criteria of hard scientific analysis and techniques. The process described here is action research where the researchers engage with, and impact upon, people in real-life practices. This is appropriate for the dynamic, socio-technical nature of the subject of the study and is suitable for research linking industry with academia.

In this paper we describe and justify the techniques used to collect data from the ICU clinicians and discuss the benefits in terms of improving the management of knowledge both for the purpose of research and in the sharing of knowledge among the stakeholders of the ICUs. Q methodology which is used in this research is well established in the study of subjectivity and the exploration of concepts held by different groups of individuals (Brown 1986). Indeed it is the ability of Q Methodology to reveal subjectivity, peoples' views, attitudes, opinions, understandings, and experiences that accounts for its popularity in a range of social sciences. As will be described further in the paper, Q-methodology begins with a concourse where statements are collected from participant subjects, normally in a focus-group type setting. A significant innovation of this research is the use of the Zing groupware system to conduct a series of concourses in ICU units. Not only does this speed up and improve the quality of the data collection among the groups of clinicians whose time is under great demand but also has the potential to lead to enhanced knowledge sharing among the subjects as data is collected by the researchers. As the study is a partnership between industry and academic researchers, there also need to be identified benefits to both as is evident here. The democratic and interactive process used to engage the ICU staff, was aimed at raising their awareness of the needs for knowledge sharing and the benefits that could accrue from the web-based information service.

¹ See <http://www.qmethod.org>

Research Techniques

Zing: a Facilitated Group Decision Support System

Zing is a groupware system consisting of a mix of hardware and software that allows for group brainstorming and decision making. Hardware enables multiple keyboards to control cursors of a PC or laptop on which software can be loaded and beamed onto a screen to be viewed by the group

participating. Templates of questions that facilitate a group discussion session have been developed through research and many years experience. In a session, a suitable template is loaded and used to guide the dialogue on a given topic or problem. Each participant types in ideas and responses on their own keyboard into their own anonymous window. When ready, they then fire up to the public section above (see Figure 1). These statements can then be reviewed, summarised and stored by the group.

Figure 1: The Zing Display: Questions on the Topic are loaded into a Zing Template for a Facilitated Session. Participants Control Individual Cursors in the Twelve Windows at the Bottom from their own Keyboards.

Zing is therefore is a facilitated decision-support system, applicable to small group problem solving or organisation-wide knowledge creation through democratic learning processes that can lead to cultural change and accelerated innovation. In addition Zing is used in classrooms to promote teaching and learning in teams which can be facilitated by the students themselves. "The software includes thinking methods and scaffolds for problem solving, planning, creative writing, feedback, hypothesis formation, playwriting, criticism, logical reasoning, ethics and team and self evaluation" (Zing 2005). Zing is portable and can also be used remotely over the Web.

Q-Method: Capture of Subjective Perceptions and Factor Analysis

Q methodology provides a standard set of procedures for analysing qualitative data by eliciting the subjective understandings held by the participants. The source of the data is frequently based on individual viewpoints about a particular topic, view, or event.

The process typically begins with a concourse, which can vary from a single brainstorming session, to a research based selection of views that will eventually be expressed as "statements". The concourse as a group activity is one of the great strengths of the methodology as it provides the

participating individuals with access to the views of the others and, in the process, new views, thoughts or ideas often arise. The next step is the conducting of the sort, which involves asking each participant to rank the statements of ideas expressed on a topic with reference to their own views. This is usually accomplished by having a sort sheet where there is one position available for each item. This has the effect of "forcing" the participant to make decisions between statements which tends to increase the level of involvement by the participant.

Once the sorts are complete, Q Method software is used to factor analysis the sorts so that a number of factors emerge that reflect the views of the participants. There is also the opportunity to interview the participants to get further insight into the reasons for the positions taken in the course of the sorting. This methodology is recommended as a research tool when attempting to identify the perceptions of the participants (see for example Meloche et al 2005).

Q Methodology allows the researcher to model an individual's orientation toward a subject (such as KM) through reference to that individual's representation of statements about the subject in question, (Dryzek 1994). Q Methodology differs from conventional survey research in that it compares individuals in light of their views rather than comparing their disparate views. In Q Methodology the people doing the sorts are the variables, not the statements that they sort. (McKewon & Thomas 1988). Q Methodology differs from conventional factor analysis in that with Q the factor represents the variance that is common to the people associated with the factor (Brown, 1980).

The final step is the statistical procedure used to analyse the data is factor analysis. Thus what matters is the correlation between the total responses of individuals not the correlation between isolated statements. This is because it is the subject not the statements that are the variables. Another advantage of Q Methodology is that it does not require large samples of the population to produce a meaningful result, as a rule a Q sample from 30 to 50 individuals can produce an accurate picture of the range of views on a topic, (although much smaller samples are common and useful, (McKeown & Thomas, 1990).

The Study Settings and Data Collection

The web-based information service is comprised of three components, the Clinical Web Information Services, the Visitor Web information services and a related service, ICU Connect, an Email listserv. Each is designed to benefit a specific audience. While these information services have been developed to allow the users to "keep-up" with current

information, it has evolved other uses and ideas (e.g. the website now acts as a knowledge repository linked is an active discussion forum: ICU connect). The main purpose of the web based information service is to share information, facilitating a collaborative network across the ICUs of NSW. Thus clinicians from any ICU can access a range of information resources including, information such as Evidence Based Practice Guidelines, procedures and procedural guidelines from various ICUs across NSW. The web based provision of protocols and procedures should position the ICUs to improve the quality of care in the ICU reduce redundancy and minimise errors. The provision of procedures can also facilitate the education and training of ICU's clinicians.

As already mentioned Q Methodology was chosen as a suitable approach to study the usefulness of the website for the provision of procedures and protocols for the use by ICU's Clinicians. In accordance with Q Methodology the method of collecting statements was via a concourse where the members of the concourse provide statements on the topic being examined. In this case as we wanted to collect statements from ICU Units, so a variety of methods were involved. The process started with an email and telephone communication between the researchers and members of Central State ICU Management Unit who developed and coordinate the development of the Web Based Information Service that is discussed in this research. The individual ICU's were contacted and confirmed appointments made for the visits. This was followed by physical visits to the various ICU units across NSW by two researchers. As NSW is a large state, this process involved a number of visits over a three day period.

Eight ICUs were visited for this study located in regional hospitals of varying sizes in NSW. In the first two days, ICUs along the far north coast of NSW were visited. On the third day, one major metropolitan ICU, and two in a medium size central coast city of NSW were visited. In each meeting, the Zing technology was adopted for the brainstorming (Group Discussion). This method of building up the set of statements allowed the researchers to easily engage with the ICU clinicians and served to prompt them with statements arising out of their own context. This approach resulted in a large number of statements, reflecting their views of the clinicians on the provision protocol and procedure that could be provided by the web based information services.

Within each of the ICU's, voluntary participation of the staff was gained with the support of the clinicians' and their management and concourses were held in the ICU between shifts. In Q Methodology the initial concourse allows the

researchers to engage the participants in a focused discussion to illicit ideas. In this study we used Zing Technology to collect statements in conjunction with the standard procedures of discussion provided by the concourse. Thus the study was conducted through conversations in which each ICU's participants, comments on the topics provided were collected. The topics examined in this study were, "the provision of procedures and protocols via the Web Information Service" and "the usefulness of Zing Technology within the Q-methodology to facilitate the discussion".

Following the concourses conducted with clinicians in the eight different ICU's, all the collected statements are developed into a statement set for the sorting stage of the research, the sorting to be done by similar groups of individual participants. This development process of this research involves refining the collected statements from the Zing technology to remove duplicates and to check them for clarity and to examine them for possible categories to which groups of statements may belong. The next stage will be done in follow-up visits to each of the sites where the statements will be sorted to collect the views of the individual clinicians in regard to the views provided in the set of statements. This will be followed by a factor analysis of the statements and the results of this will be provided to the State ICU Management Group for consideration in their development of the information service.

Discussion and Conclusion

This research is aimed at obtaining guidance from the clinicians on the additional growth paths the web-based service can take. In the process described above, a valuable set of statements was collected based on the ICU clinician's view to on the provision of protocol and procedure that could be usefully provided by the web based information services. The statement included suggestions for new features and functions in the provision of protocols and procedures on the Web based information systems as well as methods to encourage, attract and better serve clinical and public access to ICU related information. The research method used greatly enhanced the collection of ideas and thoughts as a variety of statements from those most intimately involved with the service of the ICUs.

The strength and value of Q Methodology, supported by the Zing Technology, was apparent. The clinicians in these units are pressed for time, and it is to their credit, that they participated in the research. The process almost immediately allowed communication of the views from and among the participants. In the context of ICUs located in

different hospitals across the state, an active process of KM was begun with the establishment of the web-based service at the State level. The conduct of this research where ICU staff voluntarily participated in a dynamic exchange of opinions greatly enhance the active nature of the KM process.

Q methodology alone is an ideal method for engaging the participants' and supports knowledge sharing, generation and capture and thus further sharing and generation. In this study we trialled the use of a supportive technology, Zing, whose origins are from the area of collaborative learning. The objective of this was both to improve the research process and to stimulate the knowledge management processes within the ICU. The results indicate that both objectives were met as will now be described.

In the first part of this study the participants were asked for views on the delivery and access to protocols and procedures, from a state level, from a Web Based information service. In addition they were also asked to provide feedback on the experience of using ZING Technology as part of the procedure.

The statements reflect clearly their engagement with the technology, and the ability it provided for their own knowledgesharing and capture. It appears that the whole conversational process of the Q-methodology concourse was greatly enhanced with the use of Zing. One statement, for example, "beats the whiteboard hands down" was given in the very first session at a 9am meeting from a clinician who had never previously used the Zing system. The strength of Zing is its simplicity. It consists of keyboards and a visual display of what has been typed by the individual participants. Other comments included "I think it is a very good idea... great to be able to comment whatever you want without disrupting the whole group" and "allows for a flow of ideas" and think and talk at the same time". The group benefits were noted including, "allows recording of everyone's input" and the manner in which it facilitates discussion in that it is "very good as we are not all arguing and shouting over the top of each other".

From the researcher perspective the use was equally positive, we found that both the generation and capture of the statements was enhanced and that the use was reasonably seamless and allowed for research to be conducted in a variety of settings, ranging from small tea room table to more formal group meeting rooms. The use of Zing required a minimum of instruction – merely asking the individuals to first type their names followed by statements, in their own space, on the topic and pressing the F9 key to lift the statements to the group space before writing their next statement. On seeing what others had contributed, participants were

inspired to new thoughts of their own. When the session was finished the recorded statements were available in machine readable form for further editing and did not require any additional entry. The process was enhanced by more parallel discussion and the clear display that is possible with typed rather than hand written text.

In conclusion, this experience enhanced the discussion, sharing and capture of the key elements

knowledge in the complex environment of the ICUs. It thereby contributed to active Knowledge Management both for the developers of the Web-based service and for the research process. The integration of the subjective data techniques of Q-methodology and the support of innovative technology in the real-world context illustrated the power of viewing Knowledge Management through the holistic concept of the knowledge eco-system.

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About the Authors

Mr Joseph Meloche

My research considers the views and understandings that people hold in regard to their activities. This approach has led me in the use of associated literature and methodologies including, Metaphor Theory, Q Methodology and Activity Theory. The focus of my research is involved in applying these views to the design and development of effective Information Systems Thus allowing me to work in areas including Information Seeking Activity, Health Information Systems, Knowledge Management and Small Business Research. I take a qualitative approach that is typically informed by the participants of the research. My research interests include working with how people understand, value, their activities. I use a range of associated literature and methodologies to support my research. These include, Metaphor Theory, Q Methodology, and Activity Theory. My research approach is qualitative and acknowledges the experience of people in the context of their activities, from their perspective.

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