The application of qualitative research

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Qualitative research is involves using various methods ranging from participant observation, interviews, and action research, to ethnography, document review and grounded theory in order to investigate and explain phenomena of predominantly human sciences. However, qualitative research can also be found in various other disciplines, subject to suitable methodologies. A general shift in orientation of Information Systems (IS) has resulted in an elevated focus on organizational and managerial rather than technological issues. The reorientation also requires qualitative research to enter the discipline of IS, which used to be exclusively relying on quantitative research for testing its theoretical body.

This paper is to review and discuss the methods of qualitative research with the aim of identifying their suitability for research in Information Systems. Based on the limitations and benefits of the individual research methods, a framework for applying such methods will be presented to be considered as a vantage point in applying such methods scientifically.

Keywords: research methodologies, qualitative research, Information Science,

Introduction

The concept of methodology refers to the principal way of ‘ going about’ doing research or practicing the discipline in its present activities. Consequently, the term research methodology refers to the way research is being conducted within the discipline, and normally this is methodology is confined to the respective scientific discipline. Research methodology refers to all the methods employed specifically when doing research, e. g. the subjects interviewed, the materials used, the methods used to collect data,

etc. The aim is to accurately and exhaustingly describe and list all parameters which led to the obtaining of a certain set of data, so that it could be repeated elsewhere and by other researchers. The methodology also specifies the upper and lower limits, the exact circumstances under which the research was conducted (Alavi & Carlson, 1992) (Myers, 1997) (Orlikowski & Iacono, 2001).

The emergence of computer science and the absence of a research tradition like the disciplines of physics, chemistry, or biology led to the predominance of a technical perspective on information systems. Realizing the tremendous social consequences of information systems, computer science and technology on people and society has paved the way for using qualitative research in this discipline. Not surprisingly, researchers such as (Mangan, 2004) have pointed out the increasing occurrence of qualitative research methods in information system research and its related management areas.

Discussion

The human desire to shape the world and materialise ideas and concepts brought on us many notoriously failing, yet at other times marvellously ingenious pieces of engineering and concepts of grandeur, which is unique to human life as much as we are able to reflect on ourselves and our actions. This paper is to discuss computer science by defining the terms ‘ science’ and ‘ scientific method’ in relation to the Theory of Science. Based on the writings of (Kuhn, 1962) (Carnap, 1994) (Popper, 1999)and (Chalmers, 1999), the relationships between science, research, development and technology is explored.

Computer Science has as its object of investigation the computer as a technology, as a tool to structure knowledge and information in and about our world. As much as computer science is based in mathematics and logic, its theoretical and experimental research methods follow that of classical sciences. However, computer science also features those unique methods of modelling and simulation which have drawn and transformed other sciences while impacting tremendously on artistic and commercial fields. In maintaining a close relationship with technology, computer science is subject to a continuous development parallel to modern life, though lacking a scientific tradition of classical sciences.

By the time computer science emerged in the late 1940s, it was more of a bringing together of various existing sciences, culminating in various concepts of other sciences (logic, mathematics, physics) to be re-assembled to bring forth a new theory and practice of general abstraction and specific design.

Though termed computer science, however, it is not so obvious that the field qualifies as a ‘ science’ in the traditional sense. Still a young discipline, it also started out very differently than for example similar ‘ classic’ Greek sciences such as mathematics and physics. The historical development of computer science brought about an age of dramatically increased communication, which, for one, allowed other sciences to communicate much more effectively than ever before, while at the same time allowed a holistic view of our world to emerge and establish itself amongst most of today’s societies.

What is commonly referred to as ‘ science’ can be described a systematic observation of phenomena by means of (certain) sets empirical and logical methods in order to understand such phenomena. We consign to a certain ‘ understanding’ of phenomena, once we have a theory which can help us to explain such phenomena – why they are what they are, or why we experience them as we do, whether they follow a certain pattern, etc.

Traditionally, the scientific enquiry is first and foremost concerned with the physical world, with empirical phenomena which require logical and empirical methods to observe, describe and explain such phenomena. As such, science is divided into several specific sciences in order to cut down on complexities. Natural sciences contain fields such as physics, chemistry, geology, biology, etc., while social sciences refer to psychology, sociology, economics, anthropology, etc. The humanities refer to areas of investigation such as philosophy, history, linguistics, etc., while culture refers to areas such as religion, art, etc. A special class of science is logic and mathematics, in that they are exclusively abstract fields of enquiry with no need to refer to the physical world in any way.

What is referred to as ‘ science’ is also a body of knowledge that is more or less organized, and which gives rise and consistency to the agreed logical and empirical methods employed in going about the observation and explanation of phenomena. However, ‘ science’ is also the concrete application of such organized knowledge to the physical world.

Science attempts to explain and understand the physical world. It is important to note that science is always an after-the-fact effort in

understanding the observed phenomena. Scientific knowledge is not a priori, meaning, it never occurs before the observation. This is different for logic and mathematics, in that knowledge in these fields does not presuppose an observation. In these fields, conclusions are reached by logic, while at the same time logic is the object and field of investigation.

Science presupposes an order in the natural world which structures and order everything in the universe, an order which is relatively constant, and which can be discovered in order to gain increased levels of knowledge about the world. In the end, science is an expression of human curiosity and a desire, and ability, to solve problems. Such problem-solving endeavours eventually lead to the building of theories, attempting to unite and unify all our observations, or a subset of observations into rational structures which depict the natural world. As such, theories are “ nets cast to catch what we call ‘ the world’: to rationalize, to explain, and to master it. We endeavor to make the mesh ever finer and finer.” (Popper, 1999)

The Scientific Method

There is no single scientific method. While one could define the ‘ scientific method’ as a set of practices which scientists use to answer questions within their specific field of research or investigation, the methods employed can vary significantly. Some of the methods used for scientific enquiry are of logical nature, as they refer to arriving at deductions from certain hypotheses, or as they refer to causal relationships and their logical implications. Other methods are of an empirical quality, in that they refer to making observations, the designing of instruments (e. g. to collect data), or the designing of controlled experiments.

However, all and any scientific method employed is subject to the criterion of being replicable and repeatable. Any other person should be able to duplicate the very experimental setup or enquiry, and produce either the same results, or dissimilar results. This is also a strong indicator of scientific methods being impersonal, or put differently, unless another person can duplicate the results of another scientist, this serves as a sign that there are substantial errors in either the design, the methodology, or the interpretation of such results.

Scientific methods are used to generate the logical limits or environment within which to generate information, which can serve either as a result of certain questions asked, or as input to questions to be asked. Such methods also serve to establish scientific theories about whatever can be theorised about in the context of the specific research environment. In science, everything is theoretical until substantiated by logical deduction (or induction), empirical proof, or a combination thereof.

The scientific method is characterised by the very nature of science, in that it is never absolute, constantly in a state of being changed and reviewed. All findings are negotiated in empirical terms, and this positivist negotiating process is a recursively self-correcting process which roots science exclusively in the empirical paradigm. It should be noted, though, that the scientific method is just that, a method, a set of human practices geared and calibrated towards obtaining knowledge about the world in a certain, exclusively positivist way.

Researchers such as (Feyerabend, 2000) et al. maintained that all human epistemological endeavours, and with that all scientific endeavours, do not arise from a vacuum. All human experience and thought are based on prior experience and thought, thus all experimental data is rather “ theory-contaminated”. This bears specifically on computer science, in that the design of experimental equipment has to follow a similar pattern like the scientific method exemplified above in order to maintain a verifiable baseline.

Qualitative Research

The most common differentiation between various research methods is that of quantitative versus qualitative research methods. Quantitative research is concerned with quantifiable data, objective measures which can be repeated always and everywhere, given that all parameters which could influence the measurement process have been analysed and specified in the research design. This is the predominant research methodology of all natural sciences (Myers, 1997), and includes methods such as e. g. mathematical modeling (also used in computer science), test performance scores, measurements (weighing, counting, etc.), but also context-free survey responses.

Qualitative research is about evaluating, measuring, and understanding of social issues (e. g. in sociology) or human problems (e. g. in psychology), as embedded in a social context featuring the influence of subjective opinions, goals, objectives or understandings (Cresswell, 1994). Here, more than often, it matters for example how questions and statements are worded, and how such is understood across various cultures, societies, groups, or individuals. Accordingly, the methods employed range from participant observation to

interviews and questionnaires, in short, whatever method is suitable to elucidate the very quality of a situation or condition.

The fact that the Information Systems discipline is rooted in the engineering tradition due to its positivist qualities regarding computer science and the activities around designing and building computers, prototyping and modelling have led researchers such as Roger Clarke to indicate that positivist approaches alone are insufficient to gather the interpretive aspects and qualities which often are emergent phenomena when approaching Information Systems from a management perspective (Clarke, 1995).

Positivist

Information systems research was classified as positivist by researchers (Orlikowski & Baroudi, 1991), provided such research provided quantifiable measures of variables, hypothesis testing and formal propositions about a problem, the phenomenon and the sample of the population. Researchers such as (Yin, 2002) and (Marzanah, 2007), on the contrary, have exemplified the applicability of case study research as a valid approach to information system research.

Interpretive

Notwithstanding the ideals and benefits of a positivist approach to the world, not all phenomena can be accorded for by an empirical approach as practiced in the hard sciences of physics et al. The attempt to understand the complexities of a subjectively experienced but socially constructed reality in which it is important to understand the context within which such processes happen and meaning is imbued on a multitude of processes and

relations, has fostered the scientific approach to history and culture, and the embeddedness of human life into such complex systems (Orlikowski & Baroudi, 1991). Irrespective of the perspective on such negotiated contexts, qualitative research still aims at maintaining the objectivity of the researcher as he/she attempts to collect data for interpretation. Likewise, the use of qualitative research in the Information Systems discipline is “ aimed at producing an understanding of the context of the information system, and the process whereby the information system influences and is influenced by the context” (Walsham, 1993).

Engineering

The movement from logic and mathematics to natural science, social sciences, the humanities and culture is an indication that human society developed parallel to human thought as contained in the purely natural sciences concerned only with the natural world. The development of science beyond those natural sciences and logic and mathematics is to show that humans were successfully integrating and re-integrating the then current knowledge to include further areas of interest which do not correlate with the traditional field of investigation of the respective sciences, i. e. humans were repeatedly relating one subject with another, say, the functions of vitamins in the human body with the effects thereof within a social context.

The emergence of computer science was possible by the inclusion of mathematics and logic, in the form of the field of Artificial Intelligence (AI), while at the same time drawing on physics, chemistry, biology and psychology. Since its inception in 1936 as a branch of mathematics, computer science has been limiting itself to an exploration of how

mathematics can be codified by and into mechanistic explanations and principles, with the earliest computer programs being FORTRAN in 1954 to solve problems in numerical analysis, and LISP in 1958 to solve problems in symbolic processing.

Computer science is more of a meta-activity, in that it reflects on the practice of writing software programs or designing computer hardware. More precisely though, computer science is concerned with the design, development and investigation of empirical methodologies and logical concepts that are the basis of the scientific activities of specifying, developing, implementing and analyzing computational systems (Eden, 2007).

Qualitative Research Method in Information System

IS research has been the study of processes related to the development of IS applications and the effects that IS applications have on people, particularly in formal settings such as organizations. The importance of IS research until now, has led to a number of different research approaches and methods, usually adapted from other disciplines such as sociology, natural sciences, and business studies. Harvard colloquium on qualitative IS research methods and QualIT conference in Griffith University in Brisbane on November 2005 have highlighted qualitative research, as a distinctive research approach. Qualitative research methods were developed in the social sciences to enable researchers to study social and cultural phenomena. Qualitative data sources include observation and participant observation (fieldwork), interviews and questionnaires, documents and texts, and the researcher’s impressions and reactions. According to Northcutt & McCoy (2004), Myers

(2006), and Hesse-Biber & Levy (2006), there are four research methods being used by IS researchers. The research methods are the case study research, ethnography, action research, and grounded theory.

Case Study

Case study research is the most common qualitative method used in information systems (Alavi and Carlson, 1992). Yin (2002) defines the scope of a case study as an empirical inquiry that investigates a contemporary phenomenon within its real-life context, especially when the boundaries between phenomenon and context are not clearly evident. Yin further suggested the following steps techniques for organizing and conducting the case study research. The steps are to determine and define the research questions, to select the cases and determine data gathering and analysis techniques, prepare to collect data, collect data in the field, to evaluate and analyze the data and lastly preparing the report. There are numerous case study research, in the organizational context for the implementation of information systems, to illustrate and investigate theories related to IS and organization.

Ethnography

This is the research method of anthropology with its emphasis on culture. It is undertaken by observation, interviews and examination of documents. In the research, the researchers observe their collaborators without prejudice or prior assumptions. Ethnography is widely used in the study of information systems in organizations, from the study of the development of information systems (Davies & Nielsen, 1992). Ethnography according to Avison and Myers, (1995) is suited to providing information systems researchers with

rich insights into the human, social and organizational aspects of information systems development and application. The goal of ethnographic research is to improve our understanding of human thought and action through interpretation of human actions in context. Basic steps recommended as a general framework for an ethnographic study (Rose et al., 1995), used to conduct an ethnographic study. The steps include preparation to understand, familiarize setting goals and access to observe. Field study to establish rapport with managers and users, observe/interview and collect data. Analysis to compile the collected data, quantify data and compile statistics, preparing report and presenting the findings. Randall, D., et al. (1999), explore the issue of ‘ legacy’ through the use of a long-term empirical investigation into how information technology is employed in a major UK bank. The closeness of their investigation into the day-to-day operations of the bank from the perspectives of individual users (using ethnographic techniques) identifies the embedded nature of the technology and the impact of cultural, organizational, and individual employees ‘ legacy’ on organizational and technical change.

Action Research

Action research has been promoted and practiced as one way to conduct empirical research within Information System discipline. Information system action research (Davidson, 1998) is applied research to develop a solution that is of practical value to the people with whom the researchers are working, and at the same time to develop theoretical knowledge of value to a research community. According to Baskerville, R. (1999), information system research in has led to a number of different research approaches and

methods, adapted from other disciplines such as sociology, natural sciences, and business studies and is often identified by its dual goal of both improving the organization participating in the research project, and the AR practitioner is expected to apply intervention on this environment. Action Research methodology was normally chosen as a research methodology as it provides the research with an inside and working view of the research matter. AR study done is characterized by the researcher applying positive intervention to the organization, while collecting field data about the organization and the effects of the intervention.

Grounded Theory

Grounded theory is a research method that seeks to develop theory that is grounded in data systematically gathered and analyzed. According to Corbin and Strauss (1990), grounded theory is theory discovery methodology that allows the researcher to develop a theoretical account based on concepts, categories and propositions. There are five phases of grounded theory building: research design, data collection, data ordering, data analysis and literature comparison, and each phase were evaluated against four research quality criteria: construct validity, internal validity, external validity and reliability. Orlikowski, (1993) uses grounded theory research in the findings of an empirical study into two organizations' experiences with the adoption and use of CASE tools over time. The study characterizes the organizations' experiences in terms of processes of incremental or radical organizational change. These findings are used to develop a theoretical framework for conceptualizing the organizational issues around the adoption and use of these tools and issues that have been largely missing from contemporary

discussions of CASE tools. Singh et al (2005) discussed on the challenge of methodological implication of moving from grounded theory to user requirement in IS design.

Results and Discussion

Conclusion

A research method is a strategy of inquiry to research design and data collection. The choice of research method will influence the way in which the researcher collects data. Specific research methods also imply different skills, assumptions and research practices. According to Benbasat et al (1996), no single research methodology is better that any other methodology, and in order to ensure the quality of information system research, Clarke (1997) listed the following requirements to be present in an IS research: the research method, applied within the scientific, the interpretive or the engineering tradition, the explication of a body of theory, which in most cases needs to reach back into reference disciplines, and also the extension of the theory. This give rise to the following motivation in conducting qualitative research in IS:

Spending many hours in the field, collecting extensive data, and trying to gain access, rapport, as to gain an “ insider” perspective in natural setting, and doing exploratory studies, where variables cannot be identified, theories are not available to explain behavior of participants or their population of study, and theories need to be developed.

The qualitative research does also present some challenges that the researchers might face in using the method. In grounded theory, the

challenges for the researchers are to set aside, as much as possible, theoretical ideas or notions so that the analytic, substantive theory can emerge, the researcher must recognize that this is a systematic approach to research with specific steps in data analysis.

The researcher faces the difficulty of determining when categories are saturated or when the theory is sufficiently detailed. The ethnography is challenging to use for the researchers as the researcher needs to have grounding in cultural anthropology, time to collect data is extensive, involving prolonged time in the field, and there is a possibility to be unable to complete the study or be compromised in the study. In case study research, some of the challenges that the researcher must face is that whether to study a single case or multiple cases.

The study of more than one case may dilutes the overall due to the lack of depth. In action research methods, lack of agreed criteria for evaluating action research, further complicates the publication review process, and makes this approach a difficult choice for academics. There is also an issue in both ethical and professional problems. Researchers who do not carefully explain their research orientation may mislead clients who are expecting consulting-type performance, creating an ethical breech regarding informed consent.

In the field of IS a variety of research methodologies has been explored by researchers for different aspects of research study depending on the research focus and application domain of the researchers. Whatever research method to use, there must be some way of assuring the quality of

the data collected, and the correctness of interpretation. There is also the need of a framework to guide the effort, and to clarify such methodological details, as it will provide a set of guidelines for a good IS research as suggested by Checkland (1991) and Lau (1997). A framework in Table 3 is proposed and has been used by Marzanah (2007) to guide the effort, clarify methodological details as the role of the researcher, the process of problem diagnosis, the nature of the intervention, the extent of reflection and learning intended, and whether there is new knowledge to be gained in the research.

The action research approach enabled us to understand the interaction of social organization and information systems, by introducing changes into these processes and observing the effects of these changes. The action research approach is proposed due to the value of capturing and explaining what is going on in real organization. By using action research, it enabled us to understand the interaction of social organization and information systems, by introducing changes into these processes and observing the effects of these changes. It serves as a checklist with its criteria and questions to assess the quality of the research.

The qualitative research methodology approach is viewed as significant in IS research due to the value of capturing and explaining what is going on in real organization. It enabled us to understand the interaction of social organization and information systems, the processes and observing the effects of these changes brought forward by IS. A research framework inaction research is proposed as guidance for the research activities to be undertaken to ensure the research objectives are met. The framework would

guide the research effort and clarify methodological details of the role of the researcher, the process of problem diagnosis, the real world happening in an organization, the extent of reflection and learning intended, and whether there is new knowledge to be gained.