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Metaphor Analysis for Improved Information Systems Design

Bec Neill
University of South Australia

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Bec Neill
Information Systems Doctoral School
University of South Australia
bec.neill@unisa.edu.au

Abstract

This paper presents the initial findings of an interpretive research study into improved methods of information systems design through a focus on interaction between information systems practitioners and system stakeholders. It argues that root metaphors and mental models of participants in the systems design act can be identified through metaphor and language analysis. By making these potential models and root metaphors explicit in future interactions both IS practitioners and stakeholders will gain better understandings of their organization's information systems requirements. Two examples of identified root metaphors and the subsequent change in understanding that occurred are presented in support of the argument.

Keywords: Requirements analysis, information systems design, metaphor, language analysis.

INTRODUCTION

The "conceptual" or "mental" models (see O'Connor and McDermott 1997; Weber 1997) and root metaphors people have about information and technology have been found to inform their actions. The action investigated here is people's contributions to the process and outcomes of information systems (IS) design in an organization. It may be useful to identify these prior images in order to inform the requirements analysis stage of an IS development.

RESEARCH OBJECTIVES AND QUESTIONS

From an interpretivist perspective, the nature and quality of engagement between organization members and IS practitioners when designing information systems should have significant impact on the outcomes of the design process. Largely unaddressed within the literature at a practical level, a path to engagement is, however, suggested by the literature on metaphor and language analysis. This research argues metaphor analysis techniques can be used to make explicit stakeholder's conceptual models of information and technology and so inform improved methods of requirements analysis.

The specific questions to be addressed are:

1. Can the root metaphors of stakeholders be identified?

2. Will stakeholders' root metaphors vary from those of the systems analysts/designers?

3. Can these techniques facilitate the development of culturally and contextually appropriate information systems?

Metaphor analysis has previously been used as a tool for making explicit the assumptions upon which theories are based (Morgan 1997), highlighting cultural differences between business people from different nations (Linowes 2000), improving communication between users and systems analysts in the systems development process (Kendall and Kendall 1993), and communicating the likely or typical roles systems analysts may assume within an IS development project (Avison and Wood-

Harper 1990). Within this research, metaphor analysis is used to investigate individuals' root metaphors of information and technology as a novel method for building engagement between IS practitioners and stakeholders.

THEORETICAL FOUNDATIONS

The argument presented in this research is that people's experience and use of information systems and technology is informed by different mental models. For the argument to be credible, theoretical support for IS as socially constructed systems is required.

That IS are socially constructed is clearly evident across the literature, in particular from the philosophical foundations of Churchman's inquiring systems and subsequent multiple perspectives approach (Mittroff and Linstone 1993), to debate about the nature of information itself (Boland 1987; Land 1985).

Using such social constructivist perspectives, this research suggests that IS stakeholders' tacit knowledge, prior experience, and mental models are crucial to the success of system design. Lanzara (1983) describes systems design processes as "creative inquiry taking place through transactions and conversations among multiple social actors" and Hirschheim et al. (1991) discuss IS design as "interlocked sequences of purposive performances by different actors to achieve meaningful responses from each other."

Morgan (1980) states "through language, humans structure their world in meaningful ways." This structuring of the world through "words, names, concepts, ideas, facts and observations does not so much denote external 'things' as conceptions of things activated in the mind by a selective and meaningful form of noticing the world." From this perspective, analysts and stakeholders attempt to understand the world from the other's point of view.

In doing so, analysts and stakeholders take concepts, ideas or language which they understand and map or transfer this meaning to the concepts, ideas, or language being used by another individual in an attempt to develop shared meanings. This mapping is found in the everyday use of language as metaphor (Reddy 1993) and also in the use of signs or symbols to communicate ideas or messages. Metaphors and images are useful to build shared meaning within the process of information system design for two reasons. First, their inherent application is one of transferring or mapping meaning and, second, their common use within everyday life suggests they are a tool that will be readily accessible to most, if not all, participants in an information system design project regardless of their background, experience, and mastery of language.[1]

Morgan (1997) suggests that metaphors can be used to analyse an organization from multiple viewpoints or worldviews, which supports the notion of metaphor as a tool for exploring the multiple perspectives of social actors in IS design. Further evidence to support the use of metaphor is provided by Nonaka and Takeuchi (1995), who advocate metaphor analysis as a method for turning tacit knowledge into explicit knowledge. Argyris and Schön (1996) suggest double-loop learning requires tacit knowledge be made explicit. If systems designers are to understand the domain of the system stakeholders and vice versa, there is a need to adapt theories in use to accommodate the new information.

Kendall and Kendall (1993) studied metaphors used by IS stakeholders across organizations to provide some classification for choosing appropriate IS development methodologies. Zmud et al. (1993) have identified the usefulness of metaphor as tools to elicit IS requirements from users while Stander (1998) discusses the implications of using culturally based metaphors in user interface design. These applications of metaphor to IS research are consistent with the approach, proposed here, of metaphor analysis to make explicit the root metaphors of information and technology stakeholders use in the act of IS design.

RESEARCH METHODOLOGY

Research Location

The research study is located in a community-based organization working toward indigenous land rights through litigation and negotiation of native title. The organization is staffed by indigenous and non-indigenous people working in professional and support roles. As part of an agreement to conduct research in the organization, time was spent time designing and delivering a

[1]Research suggests that young children are adept at responding to metaphor and, indeed, are capable of using quite diverse metaphors which cross senses, an aspect of metaphor use which recedes as children develop further (Marks et al. 1987).

network upgrade, e-mail, and Internet facilities. Interviews and meetings with key staff were conducted to explore their information technology infrastructure requirements as well as ongoing IS requirements.

Research Paradigm

This research necessarily assumes an ontological perspective of relativism in which multiple realities exist as subjective constructions of the mind. Furthermore, the research design requires making research participants aware of the conceptual models of information and technology they use within the information system design process as a method for developing improved understanding between researcher and participants. The chosen research approach must accommodate the bias inherent in interaction between researcher and participant and the likelihood of participants changing their behavior as a result of involvement in the research study.

Research Method

The research method selected is an interpretative case study following Klein and Myers (1999) interpretive field study guidelines. Data collection and analysis is being conducted in several cycles, allowing for verification of analysis in subsequent data collection phases. After collection, data is scanned for stakeholder language, texts, or images that indicate possible deep structures or root metaphors of information and technology. This analysis is cross-referenced to field notes and is fed into the interview process. Explicit discussion of root metaphors or models may be introduced and/or interview questions may be adjusted to draw upon the identified metaphors and models. Interview transcripts (before and after) will then be compared to assess the impact of exploring the root metaphors and mental models with participants.

EVIDENCE

Given the limited nature of the discussion possible here, two examples, which provided significant insight and developed deeper understanding of the needs of the organization, are presented.

"The System" Metaphor

The initial meeting between the researcher and the organization highlighted the use of the term "the system." One staff member commented, using the singular form, "Overall, we want a system that provides…." and went on to detail requirements for Internet access, e-mail, remote networking, a database, records management, and high levels of security and backup for anthropological and legal information. Other staff members, when discussing IT related problems, used the singular term the system to refer to multiple components of the organization's IS environment. The researcher's impression of the use of singular the system was that of naïve users without sufficient knowledge of information systems to differentiate between the multiple information systems existing in their organization.

Further interviews yielded similar usage of the term: a senior lawyer used the system to inclusively refer to a common filing system (paper/legal files) across the organization, an Access database design to track anthropological documents and files, a future document management system, a future file management system, and a scheduling/case management system. Yet this lawyer was certainly not a naïve user of technology.

Reflecting upon the researcher's use of similar terms, a contrast could be made between the singular the system used by staff and the plural information systems preferred by the researcher. If use of the term the system is driven by a root metaphor, what might this be? One explanation is that the lawyer (and others using the term in this way) is employing a holistic model of work and organization in which information or information systems/technologies are not viewed as separate entities. On the other hand, the researcher, educated and trained in IS theory and methods, which assumes rational approaches to build technical artefacts, is employing a reductionist model to view, categorize, and analyze the different elements of the organization (e.g., work process, information flow, technology, human capacity).

As a brief example of how this might then be used to develop further understanding, the researcher may choose to adjust the questions or language used in future interviews to tap into the holistic models. For example, where the interviewer may have asked

a question designed to pinpoint the information systems currently being used such as "What applications are you currently using in your work?" an alternative question such as "Tell me about the system as you experience it…" might be substituted.

"The Mess" Metaphor

Visual analysis rather than language has also helped identify possible root metaphors. A visual inspection of the organization's offices highlighted the temporary nature of storage arrangements for files, documents, and computer equipment. Legal files overflowed from desktops to flat surfaces to the floor. Boxes of documents and files, perhaps for archive, sat in corridors and empty offices (see Figures 1 and 2).

Figure 1. A Filing System?

Figure 2. Archived Files in the Corridor

Staff members often discussed the difficulty in locating information, especially when the staff member responsible for a case was absent from the office. The researcher's impression was that the organization had moved offices and never unpacked. What a mess! Upon reflection, the researcher's use of the "term" mess and strong personal reaction to the office space was related to her underlying mental models of information as structured: information should be organized and ordered; when messy it is "wicked" (Checkland and Scholes 1999).

The apparent lack of structure and order at the organization in relation to information and documents was not seen as a priority for change. This suggests unstructured information was not at odds with their underlying models of information and technology. The researcher found the examination of mess as a root metaphor led to insight about the nature of work and information management in the organization, in particular, if the idea of unstructured was central to information management then so too might ideas of flexibility and ambiguity. This is consistent with other observations of the organization's culture, such as the extremely flexible nature of meeting times and places, the limited use or mention of deadlines associated with outcomes, and the ambiguous nature of the organization's structure and reporting lines.

Alternate root metaphors may also be presented with regard to how information is handled in the organization. In an environment where the onus of proof of native title is on the aboriginal claimant communities, emphasis is placed on discovery of unknown information rather than on management of what is already known (and documented).

CONCLUSION

The sample research findings indicate that language analysis is useful for making explicit the individual's root metaphors about IS concepts and that examining these models leads to improved understanding between the analyst and stakeholders. These findings may be tempered by the distinct difference in the backgrounds and experience of the researcher and participants. The magnitude of the difference may facilitate the ease with which metaphor and subsequent mental models have been identified as well as amplify the impact of being able to do so.

From a broader perspective, this research should contribute a better appreciation of the uses of language analysis as a requirements gathering technique in information systems design. A conference presentation of this research in progress will present further methodological detail and discuss the implications for IS practice.

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