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Deborah Bunker
University of Wollongong

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Deborah Bunker

The Business School
University of Wollongong

"A tool, like an utterance, only reveals its meaning to those who can infer it by reconstructing it in their own context. Oakley [1957]" in Bronkowski [1977].

Abstract

This paper represents the further development of ideas presented at the AIS Conference in Arizona in August 1996. At that conference an Information Technology and Systems (IT & S) paradigmatic framework was outlined which presented the idea that the IT & S research area could be expressed through a model of tool creation and use. This paper further refines this framework and highlights the implications of such an approach to IT & S in the area of international technology transfer (ITT).

Definitions

Technology — "Technology is broadly defined as the documented or licensed technology, the embodying artifacts (equipment, software tooling), and the wherewithal to know how to successfully deploy the technology." Robinson [1988]

Technology Transfer — "The conveyance or shift of tools, techniques, procedures and/or the legal titles thereto used to accomplish some human purpose," Resman & Zhao [1991].

Context —"The client as the receiver of the technology, must create the context (technology, transfer, context, talent, modification, management, resource and contribution) and verify its capacity to receive and apply the technology and information in the new environment" Lien [1994].

Introduction

Understanding the process and role of tool creation and use in relation to the IT & S discipline/paradigm is fundamental to understanding the cultural bias inherent in the process. The definitions used in this paper are those generally used by the research comunity in the area of technology transfer (TT). These definitions are loaded with such terms as "artifacts", "technology" and "tools". If we accept that IT & S is a tool focussed discipline then we must look at the context of the creation of those tools in order to better understand how they can be used more appropriately and effectively in different cultural contexts.

Bunker & Dean [1996] discuss Kuhn's [1970] theory which suggests that the underlying structure of a discipline arises from a set of assumptions generally accepted by practitioners, teachers and disciplinary constituents. Techniques and tools defined by the discipline are created from a common understanding. They may be part of an evolutionary creation process or equally be created via a "paradigm shift" however, they do become indicative of the generally held underlying assumptions of the discipline. Schein [1984] suggests a three stage ascent from basic assumptions to the artifacts and creations which drive the evolution of paradigms (see Figure 1). If we look at the tools in current use by a discipline, generally accepted underlying assumptions can be deduced.

It has been shown that the model of a discipline is in four parts (Bunker & Dean 1996 - see Figure 2 - this has been changed from the 1996 version of the model). By extending the idea of tools being the visible sign of paradigmatic assumptions which underpin a discipline, we find that four entities play a role; the tool Maker, the tool User, the Scholar and the Inheritor of the discipline. The tools that reflect the IT & S discipline are created and used in a multitude of contexts. What are the implications for the discipline and the diffusion and use of these tools ?

IT & S Tool Creation And Use In Context

Young (1971) in his Introduction to the Study of Man defines tools in the following way: tool-making assumes skills and ways of life that are transmitted by interpersonal communication and tradition rather than genetics; tool-making involves foresight as to the use of the tool; tools are made by a technique that is learned from others and involves symbolic communication (language); tools are made according to an evolutionary convention (gradual) and tools are made and used in a cultural context.

Tools are not only technical in nature and function but also fulfil a social role. Take for example DeLisi's [1990] discussion of the Yir Yeront, an Australian aboriginal tribe whose use of the stone axe symbolised a critical system of social relationships with the tribe and between it and other tribes. The stone axe fulfilled a physical function (chopping wood, hunting, constructing

huts) and also a social function (only men could own axes and women had to borrow them according to kinship rules). DeLisi goes on to describe the trading relationships with the tribes that controlled the source of the stone, and the festivals, initiation rites and totemic ceremonials that surrounded these relationships. The Yir Yeront, however, had their culture changed irrevocably, toward the end of the nineteenth century, with the impact of the European steel axe (as did their trading partners). In the same way, the creation and introduction of computer information systems, can have a powerful effect on the organisation and culture into which they are introduced. For example the literature is full of stories about IS failure (Sauer (1993). Are these really stories about the impact (or lack thereof) of these tools within organisations or target cultures?

Techniques and tools are created from a common understanding or cultural context. They become an expression of generally held underlying assumptions Schein [1984]. The cultural context underpinning tool creation and use is created and evolves over time. The assumptions which in turn underpin cultural context are deep-seated, taken-for-granted, invisible and preconscious and are patterned into what Schein [1984] terms cultural "paradigms".

Cultural paradigms can be expressed in a number of ways. Research conducted by Kluckhorn and Strodtbeck [1976] and Hofstede [1980] are typical examples of the different assumptions on which various cultures are based. Schein [1984] expresses the assumptions of cultural paradigms as the: organisation's relationship to its environment; nature of reality and truth; nature of human nature; nature of human activity and the nature of human relationships.

These assumptions represent the philosophical position of a particular culture and Schein [1984] uses the example of the differences between some Eastern and Western cultures as an example:

Western cultures:
• are oriented towards mastery of nature,
• are based on individualistic competitive relationships,
• are future-oriented, linear, monochronic concept of time,
• view space and resources as infinite,
• assume that human nature is neutral and ultimately perfectible and,
• base reality or ultimate truth on science and pragmatism.

Eastern cultures:
• are passively oriented towards nature,
• seek to harmonise with nature and with each other,
• view the group as more important than the individual,
• are present or past oriented,
• see time as polychronic and cyclical,
• view space and resources as very limited,
• assume that nature is bad but improvable and,
• see reality as based more on revealed truth than on empirical experimentation.

If we accept that there are vast differences between these two views of the world, and that IT & S tool creation and use is underpinned by these cultural paradigms, what then, are the implications for the development and use of an IT & S tool in one culture for diffusion and use in another ? In this fast-paced, highly volatile and mobile global society, many organisations find themselves in a situation where the transfer, diffusion and use of IT is pushed at an extrodinary rate. Cardwell [1994] argues the importance of IT as "one of the great strategic technologies; arguably in its applications and scope exceeding all others". Richard Baskerville [1995] explains that the use and management of IT is an expression of an organisation's structure and culture and that as we computerise the symbolic universe of the organisation that we can view the system and its information as artifacts.

The impact of IT pushed into organisations with many contextual differences, in such a small time-frame, has far reaching implications for organisations within a nation and also across borders. Robinson [1988] has likened the process of developing technology in one society and implanting it in another without adaptation as "transplanting a living organ from one body to another without testing compatibility."

Straub (1994) conducted a study on the effect of culture on the diffusion of e-mail and fax in Japanese and US companies. His findings indicated that the Japanese companies he studied did not use e-mail to any large degree but that they used fax extensively. The US companies, however, did exploit the advantages of e-mail and fax. Why were the two cultures so different in their approaches to the use of IT? Cultural paradigms, particularly those expressed by Hofstede [1991] were one of the major reasons for the different treatment of the technology by each culture. The Japanese cultural context of uncertainty avoidance meant that those companies relied on more traditional and information rich channels in order to communicate. Asynchronous, lean and one dimensional channels such as e-mail were rejected. The graphical nature of the Japanese language also made it very difficult for those organisations to use a communications medium, such as e-mail, and still retain subtle meaning within their language. As Straub highlights, findings such as these may also point to the non-suitability of Local Area Networks as a communications medium within Japanese organisations due to the way in which they make people organise their work practices i.e. they assume that for productivity purposes e-mail will be used for communication instead of paper based mail and that word processing will be the norm for document creation. Further to this, Straub considers the implication of this idea in relation to international productivity comparisions between the two countries.

Implications

If International Technology Transfer is to be fully understood then further research is necessary. If we better understand the cultural context in which IT is created as well as the cultural context of the recipient, we may have to admit that some IT may not be appropriate for transfer under certain circumstances, may have to be radically redeveloped to accommodate differences in context or that the culture of the recipient may have to change in order to accommodate the technology as in the case of the Yir Yeront. Kanellis & Paul [1996] and Lycett, Kanellis & Paul [1997], consider the development of information systems "as artifacts designed to be adaptive in the first place". They consider the problem of IS failure as one of the IS not meeting staheholder's expectations.

> "Expectations represent evaluative dispositions which are derived from the stakeholder's common pool of values. In many cases these expectations are vaguely expressed, and are never rationalised or verbalised as real concerns..." Lyytinen & Hirschheim's [1987] in Lycett, Kanellis & Paul [1997].

These values are cultural paradigms and as such, are not generally articulated. Lycett, Kanellis & Paul [1997] discuss the stakeholder's "intentionality" or the representation of values in structures, practices and conventions of an organisation. Schein [1984] articulates much the same argument when he speaks of the artifacts and creations of an organisation such as documents and charters. IT & S are also artifacts or tools which are a direct expression of the cultural paradigm of their creators.

In researching within our discipline, the question needs to be considered, can an IT & S only ever be reflective of the basic assumptions and values (cultural paradigms) of its creators and immediate user population ? Is the temporal 'snapshot' that Lycett, Kanellis & Paul [1997] discuss that provides "the picture of reality" of the system, all that we can ever hope to have, or can we assume that we can (and should) develop IS tools (physical tools) and techniques and methods (conceptual tools) that can be adapted and changed to suit contextual differences?

References

Baskerville, R. [1995] "Structural entropy model of technology transfer" in Kautz, K., Pries-Heje, J., Larsen, T. & Sorgaard, P. (Eds) Proceedings of the First IFIP TC8 Working Conference on Diffusion and Adoption of Information Technology. October, 14-17,1995, Leangkollen, Oslo, Norway. Conference Notebook.

Bunker, D.J. & Dean, R.G. [1996] "Towards an Information Systems Paradigmatic Framework, Association for Information Systems", Proceedings of the Americas Conference on Information Systems, August 16 - 18, 1996, Phoenix, Arizona USA.

Bronowski, J. [1977] A Sense of the Future MIT Press

Cardwell, D. [1994] The Fontana History of Technology Fontana Press

DeLisi, P.S. [1990] "Lessons from the Steel Axe: Culture, Technology and Organisational Change", Sloan Management Review, Fall 1990.

Hofstede, G.[1980] Culture's Consequences: International Differences in Work Related Values. Sage Publications.

Kanellis, P. & Paul R.J. [1996] "Will Information Systems Continue to Dissapoint ?" Proceedings of the Americas Conference on Information Systems, August 16 - 18, 1996, Phoenix, Arizona USA.

Kuhn, T.S. [1970], The Structure of Scientific Revolution, [2nd ed] the University of Chicago Press.

Lien, L. [1994], Transferring Technologies from Developed to Developing Industrial and Commercial Environments, from IFIP Transactions Diffusion, Transfer and Implementation of Information Technologies L.Levine (ed), Proceedings of the IFIP TC8 Working Conference on Diffusion, transfer and Implementation of Information Technology, Pittsburgh, PA, USA, 11-13 October.

Lyytinen, K. & Hirschheim, R. [1987] "Information Systems Failures: A Survey and Classification of the Empirical Literature" Oxford Surveys in Information Technology, 4, pp 257 - 309.

Lycett, M., Kanellis, P. & Paul R.J. [1997] "Philosophical Directions for Information Systems Development", Proceedings of the Americas Conference on Information Systems, August 23 - 27, 1997, Minneapolis, USA.

Oakley, K.P. [1957] Tools makyth man Antiquity vol31 ppl99 - 209

Resman, A. and L. Zhao [1991] Journal of Technology Transfer, Spring .

Robinson, R [1988] The International Transfer of Technology: Issues, Theory and Practice. Ballinger Publishing Company (Harper and Row, Publishers Inc. Cambridge)

Sauer, C. (1993) Why Information Systems Fail: a case study approach. Alfred Waller, Henley-On-Thames.

Schein, Edgar H. [1984] Coming to a New Awareness of Organisational Culture, Sloan Management Review, Winter.

Straub, D.W. [1994] "The Effect of Culture on IT Diffusion: E-Mail and FAX in Japan and the U.S." Information Systems Research, 5:1.

Young, J.Z. [1971] An Introduction to the Study of Man, Oxford at the Clarendon Press

Diagrams available from the author on request (deborah_bunker@uow.edu.au).