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Developing Tailorable Information Systems through Deferred System's Design

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Abstract

The development of business information systems for changing social organisations is considered by redefining the 'engineering problem' of information systems development as the 'living problem'. Tailorable information systems are proposed to address the living problem. The concept of deferred system's design, derived through interpretivism and phenomenology, provides a design philosophy for addressing the living problem.

1. Introduction

The tailorable information systems (TIS) view is presented in this paper. It treats the development and usage of information systems (IS) as a *like for like* principle, and seeks to provide a dynamic IS development and usage environment for changing information needs in changing organisations. It specifically considers IS *usage*. It is proposed here that an aspect of the living systems paradigm (Paul, 1993) should include TIS, since they cater for organisational context, situation and change. Patel's (1999) notion of *deferred system's design* (DSD) allows for such emergent properties of IS to be facilitated. It is a radically different view of developing and using IS. DSD is the view that users themselves should be able to design and develop IS in human and social contexts.

The problem of developing business IS is first reformulated as a 'living problem'. A brief overview of TIS thinking is then given to provide refinement of the living problem. The spiral of change model of tailorable information systems is presented as an intersubjective theory of the relationship between changing organisations and IS. Tailorable computer systems are briefly considered next for their potential contribution to developing TIS that are responsive to business change. An appropriate design philosophy, namely DSD, to develop TIS is then explained. The final section concludes the paper.

2. An Engineering Problem or a Living Problem?

Business IS are essentially exchanges of data, information, and even knowledge among humans. This makes IS an integral aspect of *being human*. Each individual's or group's perception of the world is different. Winograd and Flores (1993) phrase this as *ontology* views. Given the differences in ontology, IS are essentially ontological exchanges of our different perceptions of the world. In the business context, individuals' and groups' different ontologies would require IS that provide the relevant data, information, and knowledge to exchange or communicate different views. Such social communication is regarded as phenomenological (Boland, 1985).

These differences in ontology are a product of *living* in the world. Our views are shaped by our different experiences, and these experiences determine our different ontologies. The problem of developing business IS is not so much an engineering problem as it is a *living problem*, if it can be regarded as a 'problem' at all in the sense of having a 'solution'. Our experiences, or the experiences of persons in business or groups, are the result of living and working in social groups. Patel (1995) argues that business IS should be regarded as being simultaneously products and living (human) processes. We should not conceive of IS development as once-and-for-all activity, but as an ongoing, user enacted process. In Heiderggerian terms, the question of the meaning of Being is seen to be facilitated by such living IS (whether computer based or not). (See Dryfus, 1994 for Heideggar's philosophy). Thus the 'living problem' is the view that IS, being part and parcel of human ontological interaction, should be regarded as products and processes simultaneously which are continuously developed to facilitate data, information, and knowledge exchanges.

3. Developing Contextually and Situationally Sensitive IS

Business IS that are developed by defining the problem as an engineering problem tend to *mechanise* human behaviour, because they reduce *being human* to an engineering problem. The thinking on living information

systems should be underpinned by the view that being human should be facilitated or even enhanced using computer-based IS. Thus, in DSD, the researcher is part of the phenomenon being studied (Boland, 1985).

The living problem addresses the question of how to match IS to the changing nature of human data, information, and knowledge gathering, processing and dissemination processes. It is not possible to plan for all the situations that may arise in organisational life. Some information needs only become apparent in particular situations. In that sense, information has an *emergent* property, which cannot be planned for. Probert (1997) has used Patel's (1995) work on tailorability and concurs with the view that the need to tailor systems is an emergent property of IS, and he adds that enabling tailoring of IS caters for the intertwining between technical and social aspects. The work on tailorable computer systems, discussed in Section 5 below, is relevant to addressing this problem because it considers "diversity", "fluidity", and "ambiguity" (Trigg et al.,, 1987), concepts which are appropriate when considering the management and use of business information and knowledge.

4. The Spiral of Change Model of Tailorable Information Systems

The spiral of change model of tailorable information systems (the SOC model) is based on empirical research that examined four case organisations' development and usage of IS in changing conditions (see Patel, 1995 for details). The spiral of change model is explained below in terms of the need for information as continuous processes, users' unawareness of required information, the need to amend IS to match changing organisational situations, living problems rather than once-and-for-all solutions, and continuous development of IS.

In the SOC model, IS are regarded as continuous processes in changing organisations, or as ontological exchanges. Organisational factors of change cause information requirements to change too. Such organisational change requires TIS. Regarding an information system as a continuous process is in contrast to the classic life cycle model, which views it as only a product.

As continuous processes, IS are always amended to match changing organisational situations. Such amendments to an information system are to improve its effectiveness in supporting organisational work. This kind of continuous or living development of IS is in contrast to using business projects. IS developed using business projects are bound by time and monetary considerations, and aim to deliver a 'product'. Examples of deferred system's that are tailorable are spreadsheets and the World Wide Web.

Users do not perceive IS as products or as being a once-and-for-all "solution" to a "problem", as depicted in the classic life cycle model's engineering approach. Users of business IS need different information at different times, depending on factors of organisational change.

In the spiral of change model, analysis, design, and implementation are not treated as discrete events. As users use information technology in varying organisational situations, they perform situation-specific analysis, design, and implementation continually. This contrasts with analysis, design, and implementation as discrete events bound in business projects in the classic life cycle model and systems development methodologies.

5. Tailorable Computer Systems and Tailorable Information Systems

A development approach that uniquely considers users' contextual and situational needs rather than meeting predetermined requirements is tailorable computer systems design. Studies of such systems can inform the design of TIS. Trigg et al. (1987) provides an important principle for tailorable systems. They assume that it is impossible for systems designers to capture all conceivably required systems functionality, and significantly add that designers should enable users to tailor systems interactively from within systems interfaces. Trigg et al. (1987) cite "diversity", "fluidity", and "ambiguity" as inhibitors to users knowing all potentially required functionality (user requirements); more recently, this has been confirmed by Kjær and Madsen (1995).

The "Xerox Tailorable Buttons" system is appropriately described by MacLean et al. (1990) as a user tailorable system. Devising simple models of users and utilising participatory design methods lead to its development. Xerox Tailorable Buttons uses object oriented design and object implementation, and provided users with user-interfaces consisting of tailorable "Buttons". The system was interfaced with email so that user-tailored systems functionality designs and implementations may be shared among users. MacLean et al (1990) state that users can tailor Xerox Buttons on different levels with different systems properties and systems consequences, ranging from simple windows customisation on a desktop interface, to complex user-programming using fifth generation languages.

We need to re-think the role of users in DSD as analysts, designers and developers of their own systems. This idea is not made explicit in the literature. By allowing users to tailor systems, some of the responsibilities and power of systems analysts and programmers is shifted to users. TIS are different from tailorable computer systems (Trigg et al. (1987) because of the inclusion of DSD itself.

Building on Patel's (1995) work, Stamoulis et al., (1996) have proposed a tentative conceptual tailorable systems architecture model exploring tailorable information in business. Thus the notion of tailoring is relevant to IS which cannot be completely specified or defined in advance, systems such as the proposed tailorable information system. This kind of information system requires an appropriate design philosophy as discussed in the next section.

6. Deferred System's Design and Systems Tailorability

The concept of *deferred system's design* is helpful for designing IS that have to adapt to unknown change. This concept is underpinned by the idea that users of IS themselves should be able to design IS for and in the variable or changing organisational situations they encounter. Allowing users of IS to do this type of systems designing is coined deferred system's design (Patel, 1999).

The DSD concept can be thought of as the principle of *like for like*. The like for like principle is the view that IS development and *usage* should be matched with the actual context and situations in which they happen. The actual situations are changeable or dynamic, consequently IS must also be changeable or dynamic.

Swartout and Balzer (1982) argue that the specification and implementation of program code is 'intertwined'. The DSD concept encapsulates the argument that 'specification' cannot be separated from 'implementation', IS should be designed to allow users themselves to make systems design decisions in changing social organisations.

The concept of DSD may be formulated as an IS design principle, and is coined *deferred system's design decisions*. The principle is the view that organisational change makes IS environments dynamic, so IS should be designed in such a way as to enable users to make the actual systems design decisions, depending on the organisational situations in which IS will be used. By allowing users to design systems, the IS become responsive to users' situational needs. In this way, deferring systems design decisions to them.

The principle of DSD decisions is a radically different view. It seeks to actualise Suchman's (1987) view that (intelligent) computer systems designs should consider the non-planned nature of most human behaviour, which she calls actors' "situational actions". It has been formulated to cater for variable and unobservable meanings. It provides the basic approach to designing *tailorable information systems* in which systems functionality is capable of coping with organisational

variability in terms of the different meanings attached to information by users. In that sense, the use, design and study of tailorable information system is a hermeneutic process (Boland, 1985).

7. Summary and Conclusions

The problem of developing business IS was reformulated as a 'living problem' rather than an 'engineering problem.' The SOC model was presented as an intersubjective theory of changing IS, which require systems tailorability. To design TIS the concept of DSD was expounded as an appropriate design philosophy.

Tailorable business IS and DSD provide radically different ways of viewing data, information, and knowledge in organisations. These ideas should enable a designer to design IS that is relevant to the way human organisations are. Adorno's (1978) philosophical view that culture is administered through technology can be studied to understand better the SOC model and the concept of DSD. Similarly, an appropriate theory of human communication is required to examine the role of tailorable information systems in ontological exchanges or communication.

References available upon request from Nandish Patel.