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Towards an Epistemological Framework for Measuring the Fit of Information Systems Under Perpetual Change

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Abstract

The research reported in this paper is based on the argument that organizational information systems as we currently build them tend in most cases to disappoint. This happens because they are inflexible artifacts whose purpose is to model dynamic organizations. Our objectives are to find better ways of thinking about change and adaptation of information systems within organizations by exploring the concept of 'fit'. The degree of fit between a given organization and a given information system can be judged subjectively, but currently there exists no measure which is general useful and objective. There is also no research that identifies what criteria people use when they make these subjective judgements. Our endeavours focus to determine what the barriers to such knowledge are, and to develop a generic framework for acquiring and maintaining such knowledge in any desired context.

I. Introduction

The notions of 'success' and 'failure' are prevalent in everything we do in our everyday lives as they materialize in our premonition with results. The Information Systems (IS) field is no exception, as is evidenced by the large body of work dedicated to an understanding of their causes and implications. (DeLone & McLean, 1992; Ein-Dor & Segev, 1978; Heiskanen, 1994; Lyytinen & Hirschheim, 1987; Lucas, 1975; Sauer, 1993; Kaye, 1990) The systemic nature of the objects under evaluation make such work a complex and difficult task, and as a result it is not surprising the fact that the identified number of dependent variables seemingly responsible for the success or demise of IS is large. However, previous attempts have failed to address explicitly the variable of change and its role as an obstacle in the development of successful IS.

II. Change and Information Systems

Failure: The Case for Flexibility

It can be argued that a level of benefit that can be identified for a business situation (problem/opportunity area) is that of improving the flexibility/adaptability of a given business process in a given dynamic environment (Veryard, 1994). Regarding IS, a project based nature dominates our ways of thinking and the approaches and methodologies that we employ in developing them. This has serious causal implications for failure as a project based approach is inherently finite time horizon driven, whereas the environment is infinite horizon (Paul, 1993). IS do inhabit a time continuum from their inception to their final demise (intentional or otherwise), and any notion of failure should be tried and explained within this parameter as it can occur at any point and can take any form.

For the purpose of this study, we assume that an IS is said to have disappointed when a) the system no longer meets its specific design objectives (internal failure) or b) the system objectives no longer meet the information needs (misfit failure) (Bignall & Fortune, 1984). These two types of failure are not mutually exclusive but a direct relationship exists with the dependent variable of change at its core. Change is perceived here as an element - emanating from a number of sources internal or external to an organization - that has a destabilizing effect on a system that has no adequate response for it. IS as organizational models are constantly required to meet the information needs of the organization operating in a dynamic mode. The inability to do so results in misfit failure. As the information needs dictate the system objectives - if the system is build to an exact specification as a result of a requirements 'freeze' at a certain point in time - the unavoidable inability to meet them as they will with no doubt change, results in internal failure. Hence disappointment, due to destabilization imposed by change on a system which has not been designed to provide for it.

Three observations about IS failure can be made:

- It is easier to come to an agreement as to what constitutes 'failure' than 'success'. This is because failure is an event, whereas success is a state.
- Attention should be paid as not to confuse 'project failures' with 'system failures'. There is a difference between "An IS development project does not deliver what is required to deliver" and "An IS (as an organizational model) does not provide the service that is required of it.
- All adopted notions of failure should be relative and not perfectionist ones. In every case there will be some benefits to some stakeholders.

It is postulated therefore, that the effectiveness of IS should be judged against not static but highly dynamic goals, and that the solution lies in flexible IS that can cope with both evolutionary and revolutionary changes. Very few aspects, if any, of business operations are expected to be designed for life, and as a successful organization is constantly adapting to change, so should the IS (Paul, 1993). This, as a justification for the need of such systems, has also been stressed by Blumenthal, 1969; Cotrell & Rapley, 1991; Gunton, 1989; Oei et al, 1994 and Slooten & Schoonhoven, 1994. Vickers (1965) has pointed out that management has as much to do with the maintenance of norms as with the attainment of goals. In this case, the desired norm is a relationship between an

organization and its IS known as 'fit', [see for example, Iivary, 1992; Markus & Robey, 1983; Pliskin et al, 1993 and Swanson, 1987] while the organization itself is subject to perpetual change. The perception/knowledge of fit and change are seen by the authors as epistemological problems that define the research objective: to find better ways of thinking about change and adaptation(of IS within organizations).

III. A Research Framework

Previous work on flexible IS has provided little knowledge in a structured and unified manner by being largely implicit and ambiguous. Moreover, research on IS fit - with minor exceptions (Ewusi-Mensah, 1981) - has not focused on the dependent variable of externally imposed change and consequently has not taken into consideration both the organizational and internal environments and any prevalent cause-effect phenomena. In addition, it has concentrated on the application rather than the organization- wide IS [see, for example, Brittan, 1980].

Considering the above, a conceptual model for an Organizational IS is developed (see Appendix). This model however, does not 'see' the organization as providing the external environment for the IS (Ives et al, 1980), and unlike the traditional Management Information System which tends to look inwards, such an IS "..would be additionally (and possibly mainly) externally orientated." (Tricker, 1992). The Organizational IS in the model, comprises of four subsystems, the Operating, Maintenance and Adaptive systems (Handy, 1985) and the Formal IS. The presence of an Informal IS is explicitly depicted. The importance to realize the existence of informal structures within formal artifacts was stressed by Land (1992), and we argue that often the 'Effective IS' (the system-in-use) differs from the Formal IS (the system-as-defined).

This has important epistemological implications for research. In the model, the adaptive systems are concerned with fitting the Organizational IS with its environment. The main processes are the transformation of the perceptions of the participants into assumptions about the fit which in turn are communicated to the Formal IS and guide the development process. It is hypothesized that these processes can be largely held responsible for the success or failure of the system.

IV. Measurement of Fit

Veryard (1994) gives an interesting analogy between the measurement of the fit of a garment and the human body and that of an organization and its IS. He identifies three reasons as to why a person might wish to measure the dimensions of a body over time:

- to change or control it.
- to procure clothing that will continue to fit for a reasonable period.
- to know how long a given garment will last.

With clothing, we can employ reasonable - although not very precise - predictive models of the dynamics of body shape, as we have considerable information about the kinds of

change that the body may or may not undergo. With IS, although the degree of fit between a given organization and a given IS can be judged subjectively, currently there exists no measure which is general, useful, and objective, or any research that identifies what criteria people use when they make these subjective judgements. Our work looks to determine what the barriers to such knowledge are, and to develop a generic framework for acquiring and maintaining such knowledge in any desired context.

To achieve this, research into the following questions is currently being undertaken:

- how can we deduce things about the future from present snapshots?
- how are people(including ourselves) currently trying to think about future fit? What is wrong with the way people are currently trying to think about future fit?
- what theoretical leverage is available to improve our ability to think about future fit?
- how do we confirm statements about the future? How do we confirm a method(or epistemological framework) that purports to make statements about the future?
- what actions do people take or think are appropriate in order to attain a level of flexibility in designing IS? What are the obstacles in doing so and how far/close is the actual result to the intended one? What is the frequency of the occurrence of such gaps if any?
- how and what criteria do people actually use in assigning values to various aspects of IS flexibility? Are there any cultural or political factors that influence this process?

V. Research Approach

An interpretivistic position has been adopted. We adhere to the stance that no individual account of reality can ever be proven as more correct than another, since it will be impossible to compare them against any objective knowledge of a 'true' reality. Interpretive research methods aim "..in producing an understanding of the context of IS together with the process whereby the IS influences and is influenced by such context. [Consequently] ..there are no correct and incorrect theories but there are interesting and less interesting ways to view the world." (Walsham, 1993).

A case study research method was chosen as it is a well proven approach in researching IS (Franz & Robey, 1984; Iivary, 1992; Benbasat et al, 1987) and shows strong adherence to an anti-positivistic approach (Burrell & Morgan, 1979). A first case study has already been conducted in an exploratory manner in order to clarify the context and nature of the phenomena that had to be studied. A second case study will be used as a vehicle for hypothesis generation. This will be carried out using Action Science as a better understanding will be gained from participating in an organization's activities rather than by conducting 'snapshot' studies and drawing indirect conclusions from the opinions and perceptions of participants. Action Science falls under the category of interpretive research and is "..primary applicable to the understanding and planning of change in social systems." (Gummesson, 1991). Its suitability to the study of IS in particular has been well documented by Checkland (1981) and Jonsson(1991) amongst

others. A third case study will serve for the testing and consequent confirmation or disconfirmation of the hypotheses. Triangulation (Denzin, 1978; Patton, 1990) is used as a method of gaining objective evidence of the accuracy and adequacy of data reported by the participants or gained by other sources.

Note: Due to lack of space references and appendix are available upon request

FOOTNOTES**********

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