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The discipline of information systems: Let many flowers bloom!

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Abstract

It is frequently suggested that inconsistencies in applying different views, modelling approaches or paradigms for information systems are unmotivated or not well justified. By drawing on approaches to information systems development as an example, this paper suggests that there are good reasons for a lack of harmony. There are many different approaches to developing information systems. These may be oriented towards technological, people or organisational aspects amongst others. But organisations themselves are different: there is no standard organisation where a standard information systems development methodology will always be appropriate. Even within any one organisation, a standard methodology may not be appropriate, because people are different and teams of people and departments are different. In this particular context, as a contribution towards consolidation, a contingency approach to information systems development is proposed. However, this is a holistic approach, not one that simplifies a complex problem through reductionism. The pattern of pluralism is repeated on considering research methods appropriate to the discipline and the range of relevant source disciplines. Information systems is a pluralistic discipline, and attempts at consolidation and harmonisation must not lead to simplification, where the discipline will no longer be appropriate to the complex, messy world of organisations and their needs it should be addressing.

Keywords

Multiview, Discipline of Information Systems, Information Systems Research Methods, Information Systems Development Methodologies

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1 INTRODUCTION

1.1 The inter-disciplinary nature of information systems

In recent years there has been much debate about the actual state and possible future of information systems as an academic discipline (Banville & Landry, 1989). While there is, as yet, no consensus as to what should be included or excluded from the field (Dickson *et al*, 1982) it is argued in this paper that information systems is an essentially pluralistic field, founded on knowledge from many other well-established source disciplines. The insights from the source disciplines have proved of relevance to researchers, teachers and practitioners alike.

The multi-faceted nature of the field is seen if we consider a definition of the central object of our discipline. Buckingham *et al* (1987) define an information system as follows:

> 'A system which assembles, stores, processes and delivers information relevant to an organisation (or to society) in such a way that the information is accessible and useful to those who wish to use it, including managers, staff, clients and citizens. An information system is a human activity (social) system which may or may not involve computer systems.' (p18)

This definition would seem to encompass a wide range of areas, for example, information theory (information), semiology (delivers information), organisation theory and sociology (organisation and society) and computer science and engineering (computer systems).

In order to illustrate the pluralistic and multi-disciplinary nature of information systems we look at one aspect of information systems research, teaching and practice: that of information systems development.

2 INFORMATION SYSTEMS DEVELOPMENT

2.1 Approaches to information systems development

There is a wide variety of approaches to information systems development and a large number of methodologies based on each of the general approaches. Longworth (1985) identifies over 300 information systems development methodologies. Wood-Harper & Fitzgerald (1982) discuss two basic differences of approaches as lying either within a systems paradigm or scientific paradigm, illustrated by soft systems method (Checkland, 1981) and structured analysis and design (DeMarco, 1979; Gane & Sarson, 1979) respectively.

Avison & Fitzgerald (1995) widen the basis for comparison and suggest that information systems development methodologies can be compared on the basis of philosophy, model, techniques, tools, scope, outputs, practice and product, and they classify approaches within a number of broad themes including:

- Systems
- Strategic
- Participative

- Prototyping
- Structured
- Data
- Object-oriented.

General systems theory attempts to understand the nature of systems which are large and complex. Organisations are open systems, and the relationship between the organisation and its environment are important. Systems approaches attempt to capture this 'holistic' view, following Aristotle's dictum that 'the whole is greater than the sum of the parts'. By simplifying a complex situation, we may be reductionist, and thereby distort our understanding of the overall system. The most well-known approach of this type in the information systems arena is Checkland's soft systems methodology (SSM), found in Checkland (1981) and Checkland & Scholes (1990), although the most convincing account of relevance to information systems is found in Wilson (1990).

Strategic approaches stress the pre-planning involved in developing information systems and the need for an overall strategy. This involves top management in the analysis of the objectives of their organisation. Planning approaches counteract the possibility of developing information systems in a piecemeal fashion. IBM's Business Systems Planning (IBM, 1975) is an early example of this approach and more recent examples are found in Lederer & Mendelow (1989), Earl (1989), Bullen & Rockart (1984), and business process re-engineering (Hammer & Champy, 1993; Davenport, 1993) is part of this movement.

In participative approaches, the role of all users is stressed, and the role of the technologist may be subsumed by other stakeholders of the information system. If the users are involved in the analysis, design and implementation of information systems relevant to their own work, particularly if this takes the form of genuine decision-making (as against lip-service consultation at the other extreme), these users are likely to give the new information system their full commitment when it is implemented, and thereby increase the likelihood of its success. ETHICS (Mumford, 1983) stresses the participative nature of information systems development, following the socio-technical movement and embodies a sustainable ethical position.

A prototype is an approximation of a type that exhibits the essential features of the final version of that type. By implementing a prototype first, the analyst can show the users inputs, intermediary stages, and outputs from the system. These are not diagrammatic approximations, which tend to be looked at as abstract things, or technically-oriented documentation, which may not be understood by the user, but the actual figures on computer paper or on terminal or workstation screens. Data dictionaries, fourth generation systems, CASE tools and workbenches of various kinds can all enable prototyping. These have become more and more powerful over the last few years.

Structured methodologies are based on functional decomposition, that is, the breaking down of a complex problem into manageable units in a disciplined way. The development of structured methodologies in systems analysis and design stemmed from the perceived benefits of software engineering. These approaches tend to stress techniques such as decision trees, decision tables, data flow diagrams, data structure diagrams, and structured English, and tools such as data dictionaries. Most of the techniques enable complex structures to be communicated using functional decomposition as the basic technique. Most of the documentation aids are graphic representations of the subject matter. This is usually much easier to follow than text or computer-oriented documentation. The approach adopted by Yourdon (1989) is typical of that school and follows the earlier works of DeMarco (1979) and Gane & Sarson (1979).

A methodology which incorporates formal methods uses mathematical precision and notation in the specification and design of an information system. Some systems requirements can be expressed mathematically rather than using natural language and this can be translated into computer language. This version of the specification can be tested for correctness. Software engineering approaches, which we have included in the structured school, aim at producing quality software and generally incorporate formal methods.

Whereas structured analysis and design emphasises processes, data analysis concentrates on understanding and documenting data. It involves the collection, validation and classification of the entities, attributes and relationships that exist in the area investigated. Even if applications change, the data already collected may still be relevant to the new or revised systems and therefore need not be collected and validated again. Information Engineering (Martin & Finkelstein, 1981), for example, has a data approach as its crux and another database approach is found in Avison (1992).

Object-oriented information systems development has become the latest 'silver bullet'. Coad's & Yourdon's (1989) exposition argues that the approach is more natural than data or process based alternatives, the concepts of objects and attributes, wholes and parts and classes and parts are familiar to children) and also unifies the information systems development process.

In this brief tour around the various approaches to developing information systems, we have illustrated the potentially diverse nature of the information systems development process. None of these approaches is 'the answer'. Each of the above themes can be criticised as the basis of an information systems development methodology. For example:

- Systems approaches may not seem relevant to the practitioner who wants a quick answer to particular problems.
- Planning approaches frequently lead to priorities according to the power of managers and not organisational need.
- Participation may lead to inefficient systems designed by good managers, clerks or salespeople, who are poor and unwilling analysts.
- Prototyping often concentrates on the user interface but does not necessarily address the fundamental problems of the situation.
- In breaking down a complex system into manageable units, structured analysis offers a simplistic view and fails to capture all the meaning in the links between modules.
- Data analysis may not solve the underlying problems that the organisation may have - it may have captured existing problems in the model.
- The messy world of complex organisations, people problems and the like may not be easily represented as objects.

None of these approaches can be described as different flavours to well accepted approach. They represent radically different approaches to information systems development and ways to perceive the information systems development process. They require different expertise: some emphasise people and stress the need for inter-personal skills; others require engineering skills and stress skills in the use of techniques; and yet others stress organisational issues. They represent different 'philosophies'.

If we consider the themes identified above as approaches to information systems development, disciplines relevant would seem to include, for example, computer science (prototyping tools and software engineering), mathematics (formal methods), sociology (participation) and business and management (planning). We may add applied psychology, economics, linguistics, politics, semiology, ethics, ergonomics, culture studies and probably others to the list of foundation disciplines. Information systems has a multi-disciplinary nature, and technology and computing are by no means dominant.

It is necessary to address the need to consolidate and harmonise in a way which does not simplify by assumptions that all problem situations are the same. As different situations call for different approaches, techniques and tools, there are also new methodologies which have been developed by blending together what are considered to be the strong features of existing methodologies. One such approach is Multiview (Avison & Wood-Harper, 1990), a blended methodology which assumes that some of the methods, tools and techniques are used contingent on the problem situation and information systems development is more of an exploration than the result of following a prescription of the sort provided by SSADM (Cutts, 1991), Merise (Quang & Chartier-Kastler, 1991) and other conventional approaches to information systems development.

2.2 Multiview: Consolidation without Reductionism

Different situations call for different approaches, techniques and tools (Avison, Fitzgerald & Wood-Harper, 1988). Multiview extends the emphasis in information systems away from 'technical systems which have behavioural and social problems' to 'social systems which rely to an increasing extent on information technology'. It is based on attempts to construct a methodology which attempted to answer the questions found in Figure 1.

Multiview is a contingency approach to information systems development where it is recognised that techniques and tools appropriate in some problem situations are not appropriate in others. Iivari (1987) suggests that the choice of tools and techniques used in an application using a contingency framework will depend on:

- The comprehensiveness and depth of the information systems design process required.
- Whether the designers choose a 'goal-oriented' strategy or an 'alternative-oriented' strategy. The former negotiates on what is to be achieved, and proceeds to find ways to accomplish the tasks. The latter strategy does not assume consensus can be reached on the goals, but rather that negotiation must occur on how things are done.
- The choice of an appropriate adaptation strategy, reflecting on the perception about future events. One choice is to ignore future requirements, a second is to assume they are predictable, and a third is to assume that they are unpredictable, but can be dealt with.
- The choice of an appropriate implementation strategy.

Multiview is a contingency approach providing a flexible framework where the techniques and tools available are chosen and adjusted according to the particular problem situation. It is a blended methodology where the analysis of human activity systems (Checkland, 1984; Wilson, 1984) and socio-technical systems (Mumford, 1981; Land & Hirschheim, 1983) have been wedded to the more conventional work on data analysis (Rock-Evans, 1981 and Avison, 1992) and structured analysis (Gane & Sarson, 1979; DeMarco, 1979) so as to create a theoretical framework for tackling computer systems design which attempts to take account of the different points of view of all the people involved in using a computer system.

The five stages described in Avison & Wood-Harper (1990) are summarised below.

1. Analysis of human activity

This stage concerns the search for views of the organisation. Frequently using diagrammatic techniques, different perceptions of the problem situation are incorporated showing the structures of processes and their relationships. Problem themes, such as, conflicts, an absence of communication lines, shortages of supply, and so on, are identified. Through debate within the organisation, it is possible to identify relevant systems, which could be seen as areas for future investigation. In some cases the output of this stage is an improved human activity system and the information systems development process stops at that point (Checkland & Scholes, 1990).

2. Analysis of information (sometimes called information modelling)

The purpose here is to analyse the entities and functions of the systems described, independent of any consideration of how the application will eventually develop. By using functional decomposition, it is possible to break down progressively the main function into sub-functions, and, by using data flow diagrams, the sequence of events and data flows are analysed. In developing an entity model, the problem solver identifies and names entities; relationships between entities; and attributes describing entities. This stage, of data modelling and process modelling, is a feature of most information systems development methodologies.

3. Analysis and design of socio-technical aspects

The task at this stage is two fold: (1) to produce a design from an analysis of people and their needs and the working environment and (2) to place this in the context of organisational structure, hardware, and the necessary work tasks. Thus, social and technical objectives are set and alternatives specified and compared so that the best socio-technical solution can be selected and the corresponding computer tasks, role sets and people tasks can be defined. The emphasis here is not on development, but on a statement of alternatives according to social and technical considerations.

4. Design of the human-computer interface

Decisions are made at this stage on the technical design of the human-computer interface, for example, batch or on-line and menu, command or form-driven. Specific conversations and interactions are then designed. The users are expected to be the major contributors of this stage. The technical requirements to fulfil these human-computer interfaces can then be designed.

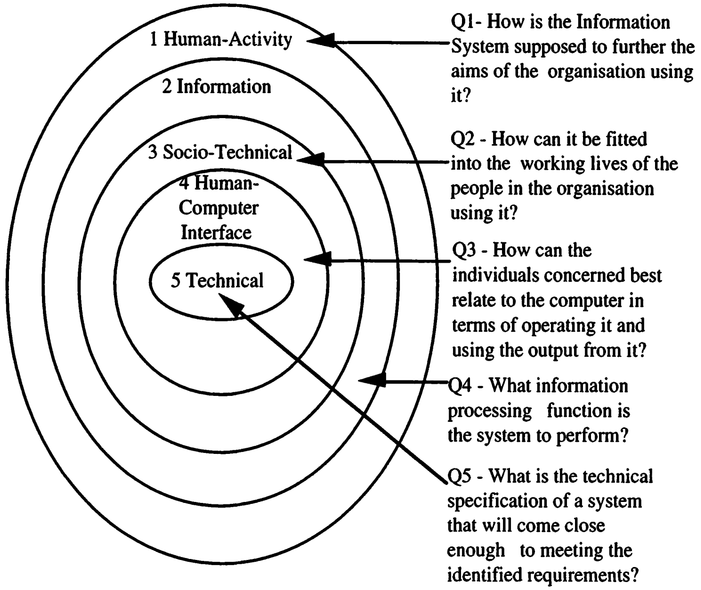

Figure 1: The core questions.

5. Design of technical aspects

Using the entity model (from stage 2) and the technical requirements (from stage 4), a more technical view can be taken by the analyst because human considerations are already integrated with the forthcoming technical considerations. This technical design includes the application subsystems and the 'non-application subsystems'. These are the information retrieval requirements subsystem, the control subsystem, the database, the database maintenance subsystem, the recovery subsystem and the maintenance subsystem.

The five stages incorporate five different views appropriate to the progressive development of an analysis and design project. These five views may be seen as necessary to form a system that is complete in both technical and human terms. Because it is a multi-view approach, it covers computer-related questions and also matters relating to people and business functions. It is part issue-related and part task-related. The distinction between issue and task is important because it is too easy to concentrate on tasks when computerising, and to overlook important issues in need of resolution. Too often issues are ignored in the rush to 'computerise'. But, a problem cannot be solved until it is identified. Issue-related aspects, in particular those occurring at stage 1 of Multiview, are concerned with debating definition of system requirements in the broadest sense, that is, 'What real world problems is the system to solve?' Conversely, task-related aspects, in particular stages 2-5, work towards forming the system that has been defined with appropriate emphasis on complete technical and human views. The system, once created, is not just a computer system; it assists people to do their jobs.

Multiview has been used in a number of action research cases, but these are not 'classic examples of how systems analysis should be done'. In a practical discipline one must always distinguish between the ideal methodology as taught in text books, and the realities of any situation which cause departure from the ideal in order to allow for the exigencies of the real world. The cases expose the difference between what one would like to find in an ideal world and what is in the real world. Many design methodologies are prescriptive not only of what must be done but of the order in which it has to be done. This is not always feasible. For example, decisions are often made before all the facts have been gathered. Frequently this is due to time, cost or political constraints. No one could pretend that this is the ideal way of decision making, but Multiview is based on a recognition of such facts of life and it can help users to make decisions which are supportable even in these situations.

Multiview in operation differs widely according to the particular situation, users and analysts. Projects follow various courses depending on such issues as to whether the objectives are clear and stable, the degree of user involvement that is practicable, working practices, the complexity of the situation, and the type and views of management (Andersen *et al*, 1990). For this reason, the use of Multiview can be said to be an 'exploration' in information systems development and the action research cases provide an opportunity to see Multiview in operation in different situations. The approach has been designed for flexibility.

This approach, as evidenced by the field work, does not, in practice, exhibit the step-by-step, top-down nature of conventional models and none of the applications have exactly followed the framework as espoused in Avison & Wood-Harper (1990). Users of the approach will almost certainly find that they will carry out a series of iterations that are not shown in the framework. Further, in some of the real-world cases undertaken, certain phases of the approach were omitted and others were carried out in a sequence different from that expected.

Developing an information system is contingent on the information systems development approach, the problem situation and the information systems development team. The team of users and analysts affect the perception of the situation and they interpret the methodology. The variety of possible interpretations reflect differences in backgrounds and experiences. In some of the applications not all stages of Multiview were used. It is possible to envisage instances in which it is deemed inappropriate to develop a computer-based information system. The framework was adapted accordingly in one case. In others, the different analysts interpreted the 'same situation' differently. In any situation in which an information system might be appropriate, there are factors such as culture, language and education which have to be taken into consideration. Frequently particular techniques and tools are not appropriate to the problem situation. The systems analyst has to choose from a 'tool box' those techniques and tools appropriate for each situation, but within the framework of an approach such as Multiview. Without such a framework, the information systems are likely to be idiosyncratic, difficult to maintain, and therefore of variable value. This should offset the potential criticism of a contingency approach, that it leads to a lack of standardisation. As mentioned earlier there may be a trade-off between standardisation and flexibility.

3 INFORMATION SYSTEMS RESEARCH APPROACHES

In view of the above discussion on information systems development approaches, only a part of the interests of information systems research, it is not surprising that there are a number of approaches to study information systems. As well as there being many areas of research, various authors, for example, Van Horn (1973), Dickson *et al.* (1977) Ein-Dor & Segev (1981), Galliers (1985; 1991) and Benbasat *et al.* (1987) have shown that a number of research approaches can be appropriate to information systems.

Keen (1987), in an overview of research in (management) information systems, critically examines particular areas of research. He argues that the mission of information systems research is to study 'the effective design, delivery, use and impact of information technologies in organisations and society'. He points out, however, that there has been a high proportion of information systems research relating to the technology, for example, design methodologies, computers, implementation, productivity tools, office technology and telecommunications; research looking for particular gains for businesses in an economically competitive environment (for example, economics and competitive implications); and also research looking for 'solutions' to perennial problems (for example, productivity tools, database management, personal computing and expert systems).

Much of this research may be seen as adapting a positivist epistemology. It is claimed (e.g. Galliers & Land, 1987; Orlikowski & Baroudi, 1991) that the positivist research approach, which has its roots in the natural sciences, is the most commonly adopted in information systems research. For example, Orlikowski & Baroudi (1991) found that 97% of the information systems literature they examined fell under positivist epistemology. These studies assume an objective reality, reduce information systems phenomena to their simplest elements, looking for causality and fundamental laws. These are seen as forming the basis for generalizable knowledge, often represented in mathematical models, that can predict patterns of behaviour, independent of time and context (e.g. Foster & Flynn, 1984).

In recent years however social and organizational issues concerning information systems have been increasingly recognised. The work of IFIP Working Group 8.2 also reflects this (see, for example, Avison *et al.*, 1993). This view is reflected in the use of non-positivist research approaches to study information systems. There are various strands among the non-positivist studies of information systems, depending of their views of the nature of the information systems and the approach to inquiry. For example, interpretive approach, aims to understand how members of a social group, through their participation in social processes, enact their particular realities and endow them with meaning (Walsham, 1993). Hermeneutics/ phenomenological research are also seen as closely associated with this epistemology (e.g. Boland, 1985). Interpretive approach views information systems as a social construction, focusing on shared interpretation around information systems and how meanings arise and are sustained (e.g. Boland & Day, 1989). Within the interpretive studies, the role of theory in research also varies. For example, studies using a 'grounded theory' approach seek to develop new theory to explain information systems phenomena from the researchers' own interpretations (e.g. Orlikowski, 1993). In these studies theories are seen as emerging from the data. Other studies illustrate the potential of a theory to explain an information systems phenomenon (e.g. Orlikowski & Roby, 1991; Walsham & Han, 1993; Jones & Nandhakumar, 1993). Another non-positivist approach to information systems research is critical epistemology (e.g. Klein & Hirschheim, 1993), which takes account of structural contradiction within the social system. Non-positivist research however represents only a small proportion of the information systems literature examined by Orlikowski & Baroudi (1991).

There is also a range of research methods which are generally associated with the positivist and non-positivist approaches to information systems research:

- Conceptual study
- Mathematical modelling
- Laboratory experiment
- Field experiment
- Surveys
- Case studies
- Action research
- Ethnography

Much of the information systems research within the positivist traditions are primarily surveys investigating information systems phenomena within a single slice of time or laboratory experiments oriented as reflected in Orlikowski & Baroudi's study. These methods are normally associated with scientific disciplines and quantitative data.

Interpretive studies on the other hand tend to employ longitudinal field studies, seeking to obtain in-depth understanding on information systems phenomena. Most widely used techniques in information systems research are interviews which are generally associated with qualitative data. Many other techniques are used in conjunction with interviews in the field such as observation (Orlikowski, 1992), participant observation (Jones & Nandhakumar, 1993). Interpretive studies tend to present detailed case studies from the field data to describe a version of events from which alternative interpretations can be made. Much of these techniques are commonly used in other disciplines such as sociology and anthropology. For example, participant observation has its root in ethnographic research studies, where the researcher would live in tribal villages attempting to understand strange cultures (Easterby-Smith *et al.*, 1991).

Other field methods used in information systems research are action research (Avison & Wood-Harper, 1990). In our case the use of action research had led to the development of Multiview and was later used to refine the approach. In this method, the researcher seeks deliberately to intervene in the situation, often by employing a specific technique, in order to achieve a particular outcome. Action research is most frequently adopted in organizational development (Easterby-Smith *et al.*, 1991)

The strength of the positivist research approach lies in its ability to provide a wide coverage of various situations and to be fast and economical, as well as in its rigour and replicability in the conduct of scientific research. Orlikowski & Baroudi (1991) claim that the existing dominance of positivism in information systems research provides a partial view and has implications on the understanding of information systems phenomena, theory building and thus for the practice of information systems work. The strength and weakness of the non-positivist approach are fairly complementary. Thus the main strength of interpretive approach is its ability to look at change processes over time, to understand actor's meanings, to adjust to new issues and theories as they emerge, and to contribute to the evolution of new theories (Easterby-Smith *et al.*, 1991).

We now illustrate some observations about research approaches in the context of information systems. Firstly, although we describe the information systems research approaches as associated with positivist and anti-positivist epistemology, it is not often possible to neatly categorise information systems research into a position. Secondly, in any research project, several research methods can be used (and not only the same mix). The research that led to the definition of Multiview was described as action research, and indeed the cycle of theory, action, reflection and theory modification using Multiview in a number of sites with researchers and practitioners involved is a cycle of action research. But this whole research included 'conceptual research' carried out when considering the various research methods in the literature, 'case study' research when looking at the application of the alternative methodologies in context, and so on. The complex nature of information systems research may therefore be seen as an extension of the earlier debate regarding the many disciplines.

4 DISCUSSION

4.1 Potential Difficulties from this Multi-Disciplinary Nature of Information Systems

We have seen how disciplines relevant to information systems include computer science, sociology, semiology, economics, mathematics, management, applied psychology, linguistics, politics, ethics, ergonomics, and cultural studies. Within these disciplines, different theories and philosophies exist and they may be mutually inconsistent. Consider, for example, systems theory, information theory, the theory of science and scientific method. They represent only some of the foundation theories of the disciplines listed.

All this leads to a perceived lack of coherence in the discipline. A particular fear is that the knowledge and understanding of work in the source disciplines of researchers working in information systems may be out of date or superficial. They are information systems specialists, not specialists in the source discipline.

It is true that many other disciplines (including medicine, French, management and geography) do not have a simple and single disciplinary status and can further be described as a collection of social practices. However, such disciplines can be seen by other academics as confused and lacking in coherence and academic rigour: information systems is often seen in the same light. In short, the 'discipline' of information systems appears to lack credibility. Indeed, Backhouse, Liebenau & Land (1991) state that 'Coming as it does out of computer science, management studies, and a variety of social and technical fields, it is hardly surprising that [information systems] does not have any theoretical clarity'. We agree with them that information systems lies in the social sciences and not engineering nor science and the complexity is to be expected. On the other hand, others disagree. For example, a technological emphasis is found in Gray (1992). This can be seen as confusion by many outside the discipline (and some inside it!), and the lack of an agreed and consistent theory is *potentially* disabling.

The choice of research method should depend on the area of concern. But in practice it also depends on other factors such as what type of research is acceptable to funding bodies, to university departments, and to assessors of various kinds. Non-positivist research can be rigorous and this extends to 'stories' (see Silverman, 1993). Likewise, the choice of information systems development methodology should depend on its appropriateness for the particular domain, but is more likely to depend on other factors, such as, the dominant paradigm in the organisation (which may, in reality, be rule-of-thumb and experience).

The emphasis and influence of practice on the 'discipline' - seen in the curricula and research methods - is also a potential weakness. The reverse impact, that of academics on practice, is less strong. Practitioners do not read (nor contribute) to information systems journals as much as in many other applied disciplines. Academics in other disciplines regard information systems lecturers as able to bring in students who see university as a training ground for the few jobs available. This may be only a temporary phenomenon. Information systems academics are also seen as able to teach fundamentals in data processing and computing (work that they do not necessarily find stimulating), and information systems is often not perceived as an 'academic' discipline in its own right.

This has meant that there are few stand-alone university departments in information systems, especially in countries outside of North America. And even in the United States and Canada, less than half of the 1,889 information systems faculty are found in stand-alone information systems departments (DeGross *et al*, 1992). Most information systems faculty are found in computer science, mathematics, business and management, social science, commerce and other departments. Sometimes, groups of information systems teachers can be seen as 'islands' off the main influential 'mainland' departments, and in other cases information systems faculty are split between two separate departments. This makes communications between information systems people difficult. Thus information systems faculty as well as research students may find themselves isolated.

The lack of stand-alone university departments in information systems results in departments having a particular bias, such as a technology bias of most information systems academics in computer science departments or the practitioner bias of those in business schools. This means that the eclectic nature of information systems is not always reflected in academic information systems communities in any individual department. Worse, neither group seems particularly interested in theory: their concerns are with practical issues. Most respected disciplines are built firmly on the rock of established theory. The potential gains of exploiting the source disciplines are not being made.

However, it is not the purpose of this paper to suggest that such a discipline should give up our higher ideals for academic respectability, or that they should artificially restrict the scope of the discipline to fit in with an inappropriate monistic view of science (Banville & Landry, 1989). The interdisciplinary nature of the subject provides richness and is a main reason for the interest shown by students on courses and researches, witness the exciting debates in conferences which are inter-disciplinary. Different research processes and methods are relevant and add to the potential for progress and discovery. The emphasis on practice provides an exciting and relevant environment to try out ideas in their natural setting. Indeed, it is this that shows us that different situations do demand different approaches. Why should we not 'let many flowers bloom'? The 'potential weaknesses' are also 'potential strengths' and we need to address the issue so that their potential as strengths are realised. It may be unrealistic to expect an agreed and consistent theory to emerge, but it is important that more researchers work in areas that may establish the theoretical underpinnings of information systems. The interdisciplinary nature of the subject is no excuse for a lack of rigour.

5 CONCLUSIONS

It seems unlikely that there will be a merging of minds as to what discipline or set of disciplines is the most relevant to information systems and also as to which research methods are most appropriate. As we saw, there is no commonly agreed approach to develop information systems and these differences are fundamental, not differences in nuance! But it is entirely appropriate that there is no agreement, because problem situations differ greatly. However, some disagreements are, perhaps, clashes of dogmas, such as those which occur between those taking a technical and technological view and those taking a social, human and organisational view; this division can again be subdivided as much as the deepest functional decomposition diagram and can be as complex as the most complex spider's web! Multiview is proposed as a contingency approach which combines consolidation without simplification. However, a consensus between all information systems academics, researchers and practitioners may be unhelpful as well as unrealistic because information systems is multi-disciplinary and the different contributions enrich the discipline. Thus the different research methods described in the paper are appropriate to the different aspects of the academic study of information systems.

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