

Bacon, J and Fitzgerald, B. (2001) A Systemic Framework for the Field of Information Systems, *Data Base*, Vol. 32, No. 2, pp. 46-65.

A Systemic Framework for the Field of Information Systems

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A Systemic Framework for the Field of Information Systems

Abstract

The main aim of this paper is to present a systemic framework of what the field of Information Systems (IS) is about; its connecting areas and its central theme. It was born out of a search for structure in providing a cohesive picture of the subject and field of IS for students and business managers. The average manager and executive has difficulty in obtaining an integrated and holistic view of information systems, and it is said that this leads to a lack of alignment between IS and the strategic aims of the enterprise. Students, particularly MBA students, have a similar problem. Using a large number of disparate data sources, including a delphic survey of leading academics, the paper adopted a grounded theory approach in developing an integrating framework of five main areas for the field: (1) IS Development, Acquisition & Support (2) People & Organisation, (3) Information & Communications Technology, (4) Operations & Network Management, and (5) Information for Knowledge Work, Customer Satisfaction & Business Performance. The latter area is proposed as the central, distinguishing theme for the field. The paper also discusses the implications of the framework and how it might be used in teaching, the organisational setting, and IS research.

The Problem

The work described in the paper began with a concern at the lack of integrated and cohesive definitions within the field of Information Systems (IS), and the consequential difficulties in teaching, learning and research, and indeed application. The concern is especially with students, especially MBA students, and middle and senior-level executives, all of whom typically have difficulty in obtaining an integrated and systemic (i.e. holistic or total) view of information systems & technology (Burnes, 1991; Dooley, 1991; Keen, 1991a; Silver *et al.*, 1995), which in turn leads to a lack of alignment between information systems & technology (IST) and the strategic aims of the enterprise. For example, many managers and knowledge workers will have little education in Information Systems (apart, possibly, from an introductory course), or have training of the ‘point-and-click’ variety, giving them a technologically-centric, ‘tunnel-vision’ view. Thus, the difficulty in obtaining an integrated and systemic view may be a root factor in explaining the rate of failure for IST in the organisational environment. In the absence of such a view, IST may be technologically driven rather than business-driven. The lack of an integrated and systemic view is the problem that is addressed in this paper.

MBA students (if not other students), have a similar concern. They tend to expect practice-related, insightful, integrated themes, with useful models that they can take away and use. For them, in the absence of such models, there may be little rhyme or reason to the subject. How does one topic area relate to another topic area?

Similarly, what is the general subject of IS about? Is it essentially about systems development? Is it about strategic systems planning? Is it about information for decision-making, or perhaps the competitive use of IT? Is it about e-commerce? Is it about research themes, or contemporary IS issues? What is the central theme, or is there one? Is it just a

cluster of somewhat-related, general topics; an “amalgam” of knowledge? (Hirschheim et al., 1995)

Even the name and acronyms used for the field continue to be different: MIS, IM, IRM, BITM, IS, IT, TBIT, ICT, IST, etc. The only common word in all of these names and acronyms is information itself. For someone not immersed in IS, this cannot make the subject or field any easier to understand.

As for middle and senior level executives, there appear to be few who have an integrated, systemic understanding of IST; how it can be invested in, developed, used and effectively exploited in aligning with business aims.

A large part of the problem, at least in the view of the authors, is that despite various models, there is no underlying framework that provides a 'big picture' for the subject and field, or a central focus. For example, there is a five-component model of hardware, software, data, procedures, and people that relates to an *information system* (Ahituv and Neumann, 1990; Kroenke and Dolan, 1987). There are also models at the enterprise level that delineate *strategic systems planning* (Earl, 1989; Robson, 1994). In addition, there are models of *IS development*, providing as they do an overall, paradigmatic view of the different schools of development (Barron et al., 1999; Iivari, 1991; Hirschheim et al., 1996; Iivari et al., 1998; Orlikowski, 1993). *Types of system/application* have also been the focus of research (see, for example, Ein-Dor and Segev, 1993). Furthermore, there are models that have endeavoured to provide a basis for *research* in the field (Barki et al., 1988, with subsequent updates; Cushing, 1990; Gosain et al, 1997; Gorry and Scott-Morton, 1971; Ives et al., 1980; Mason and Mitroff, 1973; Nolan and Wetherbe, 1980; Swanson and Ramiller, 1993). Lastly, there is a useful model of an information system *and* its interaction with the organisation context (Silver et al, 1995). Even this, however, does not provide a view of the subject and field of Information Systems.

All of these contributions describe a particular *part* of the subject and field. They describe (a) an information system, (b) strategic systems planning approaches, (c) types of development, (d) types of system/application, and (e) research themes. They do not describe the field, as such. Rather, the field is seen through *a particular lens*, such as types of system, research themes, etc. In addition, these and other models tend to concentrate on *one particular type of source* in developing a model, thus reflecting the orientation of that source. Consequently, notwithstanding the significant contribution of these models, they do not provide an integrated, overall, *systemic view*, so that Information Systems becomes meaningful as a subject and area in itself.

In addition to the models describing part of the subject and field of IS, there have also been models classifying the intellectual progression of the field (Culnan, 1986; Culnan and Swanson, 1986; Dickson, 1981). These contributions are significant in that they give a *historical* context to the field.

Notwithstanding curricula-type lists, there remains little if anything to which the student, and particularly the practitioner and executive, can point to in relating one main area of the overall subject matter to another, whatever those main areas are. Therefore, knowledge-building and understanding is hindered, since knowledge depends upon frameworks (explicit, taught frameworks, or implicit, mental frameworks), for putting concepts together and relating information components (Vickery & Vickery, 1992). More seriously, perhaps, managers and executives may put the subject of IS into a box – a technology tools & techniques box. Its identity, if there is one, as against computer science on the one hand, and management on the other, becomes blurred.

Indeed, IS research itself remains “a moving target” (Iivari, 1991), and “fragmented and disjointed” (Hirschheim et al., 1995). More fundamentally, the field is still torn between the positivist and interpretivist positions; indeed, its traditional preoccupation with method,

methodology and the scientific/positivist method is said to be at the root of its problems (Ciborra, 1997).

On the one hand, the traditional, scientific/positivist, paradigm of the natural sciences can be drawn upon to achieve criteria such as objectivity, testability and replicability. We can therefore have a reasonable degree of confidence in the findings, and can build upon them as 'true' knowledge. On the other hand, if the field is to address the real-world, and the 'soft', ill-structured, problems that are typical of human organisations and their use of IST, then the use of interpretivist, qualitative, and critical research approaches is an imperative (Galliers, 1994; Hirschheim et al, 1995; Orlikowski and Baroudi, 1991; Remenyi and Williams, 1996).

In addition, the scientific/positivist paradigm, may miss the big-picture. It may give a partial and restricted view of given phenomena, and thus provide an understanding without context (Orlikowski & Baroudi, 1991). And yet, if there is one thing that the IS field needs to draw from systems theory/thinking, it is that of the systemic whole; the big picture; the whole is greater than the sum of its parts; the system within a system within a system; everything is connected to and potentially informs or informed by everything else.

Also, there continue to be problems in accreditation, funding, recognition for the field (Avison, 1997; Stowell and Mingers, 1997; Watson et al, 2000). A further problem is that its entry barriers are weak (Adam & Fitzgerald, 1996). In summary, the field of information systems still faces the challenge of identity, at least for those not immersed in the field, and this may be a factor in its difficulty in gaining recognition as a distinct, cognate domain.

To reiterate, therefore, the problem addressed and the main aim in this paper, is that of making sense of the IS subject and field for students, especially MBA students, middle and senior-level executives, and indeed anyone else seeking to understand the overall IS subject and field, such as non-IS academic colleagues and Business School Deans.

The means of addressing this is to derive a systemic framework for the field and subject of IS and, within the framework, a central theme. This could provide not only a context and framework for the field of Information Systems, but also a model that is applicable to the development and use of information systems & technology in organisations, thus offering a bridge between academia and practice.

Structure of the Paper

In the next section, the research approach is summarised. Some have argued against any such framework as proposed in this paper, and we briefly address the arguments for and against frameworks for the field in the following section. The main framework of the paper is then proposed, providing a holistic or systemic view of the five main areas of the subject and field of information systems. This is followed by a discussion of the main areas and their relationships. The central area and theme of *Information for Knowledge Work, Customer Satisfaction & Business Performance* is discussed. Finally, the implications and use of the framework in teaching, in practice, and in research, are discussed.

Research Approach

The nature of the research undertaken in developing this paper is largely at the classification level (Bennet, 1991). It is primarily a qualitative approach, largely inductive, and drawing on several, different types of source data in aiming for triangulation of results (Van Maanen *et al*, 1982). It is also iterative, and subject to testing and validation through different contexts and audiences.

The principles of grounded theory and its constant comparative method (Glaser and Strauss, 1967) were a foundational part of the research. Grounded theory seeks categories and principles about the research subject from the ground up. Unlike scientific/ positivist or logico-deductive research, it does not start from *a priori* theory or hypotheses, which it then seeks to disprove. Instead, (1) categories of occurrences/incidents/examples with common characteristics emerge, and are coded into as many categories as possible, (2) the attributes of each category are identified through constant comparison between occurrences and categories, so as to consolidate the categories, (3) the number of categories are delimited, or reduced to a minimal set, through parsimony, i.e. no more causes/occurrences or attributes are used than are needed to account for the categories and their causes, and (4) the framework is employed in generating systematic, substantive theory that suggests a plausible representation of the data and overall subject studied.

In summary, the stages of the research approach were as follows:

1. An extensive literature review was carried out to understand the historical evolution and maturation of the field, from its early days to the beginning of the third millennium. This provided the first output, wherein main themes were captured, in the form of an initial list of about 200 topics for the field.
2. A survey was undertaken of information systems or IS-related syllabi at graduate and undergraduate levels, from about 130 universities in the United States, Canada, the United Kingdom, Ireland, Australia and New Zealand. This provided a second output, in the form of a rough list of about 100 additional topics.
3. The list from the literature review and the list from the survey of syllabi were combined to produce a third output, which was an initial rough draft taxonomy¹ of:

¹ A copy of the taxonomy with its full listing of suggested detailed sub-topic areas for the field of information systems is available from the authors on request

main areas, and headings and sub-headings within those main areas. Criteria for the taxonomy as a whole were that it should aim to be: (1) of practical use and practice-connected (2) inclusive but at the same time parsimonious in its topics and sub-topics, (3) of minimal overlap, (4) reasonably robust in accommodating developments in the field. The criteria in establishing a given topic at a given level in the taxonomy were as follows: (1) the topic was a main heading topic in a syllabus, which pointed to a high level, (2) it was a frequently covered topic, this also being a pointer to a higher level in the taxonomy, and (3) the amount of space/experience given to a topic.

4. Some 20 texts with a managerial flavour and/or at an advanced level beyond programming and systems analysis were surveyed, and their subjects mapped against the taxonomy. This provided a second draft of the taxonomy.
5. A survey of 14 information systems curricula proposals, 15 industry/management surveys on critical concerns in managing and using IS, and several proposed research agenda or classification schemes was undertaken, to provide a *separate* taxonomy.
6. The two separate taxonomies from the preceding stages were mapped compared and combined, for a third draft of the taxonomy.
7. The next stage and output was a first draft of a systemic framework for the field, which essentially took the taxonomy's main/top areas, and headings within those areas – ignoring the third, detail-topic level. Thus, the first draft of the framework itself was drawn from the two top levels of the taxonomy. Indeed, this was the purpose of the taxonomy; to derive the systemic framework.
8. A delphic survey of leading academics from around the world was then undertaken, by way of testing the systemic framework and its central theme. This was done by providing leading academics with a draft version of this paper, and inviting their views

in the form of a structured questionnaire. It was a form of testing for the usefulness of the framework. A net total of 105 leading academics were surveyed in 19 countries.

9. The framework was revised, based on feedback from the delphic survey.
10. The systemic framework was then validated in a variety of teaching and use contexts, in the academic and business environments, wherein the authors used the framework in teaching, and working and consulting in several organisations. A draft of the paper and its systemic framework was also made available to interested academics and executives through a business school portal. These final evaluations provided further feedback and iteration.

The research approach, therefore, tried to encompass a number of disparate sources, so that it was not simply the view of academia, on the one hand, but properly representative of and giving importance to the academic view on the other. Also, in using grounded theory, it did not start out with any pre-conceived view of what the framework should include. That is, it attempted to be impartial and without any philosophical platform. Lastly, the approach aimed to be very much of an iterative nature, in the ten stages used and described.

The end-result of the research approach led the authors to conclude that the systemic framework could be useful and practical in explaining what the field of IS is about, and how the main areas might apply and inter-relate in organisations.

One set of criteria that has been suggested in evaluating conceptual development in IS, and which might be used with the systemic framework, is that of Khazanchi (1996). The five criteria suggested are plausibility, feasibility, effectiveness, pragmatism, and empirical. The research approach as described certainly had these criteria as aims. They were pursued in (1) the use of the different sources as mentioned, (2) in the comparison of those sources, (3) in

validating through the Delphic Survey of leading academics, and (4) in the final validation, in teaching, organisational use, and feed-back to the final draft via a business school portal.

For and Against a Framework for the Field

It has been argued that, because IS is an eclectic field, drawing as it does on a number of other fields, there can be no common ground or theory (Keen, 1987). Thus, there can be no framework, such as that proposed in this paper. However, this does not follow. Most fields draw on others (Adam and Fitzgerald 1996). It would be an impoverished one that did not, for it has been shown how research is illuminated through principles and concepts drawn from other fields. Certainly, the IS field draws on many other fields, such as computer science, organisational theory, linguistics, political science, psychology etc. (Ahituv and Neumann, 1990; Avison, 1996; Bariff and Ginzberg, 1982; Culnan and Swanson, 1986; Falkenberg, 1994; Vogel and Wetherbe, 1984). In fact, it is a distinguishing characteristic of the IS field that it *must* draw on other fields, for effective, *systemic* approaches and solutions to organisational needs in using information systems & technology.

It has also been argued that the field cannot be disciplined or controlled by any imposed structure or paradigm, as in the Kuhnian model of scientific advancement, because of its technologically dynamic nature (Banville and Landry, 1989). The third argument against a common ground, framework or theory is that a monistic/single view would be restrictive, given the disparate backgrounds and pluralistic interests of those involved in the field (Banville and Landry, 1989).

The implication, however, is that a framework that has incorporated social construction through those in the field may be feasible. The delphic survey, the disparate sources used in

this work, and final validation through electronic publication of a draft, have all sought this end.

In contrast to the arguments against, there have been many arguments *in favour* of some kind of unifying framework, and some kind of underlying theory. For example, it has been argued that without such framework or underlying theory, the field may be driven by technology or the events of the day (Weber, 1987). It has also been said that a framework is needed so that researchers can build upon the development of a consistent set of data, and avoid 're-inventing the wheel' (Grimshaw, 1992). In addition, there is historical evidence of certain fields achieving progress at the expense of others, through the establishment of a core, theoretical structure (Latour 1988).

A further argument in favour of some kind of framework and structure for a field is that, without it, "progress is but a fortunate combination of circumstances, research is fumbling in the dark, and the dissemination of knowledge is a cumbersome process" (Vatter, 1947). For example, it has been shown how the production of scientific fact is characterised as a process of creating cognitive order, or some sort of framework, out of disorder (Latour and Woolgar, 1979). It has also been argued that the lack of an underlying structure is one of the things that impedes the field of information systems in becoming a recognised discipline (cf. Pfeffer, 1993).

There have, in addition, been others who have also argued in favour of or pointed to the need for some kind of basic framework or underlying structure for the field (for example, Adam and Fitzgerald, 1996; Boynton and Zmud, 1987; Stocks and Romney, 1987; Targett, 1991; Van Gigch and Pipino, 1986).

Lastly, it was shown in the delphic survey that of the 52 leading IS academics responding from 16 countries around the world, 93% said that a basic framework or structure of some kind is

needed for the field of Information Systems – a very high level of agreement for academics (see Table 1 in the next section).

The Delphic Survey

The delphic survey asked leading IS academics (at professorial, head of department, or programme director level), to respond to a set of questions, and then invited overall comment on the paper (see Appendix I). With follow-up, 52 responses were received, out of 105 invitations sent out, from leading academics in 15 countries: Australia, Austria, Canada, Finland, France, Germany, Hong Kong, Ireland, the Netherlands, New Zealand, Norway, South Africa, Switzerland, the United Kingdom, and the United States. There were four European countries that did not have a representative response. The questions asked, together with categorisation of responses, is shown in Table 1.

Where a response is represented as “Maybe”, it indicates a variety of responses - largely a qualified or conditional “yes”. In such cases, any suggestion for change was seriously considered in making amendments to the framework or definitions, especially where similar comments were made by more than one respondent. Similarly, where “small change” is indicated, suitable amendments were seriously considered.

Table 1. Responses to the Delphic Survey

Is a basic framework or structure <i>needed</i> for the field?	Yes: 93%	Maybe: 5%	No: 2%
Is a basic framework or structure <i>feasible</i> for the field	Yes: 40%	Maybe: 30%	No: 30%
Is information & knowledge the central/underlying theme for the field?	Yes: 50%	Maybe: 25%	No: 25%
Is the grouping of main areas in the framework acceptable as is (yes); or what change is needed?	Yes: 43%	Small Change: 50%	Big Change: 7%
Is the distinct <i>character</i> of/for the field agreeable as stated (yes); or what change is needed?	Yes: 59%	Small Change: 27%	Big Change: 14%
Is the distinct <i>competence</i> of/for the field agreeable as stated (yes); or what change is needed?	Yes: 57%	Small Change: 32%	Big Change: 11%

In a number of cases, responses from these leading academics went beyond a simple response to the survey, with extended correspondence taking place. The framework was evidently a subject in which some have a deep interest. And, judging by the high response rate (almost 50 per cent), it has more than passing interest for many. Most importantly, the responses to the delphic survey, and the range of knowledge represented, were highly beneficial in guiding this present work and its systemic framework.

A Systemic Framework for the Field

In proposing any model or framework, it may be useful to note that “while all models are wrong, some are useful” (Box, 1979, p.202). Thus, the systemic framework described in this section of the paper must be wrong, to a larger or lesser degree. It is not all things to all people. Few will be able to agree fully with it. Its use would need to be flexible. Nonetheless, it is presented as a step, within the historical development of the field, towards some form of common ground for the field of information systems. It aims to be a ‘stake in the ground’, at the beginning of the third millennium.

The research followed an iterative and inductive approach based (stages 1 to 7), as described above, to produce a first draft systemic framework . This was then further validated by means of the Delphic survey (stage 8), as Table 1 illustrates.

The framework was further validated in stages 9 and 10 of the approach, although this was through informal feed-back in teaching, through use within the organisation environment of actual IS-related projects, and through publishing it in a working paper which was widely disseminated to an academic and management audience. The revised version of the framework is shown in Figure 1.

It is the five main areas of the framework that integrate with each other, around the central area and theme. In contrast, the sub-areas may *not* all inter-relate, at least not in the way indicated through the relationship arrows. For example, the sub-area of *System/Application - Types of*, under *IS Development, Acquisition and Support* is not “Aimed at” the sub-area of *Semiotics*, under *Information for Knowledge Work, Customer Satisfaction & Business Performance*.

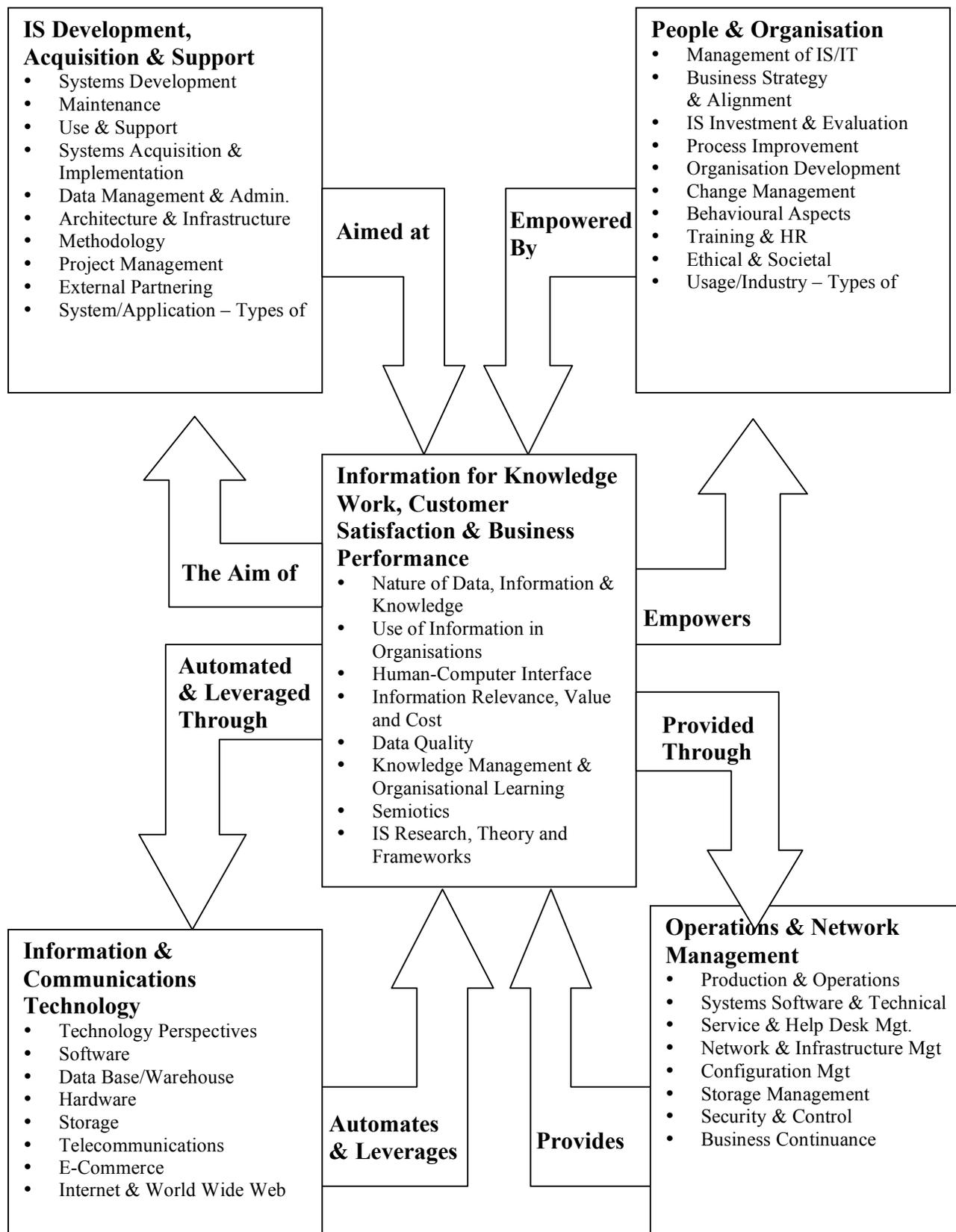


Figure 1. A Systemic Framework for the Field of Information Systems

Also, some sub-headings might arguably be included under a different sub-heading. For example, *Change Management*, under the *People & Organisation* main area/theme, has come to mean a number of different things (change in organisational culture, change of business process, roll-out of new desk-top infrastructure, and the control of software updates). This, therefore, might be included under *IS Development, Acquisition & Support*. The model, however, allows for flexibility. It may be adapted to the particular world-view of the user, and the particular use of the framework.

A further sub-heading that could arguably be moved is *Process Improvement*, which might also be included under *IS Development, Acquisition & Support*. Process improvement traces its roots back to early systems analysis and the principle that the process is first made efficient, and then automated. In its modern form, however, process improvement is about improving or re-shaping process *across the organisation* - for efficiency *and* effectiveness; it is the corporate process paradigm (Hammer and Champy, 1993).

The process of developing the framework was initially based upon the development of a taxonomy down to the detailed level. This was undertaken to provide a preliminary basis for the framework. The framework was required to logically and sensibly incorporate its indicated topics at the detailed level in its supporting taxonomy, and vice versa. For example, under the main area of *People & Organisation* there is the sub-heading of *IS Investment & Evaluation*. Any detail-level topic under this heading in the taxonomy had to fit plausibly, both top-down and bottom-up. In the taxonomy, and based on texts, syllabi, and other sources, *IS Investment & Evaluation* includes the following sub-headings:

- Support of Business Aims & Objectives
- Organisation/Firm Performance
- Cost & Budget Trends
- Critical Success Factors
- Critical Business Processes
- Client/User Satisfaction
- Service Level Agreements

- Benefits, ROI and & Business Value
- IS & Organisational Productivity
- Information Economics
- Systems Development Productivity
- Project Time & Cost
- Costing, Pricing & Control
- Facilities Cost vs. Performance
- Reliability & Response.

Looking from the top down, the question is whether the *IS Investment & Evaluation* heading is plausible and inclusive in representing the sub-headings listed.

Looking from the bottom up, the question is whether each of these sub-headings logically and sensibly fit under the *IS Investment & Evaluation* heading. If they do not, do they belong anywhere, if so where, and how might that affect other headings? Thus, to be viable and acceptable, the main areas and sub-headings in the systemic framework had to be consistent with the detail-level topics in the taxonomy. This was the purpose of the taxonomy, with its third level of supporting-topic detail

The Main Areas and Their Relationships

The framework shows eight relationships; those between the central theme and the other four themes/areas. It originally showed all 20 relationships between the five main areas but this made the framework somewhat daunting, and not as effective for teaching as the current format. The full set of relationships is shown in Table 2.

These relationships, as shown in the matrix, are suggested as *prescriptive* relationships. For example, it is suggested that *IS Development, Acquisition & Support* should be determined & specified by *People & Organisation*. Similarly, *People & Organisation* should be empowered by *Information for Knowledge Work, Customer Satisfaction & Business Performance*.

In each of the relationships, the aim is to represent the primary, essential nature of the relationship between two main areas. For example, it is suggested that *IS Development, Acquisition & Support* is primarily and essentially aimed at *Information for Knowledge Work, Customer Satisfaction & Business Performance*. That is, *IS Development, Acquisition & Support* is the process, and *Information for Knowledge Work, Customer Satisfaction & Business Performance* is the product.

Table 2 Matrix of Suggested Relationships Between the Main Areas of the Framework

	IS Development, Acquisition & Support	People & Organisation	Information for Knowledge Work, Customer Satisfaction & Business Performance	Information & Communications Technology (ICT)	Operations & Network Management
IS Development, Acquisition & Support		<u>Determined & Specified by</u>	<u>Aimed at</u>	<u>Results in Applications of</u>	<u>Operationalised through</u>
People & Organisation	<u>Determine & Specify</u>		<u>Empowered By</u>	<u>Exploit</u>	<u>Rely Upon</u>
Information for Knowledge Work, Customer Satisfaction & Business Performance	<u>The Aim of</u>	<u>Empowers</u>		<u>Automated & Leveraged Through</u>	<u>Provided Through</u>
Information & Communications Technology (ICT)	<u>Applied Through the Process of</u>	<u>The Technical Infrastructure for</u>	<u>Automates & Leverages</u>		<u>The Platform for</u>
Operations & Network Management	<u>The Operational Result of</u>	<u>Serves & Supports</u>	<u>Provides</u>	<u>Deploys</u>	

A further, suggested relationship is that *Information for Knowledge Work, Customer Satisfaction & Business Performance* is primarily and essentially automated & leveraged through Information & Communications Technology (to leverage meaning to use something - ICT - as the means of accomplishing a purpose - *Information for Knowledge Work, Customer Satisfaction & Business Performance*). Also, *Operations & Network Management Deploys* i.e. brings the forces - of ICT - into operation.

As for the main areas themselves, the research approach clearly showed that *IS Development, Acquisition & Support* is a main area and theme for the field of Information Systems. Indeed IS development, in its original form of systems analysis, was the core for the field (Cotterman & Senn, 1992). However, much work in the organisation environment is not so much devoted to IS development, as to acquisition, since many information systems are either off-the-shelf, bought-in business solutions (BIBS) or are bolted together using bought-in components. It is therefore acquisition rather than development that is the expectation in many organisations.

In addition, a large proportion of the IS/IT effort in organisations is devoted to system maintenance, providing hardware/software upgrades, training users for effective, desk-top use and mobile use, trouble-shooting client-server networks, and interfacing with and supporting users in other ways. In other words, IS development itself is generally a *small proportion* of the real world of information systems, albeit a strategic and highly visible proportion (apart, of course, from the consulting and software organisations – of which there are many - who make their money by developing business solutions/applications for use by other organisations).

People & Organisation is a further main area and theme that arose through the grounded theory data gathering. The field of Information Systems has always had the organisation environment as its context (Dickson, 1981). Likewise and implicitly, it is people that comprise organisations. People are the stakeholders. Certainly it is people in organisations

that determine, specify, develop, exploit, support, are empowered by, and rely upon information, information systems and information technology.

Information & Communications Technology is again, clearly, a further main area and theme, if not a foundational area for the field of Information Systems. The term “ICT”, which started to come into vogue at the end of the 1990s, compared with the term “IT”, represents the networking infrastructure of IT as being of fundamental and integral significance. It is ICT that *automates and leverages Information for Knowledge Work, Customer Satisfaction & Business Performance*.

Operations & Network Management is a relatively neglected area in the academic environment of Information Systems. It is, however, the operational result of *IS Development, Acquisition & Support*. Its importance as a main area for the field may be better seen when investigation goes outside the academic environment, and into the world of organisations. In some organisations, where the environment is relatively stable, *Operations & Network Management*, along with information systems support (as opposed to development and acquisition) may be, in effect, the strategic focus. *People & Organisations* rely upon *Operations & Network Management* for the provision of *Information for Knowledge Work, Customer Satisfaction & Business Performance*.

As for *Information for Knowledge Work, Customer Satisfaction & Business Performance* as not only a main area but the central theme for the field, this is discussed in the following section.

A Central/Underlying Theme for the Field

If data in the texts, journals, and syllabi were represented in developing the framework according to *explicit* subject coverage in these sources, the area of *Information for Knowledge Work, Customer Satisfaction & Business Performance* may not be identifiable as a main area. It might be dispersed among the other main areas in the framework. However, when grounded theory, together with the delphic survey responses and final validation of the framework were applied in the research approach, it emerged as the underlying theme. It emerged as the “big idea” for the field (Checkland and Holwell, 1995).

All along, ever since the days of MIS, there has been an underlying recognition that the field has a fundamental concern with information in the organisational environment (Brehaut, 1991). Also, it has been argued that the information-intensive organisation needs to focus on the product of IT, namely information itself. Further, trend studies have shown that alignment between the information needs of business, and its actual use of IS/IT, remain a top, perennial concern (Computer Science Corp., 1999).

Certainly, every term and acronym used to describe the field includes “information”: MIS, IM, IRM, IS, IT, TBIT, BITM, ICT and IST. Indeed, it is the only word common to all terms. We might therefore conclude that either these terms are all misnomers, or that information itself is the essential theme.

Then why the central theme of *Information for Knowledge Work, Customer Satisfaction & Business Performance*? That is, why not information for *decision-making*? Certainly, the traditional rationale for information is decision-making. It is deeply rooted in the IS field, based on the work of Simon (1957 and 1965), March and Simon (1958), and Cyert and March (1963). The construct of decision support continues to be important for the field of information systems. But decision-making as the central purpose of information, and its

traditional, logico-deductive paradigm, have been shown to have limited reality (see, for example, Johnson, 1987; Laroche, 1995; Langley et al, 1995; Mintzberg, 1973). It is said that we need to escape from the “grip” of the idea that organisations are largely systems of management decision-making (Spender, 1995). Rather, from the boardroom to the customer interface, information is inherently and more broadly for knowledge work, and *part* of this use and/or outcome is decision-making.

Up to the point of the delphic survey, the data uncovered in the research process pointed to the underlying theme of *information & knowledge*, or *information for knowledge work*, as the underlying theme.

As noted previously, the delphic survey showed that, of the leading academics responding, 50 per cent agreed that information and/or knowledge represented the central, underlying theme for the field, while another 25 per cent said that it may be. Thus, a total of 75 per cent indicated yes/maybe.

This led to further iteration, first, in responding to the replies and comments of the leading academics and, second, in the final stage of validating the framework. The final stage included teaching and using the framework with classes of MBA students, consulting and training in several organisations and, finally, getting further feedback from interested academics and executives through a business school portal.

The aspect of information for *customer satisfaction* (both external and internal customers), was added largely as a result of consulting and training in organisations. If information is seen as the *essential product* of information systems, then that product must seek to *satisfy a customer*. This is the litmus test of any product.

It may be an external customer, such as a business, retail or mail-order customer, a web-site or corporate portal user, an e-business retail customer, or a trading partner. Or it could be an

internal customer, such as a board executive, a managerial user, or an operational user, at the ‘coal-face’ so to speak, dealing directly with customers or clients. For example, the Internet web-page user or business portal user must be satisfied with the information provided. It must be relevant to them, provide value, be presented with satisfactory human-computer interface, be based on quality data, and so forth. Thus, the information in all of its aspects must satisfy the user, stakeholder, manager, client/customer, net-surfer. Thus, information in business organisations is *inherently* for knowledge work and, *importantly & prescriptively*, for customer satisfaction.

The aspect of information for *business performance* was added in response to comments to the effect that individual and business performance have always been a basic aim for information systems (Bjorn-Anderson, 1984; Culnan, 1986; Davies et al, 2000). Thus, the end-result becomes information for knowledge work, customer satisfaction and *ultimately*, business performance.

In the different sources used for this study, there was little explicit reference to the *sub-headings within the central theme* (exceptions being, for example, Land and Kennedy-McGregor, 1987; Liebenau and Backhouse, 1990; Mingers, 1995; Stamper 1973, 1985 and 1991; Tricker, 1992). But throughout the sources there was nonetheless implicit reference. The *implicit* topics or sub-headings are: the nature of data, information & knowledge, the use of information in organisations, and information relevance, value & cost.

Human-Computer Interface (HCI) is, on the other hand, an *explicit* sub-heading, and is an example of a sub-field within IS. A core aspect of HCI, and the reason for its inclusion under *Information for Knowledge Work, Customer Satisfaction & Business Performance*, is the ease-of-use of presented information. Another explicit sub-topic is Data Quality, which has long been a concern in data base, and more recently in data warehousing and knowledge management (English, 1999, Huang *et al*, 1999; Redman, 1996.).

A further sub-heading within the central theme is knowledge management & organisational learning. This is not a new topic (see Sveiby and Lloyd, 1987), but it is now recognised as a key element in achieving competitive edge (see, for example, Cranfield, 1998; Nonaka and Takeuchi, 1995). As for semiotics, which refers to the raw material of data, namely signals and signs, this is virtually a field in itself. Its use could have important implications for ‘reading the signs’ in determining underlying information needs in *IS Development Acquisition & Support*.

IS Research, Theory and Frameworks is placed under *Information for Knowledge Work, Customer Satisfaction & Business Performance* as the central theme, since *IS Research, Theory and Frameworks* would ultimately connect back into the central theme; the unifying theme.

It has been said that information as such has often been taken for granted in IS (Davies and Ledington, 1991; Galliers, 1987; Marchand and Horton, 1986; Tricker, 1992; Stamper, 1985). Perhaps *process* has overshadowed *product*. But if the information product and its use is where end-value resides, then it is suggested that this is where the central, distinguishing focus and theme for the field of Information Systems resides.

Implications and Use of the Framework in Education

To begin with, the systemic framework included all 20 of the relationships between the five main areas or themes. Students on whom the authors tested the framework found this overwhelming and overly complex. Thus, it was decided to remove most of the relationships, and leave just the eight relationships between *Information for Knowledge Work, Customer Satisfaction & Business Performance*, and the other four main areas. This does make the framework appear less cohesive, but experience shows that the model becomes less daunting and easier to understand and use. The model becomes a better teaching and facilitating device.

A first line of discussion in using the framework in teaching is to ask students for opinions as to its validity in the main areas and sub-areas. Is there anything missing? Is there anything there that should not be there, and why? On a detailed sub-topic, where might it fit in the framework? There might be something of special importance for the group that is not specifically shown. If so, and if there is consensus for a change in the framework, then it might be enhanced so that it becomes 'owned' by the group.

At this point the general question might be asked: how valid are the relationships between *Information for Knowledge Work, Customer Satisfaction & Business Performance* and the other four main areas? Does the group feel that these represent the essential nature of the inter-relationships?

What about the other 12 relationships not shown? At this point the suggested relationships shown in the matrix might be drawn in. What can we agree upon in these relationships?

A third line of questioning is: are these the relationships *actually present* in organisations? For example, is *IS Development, Acquisition & Support* actually determined & specified by *People and Organisation*? And, does *People & Organisation* actually exploit *Information & Communications Technology*? In other words, how do students see the descriptive versus prescriptive relationships in organisations. Again, does the framework need to be changed in the inter-relationships, so that it becomes 'owned' by the group?

In pursuing this line of questioning further, the question may be asked: to the extent there is a difference between the *prescriptive* versus the *descriptive* relationships, what might be some of the causal areas? What are the critical success factors (CSFs) and the critical failure factors (CFFs)? For example, if *People & Organisation* do not satisfactorily determine & specify *IS Development, Acquisition & Support*, in which areas are the causes; in which sub-areas might the problem be rooted?

A fourth line of questioning is to take specific topics treated elsewhere in the course and ask where they might fit within the framework (a) prospectively, looking forward to other topics in the course, (b) currently, by discussing a specific topic within the context of the framework, and (c) retrospectively, tying topics back into the framework as the course proceeds. For example, where might the topics of ERP systems, middleware, data compression, knowledge management, business process re-design, data modelling, object oriented analysis, user interface, information management, systems steering committees, and other topics, fit into the framework? To which main area do they seem most pertinent? In fact, does the topic relate to *more than one* main area, if so to which, and *how* does it inter-relate?

For example, if *system development* and the *use & support* of a *system/application* were being discussed, how might this need to be linked with other areas? Supposing it were an enterprise information system (EIS), an organisation Intranet, a call-centre system, or a web-based data warehouse-supported business portal? In each case, which are the areas and sub-areas under *People & Organisation*, for example, which need to be linked in and considered?

Similarly, the framework is a vehicle for discussing issues for the field of Information Systems. For example, is e-commerce delivering on its expectations; are customer relationship management systems old wine in new bottles; how are data warehouses benefiting the organisation?

In using and discussing case studies for the field, how does the case study relate to the framework, and vice-versa? To which main areas and sub-areas does the case study largely relate? We might start by circling those sub-areas in the systemic framework that are treated in the case study, and inserting any sub-topic areas into the framework that are treated in the case study but not specifically included in the framework. What are the inter-connections and their implications?

Lastly, an assignment is suggested. Students or discussion delegates might be asked to: (1) fill in detailed sub-topics within the framework as appropriate to the course, (2) give reasons as to why these detailed sub-topics are significant enough to be included, and (3) indicate how they inter-relate. There are variations on this theme. For example, teams might be asked to choose one main area/theme of the framework, and fill in the detailed sub-topics. Also, topics from other courses (as in an MBA programme), might be linked into the framework. Thus, the systemic framework aims to be a vehicle for encouraging and building a big-picture view of IST, regardless of topic or issue.

Implications and Use of the Framework in the Organisation Setting

Much of what has been said about the teaching use of the model also applies in the organisation setting. People who are responsible for information systems & technology (IST), or in some way determine the development and use of IST, are likely to benefit from some form of training that provides a big-picture view.

It has been said that the average manager and executive has difficulty in obtaining an integrated and holistic view of information systems & technology, and that this may be a factor in the lack of alignment between IST and the strategic aims & needs of the enterprise. The point here is that technologically-centric training, only, gives a technologically-centric view.

It is expected that use of the systemic framework in training, and in planning and discussion, should help to overcome such a technologically-centric view, and provide more of an integrated and systemic view – with possible implications for strategic use and alignment of IST with the needs of the enterprise.

For instance, in planning the portfolio of systems projects for the coming year, (1) what type of system/application is involved and, given this type of system/application, (2) which main

areas and sub-areas in the framework are involved and inter-related, and need to be factored into the planning, and (3) in which areas do the critical success factors (CSFs) and critical failure factors (CFFs) reside?

Such planning will generally require significant interface between IS/IT management, senior management, and user/client stakeholders. In this interface, a common challenge is that of having common values, agreeing on the process needed, and achieving common aims. The framework provides a means of constructing such values, process and aims. It is not 'technical' and, experience shows, it is reasonably easy to attain understanding of the framework with the user/client.

A further instance is the business analysis and/or systems analysis for a particular systems project. What is our overall schema? Is it just an automation project, or are there other implications & impacts? For example, to what extent do we need to consider: *use & support, maintenance, architecture, process improvement, alignment with business strategy, security & control, data quality*, and other areas in the systemic framework? More fundamentally, will the products from this project lead to or provide *information for knowledge work, customer Satisfaction & Business performance*?

The systemic framework may also support the *Management of IS/IT*. Its use in communicating with client-users has already been discussed. But even before this, what is the role for IS/IT management in the organisation? What are the priority issues, and how are they inter-connected? Given the pervasive nature of information systems & technology, its strategic import for the organisation, the dependence of the organisation upon it, the host of disparate stakeholders, and the fish-bowl nature of IS/IT management, where mistakes may have significant and visible impact, the job of managing IS/IT is one of the most complex and demanding. To the extent that the framework might be used to determine and agree the role of IS/IT management, and not only facilitate communication with user/clients, but also help in the

education of such user/clients, then the framework is being used to support the IS/IT management role.

Implications and Use of the Framework in Research

The systemic framework has implications for research. Firstly, the framework offers a clarity for the field. The framework suggests that this is what the field of Information Systems is about. In making use of such a systemic or holistic view, it may become easier to represent the significance of a particular research interest, and where it ties into other areas of the field.

Second, to the extent that a big-picture dialogue is facilitated, it may point to areas of uncertainty, areas where there is a need to know more. For example, the IS Masters or PhD student might use the framework as a top-level road map in searching for areas of concern in organisations.

Similarly, when a big picture view is offered, it tends to invite the insertion of those pieces that may be missing, or the extra detail that might be needed for a particular purpose or group. A blank page is less likely to facilitate effective thought and discussion, compared with a suitable model that invites comments, ideas, changes and additions.

Also, when a specific research subject is being pursued, the framework may inform a big-picture, integrated view of Information Systems. It may encourage linking with and thinking about other, related areas. For example, such other areas might be pointed to at the end of a thesis, in “areas for future research”.

The grounded theory data gathering included the field of *practice*, and it is hoped the framework reflects this. To the extent that it does, the framework, may provide encouragement to undertake research oriented to practical outcomes in IS Research. Certainly,

there have been calls for IS academics to cast aside their “esoteric detachment” from corporate concerns, and become more responsive to the field of practice (Slater et al, 1995).

This leads to what might be a vicious cycle for the field. On the one hand, esoteric and detached research abstracts from the field of practice. Consequently, organisations may view academic research as fuzzy, irrelevant and pretentious (Keen, 1991b). On the other hand, with this view, it becomes difficult to get into organisations to carry out, compare and validate academic research. Business managers and executives are already hard-pressed to find the time to get their jobs done, without adding ‘the problem’ of academic research. Therefore, finding ways of bridging the gap, and actually getting into and partnering with organisations for mutually satisfactory research outcomes, has become a significant issue. Might the framework be of help? It has been found to be useful by the authors in dealing with managers and executives. They appear to relate well to the framework when it is applied to their organisation.

Further, in offering a big picture view of the field, the framework may offer support to those who wish to engage in *divergent* research, which draws upon scholarship among different disciplines to address real-world needs (Brown, 1992). It compares with *convergent* research, which develops clearly defined, specific lines of enquiry to validate promising hypotheses. Thus, where divergent research aims to incorporate the big-picture view, it may find the framework to be of value.

To the extent that *Information for Knowledge Work, Customer Satisfaction & Business Performance* is accepted as the central, unifying theme for the field, this may have implications for research focus. For example, It may lead to greater focus on how people actually process and use information in organisations, for the nature of knowledge work is still “one of the best kept secrets in America” (Suchman, 1995). Information *relevance* may also earn greater attention. Semiotics and its place in systems development may become the

subject of greater attention. Data quality might be a further area deserving of greater research effort. Thus, the focus of IS research might shift more toward the area of information itself, and its associated concepts of signals, data, knowledge and wisdom.

Lastly, the five main areas or themes in the systemic framework, and their inter-relationships, may provide a spur for some form of global IS theory. For example, is *People & Organisation empowered* by *Information for Knowledge Work, Customer Satisfaction & Business Performance*? What are the areas of contingency? Is *IS Development, Acquisition & Support aimed* at *Information for Knowledge Work, Customer Satisfaction & Business Performance*? Is *IS Development, Acquisition & Support* in fact, a main theme? Thus, in offering a clarity for the field, and in putting forward these main themes and inter-relationships, it either invites (a) disagreement, and development of a more representative model for the IS field, or (b) agreement, and a process of building upon the framework toward global theory for the field.

Summary and Conclusions

This work began some years ago with a concern at the lack of integration between subjects in the field of information systems, and the consequential difficulties in teaching, learning and research. Despite some arguments against, there would seem to be a need for a basic, systemic framework for the field, and one is proposed herein. It seeks to allow not only the teacher and researcher but also the manager and practitioner to inter-connect the main areas of the field and its basic areas of application in organisations. Thus, it aims for an integrated, systemic big picture of what the field is about. In developing a systemic framework for the field, the paper proposes that the central focus is no longer the development of information systems, nor computers, nor computer-based information *only*, nor any particular purpose of information such as decision-making and control. It is proposed that the central theme of the field of

information systems is *Information for Knowledge Work, Customer Satisfaction & Business Performance*.

References

- ACM (1991 version). The Computing Reviews Classification System
- ACM/IEEE-CS Curriculum Task Force (1991). Computing Curricula. *Communications of the ACM*. Vol. 33, No. 3, pp. 69-84.
- Adam, F. and Fitzgerald, B. (1996) A Framework for Analysing the Evolution of the IS Field: Can IS become a Stable Discipline?, in Coelho, J. et al. (Eds) Proceedings of the 4th European Conference on Information Systems, Lisbon, pp. 17-32.
- Ang, A. Y. and Lo, B.W.N. (1991) Changing Emphases in Information Systems Curriculum: An Australian Perspective. Second Annual Conference on Information Systems and Database Special Interest Group. 4-5 February, 1991. University of New South Wales.
- Ahituv, N. and Neumann, S. (1990) Principles of Information Systems for Management. 3rd ed. Wm. C. Brown, Dubuque, Iowa.
- Association for Information Systems (1995), Policy Statement on the Role of IS in American Business Schools, December.
- Avison, D. (1996) The Discipline of Information Systems: IS Teaching, Research, and Practice, First Annual Conference of the Academy of Information Systems (UK), John Ward (Chair), Cranfield University.
- Avison, D. (1997) *The 'Discipline' of Information Systems: Teaching, Research and Practice*, in Mingers, J. and Stowell, F., (Eds) *Information Systems: An Emerging Discipline?* McGraw-Hill, London.
- Bacon, C.J. (1992) *A Model for Teaching the Management of IST*, 12th World Computer Congress of IFIP, Madrid, Spain, August.
- Banville, C. and Landry, M. (1989) Can the Field of MIS Be Disciplined? *Communications of the ACM*. Vol. 32 No.1, pp. 48-60.
- Bariff, M., and Ginzberg, M. (1982) *MIS and the Behavioural Sciences: Research Patterns and Prescriptions*, Data Base, Vol. 14, No. 1, pp. 19-26.
- Barki, H., Rivard, S., and Talbot, J. (1998). An Information Systems Classification Scheme. *MIS Quarterly*. Vol. 12 No. 2. pp.298-311.
- Barron, T.M., Chiang, R.H.L., Storey, V.C. (1999) A Semiotic Framework for Information Systems Classification and Development, *Decision Support*, Vol. 25, Issue 1.
- Benbasat, I. and Weber, R. (1996) Research Commentary: Rethinking "Diversity" in IS Research, *Information Systems Research*, Vol. 7, No. 4, pp. 389- 399.
- Bennet, R. (1991) How is Management Research Carried Out? *The Management Research Handbook*, eds. Smith, N.C. and Dainty, P., Routledge.
- Bjorn-Andersen, N. (1984), Challenge to Certainty, in *Beyond Productivity: Information Systems Development and Organisational Effectiveness*, pp. 1-8, North-Holland, NY.

- Bjorn-Andersen, N. (1985) IS - A Doubtful Science?, *Research Methods in Information Systems*, ed. E. Mumford, R. Hirscheim, G. Fitzgerald, and A. Wood-Harper, Elsevier Publishers, North Holland, pp. 273-277.
- Blume, S. (1990) Interdisciplinarity in the Social Sciences. IMRAD Working Paper. University of Warwick.
- Boaden, R. and Lockett, G., (1991) Information Technology, Information Systems and Information Management: Definition and Development, *European Journal of Information Systems*, pp. 23-32, Vol. 1, No. 1.
- Box, G. (1979) Robustness in the strategy of scientific model building, in Launer, R. and Wilkinson, G. (Eds) *Robustness in Statistics*, Academic Press, New York, pp. 199-217
- Boynton, A.C. and Zmud, R.W. (1987) Information Technology Planning in the 1990s: Directions for Directions for Practice and Research. *MIS Quarterly*. Vol. 11, No. 1. March, pp. 59-70.
- Brancheau, J.C. and Wetherbe, J.C. (1987) Key Issues in Information Systems Management. *MIS Quarterly*. Vol. 11, No. 1. March, pp. 23-33.
- Brehaut, S.(1991) Teaching Information Systems: A Usable Concept of Information. *Interface*. Vol. 12, No. 4. Winter.
- Broadbent, M., Hansell, A., Lloy, P., and Dampney, C.N.G. (1992) Managing Information Systems in Australia and New Zealand: Requirements for the 1990s. *The Australian Computer Journal*. Vol. 24, No. 1, pp. 1-11.
- Brown, R.V. (1992) The State of the Art of Decision Analysis: A Personal Perspective, *Interfaces*, pp. 5-14, Vol. 22, No. 6.
- Buckingham, R.A., Hirscheim, R.A., Land, F.F., and Tully, C.J (1987) Information Systems Curriculum: A Basis for Course Design, in *Information Systems Education: Recommendations and Implications*, by the same authors/editors. Cambridge University Press, London.
- Bulkeley, D. (1995), Where to Recruit Your Next Rising Star, *Datamation*, 15 October, 1995, pp.56-58.
- Burk, C.F. Jr. and Horton, F.W. (1988) *Infomap: A Complete Guide to Discovering Corporate Information Resources*, Prentice Hall, NJ, 1988.
- Burnes, B.(1991) Managerial Competence and New Technology: Don't Shoot the Piano Player - He's Only Doing His Best. *Behaviour and Information Technology*. Vol. 10, No, 2, pp. 91-109. March-April, 1991.
- Butler, G.N. (1991) Trends in Educational Requirements for the Use of Information Technology in Commerce, Industry and the Services Sector from 1990 to 1995. New Zealand Futures Trust, P.O.Box 12-008, Wellington, New Zealand, August, 1991.
- Cannon, S.F.(1978) *Science in Culture*, Science History Publications, NY, 1978.
- Cash, J. I. Jr., McFarlan, W. F. and McKenney, J.L. (1992) *Corporate Information Systems Management: The Issues Facing Senior Management*, 3rd. ed. Dow Jones-Irwin. Homewood, Illinois.

- Chen, J., Danesh, N.A. and Willhardt, J.A. (1992) Computer Curricula in AACSB Accredited Business Schools. *Interface*. Vol. 13, No. 4, pp. 60-72, Winter.
- Checkland, P.B., and Holwell, S., (1995) Information Systems: What's the Big Idea? *Systemist*, Vol. 7, no.1, pp. 7-13.
- Ciborra, C.U., (1997) Crisis and Foundations: An Enquiry Into the Nature and Limits of Models and Methods in the IS Discipline, 5th European Conference on Information Systems, University College Cork, Ireland, Cork Publishing Co., June, 1997.
- Clarke, T.D. (1992) Corporate Systems Management: An Overview and Research Perspective. *Communications of the ACM*. Vol. 35, No. 2. Feb. 1992. pp. 61-75.
- Computer Science Corporation, (1999) *Critical Issues of Information Systems Management*, El Segundo, CA.
- Computer Science and Technology Board. (1990) Scaling Up: A Research Agenda for Software Engineering. *Communications of the ACM*. Vol. 33, No. 3. pp. 281-293, March, 1990.
- Cotterman, J. and Senn, J. (1992) *Challenges and Strategies for Research in Systems Development*, Wiley & Sons, Chichester.
- Couger, J.D., Davis, G.B., Dologite, D.G., Feinstein, D.L., Gorgone, J. T., Jenkins, A.M., Kasper, K.M., Little, J.C., Longenecker, H.E. and Vlacich, J.S. (1975) Guideline for Undergraduate IS Curriculum, *MIS Quarterly*, Sep., 1975.
- Cranfield University School of Management, (1998) *The Cranfield/Information Strategy Knowledge Survey: Europe's State of the Art in Knowledge Management*, Cranfield, 1998.
- CSC Index, (1995) 5841 Edison Place, Carlsbad, CA. 92008. Cambridge, Mass., 1995.
- Culnan, M.J. (1986) The intellectual structure of management information systems, 1972-1982: a co-citation analysis, *Management Science*, 32, 2, pp. 156-172, 1986.
- Culnan, M., and Swanson, E., (1986) Research in Management Information Systems, 1980-1984: Points of Work and Reference, *MIS Quarterly*, pp. 289-301, Sep. 1986.
- Cushing, B.E., (1990) Frameworks, Paradigms, and Scientific Research in Management Information Systems, *The Journal of Information Systems*, Vol. 2, No. 2, Spring, 1990
- Cyert, R.M. and March, J.G., (1963) *A Behavioural Theory of the Firm*, Prentice Hall, NJ, 1963.
- Daniels, C., (1991) *The Management Challenge of Information Technology*, The Economist Intelligence Unit. 40 Duke St. London.
- Davies, A, Elvin, R. and Ward, J, (2000) *Managing IT Enabled Change: A New Approach*, Cranfield School of Management Magazine, Issue 12.
- Davies, L., and Ledington, P., (1991) *Information in Action: Soft Systems Methodology*, Macmillan Education, Basingstoke.
- Davis, G.B. (1974) *Management Information Systems: Conceptual Foundations, Structure and Development*. McGraw Hill. New York.

- Davis, G.B. and Olson, (1985) M.H., *Management Information Systems: Conceptual Foundations, Structure and Development*. 2nd. Ed. McGraw Hill.
- Dearden, J. and McFarlan, F. *Management Information Systems: Text and Cases*, R.D. Irwin, Homewood, IL, 1966.
- Denning, P.J., Comer, D.E., Gries, D., Mulder, M.C., Tucker, A., Turner, J.A. and Young, P.R., *Computing as a Discipline. Report of the Task Force on the Core of Computer Science. Communications of the ACM. Vol. 32, No.1, pp. 9-23, Jan., 1989.*
- Dickson, G.W. *Management Information Systems: Evolution and Status, Advances in Computers, Vol. 20, Academic Press, 1981.*
- Dickson, G.W., and Wetherbe, J.C., *The Management of Information Systems*, McGraw Hill, 1985.
- Dixon, P.J. and John, D.A., *Technology Issues Facing Corporate Management in the 1990s. MIS Quarterly. Vol. 13, No.3, pp. 247-255, Sep., 1989.*
- Dooley, R.E., in *Critical Issues in Information Systems Management, 1991-1995. I/S Analyser. Vol. 29, No. 1. Jan. 1991.*
- Earl, M.J., *Management Strategies for Information Technology*, Prentice Hall International. 1989.
- Ein-Dor, P. and Segev, E., *A Classification of Information Systems: Analysis and Interpretation, Information Systems Research, Vol. 4, No. 2, June, 1993.*
- English, L.P., *Improving Data Warehouse and Business Information Quality*, John Wiley & Sons, NY, 1999.
- Falkenberg, E.D., (Compiler) *A Framework of Information System Concepts: Excerpt/Working Draft of the IFIP WG8.1 Task Group FRISCO, IFIP WG8.1 Conference on Business Process Re-Engineering, Bond University, Australia, May, 1994.*
- Galliers, R.D., in the *Preface to Information Analysis: Selected Readings*, Galliers, R.D Ed, Addison-Wesley, Wokingham, 1987.
- Galliers, R.D., *Points of Debate in Understanding Information Systems Research, SystemIST, Vol. 16, No. 1, Feb., 1994.*
- Galliers, R.D., *IS Research: Quo Vadis?*, First Annual Conference of the Academy of Information Systems (UK), John Ward (Chair), Cranfield University, April 1996.
- Glaser, B. & Strauss, A. *The Discovery of Grounded Theory: Strategies for Qualitative Research*, Aldine, Chicago, 1967.
- Gorry, A and Scott-Morton, M. (1971) *A framework for MIS, Sloan Management Review, Fall, pp. 55-70.*
- Gosain, S., Lee, Z., and Im, I., *Topics of Interest in IS: Comparing Academic Journals with the Practitioner Press, Proceedings of the International Conference on Information Systems, Atlanta, Georgia, December, 1997.*
- Grimshaw, D.J. *Towards a Taxonomy of Information Systems: or Does Anyone Need a TAXI? Journal of Information Technology. Vol. 7, No, 1, pp. 30-36. March, 1992.*

- Hammer, M. and Champy, J., *Re-Engineering the Corporation: A Manifesto for Business Revolution*, HarperCollins Publishers, NY, 1993.
- Hirschheim, R., Klein, H., and Lyytinen, K., *Information Systems Development and Data Modelling: Conceptual and Philosophical Foundations*, Press Syndicate of the University of Cambridge, Cambridge, 1995.
- Hirschheim, R., Klein, H. and Lyytinen, K. (1996) Exploring the Intellectual Structures of Information Systems Development: A Social Action Theoretic Analysis, *Accounting, Management and Information Technology*, Vol. 6, No. 1/2, pp.1-64.
- Huang, K.T., Lee, Y.W. and Wang, R.Y., *Quality Information and Knowledge*, Prentice Hall, NJ, 1999.
- Iivari, J., A Paradigmatic Analysis of Contemporary Schools of IS Development, *European Journal of Information Systems*, Vol. 1, No. 4, pp. 249-272, Dec., 1991.
- Iivari, J. Hirschheim, R. and Klein, H. (1998) A Paradigmatic Analysis Contrasting IS Development Approaches and Methodologies, *Information Systems Research*, Vol. 9, No. 2, pp. 164-193.
- Ives, B., Hamilton, S. and Davis, G. A Framework for Research in Computer-Based Management Information Systems, *Management Science*, 26, 9, 910-934, 1980.
- I/S Analyser (a), Editorial Advisory Board. *Critical Issues in Information Systems Management*, 1991-1995. Vol. 29, No. 1. Jan. 1991.
- I/S Analyser (b), *Assessing the Personnel and Organisational Issues of the 1990s*. Vol. 29, No. 11. Nov. 1991.
- Jackson, I. F., *Corporate Information Management*, Prentice-Hall, Englewood Cliffs, NJ, 1986.
- Johnson, G., *Strategic Change and the Management Process*, Blackwell, Oxford, 1987.
- Khazanchi, D., A Framework for the Validation of IS Concepts, *Proceedings of the Second Annual Association for Information Systems Americas Conference*, Phoenix, Arizona, August, 1996.
- Keen, P.G.W. MIS Research: Current Status, Trends and Needs, in *Information Systems Education: Recommendations and Implementation*, eds. Buckingham, R.A. Hirschheim, R.A. Land, F.F and Tully, C.J. Cambridge University Press, 1987.
- Keen, P.G.W. (1991a) *Shaping the Future: Business Design through Information Technology*. Harvard Business School Press. Boston.
- Keen, P.G.W. (1991b) *Relevance and Rigour in Information Systems Research: Improving Quality, Confidence, Cohesion and Impact*, in *Information Systems Research: Contemporary Approaches and Emergent Traditions*, ed. Nissen, H.K., Klein, H.K., Hirschheim, R., Elsevier Science, North-Holland, IFIP, 1991.
- Khosrowpour, M., (Chair), combined task force of the Information Resources Management Association and the Data Administration Management Association, *The Information Resources Management Curriculum Model: an International Curriculum Model for a 4-Year Undergraduate Program in IRM*, IRMA, 4811 Jonestown Road, Suite 230, Harrisburg, PA, 171090-1751, 1996.

- Kroenke, D.M., and Dolan, K.A., *Business Computer Systems: An Introduction*, Mitchell Publishing, Santa Cruz, CA, 1987.
- Land, F.F. and Kennedy-McGregor, M., *Information and Information Systems: Concepts and Perspectives*, in *Information Analysis: Selected Readings*, ed. Galliers, R.D., Addison-Wesley, 1987.
- Langley, A., Mintzberg H., Pitcher P., Posada E., and Saint-Macary, J., *Opening Up Decision-Making: the View from the Black Stool*, *Organisation Science*, Vol. 6, No. 3, pp. 260-279, May-June, 1995.
- Larabee, J.F., *Building a Stronger IRM Curriculum*, *Information Systems Management*. Vol.9, No. 2, pp. 22-28, Spring, 1992.
- Laroche, H., *From Decision to Action in Organisation Decision-Making as Social Representation*, *Organisation Science*, Vol. 6, No. 1, pp. 62-75, Jan-Feb., 1995.
- Latour, B. *The Pasteurisation of France*, Harvard University Press, Cambridge, Massachusetts, 1988.
- Latour, B., and Woolgar, S., *Laboratory Life*, Sage Publications, London, 1979.
- Lethbridge, D., O'Byrne, G., and Altman, G., *Learning to Manage Information Systems*. Occasional Paper No. 112. Faculty of Commerce, Deakin University, Geelong, Victoria 3217, Australia. May, 1991.
- Liebenau, J. And Backhouse, J., *Understanding Information: An Introduction*, Macmillan Education, Basingstoke, 1990.
- Longenecker, H.E. Jr. and Feinstein, D.L. eds., *The DPMA Model Curriculum for a Four Year Undergraduate Degree*, Data Processing Management Association. 505 Busse Highway. Park Ridge. Illinois. 60068-3191. 1991.
- McFarlan, F. W. and McKenney, J.L., *Corporate Information Systems Management: The Issues Facing Senior Management: Text and Cases*, 3rd. ed. Richard D. Irwin. Homewood, Illinois. 1988.
- McNurlin, B.C. and Sprague, R.H. Jr., *Information Systems Management in Practice*, Prentice Hall. Englewood Cliffs, New Jersey. 1989.
- March, J.G. and Simon, H.A., *Organisations*, Wiley, NY, 1958.
- Marchand, D.A. and Horton, F.W., *Infotrends: Profiting from Your Information Resources*, John Wiley and Sons, NY, 1986.
- Martin, E.W., DeHayes, D.W., Hoffer, J.A., and Perkins, W.C., *Managing Information Technology: What Managers Need to Know* (2nd ed.), Macmillan, 1994.
- Mason, R., and Mitroff, I. *A Program of Research on MIS*, *Management Science*, **19**, 5, 475-485, 1973.
- Mingers, J.C., *Information and Meaning, Foundations for an Intersubjective Account*, *Information Systems Journal*, Vol. 5, No. 4, pp 285-386, Oct., 1995.
- Mintzberg, H., *The Manager's Job: Folklore and Fact*, *Harvard Business Review*, Vol. 53, No. 4, pp 49-61, 1973.

- Mintzberg, H., Rounding Out the Manager's Job, *Sloan Management Review*, pp. 11-26, Vol. 36, No. 1, 1994.
- Morse, R.J. and Wager, E.A., The Best Graduate Schools. *U.S. News & World Report*. 29 April, 1991. pp. 62-69.
- Nolan, R. and Wetherbe, J. Towards a comprehensive framework for MIS research, *MIS Quarterly*, June 1980, 1-13, 1980.
- Nonaka, I. and Takeuchi, H., *The Knowledge-Creating Company*, Oxford University Press, Oxford, 1995.
- Orlikowski, J.W. and Baroudi, J.J., Studying Information Technology in Organisations: Research Approaches and Assumptions, *Journal of Information Systems Research*, Vol. 2, No. 1, 1991.
- Orlikowski, J.W., CASE Tools as Organisational Change: Investigating Incremental and Radical Change in Systems Development, *MIS Quarterly*, Vol. 17, No. 3, Sep. 1993.
- Parker, C.S., and Case, T., *Management Information Systems: Strategy and Action*, McGraw-Hill Intl. 1993.
- Pfeffer, J. (1993) Barriers to the advance of organizational science: paradigm development as an independent variable, *Academy of Management Review*, 18, 4, pp. 599-620.
- Porter, L.W. and McKibbin, L.E. *Management Education and Development: Drift or Thrust into the 21st Century?* McGraw-Hill. 1988.
- Redman, T.C., *Data Quality for the Information Age*, Artech House, Boston, 1996.
- Remenyi, D. and Williams, D., The Nature of Research: Qualitative or Quantitative, Narrative or Paradigmatic? *Information Systems Journal*, Vol. 6, pp. 131-146, 1996.
- Robson, W., *Strategic Management and Information Systems: An Integrated Approach*, Pitman, 1994.
- Silk, D.J. Current Issues in Information Management - Update. *International Journal of Information Management*. Vol. 10., No. 3. Sep. 1990. pp. 178-181.
- Silver, M., Markus, L. (1995) The Information Technology Interactive Model: A Foundation for the MBA Core Course, *MIS Quarterly*, September, pp. 361-390.
- Simon, H.A., *Administrative Behaviour: A Study of Decision-Making Processes in Administrative Organisations*, the Free Press, NY, 1957.
- Simon, H.A., *The New Science of Management Decision, The Shape of Automation for Men and Management*, Harper and Row, 1965.
- Slater, J.S., McCubbrey, D.J., and Scudder, R.A., Inside and Integrated MBA: An Information Systems View, *MIS Quarterly*, September, 1995.
- Spender, J.C., Organisations are Activity Systems Not Merely Systems of Thought, *Advances in Strategic Management*, Vol. 12B, pp. 153-174, JAI Press, 1995.
- Stamper, R.K., *Information in Business and Administrative Systems*, Wiley, Chichester, 1973.
- Stamper, R.K. Towards a Theory of Information; Information: Mystical Fluid or Subject of Scientific Enquiry?, *The Computer Journal*, pp. 195-199, Vol. 28, No. 3, 1985.

- Stamper, R.K., The Semiotic Framework for Information Systems Research, Proceedings of the IFIP TC8/WG 8.2 Working Conference, Denmark, eds, Nissen, H. Klein, H.K., Hirscheim, R., North Holland, Dec., 1990.
- Stocks, K.D. and Romney, M., The Supply and Demand for IS/MIS Graduates. *The Journal of Information Systems*. Spring, 1987. pp.83-100.
- Stowell, F., and Mingers, J., Introduction, in *Information Systems: An Emerging Discipline?* Ed. Mingers, J. and Stowell, F., McGraw-Hill, London, 1997.
- Suchman, L., Making Work Visible, *Communications of the ACM*, Vol. 38, No. 9, Sep. 1995.
- Sveiby, E.K., and Lloyd, T., *Managing Know-How*, Bloomsbury Publishing, London, 1987.
- Swanson, E. B., Land, F.F. and Targett, D., Information Systems as a Field of Study: Its place in the Graduate Business School. Selections. *Journal of the Graduate Management Admission Council*. 11601 Wilshire Boulevard, Suite 760, Los Angeles, CA, 90025. Spring, 1991.
- Swanson, E.W. and Ramiller, N.C., Information Systems Research Thematics: Submissions to a New Journal, *Information Systems Research*, Vol. 4, No. 4, Dec. 1993.
- Targett, D., The ITBE Initiative: Are Business Schools Meeting the Challenge of Management and IT in the 21st Century? *Journal of Strategic Information Systems*. Vol. 1, No. 1. pp.43-46. Dec. 1991.
- Tricker, R.I., The Management of Organisational Knowledge, in *Information Systems Research: Issues, Methods and Practical Guidelines*, ed. Galliers, R.D., Blackwell Scientific, Oxford, 1992.
- Van Gigch, J.P. and Pipino, L.L. In Search of a Paradigm for the Discipline of Information Systems. *Future Computer Systems*. Vol. 1, No. 1, pp. 71-97, 1986.
- Van Maanen, J., Dabbs, J.R. Jr., and Faulkner, R.R., *Varieties of Qualitative Research*, Sage Publications, Beverly Hills, 1982.
- Vatter, W.J., *The Fund Theory of Accounting and Its Implications for Financial Reports*. The University of Chicago Press. 1947.
- Vickery, B., and Vickery, A. *Information Science in Theory and Practice*, revised edition, Bowker-Sauer, Reed Reference Publishing, London, 1992.
- Vogel, D.R and Wetherbe, J.C. MIS Research: A Profile of Leading Journals and Universities. *Database*, Vol. 16, No. 1, pp. 3-14. Fall, 1984.
- Ward, J., Griffiths, P., and Whitmore, P., *Strategic Planning for Information Systems*, John Wiley & Sons. 1990.
- Watson, T.M., Sousa, R.J. and Junglas, M.R., Business School Deans Assess the Current State of the IS Academic Field, *CAIS*, Vol. 4, Article 4, Sep. 2000.
- Weber, R., Towards a Theory of Artifacts: A Paradigmatic Base for Information Systems Research. *Journal of Information Systems*. pp. 3-19. Spring, 1987.

Appendix I. Sources for the Framework

The Delphi Survey of Leading Academics

This was considered the most important source of/for the framework. The academics were randomly selected from three published Directories: (1) the McGraw-Hill Directory of MIS Faculty in North America, (2) the Directory of Information Systems Faculty in Europe, and (3) the Australasian Information Systems Academic Directory. To be randomly selected, the academic person generally had to be of professorial rank, or head of department, or director of a programme. In the case of non English-speaking countries, they also had to be represented as having "excellent" English, and this did restrict the selection in such countries. A total of 113 surveys were mailed and 8 were returned "address unknown", for a net total of 105, to which there were 52 responses. Based on the net total, therefore, the response rate was 49.5%. The returns were as follows, with the number originally mailed indicated in parentheses after the country, and the number of replies for that country indicated in parentheses at the end.

- Australia (7): Kit Dampney, Steve Elliot, Igor Hawryszkiewicz, Ron Weber. (4)
- Austria (2): Thomas Weitzendorf. (1)
- Belgium (1): None (0)
- Canada (3): Brent Gallupe, Sid Huff (2).
- Denmark (2): None (0).
- Finland (2): Kalle Lyytinen (1).
- France (4): Alain Berdugo, Jean-Louis LeMoigne (2).
- Germany (6): Armin Heinzl, Franz Schober (2).
- Hong Kong (1): Bob Tricker (1).
- Ireland (4): Tony Moynihan, Ciaran Murphy, Michael Sherwood-Smith (3).
- The Netherlands (5): B.K. Brussard, H.G. Sol, Ronald Stamper (3).
- New Zealand (3): Ivan Jackson, David Keane (2).
- Norway (3): Tor Larsen (1).
- South Africa (5): Trevor Crossman, Derek Smith, Peter Warren (3).
- Spain (2): None (0).
- Sweden (3): Mats Lundeberg (1).
- Switzerland (2): Hubert Oesterle, Andre Probst (2).
- United Kingdom (14): Ruth Boaden, Benita Cox, Guy Fitzgerald, David Grimshaw, Malcolm King, Anne Leeming, John Mingers, David Targett, Leslie Willcocks, Trevor Wood-Harper (10).
- USA (44): John Burbridge, Gordon Davis, Omar El Sawy, Gary Green, Rudy Hirschheim, Clyde Holsapple, Blake Ives, Milton Jenkins, Mehdi Khosrowpour, Heinz Klein, Gary Kohler, Al Lederer, Henry Lucas, Ted Stohr (14).

Some of the respondents not only completed the Delphi survey form but also wrote letters and engaged in e-mail dialogue with the authors in amplifying and extending the discussion. Consequently, the revised draft of the paper represents this additional input. The authors wish to record, herein, sincere appreciation to those who responded, who in no small sense might be considered co-authors of this work.

Syllabi and Texts

In developing the systemic framework for the field, about 130 syllabi were collected from universities, from 1993 to 1995, in the United States (65), Canada (10), the United Kingdom (20), Ireland (2), Australia (25), and New Zealand (8). In requesting these, the request was for syllabi on any courses, either graduate (MBA, M.Sc. and Ph.D) or undergraduate, that included or dealt with the managerial or organisational aspects of IS or IT. In the United States, syllabi were obtained from such institutions as New York University, the University of Arizona, University of Minnesota, the Sloan School at MIT, University of Texas, Indiana University, Carnegie Mellon, Southern Methodist University, the Wharton School at U. Pennsylvania, and Harvard. In each country, the aim was to obtain syllabi from those institutions that have identifiable programs in MIS, IM, IS, IT or similar, particularly at the graduate level, and particularly those identified for their leadership in the study and research of IS (Morse and Wager, 1991).

With respect to the syllabi, there is a wide range of subjects covered. Some have graduate programs that are oriented to the *management of* IS functions, while others are for business executives operating and *managing with* IS. And some have both. Many programmes emphasise the technical side of IS, having being developed in computer science environments. There have been calls for such programmes to move beyond a technical focus, to a more strategic and business orientation (Stocks and Romney, 1987, Porter and McGibbin, 1988, Targett, 1991, Butler, 1991, and Laribee, 1992). And it seems that

some universities are responding to this call, by focusing more on the people and organisational aspects of IS (Bulkeley, 1995). In the UK, the term "hybrid manager" has been coined, in expressing the type of business and technical skills that need to be taught (Earl and Skyrme, 1990).

In MBA programmes, however, the coverage of IS is often light and superficial, there is an apparent uncertainty as to what to teach, and the programmes are too 'tools' oriented - at the expense of strategic business concerns (Targett, 1991, and Swanson et al., 1991).

The 20 texts used in developing the framework spanned about nine years, from 1984 to 1994. These included texts such as Davis and Olson, 1985, Dickson and Wetherbe, 1985, Jackson, 1986, McFarlan et al., 1988, Earl, 1989, McNurlin and Sprague, 1989, Ahituv and Neumann, 1990, Ward, 1990, Daniels, 1991, Cash et al., 1992, Parker and Case, 1993, and Martin et al., 1994.

Like the syllabi, the texts varied greatly in the types of subjects covered. Also like the syllabi, there was and is growing emphasis on the people and organisational aspects of IS, compared to earlier texts that tended to focus on systems development aspects.

Curricula Studies and Research Classification Schemes

Given the emergent status of the field, it may not be surprising that there have only been a few curricula studies in and for IS (e.g. Buckingham et al., 1987, Stocks and Romney, 1987, Ang and Lo, 1991, and Khosrowpour, 1996). More common or regular are those in the related field of computer science (Denning et al., 1989, Computer Science and Technology Board, 1990, ACM/IEEE-CS Curriculum Task Force, 1991, Chen, et al., 1992, and Longenecker and Feinstein - DPMA Model Curriculum - 1991).

Curricula studies and research classification schemes are generally aimed at classifying the body of knowledge (e.g. Barki et al., 1988, ACM Computing Reviews, 1991, and Larabee, 1992). However, these sometimes have a computer science emphasis, with the management and use of IS put into a sub-heading 'box'.

Industry/Management Surveys

Industry surveys, such as those of CSC Index, are regularly undertaken of key management concerns regarding IS. Studies with a research basis are also undertaken fairly regularly. These surveys and studies provide a window on the field because they reflect what those in practice consider to be important at the time. It is the strategic issues that tend to be of increasing concern. These are issues such as corporate-IS goals alignment, change management, competitive advantage, information architecture, productivity, IS investment, organisational learning, and people issues (Brancheau and Wetherbe, 1987, Dixon and John, 1989, Silk, 1990, IS Analyser a & b, 1991, Lethbridge et al., 1991, Clark, 1992, Broadbent et al., 1992, and CSC Index, 1995). In all, 15 surveys and studies were reviewed.