1
Scoping the Discipline of Information Systems[1]

David Avison and Steve Elliot

INTRODUCTION

In reflecting on the academic discipline of information systems (IS) we might first look at what we mean by 'discipline'. Here we mean 'a branch of instruction or learning' though we do not wish to imply the desirability of, nor actual, agreement on a limited field of study nor total 'control', 'obedience' nor too much 'order' about what we research. This would give grounds for concern, for information systems is a pluralistic field, founded on knowledge from other, more established, source disciplines and frequently borrowing from these disciplines. On the other hand, a lack of 'discipline'—for example, not having an agreed general area for teaching, research and practice—is also a concern, as it leads to a perceived lack of coherence in the discipline and a low status as a consequence. It is this balancing act, between too much control about limiting the issues relevant to the discipline on the one side and the danger of incoherence on the other, which is a central theme of this chapter. This balancing act might be considered to be only of academic interest except for the importance of information systems to industry and to society.

Since the 1990s, applications of information and communication technology (ICT) have been fundamentally changing the way organizations conduct business. These changes create opportunities for

An earlier version of this chapter appears in Avison, D. E. and Pries-Heje, J. (eds) (2005), *Research in Information Systems: A Handbook for Research Supervisors and Their Students*.

researchers to make significant contributions to knowledge while they assist organizations to manage this change better. The Organization for Economic Cooperation and Development (OECD) acknowledges the structural impact of these technology-enabled innovations:

> The Internet and related advances in information and communication technology (ICT) are transforming economic activity, much as the steam engine, railways and electricity did in the past (OECD, 2001).

But we have reservations about the above as a basis for understanding the discipline of information systems in its concentration on economic activity with technology, rather than the broader activity between people and organizations and technology, and also in its comparison between ICT and the more static technologies mentioned. Major developments in ICT seem to occur every day and there are so many different strands and applications. Further, there can be no doubt that it is transforming society, at least in the developed world and some regions in the developing world.

IS is a relatively new discipline. We consider the start of the discipline to be the widespread use of computers to process data in the 1950s. Of course they existed well before the advent of computers. There can today be IS without computers. The grapevine is a powerful information system. Further, if technology is used, it does not have to be sophisticated. But in practice, information systems are now almost invariably computerized, and can be very sophisticated in their use of technology. The rejoinder is that the organizational context is key, that people will be involved as much as computers, and that not all parts of the information system will be automated.

IS as a field of study developed in response to the increasing necessity of organizations to improve their capabilities to process and to manage data. Reflecting this origin, an information system was initially seen to be an application of computers to help organizations process their data so they could improve their management of information. Indeed, information systems used to be referred to as data processing systems.

While the types of computer technologies developed and potential areas of their application increased, so too did the role of an information system and the scope of the discipline. Information and communication technologies are now ubiquitous in industrialized nations and widespread in much of the rest of the world. Their impact extends from business, across a broad range of application areas, including health and government, to the community at large and into many private homes.

By looking at some potential definitions for the discipline, we will set the scene for our discussion on its scope. Our starting point for a definition of information systems is that of Avison and Fitzgerald (2003, p. xi): 'The effective design, delivery, use and impact of information [and communication] technologies in organizations and society.' This definition captures an important part of IS, that is the development of IT applications, and it recognizes that successful applications of ICT require broader attention than just that on the technology. The IS discipline has steadily developed from its initial 'techno-centric' focus to a more integrated technology, management, organizational and social focus.

But this definition does not capture the excitement of the discipline. We are now in a period of great transformation, as organizations change to address their challenges or achieve their goals. It is also a period of structural transformation of the global economy. ICT supports and enables most of these changes, and IS is the only discipline with a primary focus to study the applications of technology by organizations and society. It is therefore particularly relevant during this period of great change.

The following definition suggested by the UK Academy for Information Systems is somewhat broader than the definition looked at previously:

> The study of information systems and their development is a multi-disciplinary subject and addresses the range of strategic, managerial and operational activities involved in the gathering, processing, storing, distributing and use of information, and its associated technologies, in society and organizations.

The above definition is, however, somewhat passive about IS as it does not give a sense of the creativity and innovative effort that is part of the potential contribution of IS. The definition might also include some scholars from other disciplines, such as the computing disciplines or some management and social science ones, such as sociology or psychology. In his definition, Allen Lee tries to distinguish information systems from other disciplines without presenting too narrow a view. He argues that the IS discipline is distinct in that it:

> examines more than just the technological system, or just the social system, or even the two side by side; in addition it investigates the phenomena that emerge when the two interact. (Lee, 2001, p. iii)

As Lee points out: 'This embodies both a research perspective and a subject matter that differentiate the academic field of information

systems from other disciplines' (Lee, 2001, p. iii). However, although it provides a focus, it lacks a sense of the richness of the discipline and its possible contribution.

The above discussion has set the scene on our perspective on the scope of the discipline and, having suggested a fairly broad scope, we turn to differentiating between IS and other related disciplines, both on the technology side and the social side, using Lee's definition above.

DIFFERENTIATING IS FROM RELATED DISCIPLINES

On the technology side of information systems, it is differentiated from computer and IT disciplines by its focus. In a controversial article in the *Harvard Business Review* of May 2003, Nicholas Carr argues that IT doesn't matter. He compares IT to the electricity or telephone infrastructure: the early mover advantage has gone, everyone has it and organizations cannot gain competitive advantage because of it (Carr, 2003). In some respects this is similar to the OECD perspective given at the beginning of the chapter.

But IS is different from IT. As illustrated graphically in Figure 1.1, compared with two other IT-related disciplines, computer science and computer systems engineering, IS emphasizes the applications of technology rather than a focus on fundamental technologies and theories. It focuses more on interactions between people and organizations

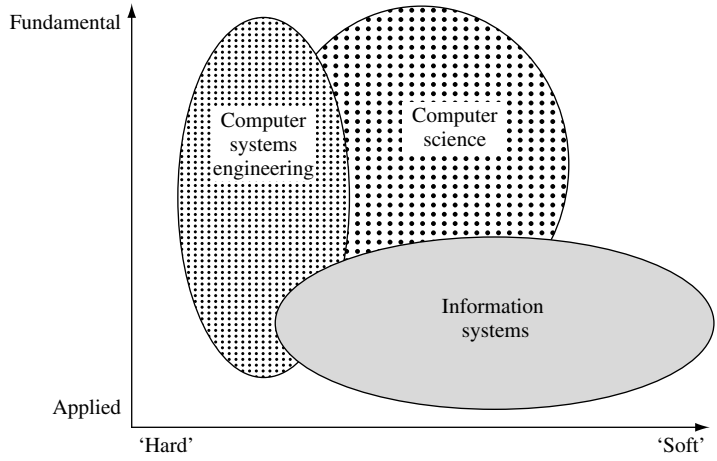

Figure 1.1 *Differentiating IS from other IT-related disciplines (adapted from ACS, 1992)*

(the 'soft' issues) and technology rather than on the technologies (the 'hard' issues) themselves. (It should be noted that Figures 1.1 and 1.2 represent the focus of the different disciplines, not the quantum of work conducted in or contributed by any of the disciplines.)

Figure 1.3 is a comic-strip representation of the different viewpoints of the computer scientist and the IS researcher vis-à-vis the computer. Whereas the computer scientist and systems engineer will be looking at the technology, interested in technology itself, the

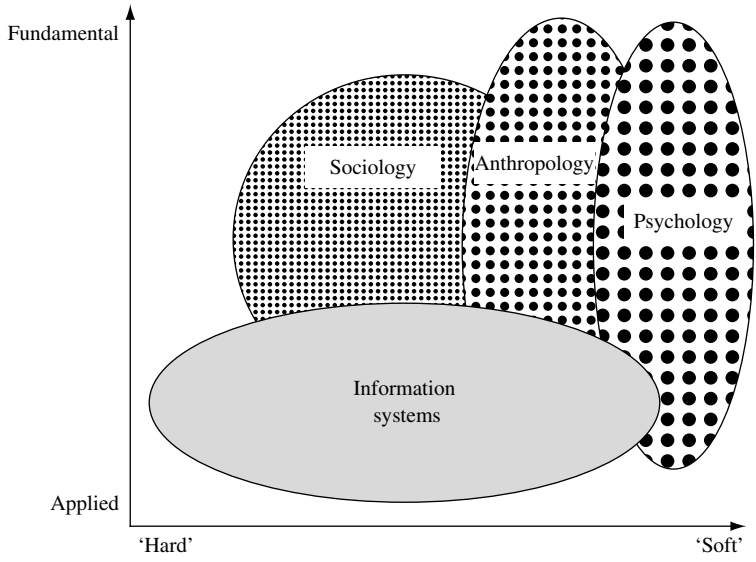

Figure 1.2 *Differentiating IS from other social science disciplines*

Figure 1.3 *The computer scientist and the IS researcher (or the software developer and the systems analyst)*

information systems researcher is looking away from the computer to its impacts on people and organizations. In the same way, in practice, the software developer is focused on the technology, whereas the systems analyst is focused on the business.

This emphasis on soft, or human and organizational, issues may suggest that IS should be seen more as a social science discipline rather than science or engineering. But as shown in Figure 1.2, sociology, psychology, anthropology and other social sciences do not share our emphasis on the applications of technology to organizations and society.

Like computer science, these other disciplines can be seen as both related disciplines and foundation disciplines of IS. But, while there may be considerable overlap of the disciplines at the boundaries, the disciplines are still differentiated by the focus, purpose and orientation of their activities.

FOUNDATIONS OF IS

We now turn to some of the foundations that support the discipline, beginning with the theoretical foundations. We have seen that the IS discipline is in essence an applied social science pertaining to the use and impact of technology. As researchers were drawn to the discipline, they began by applying the theories, methods and research practices from their original disciplines, primarily computer science on the one side and social sciences and management on the other. A diversity of theory from reference disciplines, including economics, mathematics, linguistics, semiotics, ethics, political science, psychology, sociology and statistics, along with computer science, was applied.

For example, we can see how economic theories might be used to cost-justify an information system to the organization's management; how psychology might be used to assess the impact of the system on individual users; how sociology might be used to assess the impact of the system on organizations and society; and semiotics to study the meaning of signs, how people and computers can communicate, as well as computer science to study the efficiency of software.

One potential problem is that, within these disciplines, different theories exist and these may be mutually inconsistent. As Orlikowski and Baroudi (1991) argue, the social sciences are 'marked by a plethora of "schools of thought," each with its own metatheoretic assumptions, research methodologies, and adherents'.

The theories include systems theory, information theory, design theory, the theory of science and scientific method. It is true that

many disciplines (including medicine, management and geography) also do not have a simple and single disciplinary status and can further be described as a collection of social practices. However, as we have already suggested, such a discipline can be seen by other academics as confused and lacking in coherence and academic rigor: in short, the discipline of information systems could lack credibility because it does not have theoretical clarity.

The interdisciplinary nature of the subject is no excuse for a lack of rigor. One of the problems with the use of concepts from another discipline is that they may be used uncritically. Avison and Myers (1995) give an example of the uncritical use of a concept within information systems with the use of the term 'culture'. Researchers in information systems may be unaware of their historical development within the source discipline, and may gloss over the fact that there may be a range of perspectives that operate concurrently.

The way that IS seems to take on board major theoretical underpinnings of other disciplines has been lax at times. In attacking the once-prevalent view that systems theory can be used to underpin IS, Checkland (1999) argues that this should be dispelled as 'naïve optimism…there is no simple link between systems theory and information systems'. Similarly, information theory (Shannon and Weaver, 1949) is a very technical, indeed mathematical, way to perceive communication between humans and organizations that is the essence of IS. It is not mathematical complexity that underpins IS. Stamper (1997) argues the case for the related theory of semiotics (and also linguistics) to be fundamental to IS. The unifying work of Simon (1981) continues to be influential in branches of economics, sociology, psychology, computer science and elsewhere, as well as in IS. The theory of communicative action (Habermas, 1979), structuration theory (Giddens, 1987), and actor-network theory (Latour, 1987) have also become popular in some IS academic circles. As an emerging discipline, IS has also been influenced by writers giving a sociological perspective from within and outside the discipline (for example, the socio-technical theory expressed in Mumford, 1995, and also by Kling, 1996).

Even well-established concepts in IS research such as 'users' have been found simplistic and unrepresentative of the multitude of roles undertaken by users in their interactions with a diversity of applications and people within varying social contexts (Lamb and Kling, 2003). The authors consider earlier research approaches based on the concept of an individualistic user to be limited, leading to an inadequate understanding of information selection, manipulation, communication and exchange in a variety of social contexts.

New insights into the strategic role of IT have also been sought, for example by Sambamurthy, Bharadwaj and Grover (2003), by drawing

on recent thinking in strategy, entrepreneurship and IT management. Stressing the critical impact on organizational performance related to its capabilities (agility, digital options and entrepreneurial alertness) and strategic processes (capability-building, entrepreneurial action and co-evolutionary adaptation) these authors consider their antecedents to be research into IT investments and capabilities.

Thus IS has been reliant on the theories espoused in other disciplines. Interestingly, the view that IS serves as a reference for emerging disciplines in a discourse with other reference disciplines has also been promoted recently. Baskerville and Myers (2002) note the development of new fields of study that refer to IS theory for explanations; for example, biotechnology. They also note the increasing influence of IS on disciplines, including accounting, banking and marketing, experiencing structural transformation resulting from application of ICT. As illustrated in Figure 1.4, they present an argument that no single discipline is able to completely address today's multi-faceted research issues so well as IS. A more viable reference model is a network of disciplines in continuous dialogue and exchange, with IS at the center of the network.

These diverse perspectives on the focus of IS theory development, with compelling arguments on all sides, should be recognized as being complementary. The discussion is beneficial to the discipline. The dynamic IS domain requires both excitement and enthusiasm in its research as well as reflective consideration on how dynamically developing research may contribute to, and be consistent with, the

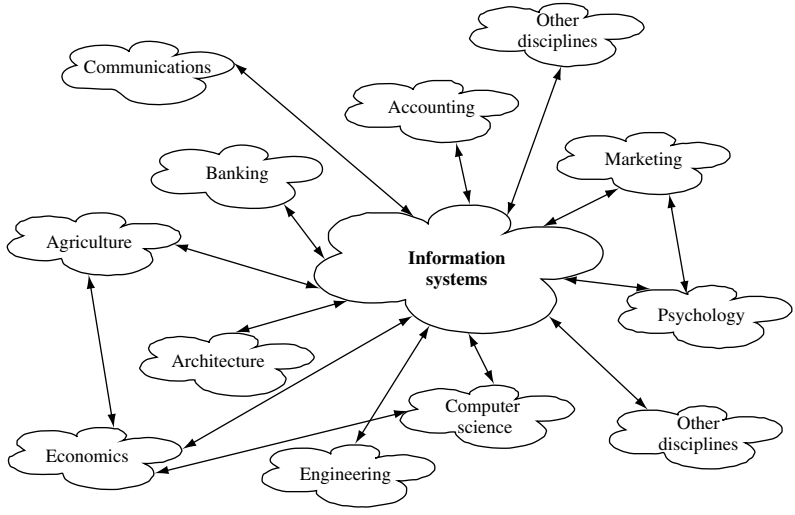

Figure 1.4 *IS as a reference discipline in discourse with other reference disciplines (adapted from Baskerville and Myers, 2002)*

discipline's overall development. The diversity of perspectives means that IS is vibrant both as a discipline and as an area of research.

But the discipline does not rest on its theoretical foundations alone, there need to be practical foundations as well. Major landmarks in the development of the IS discipline were the publication of the first research-oriented IS journal, *Management Information Systems Quarterly (MISQ)*, published in 1977 and the first *International Conference of Information Systems (ICIS)* held in 1980. It is interesting that, at that first conference, Dickson et al. (1980) suggest that IS has an image problem due to an identity crisis, definitional uncertainty, moving target, communication and integration, practitioners vs. academics, research quality and fragmentation, and being the new kid on the block. As we have seen, some of these are still concerns, although much has been achieved since that time.

More recently, the *Association for Information Systems (AIS)* was formed in 1994 as the international organization for IS academics, to add to the many national organizations already existing. Reference to the AIS website at http://isworld.org/ is time well spent and it reveals a very exciting but diverse discipline. To give only two examples, at the time of writing (in 2005) 60 conferences were listed that have taken place or would take place in the first six months of the year, with over 200 journals listed as relevant to the IS researcher.

UNITY AND DIVERSITY

Since the range of ICT is rapidly developing, applications of ICT are also developing rapidly. In consequence, IS research, teaching and practice are characterized by diversity, flexibility and dynamic development. As we have seen, these characteristics may be seen to provide the discipline with both strengths and weaknesses.

The IS discipline's strength lies in its ability to support research into applications of ICT that are structurally transforming traditional business practice and the global economy. The weakness is that the discipline may focus on such a diversity of phenomena that it may appear to lack a central core.

This potential weakness is examined in Benbasat and Zmud's (2003) paper where the authors express concern that the IS research community is contributing to an identity crisis by under-investigating what they call core issues in IS and over-investigating non-core issues. They scope the IS field narrowly and, while acknowledging its multi-disciplinary principles, seek to limit multi-disciplinary practice in IS research. The authors also challenge the current approach discussed

above of borrowing and adapting theories from other disciplines to explain IS phenomena better and suggest that focus would be applied more beneficially to original contributions to the IS field. On the other hand, this view has been challenged widely by the IS community.

The narrowness of their proposed scope for IS appears to be too restrictive. It excludes the 'information' aspects of information systems and the rich tradition of diversity in IS. Instead it promotes a narrow focus in research approaches (there is a strongly positivist flavor in their research examples). It omits the major role played by IS in the transformation of organizations, industries and the community which have occurred particularly recently as a result of e-business applications; and much of the excitement and the energy that is associated with assisting to address major issues confronting organizations and the community.

Ironically, in the same *MISQ* issue that Benbasat and Zmud propose limiting the application of reference disciplines to IS theory, two essential concepts of IS theory (both mentioned previously), 'users' and the 'role of IT in firm performance' have been reviewed and substantially revised through exactly this process (Lamb and Kling, 2003; Sambamurthy, Bharadwaj and Grover, 2003).

While Benbasat and Zmud (2003) raises many contentious issues, it does serve as a timely reminder to IS researchers that while a plethora of research opportunities constantly confront us, we need to ensure our focus remains distinctly IS in order to develop our discipline. We turn now, therefore, to suggesting categories of IS research and key concepts in IS from an academic and practice perspective.

Major Categories in IS Research

In June 1988, *MISQ* published a classification scheme of IS keywords 'to provide a description of the discipline, introduce a common language, and enable research of the field's development'. This scheme was updated in 1993 with an additional 175 keywords bringing the total to nearly 1300 'to incorporate the new research topics and methods, hence reflecting better the evolution of the IS discipline' (Barki, Rivard and Talbot, 1993). Table 1.1 shows the scheme with nine major categories.

In a dynamically developing technology and business environment, individual keywords may become out of date and emerging research areas may not receive specific mention. The categories do, however, help to identify the focus of research within the IS discipline. Even where a new phenomenon is not identified explicitly as a keyword, analysis of the categories can provide a framework for its research.

Table 1.1 *Major categories in IS research (Barki, Rivard and Talbot, 1993)*

A	Reference disciplines, including behavioral science, computer science, decision theory, information theory, organizational theory, social science, management science, economic theory, ergonomics, political science and psychology
B	External environment: economic, legal, political and social
C	IT, computer systems and software
D	Organizational environment, including characteristics, functions and tasks
E	IS management, including hardware, software, personnel, projects, planning, evaluation, security and other management issues
F	IS development and operations, life cycles, IS development, implementation and operations
G	IS usage, by organizations and users, and their support, access and processing
H	IS types, application areas, components and characteristics
I	IS education and research

For example, although e-business is not included as a keyword in the classification scheme, e-business research could be located within several different categories depending on the particular topic. These categories include: B, for external drivers and inhibitors of Internet purchasing; C, for specific e-business technologies; D, for organizational aspects of e-business adoption; E, for planning, evaluation and security of e-business applications; F, for development of e-business applications; G, for usage of e-business by organizations; H, for characteristics of e-business systems; and I, for research into the levels of education and research activity in the e-business area.

Indeed, we could complete all the categories if we consider the reference disciplines influencing e-business, thereby adding A. If the research was, for example, concerned with website design characteristics to facilitate online consumer purchasing, then theory from other disciplines including decision theory, ergonomics and psychology may also be considered applicable. The research could be located in category A which is the category relating to reference disciplines (for example, AC sub-discipline decision theory; and AP sub-discipline psychology) and, potentially, categories F (for example, FC development methods and tools) and H (for example, HD IS characteristics).

The research would be classified as IS research not because it could be allocated totally to an IS category, but because the primary focus of the research was within the IS classification categories. If the primary focus of the research was, for example, within a reference discipline such as psychology or ergonomics, rather than in its application to the IS discipline, then the research may be more properly classified and conducted within the other discipline. Indeed, with IS research now impacting on other disciplines, this may well be the case. This categorization of website design also shows how essential it is that IS

research issues are sustainable. The particular phenomenon being examined may change, but the underlying IS research issues remain.

Key concepts in IS—educational perspective

As this chapter is attempting to acknowledge the broad scope of IS, it may be useful to examine the perspective of IS educators and of business. Forty of the world's most influential IS educators jointly specified the key concepts in IS for business students (Ives *et al.*, 2002). Among the authors are those who, in another forum, sought to limit the scope of the IS discipline (Benbasat and Zmud, 2003)! It is suggested that this list (Table 1.2) comprises the essence of the discipline in its business and organizational contexts. The breadth of scope and the balanced focus on technology, organizational, management and social issues are noteworthy.

This suggests that IS must retain a broad focus on issues at the intersection of technology and business, and the conclusion of these eminent authors is that: 'We believe that information technology is now the prime driver and enabler of business strategy for many, if not most, organizations' (Ives *et al.*, 2002).

Key IS issues—industry perspective

Given that the focus of IS is on applications of technology in organizations and by individuals, then analysis of the key IS management issues confronting business can assist in defining the core focus of IS. Table 1.3 compares the top ten issues from the international study (CSC, 2004) and a study of 301 Society of Management and the Conference Board members in the USA across more than ten industries (Luftman and McLean, 2004). Although the terminology

Table 1.2 *Key IS concepts—educational perspective*

1	What are information systems?
2	How do information systems influence organizational competitiveness?
3	Why have databases become so important to modern organizations?
4	Why are technology infrastructures so important to modern organizations?
5	What is the role of the Internet and networking technology in modern organizations and how is e-business transforming organizations and markets?
6	What are the unique economics of information and information systems?
7	How do information systems enable organizational processes?
8	How do organizations develop, acquire and implement information systems?
9	What is the nature of IS management?
10	What ethical, criminal and security issues do organizations face when using information systems?

Table 1.3 *Comparison of key IS/IT issues for executives 2003*

CSC international study 2003 (CSC, 2004)	**SIM/TCB USA study 2003 (Luftman and McLean, 2004)**
1 Maximizing the return on IT for the business	IT and business alignment
2 Enterprise architectures for business agility	IT strategic planning
3 Safeguarding information assets	Security and privacy
4 Driving competitive advantage through innovation	Attracting / retaining IT professionals
5 Selecting and managing sourcing options	Measuring value of IT
6 Structuring for global organizations	Measuring performance of IT
7 Managing business change	Creating information architecture
8 Managing business relationships	Reducing complexity
9 Connecting with CEO and peers	Speed and agility
10 Adopting new roles and responsibilities	IT governance

differs across the two studies, there is a high level of consistency between the studies about the major IS/IT challenges confronting industry. This high degree of consistency across numerous studies (see also Elliot and Avison, 2005) helps in defining the core focus of the academic discipline of IS.

ALIGNMENT

Concern has been expressed that the IS discipline suffers from a lack of focus due to excessive diversity in its research. Table 1.4 shows a cross analysis of seven sources that contribute to determining IS research focus and theory using the research categories proposed by Barki et al. (1993). The table demonstrates remarkable uniformity in breadth and depth of focus by industry and education over the past 20 years. Despite specific emphasis by one or more sources, taken as a whole, there is a high degree of alignment on core issues.

The outlying categories, reference disciplines and research, could not be expected to be included as issues of concern to industry, but research and education on a specific discipline may reasonably be considered part of that discipline. The IS discipline should continue to engage in a discourse with other reference disciplines as they all seek to cater for technology-enabled transformation of industries and organizations. This appears to be one of the weaknesses of the argument that IS educators and researchers should deliberately exclude potentially relevant theory from other disciplines.

Table 1.4 *Cross-analysis of sources determining core focus of IS research*

Research categories (Barki, Rivard and Talbot, 1993)	**Reference**	**External environment**	**IT systems**	**Organizational environment**	**IS management**	**IS development and operations**	**IS usage**	**IS types**	**IS education and research**
ACS submission, 1992	√	√	√	√	√	√	√	√	√
Benbasat and Zmud, 2003	—	—	√	*	√	√	√	√	*
Baskerville and Myers, 2002	√	√	√	√	√	√	√	√	√
Ives *et al.*, 2002	—	√	√	√	√	√	√	√	√
Key IS management issues, CSC, 2001	—	—	√	√	√	√	√	√	—
Key IS management issues, CSC, 1988	—	√	√	√	√	√	√	√	—
Key technology issues, CSC, 2000	—	√	√	√	√	√	√	√	—
Barki, Rivard and Talbot, 1993	√	√	√	√	√	√	√	√	√

Key: √ core focus; — not mentioned or excluded; * limited applicability

This overview of the IS discipline acknowledges the rapidly developing nature of the IS discipline as it responds to the essential dual roles of IS in enabling organizations to realize potential strategic and operational benefits while facilitating the fundamental transformation of traditional business and government practice and, in a wider context society, through the processes of global transformation.

The IS discipline is located to assist these organizations and industries through both research and education. The energy that powers organizational innovation fuels the energy and excitement that enthuses IS researchers to contribute to the development and revision of IS theory.

Although this chapter acknowledges different views and orientations of researchers in this comparatively new and exciting discipline, core concepts and issues identified by researchers, educators and industry over the period from 1988 to 2003 display fundamental alignment and agreement in their focus. We have demonstrated that there is much more coherence in the discipline than is frequently observed, and this has not meant narrow boundaries in its focus of study.

IS has reached a level of maturity where it has gone beyond merely incorporating seminal works in other disciplines: it now acts as a reference discipline in its own right. Its status has changed from an

emerging to an accepted academic discipline, impacting on teaching, research and practice. Its work is both important and permanent.

NOTE

1 Editors' Note: This paper was produced as an original contribution to this volume, but appears first in the chronological order of the papers because it is an update of a paper first published by Avison and Fitzgerald in 1991, and developed further in Elliot and Avison in 2005, and provides a good general introduction to the topics.

REFERENCES

ACS (1992) *Submission to Review of Computing Disciplines*, Australian Computer Society, Canberra.

Avison, D. and Fitzgerald, G. (1991) 'Information systems practice, education and research', *Journal of Information Systems*, 1(1), pp. 5–17.

Avison, D. E. and Fitzgerald, G. (2003) *Information Systems Development: Methodologies, Techniques and Tools*, 3rd edn, McGraw-Hill, London.

Avison, D. E. and Myers, M. D. (1995) 'Information systems and anthropology: An anthropological perspective on IT and organizational culture', *Information Technology and People*, 8(3), pp. 43–56.

Barki, H., Rivard, S. and Talbot, J. (1993) 'A Keyword classification scheme for IS research literature: An update', *MIS Quarterly*, 17(2), pp. 209–26.

Baskerville, R. and Myers, M. (2002) 'Information systems as a reference discipline', *MIS Quarterly*, 26(1), pp. 1–14.

Carr, N. (2003) 'IT doesn't matter', *Harvard Business Review* (May), pp. 1–10.

Checkland, P. B. (1999) 'Systems thinking', in W. L. Currie and R. G. Galliers (eds), *Rethinking Management Information Systems*, OUP, Oxford.

CSC (2004) *16th Annual Survey of IS Management Issues*, Computer Sciences Corporation, El Segundo, California.

Dickson, G. W., Benbasat, I. and King, W. R. (1980) 'The management information systems area: Problems, challenges and opportunities', in *Proceedings of the First International Conference in Information Systems*, McLean, E. R. (ed.), pp. 1–8.

Elliot, S. and Avison, D. (2005) 'Discipline of information systems', in D. Avison and J. Pries-Heje (eds), *Research in Information Systems: A Handbook for Research Supervisors and Their Students* (Butterworth Heinemann), pp. 185–206.

Giddens, A. (1987) *Social Theory and Modern Sociology*, Polity Press, Cambridge.

Habermas, J. (1979) *Communication and the Evolution of Society*, Beacon Press.

Ives, B., Valacich, J. S., Watson, R. T. and Zmud, R. W. (2002) 'What every business student needs to know about information systems', *Communications of the Association for Information Systems*, 9, pp. 467–77.

Kling, R. E. (1996) *Computerization and Controversy*, Academic Press, San Diego.

Lamb, R. and Kling, R. (2003) 'Reconceptualizing users as social actors in information systems research', *MIS Quarterly*, 27(2), pp. 197–235.

Latour, B. (1987) *Science in Action: How to Follow Scientists and Engineers through Society*, Harvard Universilty Press, Cambridge, Mass.

Lee, A. S. (2001) Editorial, *MIS Quarterly*, 25(1), pp. iii–vii.
Luftman, J. and McLean, E. R. (2004) 'Key issues for IT executives', *MISQ Executive*, 3(2), pp. 89–104.
Mumford, E. (1995) *Effective Requirements Analysis and Systems Design: The ETHICS Method*, Macmillan, Basingstoke.
OECD (2001) *The Internet and Business Performance*, OECD, Paris.
Orlikowski, W. J. and Baroudi, J. J. (1991) 'Studying information technology in organizations: Research approaches and assumptions', *Information Systems Research*, 2(1), pp. 1–28.
Sambamurthy, V., Bharadwaj, A. S. and Grover, V. (2003) 'Shaping agility through digital options: Reconceptualizing the role of information technology in contemporary firms', *MIS Quarterly*, 27(2), pp. 237–63.
Shannon, C. E. and Weaver, W. (1949) *The Mathematical Theory of Communication*, University of Illinois Press, Chicago.
Simon, H. A. (1981) *The Sciences of the Artificial*, MIT Press, Cambridge, Mass.
Stamper, R. (1997) 'Organisational semiotics', in J. Mingers and F. Stowell (eds), *Information Systems: An Emerging Discipline*, McGraw Hill, Maidenhead.