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Information Systems: what sort of science is it?

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Abstract

The academic field of Information Systems (IS) is concerned with a large range of multifaceted questions regarding the development, use and implications of information and communication technologies in organisations. Responsive to the challenge that profound technological innovation in the last 30 years posed to all types of social life, IS studies have developed a wealth of detailed knowledge at the organisational level. Yet, the field of IS is not well understood by academics and professionals in other fields, even in fields related to IS, such as Operational Research, Management, or Psychology. In this paper, written mainly for academics and professionals who are not IS specialists, we outline the IS field in terms of its main thematic areas, theories, and investigation approaches and discuss its institutional characteristics. We argue that the major strength of the field is its responsiveness to a large variety of issues emerging in organisations as they learn to exploit the new technological potential. However, being issue oriented rather than theory driven, IS lacks the distinctiveness and rigour usually associated with scientific disciplines and remains institutionally weak.

Keywords: Information Systems, academic fields, Information Systems Research, Information Systems theory

Information Systems: what sort of science is it?

Introduction

The academic field of Information Systems (IS) has its origins in the applied computer science studies of the 1960s which aimed at systematising the design of data processing applications in organisations. Since those early days the IS field has been broadened in scope to study the efforts organisations make to respond to the challenge of continuous innovation in information and communication technologies. In many countries IS studies are now hosted mostly in business schools and faculties of social science, such as economics, rather than in faculties of computer science or engineering.

The emergence of IS as an internationally identified academic field can be traced in the first curricula suggestions for computer applications studies in the early 1970s. In 1972 the American Computer Society (ACM) published a curriculum for a two-year Masters degree on computing in a business context {1}. This was followed by similar curriculum suggestions by the International Federation of Information Processing (IFIP) {2, 3}, intended to create knowledge on the design of computer based information systems. Later, important landmarks in the creation of the field have been the publication of two major research journals – *MIS Quarterly* in 1977, and *Information Systems Research* in 1987 – and the launching of the International Conference of Information Systems (ICIS) in 1980. The most dominant group in these journals and conferences has been IS researchers from North American business schools. Europe, although not as homogeneous as North America, has made distinct contributions which amount to schools of thought - such as the socio-technical approaches in the UK and Scandinavian countries, or German software engineering - with distinct research agendas and methodological approaches.

In the 1990s, the international profile of IS is more polycentric than in previous decades. European IS research became much more visible within the international IS community with the launching of a number of conferences and journals. The European Conference of Information Systems (ECIS) was launched in 1993, and several specialised conferences, such as the IFIP TC8.2 conference on organisational implications of IS, and the Conference on Advanced Information Systems Engineering (CaiSE), draw substantial

numbers of European contributions. Also, a number of European journals, such as the *Scandinavian Journal of Information Systems*, the *European Journal of Information Systems,* the *Journal of Information Systems,* the *Journal of Strategic Information Systems*, launched in the early 1990s have become influential outlets of IS research.

A strong IS academic community has emerged in Australia and South East Asia too, with regional conferences - Australasian Conference in IS (ACIS) since 1990, and Pan Pacific Conference on IS (PACIS) – and journals, such as the *Australian Journal of IS*, launched in 1993. Around 1993 the IS field became distinct within the Australian academic context, and since then it has been gradually building its own research tradition {4}.

The establishment of the Association for Information Systems (AIS) in 1995, structured in three regions – the Americas, Europe / Africa/ Middle East, and Australasia - has been the most recent landmark in the institutionalisation of the IS academic field as an international community. However, the IS field is rarely found as an autonomous academic unit in Latin America, the Middle East (with the exception of Israel), Africa (with the exception of South Africa) and Eastern European countries.

The IS field has been very influential on practice, maintaining close links with professional practitioners and developing knowledge that shaped the systematic deployment and management of IT based information infrastructure in organisations. Taught IS programmes acquired and continue to be in high demand.

However, despite the timeliness of the issues it addresses and its practical relevance, the IS field has not attained a particularly prominent position within academia yet, even in the regions where it is widely studied. The object of IS studies does not fit easily within the categories of conventional scientific disciplines. Although IS is concerned with a new technology, it addresses questions of organisational action and social change. Drawing from both engineering and social science disciplines its value and rigour are often questioned by both. This problem is more acute in Europe, where the study of IS is accommodated in a variety of university faculties. While such spread has enriched European IS studies intellectually, it has left the field institutionally weak.

There has always been concern within the IS field itself about its 'scientific' merit, and its future. Some have called for a more strict definition of the object of study, and more

rigorous efforts to consolidate its theoretical foundations {5, 6}. Indeed there have been attempts to develop paradigmatic foundations of the field{7, 8}. However, it is generally felt that the variety of research topics and approaches, the interdisciplinary sources of theory used, and the methodological pluralism found in the field are necessary to cope with the complex nature of the phenomena studied {9-11}. Rather than being limitations to be overcome, diversity and pluralism can be seen as the strength of an intellectual inquiry addressing the multifaceted processes involved in the appropriation of IT in contemporary organisations, and authors such as Hirschheim et al {12} prefer to expose the philosophical and conceptual underpinnings of alternative paradigms, without attempting to consolidate them.

This paper, intended mainly for the non-IS specialist academics and professionals, sketches the profile of the evolving IS field in terms of research themes, theoretical underpinnings, methodological approaches and institutional settings. It then discusses the strengths and weaknesses of the field in its current state and concludes with an overall assessment of its merits and future trends.

The object of IS studies

The focus of attention of most information systems studies has been the human organisation. Nevertheless, the study of the use of IT in organisations inevitably raises questions about how people as individuals interpret information, use technologies, and take part in working out innovation. Also, as organisational boundaries often become blurred and the development of communication networks and IT applications play an instrumental role in new forms of organisational interactions, information systems studies are broadening, becoming increasingly more concerned with the wider context within which an organisation is embedded. Thus more recently the organisational focus of the field is broadening to include topics such as philosophical foundations of information and communication, inter-organisational uses of IT, the nature, use and impact of the Internet, and policy aspects regarding the 'information society'.

With the risk of oversimplifying, we can distinguish five main thematic areas of information systems research: applications of information technology to support the functioning of an organisation; the process of systems development; information systems

management; the organisational value of information systems and the societal impact of information systems.

a) Applications of information technology to support the functioning of an organisation.

Soon after the invention of computers and their first use for military and scientific purposes, data processing applications for "commercial organisations" emerged as a distinct area of computing {13}. Over the years application areas have included database technology, transaction processing systems, decision support systems (DSS), expert systems, electronic data interchange (EDI), multimedia systems, computer supported co-operative work systems (CSCW). This stream of studies has resulted in a wealth of applications in organisations, and a vibrant software market.

To a large extent, this has been the work of technical experts with the enthusiasm for building and refining intricate artefacts. Within IS, a great deal of research has been devoted to understanding the domains of applications and to developing models that provide the basic logic for combining sophisticated technical components in order to form a useful application. For example, the development of systems to support managers in their tasks drew extensively from decision theory, psychology, organisational theory and operational research in order to form an adequate understanding of how managers work. Such research differentiated between different management roles and management contexts, and contributed valuable findings about the way technologies are used. Studies on Decision Support Systems, Executive Information Systems, and more recently Group Decision Systems focus more on the nature of decision making in organisations, and less on technical features of applications {14, 15}.

b) The process of systems development.

A great deal of effort has been made to work out methodical practices for developing reliable and effective systems in cost-efficient ways. This effort began with introducing systems analysis lessons in computing curricula in the 1960s, and the first theoretical foundations of systems analysis such as by Langefors in Sweden {16}. In the 1970s the life cycle model was established as the professional way to organise the development of a computer based information system and several techniques and methods were suggested to systematise the practice of systems development. By the mid-1980s research on systems

methodologies had addressed fundamental questions about the nature of information systems, and the process of systems development {17-19}. Such research continues, addressing issues relevant to the systems development context of the 1990s {20-22}.

Early engineering conceptions of the process of systems development were enriched with recognition of the 'soft' social and human aspects of information systems. Such enrichment did not happen smoothly. Reconciling the existing engineering practices for building robust technical systems (the 'hard' systems approach) with the slowly emerging perceptions that information systems are as much social systems as they are machines, proved particularly difficult.

Textbooks and research publications on systems development methods of the early 1980s {19, 23, 24} manifest the tension between the engineering of a robust technical system and the management of a social intervention. Viewed from the perspective of the classical life cycle of a software application, systems development is an engineering task that can benefit from formal engineering principles for specifying requirements of the system to be developed, selecting an optimal technology that satisfies the specified requirements according to technical and economic criteria, implementing the selected technology and producing a quality system for use. What matters is the delivery of useful, reliable, and cost-effective systems to users.

Viewed from a social perspective, the development process is an intervention in an organisation to change the technical means and the information available to people's work. Such a perspective of the systems development process emphasises the importance of understanding the social dynamics that accompany the building or adopting of technical systems and the organisational and social change related with the systems development project. What matters in this approach is the improvement of the capacity of people to perform their work tasks in the context of their organisation {25}.

The tension between the engineering and the social perspectives has been eased with the distinction between two different disciplines: software engineering and information systems. The former is dedicated to the development of robust software applications in cost-effective ways, while the latter is more concerned with getting value from information and telecommunication technologies in organisations. Moreover, the availability of

flexible generic application software in the market, and the development of a vibrant market of information systems services, shifted the attention of the IS research community from systems construction to systems implementation and management issues.

c) Information systems management.

The issues explored in this stream of studies partly reflect the evolution of information technologies, and partly the learning process organisations have undergone regarding the management of IT and their information resources {26}. In the days of the mainframe a centralised department (usually called EDP, from Electronic Data Processing) was the 'natural' way to organise the required expertise for the design and operations of computer applications and to control investment and services of the computer based information systems. The diffusion of ever more powerful microcomputers and software packages led to 'end-user computing' and raised questions regarding the relative merits and problems of centralised and decentralised management of the 'information systems function'. Moreover, the development of a market of software and information systems services provided increased possibilities for sub-contracting information systems development or operations to specialist companies. Such 'outsourcing' raised new questions of controllability and contract-based relationships between the purchaser and the provider of information systems services {27}.

Also, growing management appreciation of the potential benefits and risks associated with information technology investment, shaped the research agenda of the information systems management theme in a way that reflects more complex business concerns. Information systems management is concerned with issues such as the formation of strategy regarding information systems, aligning information systems development with business objectives, using IT to achieve desirable organisational change, using IT to manage multinational corporations in the emerging global economy.

Research in information systems management has been cross-fertilised with other business studies areas such as strategic management, and more specific management themes, such as total quality management, or business process re engineering. Indeed many influential publications on information systems management on business strategy were written by experts on business strategy {28-30}.

d) The organisational value of information systems.

Although information technology and telecommunication networks are now unquestionably considered fundamental for the running of all contemporary organisations, questions about the value organisations get from investment in these technologies continue to be as relevant and pressing as when computers were first introduced in business and administration. A great deal of research has been devoted to the evaluation of information systems, in terms of criteria (what effects should be assessed), methods (how to assess potential or perceived effects), and the very nature of the evaluation process {31-34}.

The economic value of early applications that substituted computer data processing for manual data processing appeared rather straightforward to assess. Computerisation projects had more or less clear efficiency objectives, and were not intended to cause significant organisational changes. Cost-benefit analysis techniques were considered to be the most valid way to assess the merits of investing in data processing applications in comparison to competing needs of investment an organisation was facing {35}.

However, it was soon realised that assessing the costs and benefits of information systems was much more complex than what investment appraisal techniques can account for, as not all benefits are easily or legitimately quantifiable in monetary terms {36}. In the 1990s economic studies of information systems highlighted the relevance of indicators such as profitability and competitiveness, presenting more sophisticated accounts of what IT means for the business firm {37}. Another stream of studies has addressed the strategic gains or losses organisations expect or fear in relation to IT investment. Several techniques have been suggested to that end {38, 39}, although, when strategic issues are at stake decisions tend to be highly judgmental and political.

Organisations became aware of the significance of effects of a non-straightforward economic nature, such as organisational structure, or the morale of the employees who have to cope with new information procedures. Indeed, the question whether computerisation is beneficial in an organisation proved to be highly political: beneficial to whom? would some categories of employees loose in power of position[1]? would some

[1] As early as 1958 Leavitt and Whishler predicted that computers would weaken middle managers, lower their status and reduce their numbers while they would add to the power, innovativeness, creativity and extent of control of the higher

employees loose their job? would the whole organisation run the risk of becoming too vulnerable to a powerful group of technical experts, such as systems analysts or even operators[2]?

Thus, in the 1990's the value of IT in organisations is closely linked with the perception of IT as an enabler of organisational transformation {42-44}. This kind of effect associated with IT innovation further limits the capacity of conventional investment appraisal approaches to assess the value derived from IT. More than any other area of IS research, studies of IT and organisational change go beyond the assumptions on the economic value of IT, raise new social issues and adopt theoretical perspectives from the social sciences to understand the value of IT in organisations {45, 46}.

The societal impact of information systems

From a very early stage of the field's development information systems researchers showed interest in studying the impact of new technologies on wealth creation, working life, and social life more generally. It was apparent that the costs, risks and benefits of computerisation reached different groups beyond the boundaries of the organisation or the organisations 'owning' information systems {47-51}.

Thus, IS research has addressed broader social implications of IT, such as on national socio-economic development, work, privacy, identity, or democracy {46, 52-55}. A recent survey suggested that 30% of European information systems academics have done research in the last five years or are planning to do research on questions regarding the impact and ethics of information technology {56}.

The widely held among social and economic scientists view that information and communication technology innovation is associated with imminent, across the globe

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managerial echelons{40}. Thirty years later research by Applegate, Cash and Mills {41} found that Leavitt and Whishler's prediction of downsizing the structure of organisations by reducing middle management was correct. However centralisation of control has not been found to be an imperative, mainly because technical developments allowed for technology-driven control systems that can support the flexibility and responsiveness of decentralised organisations.

[2] An example of such a case was the strike of the operators in the computer centre of the Department of Health and Social Security in Britain in 1979, over a dispute on night shifts. The strike paralysed the payment of pensions for months. The

societal transformations {57-59} presents a challenge to information systems research. The rich and detailed knowledge that the field has accumulated about the nature of the processes of information systems development and utilisation is valuable in making sense of the large scale changes taking place. Information systems studies have a great deal to contribute towards avoiding the pitfalls of technological or economic determinism so often encountered in the contemporary 'globalisation' literature (see for example {60}).

Theoretical foundations of information systems

The study of the themes outlined above has involved a variety of conceptual approaches, from the very technical, to the philosophical. Each of the five thematic areas outlined in the previous section involves many different theories, not only because each of these areas accommodates a spectrum of research issues, but also because such issues are examined from different perspectives, making different assumptions on the nature of the phenomenon investigated.

The theories used in the study of IT applications range from models for the design and structure of specific types of IT based systems, such as intelligent knowledge based system or decision support systems (see for example {61, 62}), to theories of individual human and organisational behaviour, such as on problem solving and decision making (see for example {63, 64}). The study of the process of systems development has deployed a similar spectrum of theories. They include modelling theories, such as those setting the foundations of structured and object oriented analysis and design (for example {65, 66}), and theories elaborating on behavioural, organisational or social aspects of systems development (for example {25, 67}). In the areas of management, organisational value, and societal impact are drawn mainly from more established disciplines, such as business, economics, organisational theory, sociology (for example {29, 37, 44, 68-72}.

It is beyond the scope of this paper to trace and analyse the plethora of theoretical instruments used in the IS field. Such work has been undertaken for specific areas, for example Eom studied the development of the Decision Support Systems sub-field of IS {14, 15}, and Hirschheim *et al* analysed the intellectual structures of information systems development {18}. At this point two aspects of IS theory may help the reader understand

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Department had to work out temporary alternative means for issuing pension

the development of the IS field: the debate on ‘reference disciplines’ and the most prevalent broader intellectual underpinnings of IS research.

The variety of theoretical constructs deployed in information systems research has given ground to criticism for amateurism and lack of a cumulative knowledge trend {73}. A widely influential intervention to create a cumulative scientific tradition in the seemingly disparate IS research field was the first ICIS conference in 1980, where the opening speech by Peter Keen identified IS in relation to established disciplines, such as economics, organisational science, computer engineering, and management science and cognitive science {74}. By relating IS to *reference disciplines* the founders of the conference attempted to set standards, such as formal methodologies and criteria for evaluating the soundness of the research results, as high as the fields from which most IS researchers at that time drew their theoretical base.

Throughout the 1980s and 1990s the diversity of theoretical perspectives continued to increase, although it was noted that the quality of the diverse traditions increased too {75}. Reliance on reference disciplines continued to be strong {75, 76}, but there are also signs that the diversity of IS research streams is gradually composing the profile of a distinct inter-disciplinary field {77}.

While the linking of the IS field to reference disciplines remains a controversial issue, it may be more appropriate to present the cognitive character of the field by acknowledging its theoretical underpinnings in relation to broad theoretical perspectives. Most of the specific theories that have been deployed in the IS field are founded on ideas which can be traced into a few widely influential streams of ideas, which we can call theoretical platforms, intellectual streams of ideas that provide general principles of making sense of the world. Theoretical platforms cut across conventional boundaries of academic disciplines; they convey specific assumptions about the nature of society and social change, and imply general principles for perceiving scientific questions and social phenomena and for organising intellectual inquiry. Moreover they have methodological implications, determining what issues are relevant for inquiry and what ways of conducting research are 'valid'. Their principal concepts are relevant to the investigation of a diverse range of topics.

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payments and to employ additional staff in its hundreds of local offices.

In my view, the most influential theoretical platforms in the information systems have been systems theory, and organisational rationalism, and to a lesser extent but increasingly more visible, structuration, and critical theory. One may think of other streams of ideas as theoretical platforms in the above sense such as, perhaps semiotics. I believe, though that the four streams of ideas identified here have been the most significant in shaping either the development of know-how or the debate in the field.

Systems theory, challenging the basic principles of classical science to break down problems into as many separate simple parts as possible and to try to discover one-way causality between the elementary unit or variables of these parts, has been influential in all areas of research {78}. A wealth of models, mathematical techniques and concepts were developed, many of which are applicable across conventional disciplines, addressing issues of interrelations within a 'whole'. In its most ambitious form, General Systems Theory suggested an epistemology different from that of the logical positivism or empiricism of classical science which aims at establishing linear causality between observed parts of the world. It put forward the view of knowledge as an interaction between knower and known, and thus dependent on factors of a biological, cultural and linguistic nature.

In information systems, elements of systems theory have formed part of the conceptual fundamentals in all thematic streams. Terms such as system, sub-system, control, boundary, and environment constitute the field's pervasive vocabulary. Computer and telecommunication technologies embody systems concepts, models, and techniques, and have themselves contributed to the efforts of advancing the theory of systems. Systems modelling techniques have been widely influential in designing IT applications as well as in organising the design process.

Also, systems concepts and models have had an impact on IS in as much as such concepts and models are used to conceptualise organisations and society. Seminal early publications such as those by Churchman {79}, Emery {80}, and Ackoff {81}, established an elaborate conceptualisation of organisations as purposeful systems. Despite some criticisms that viewing an organisation as a purposeful system is oversimplifying its social dynamics, the systems perception has proved a useful abstraction, which continues to be refined and to provide theoretical thinking tools. Soft systems theory, an adaptation of systems concepts

to address unstructured problem situations in organisations, has been a particularly influential platform for analysing aspects of information systems {82}

Overall, however, the use of systems ideas has not led to a cohesive theory for the field of information systems. Rather, it has sustained distinct and often conflicting approaches, which reflect the more general differences of orientation, such as between engineering and social intervention, that exist in the field.

With the term *organisational rationalism* I refer to the stream of thought concerned with the identification of the principles of deploying the resources of organisations in order to survive and excel in the market economy. Unlike systems theory, organisational rationalism cannot be attributed to a particular person or school of thought. It represents a widely adopted attitude towards the study and the practice of contemporary organisations, and can be deduced from the shared ideological and epistemological fundamentals of the prevailing 'orthodoxy' of theories and practical rules on how to run organisations. Although more often identified through analyses of its critics rather than the declared intellectual positions of its followers, organisational rationalism constitutes a conceptual and epistemological platform for the study of human organisations in contemporary society.

With its origins in the work of Max Weber, Taylor and Fayol, organisational rationalism emerged as the theory committed to improving organisational efficiency. It is a rather mixed bag of general approaches to social phenomena in organisations and specialised research fields, such as decision making theory, management theory, administration science, industrial and organisational psychology.

Today organisational rationalism continues to be the dominant approach in management research, providing much of the intellectual legitimacy for the mainly normative field of business studies, and has been particularly influential in information systems research. Mostly prevalent in the theories used in the areas of management and organisational value of information systems, organisational rationalism can also be detected in the models of organisational communication and decision making both for the development of applications, such as decision support systems {83}, and systems development (see, for example {30} and the critique of systems development in {84}). Moreover, it has

influenced the research agenda and method of studies on IS management and the value of IT . Providing a basis for the formation of cause and effect hypothesis regarding IT and organisational structure or behaviour, organisational rationalism has been adopted to built the confidence of 'rigorous' social science research into the young field of information systems. Moreover, it has determined the primary mission of the field as developing knowledge in order to inform professional management .

But, the dominance of organisational rationalism has for long restricted both the research questions regarding the use of the powerful cluster of information and communication technologies in organisations, and the intellectual inquiry pursued by IS researchers. Alternative or complementary views were voiced throughout the history of IS studies (see for example {85}). Increasing criticism of the limitations of organisational rationalism has been accompanied by adopting research approaches from the social sciences, including structuration theory, and critical theory.

The social theory of *structuration* {86-88} has provided an epistemological and ontological perspective for the study of the relationship between social change and technology, and more specifically the study of the organisational implications of information technology.

IS research has always been cautious to avoid a technology deterministic attitude. But the role of IT innovation in organisational and societal changes has been unclear, with technology characterized vaguely as 'enabler' of change. The 'socio-technical' tradition of IS research and practice has maintained the complementarity between technology and the social context {25, 89}. Structuration theory reinforces this position with a powerful general conceptual foundation {90-92} and provides links between IS research and the more general studies regarding the relationship between technology and society {93, 94}.

Structuration theory provided IS researchers with powerful foundations to conceptualise the association of technology and organisations, of machines and society, and formed an intellectual basis to address one of the most troublesome issue of the field, namely the reconciling of the technical and the social, the 'hard' and the 'soft'. More recently, structurational analysis of the relationship between IT and its social context have enriched the socio-technical tradition of IS research {44}.

Critical theory, based on the belief that social sciences have an emancipatory role to play, has challenged the view that academic research is objective and neutral, and practice can be impartial. It has emphasised power relations which are historically constituted in society. Critical social theory has been applied to criticise the 'instrumental rationality' underlying information systems research and practice. The notion of instrumental rationality refers to the application of reason for exploring means and assessing their consequences, without questioning whether the purposes that these means are marshalled to serve are reasonable. The fundamental criticism made is that the use of computer technology without questioning the utilitarian ethos of contemporary industrial society is limiting the exercise of human choice and ultimately endangering human existence. Authors such as Klein and Hirschheim {95}, use Horkheimer's concept of instrumental reasoning and draw from Habermas' theory on language and to discuss critically the assumptions behind the use of computers to support decision making in organisations.

Critical theory has also been used to classify and criticise systems development approaches. Lyytinen's classification {96} used Habermas' interest theory and communicative action theory and showed that most information systems development approaches support an interest in technical control. Furthermore, critical social theory has been suggested as a useful basis to develop alternative approaches to overcome the narrowness of vision of currently used methods for systems development and to understand the relationship between IT and organisational change {18, 97, 98}.

Methodological aspects of IS research

Implicit to the theoretical perspectives outlined above are issues regarding research methodology. The gradual shift of focus from technology centred to behavioural and social issues brought to the fore questions on appropriateness of research method. From the early days of their establishment, the major publication outlets of the field, MISQ and the ICIS, adopted a positivist epistemological stance. Doctoral research also has tended to be structured in positivist hypothesis testing terms. Quantitative modelling, empirical surveys, and laboratory experiments were almost exclusively considered to be the trustworthy methods of investigation in the field.

Such epistemological bias has not remained uncontested for long. Strong voices of criticism to the epistemological narrowness of the field were first raised at a conference by the IFIP working group studying computers in organisations, in Manchester in 1994 {99}. That conference marked the beginning of dissent to the dominance of positivist epistemology, and proposed interpretivist or critical methods as valid approaches for IS research. The debate continued in subsequent conferences and methodology publications {100, 101}. European IS researchers were very prominent in such debates and were seen by the international research community as challengers of the positivist research orthodoxy of the field, and advocates of interpretative and social theory based research.

In the USA the methodological issue was addressed in a less confrontational manner in series of colloquia sponsored by the Harvard Business School in the mid 1980s, aiming to clarify the role of qualitative, experimental and survey research method {102-104}.

With time the tone of the debate became reconciliatory rather than polemic {105, 106}. Journal editors tend now to state their journals' methodological openness. Positivist methods continue to be prevalent in *MISQ* and *ISR*, and concern about lack of rigour as a risk accompanying methodological pluralism continues to be expressed by influential researchers in the field {75}, but interpretivist methods have gradually become more accepted.

Against such continuing methodological concerns, a recent survey of IS academics in Europe {56} found that IS research is indeed pluralistic. In Europe qualitative methods, namely case study, action research, and secondary qualitative data analysis are more prevalent than the empirical methods of surveys, secondary quantitative data analysis, and experiments. There is also evidence of increasing epistemological diversity in Australia. A study of refereed empirical IS publications with at least one Australian author revealed that, although positivism continues to be the dominant epistemology, there is a trend towards an increase of non-positivist research {77}.

Institutional characteristics of the IS field

The evolution of scientific fields is an intertwined process of intellectual and institutional development {107, 108}. Institutional development is a battle on two fronts: the organisational hierarchies of universities and other authorities or markets which control

resources for higher education and research, and the mechanisms which determine the reputation of academic outcomes, such as academic journals, and conferences.

By far the most dominant institutional setting for the IS field is the North American business school. The vast majority of IS academics in North America are located in faculties of business studies. In other regions IS studies are located in various faculties. Not surprisingly, the main 'international' institutions of the field reflect the dominant norms and concerns of the North American business school context. The Association for Information Systems (AIS) was created primarily as a response to marginalisation threats faced by IS academics in US business schools, and the great majority of its members as well as its officers are North American. Naturally, its main efforts have been directed towards strengthening the credentials of IS researchers as contributors to the teaching and research objectives of business studies. Both in ICIS and in the journals widely considered to represent the field 'internationally', most of the editors and contributors are researchers in North American business schools. A primary role of these journals is to provide a highly reputable publication outlet for the purpose of tenure and career progression with the context of business schools.

The dominance of the business school context has had a strong influence on the international profile of the research agenda and the curriculum of information systems. The main international journals and conferences of the field suggest that the mission of IS research is to produce knowledge on IT which is useful for business management. This is a particularly biased focus for a field studying the use of a technology as pervasive as information and communication technologies, which has implications on all forms of organised human activity. Little attention, for example, has been given to issues concerning the take up of new information and communication technologies in public sector institutions, or information intensive organisations which are not typical business concerns, such as cultural institutions or community centres. Issues such as accountability, security, public accessibility to services, quality of social services, and sovereignty, which are relevant to state and community institutions have not been addressed by information systems management research and they hardly feature in relevant teaching programmes.

In Europe the IS field is more diverse in terms of institutional setting than the prevalent North American IS studies, hosted in engineering departments as well as in various

departments of the social sciences. The diverse socio-cultural features of the European context are reflected in the IS research of the region. For example, in Scandinavian countries, within a distinct culture of industrial democracy during the 1970s and 1980s, IS research addressed issues regarding the introduction of computers in the work place, and in particular their impact on work conditions and the rights of people to control the means of their work {109}. In contrast, the German IS field, 'Wirtschaftsinformatik', has pursued a much more prevalent technology orientation, linked as it is with the country's continuing significance attached to engineering as a means for economic growth {110}.

However, with all its richness European IS research remains institutionally weak. In many countries the small concentrations of IS specialists, scattered across disciplines, lack autonomy and resources. Characteristically, at the government's research quality assessment process in Britain, IS research groups are judged in conjunction with such diverse categories of academic fields as computer science, computer engineering, management, or information science. This is undoubtedly a weakness which has prevented European IS research to form a clear identity and an influential inquiry agenda.

Strengths and weaknesses of the IS field within academia

The major strength of the IS field - its responsiveness to a timely phenomenon that implicates almost all aspects of organised behaviour – is also the source of its fundamental weaknesses. Responding to the needs of the industry, and to a lesser extent government institutions and individuals *vis a vis* institutions, IS studies have been largely issue oriented, investigating a set of questions regarding the implementation of IT in organisations. To do that, IS has drawn theories and methods from a variety of scientific disciplines, and as a result it has developed detailed knowledge for various situations that informs a range of professions, such as systems analysts, database administrators and information managers. It is one of those areas of inquiry that evolve along multiple paths, responding to issues that emerge as organisations are learning to exploit the new technological potential. What links these paths in the same field is the assumption that the effects of new technologies depend as much on the potential of the technologies as on organisational and social actions that shape them.

Being predominantly issue oriented rather than theory driven, IS has produced knowledge with an immediate impact on practice. Drawing from various disciplines, this field has developed the capacity to pursue different theoretical perspectives in order to understand complex processes where the technical, economic, and social are intertwined. By using many research methods it has developed a critical attitude on the trustworthiness of the knowledge it produces. Thus, IS differs, for example, from Science and Technology Studies, which have little interest in influencing practice, have well developed theories and methods that drive and provide the basis for the trustworthiness of their research. In contrast, the diversity of IS research is the result of a research community deploying the requisite variety of intellectual instruments to address the unfolding complexities of evolving multifaceted phenomena.

With these characteristics, the overall development of the IS field has not been a case of smooth progress. The field has been slow to appreciate the significance of building theory, and a large part of its early research effort was mainly normative. A good example of this is the research on systems development methodologies and IS strategy during the 1980s {19, 24, 111}. IS research was keen to contribute to the development of responsible professional capacities for the exploitation of new technologies in organisations. Nevertheless, the analytical elements of that research gradually amounted to a rich understanding of the process of introducing IT in organisations {18, 112}. Normative knowledge in the form of recommendation of 'good practice' is much less a feature of IS studies in the 1990s. The field has developed substantial analytical capacity, and its continuing influence on practice is more through shedding light on the multiple aspects of IS implementation and use than by prescribing what practitioners should do.

Tracing the rather short history of the formation of the cognitive identity and institutional basis of IS makes clear that this field has grown to a substantial academic community, and has gone a long way towards building cumulative knowledge paths and overcoming risks of exclusion of valuable insights through undue methodological rigidity. There continue to be concerns among the IS research community about its strengths, its impact and potential future but these are probably 'healthy' reflections of a young and fast growing field.

Still, thematic diversity, theoretical and methodological pluralism are not the best credentials within academia. Academic institutions in most countries tend to judge fields of inquiry in terms of internal cohesiveness and incremental 'progress' in the development of knowledge on the basis of an esoteric specialist construct of concepts. Conceptual consolidation and distinct theoretical knowledge are highly valued qualities. IS leaves much to be desired when judged against such purist scientific criteria, and this has repeatedly surfaced as anxiety about the state and future of the field {73, 113}.

While many sub-fields in IS, such as the study of IS management in the North American business schools, or the IT studies of Wirtschaftsinformatik in Germany, enjoy a great deal of cohesiveness and confidence in their own context, overall concern about the fitness of the field as an academic discipline has created a defensive attitude, that divides the field and stifles innovative thinking {75}. This can be seen in the continuing reluctance of the top journals to publish research from across the thematic and methodological spectrum practised in the field. Yet, as the field tends to develop in response to the unfolding of a phenomenon, such rationalisation policies entail the risk of leading to entrenchment of sub-fields and further fragmentation of the research community.

More significantly, perhaps, the combination of pragmatism in responding to industry concerns and insecurity regarding its position in academia led the field to a conservative attitude regarding knowledge creation. A great deal of research is devoted to empirical verification of hypotheses on behavioural characteristics within organisations. Some research seeks to explain theoretically changes that take place as organisations endeavour to harness technological potential. Little effort is devoted to use the knowledge accumulated in the field as a basis of prediction. IS research tends to be limited in explaining events rather than foreseeing changes and trends.

Conclusions

IS has developed detailed understanding of the nature of the process of developing and using information and communication technologies in organisations, filling the gap between the engineering disciplines which elaborate on the production of new technological capabilities, and macro sciences such as economics and sociology, which

tend to suggest general trends on the basis of technological capacity {59}. Thus IS has developed knowledge to explain the much discussed socio-economic changes associated with IT, and to provide relevant guidance for action.

This body of knowledge is not in the form of one well cohesive structure. Rather, it comprises a diversity of 'understandings' of multiple interrelated issues. Such 'understandings' are developed by employing a variety of research methods, and by pursuing a variety of theoretical perspectives.

From a conventional academic perspective IS has serious limitations. It lacks the distinctiveness of theory and method that is usually associated with scientific disciplines. Moreover, it does not have a clear location on the map of academic disciplines. Indeed, in Europe, where IS studies encompass a broader research agenda than in the USA, and is more pluralistic in terms of theory and method, the field is awkwardly positioned both in engineering and social science faculties. At best, it is acknowledged as interdisciplinary, seen as overlapping with a number of established sciences.

There is significant concern in the field about its position in academia, and many have argued for the need to restrict its object and method of inquiry. To a large extent this is the policy pursued by the two journals most widely considered to represent the field, so far publishing mainly positivist research on a more limited range of business related issues. However, efforts to 'discipline' the study of IS internationally seem futile. A network of conferences and journals has been developed, which provide visibility to different aspects of its research. Moreover IS research in different countries has clear biases of thematic focus and of method.

From a different perspective, the difficulties faced by the field within academia manifest limitations of the academic institution to accommodate the study of multifaceted phenomena in contemporary society. It is not surprising that a field of inquiry studying the nature and implications of the profound changes occurring in organisations as they exploit the new information and communication technologies exposes the limitations of the established academic system. Its reductionist research culture, which tends to favour monolithic knowledge structures, is under tension in addressing itself to the complexity of change associated with such pervasive technical innovation.

Finally, the continuing high demand for IS teaching programmes and the growing attendance to IS conferences suggest that the field is greatly valued by two significant forces in academia: students and research community. Although not a cohesive discipline in the conventional academic sense, this collective body of analytical knowledge with all its diversity of conceptualisations constitutes a rich body of knowledge on the manifold issues raised by the take up of information and communication technologies in contemporary society.

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