

Information Science and Information Systems: Conjunct Subjects Disjunct Disciplines

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The relationship between information science and information systems (IS) research is examined through analysis of the subject literature of each field and by citation and co-citation analysis of highly cited researchers in each field. The subfields of user studies (US) and information retrieval (IR) research were selected to represent information science research as these subject areas are central to information science and seemed also to represent areas in which there was most overlap of interest or subject matter. The two forms of analysis revealed that although there seemed considerable overlap or potential for overlap in research subjects that there was almost none in relation to the disciplinary fields as assessed by the co-citation analysis of the most highly cited authors in the three subject areas. An examination of the reasons for this is offered in relation to the nature of scientific disciplines, the socialization process of researchers in the different fields and with institutional pressures.

Introduction: Information Science and Information Systems

The aim of this article is not to provide a history of either information science or information systems (IS) research but instead to examine the rather curious relationship between the two subject fields. To outline the nature and scope of disciplines such as information science or IS is not straightforward, as the numerous and not entirely successful attempts to do this attest. This is, in part because Vakkari argues:

conceptions of the structure and scope of a discipline are always social constructs that include certain objects within that domain and exclude others. (Vakkari, 1994, p. 1)

The disparate nature of research in library and information science is apparent in the coverage of articles in the proceedings of the two international conferences on Conceptions of Library and Information Science that have explored the historical, empirical, theoretical, and methodological perspectives in the field (Ingwersen & Pors, 1996; Vakkari & Cronin, 1992). A similar picture of disparity in research emerges from analysis of the articles of the Association for Information Systems Americas Conference (Association for Information Systems, 1997), the European Conference on Information Systems (Baets, 1998) and the UK Academy of Information Systems Annual Conference (Avison & Edgar-Nevill, 1998). Furthermore, analysis of the contributions to these sets of conferences would indicate that the relation between information science and IS research would seem to be nonexistent.

The tenuous relationship between the two fields is reflected in the coverage of the recently published "International Encyclopedia of Information and Library Science" which, among its some 500 entries, includes an entry for "information management" by Wilson (1997b) and for "information science" written by the late Bob Bottle, former Professor of Information Science at City University, in which he defined Information science as:

A discipline which investigates the characteristics of information and the nature of the information transfer process, whilst not losing sight of the practical aspects of collecting, collating and evaluating information and organizing its dissemination through appropriate intellectual apparatus and technology. (Bottle, 1997, p. 212)

But, surprisingly, there is no entry at all for IS. This is despite the fact that the Criteria for Information Science published by the Institute for Information Scientists in the United Kingdom (Institute of Information Scientists, 1996) does specifically and prominently refer to IS:

The broad concepts and theories of information systems and information and communication technologies insofar as they apply to the principles and practices of information management. (Institute of Information Scientists, 1996, p. 1)

The indicative knowledge and skills under this criterion include specification, identification, analysis, implementation, evaluation, and utilization of manual and electronic systems and tools. The other criteria are information generation communication and utilization; information management and organizational context; information environment and policy; and management and transferable skills (Institute of Information Scientists, 1996). There would appear to be, from the definitions and indicative knowledge and skills described in these criteria, a considerable potential common research interest between information science and information systems. However, this common interest, does not seem to have been translated into research in theory or practice.

Taken as a whole, information science may be considered to cover a very wide variety of subjects, some of which may not be close to the interests of IS researchers. Therefore, to narrow the focus of the study the focus is on those subdisciplines of information science where there may be expected to be the highest overlap of subject interest between information science and IS researchers—IR and user studies (US). The centrality of IR and user studies (US) research to information science has been underlined by Hjørland who argues that: *‘Information seeking and information retrieval are core concepts in information sciences’*. (Hjørland, 1997, p. 11) This viewpoint is borne out by the amount of research devoted to these subjects in both library and information science research over the years, which even a cursory review of the American Society for Information Science Annual Reviews of Information Science over the years would confirm.

User studies and IR are not only undeniably core areas for information science research, but also, their concerns with users and systems are recognizably similar to those of IS research. So that, for the purpose of comparison between research in the two disciplines, US and IR will be used to represent (stand proxy) for research in information science more generally. This limitation is fair for the purposes of this comparison because it would be in these areas that one would expect some overlap. Moreover, in both these areas there have been recent extensive reviews of research extending back to their foundations as subdisciplines (Ellis, 1996; Wilson, 1994, 1997a) from which it is possible to identify the names of researchers who have been influential or highly cited over the years.

The relatively new field of IS is seen as primarily interdisciplinary or multidisciplinary. Many of the key protagonists within the field of IS have migrated into the field from the older and more established “reference disciplines” such as computer science or management. As a result of this it is very difficult to describe the core theoretical underpinnings of the field. This difficulty is reflected in the charter of the largest of the IS professional bodies, the Association for Information Systems:

The ‘Association for Information Systems’ is an international organization ‘that seeks to identify, extend, unify, and communicate knowledge in information technology (IT), systems (IS), and management (IM).’ For simplicity, in this constitution, the abbreviation IS and the term ‘Information Systems’ will be used to refer to IT, IS and IM jointly. (Association for Information Systems, 1998)

Numerous commentators have stated that the IS community is fragmented and without any core theory, and many share the view put forward by Checkland and Holwell that,

...it is very far indeed from being a taken-as-given structure-with-content within which the energy and attention can be concentrated on substantive work. Practically everything about it is problematical: Its focus, methods, norms language and standards. (Checkland & Holwell, 1998, p. 33)

The data that we have collected for this article seems to indicate that despite its fragmentation, substantive work can be identified within the IS field (see for example the work undertaken on strategic planning for IS). There are groupings with diametrically opposite philosophical positions within the IS field: However, these are groupings which do communicate together (see, for example, Mingers & Stowell, 1997). Information systems researchers, particularly in the UK, have been extremely active in debating the nature of the field (Galliers, 1987, 1992; Galliers & Baker, 1994), with a recent spate of publications about the nature of the field (Checkland & Holwell, 1998; Mingers & Stowell, 1997; Winder, Probert, & Beeson, 1997). We would argue that the IS community is starting to develop a clearer sense of community and is therefore developing a clearer conception of the field. More clarity can be found in the United Kingdom Academy for Information Systems (UKAIS), which has given an outline of the domain of study and an outline of the eight theoretical underpinnings of the field.

Definition: *Information systems are the means by which organizations and people, utilizing information technologies, gather, process, store, use and disseminate information.*

Domain of study: *The domain of IS requires a multidisciplinary approach to studying the range of socio-technical phenomena which determine their development, use and effects in organizations and society.*

Theoretical underpinnings of IS

1. *Data, information and knowledge management*
2. *Information in organizational decision making*
3. *Integration of IS with organizational strategy and development*
4. *Information systems design*
5. *Development and maintenance of IS*
6. *Management of IS and services*
7. *Organizational, social and cultural effects of technology-based IS*
8. *Economic effects of technology-based IS (UKAIS, 1997)*

Checkland and Holwell give further clarification:

Nowadays, we take the core concern to the field to be the orderly provision of data and information within an organization using IT, that information being relevant to the ever-changing activity of the organization and/or its members. (Checkland and Holwell, 1998, p. 39)

These definitions have a great deal in common with those put forward by Bottle (1997) and by the Institute of Information Scientists (1996) for information science.

Information Systems, US, and IR: Co-Citation Search Results

So far what has been outlined is a more or less conventional sketch of research in information science and IS, hopefully familiar to researchers in both fields. The next step is to discover to what extent researchers in either of the two disciplines would be recognized in the other. The method chosen was a hybrid of qualitative and quantitative research combining preliminary analysis of the

literature of the two fields with a quantitative citation cut-off impact criterion, followed by field and researcher co-citation analysis to identify overlap. This proceeded as follows: first the qualitative analysis of the literature of the field to identify potential candidates for citation study. The sample of candidates identified qualitatively was then reduced by the application of a quantitative impact factor measure criterion via the application of a minimum one hundred citation cut-off rule. This operated as a check on the validity of the initial qualitative sample which was far more extensive.

This was followed by a co-citation analysis of the researchers identified, this being a straightforward way of determining overlap. The application of the co-citation technique being used to identify to what extent researchers in the different fields were cited together, and, therefore, to what extent the sets are conjunct or disjunct. For this purpose the citations to the researchers were first added together in two separate sets—an information science set and an IS set. The two sets were then combined and the combination of the two sets analyzed to indicate to what extent there was overlap. The sets were further analyzed to assess the individual impact of researchers in the conjunct sets. The use of citation analysis is relatively common in studies of information science, as is the related technique of co-citation analysis pioneered by White and Griffith (1981). This technique is now a well established approach to mapping the bibliometric structure of academic disciplines (Bayer, Smart, & McLaughlan, 1990; Bradley, Willett, & Wood, 1992; Cronin & Davenport, 1989; Culnan, O'Reilly, & Chatham, 1990; Lievrouw, 1988; Martyn, 1975; McCain, 1990; Oppenheim, 1995, 1997; Paisley, 1990; Small & Garfield, 1985; White & McCain, 1998).

However, the role of citation analysis in this study is rather different. The methodology of the study brings together analysis of the academic literature of the research communities with co-citation analysis. Through analysis of recent comprehensive reviews of research in the fields of US, IR, and IS an extensive list of researchers in each field was compiled. These researchers were then searched on Social SciSearch using the cited author facility and a cut-off of 100 citations to identify the most cited researchers in each subfield. This cut-off was used to provide consistency in comparability of impact across the different fields and to provide some control over the number of sets to be used in the co-citation analysis. For researchers with a common surname and single initial where the resulting set was very large, possibly due to their being an author with the same surname and initial working in a different field, the sets were further limited by the combination with "information and system?".

A repetition of the search on SciSearch resulted in a considerably lower number of citations to the researchers than those identified through Social SciSearch. Analysis of the coverage of Social SciSearch through display of all of the journal names in the resultant sets confirmed that it was Social SciSearch which covered the mainstream literatures of IS, US, and IR, so the attempt to replicate the search in SciSearch was abandoned and the analysis focused on the results of the search on Social SciSearch.

For IS research the researchers identified in this manner were Izak Benbasat, Neils Bjornandersen, Peter Checkland, Claudio Ciborra, Michael Earl, Rob Galliers, Rudy Hirschheim, Blake Ives, Michael Jackson, Rob Kling, Kenneth Kraemer, Albert Lederer, Kalle Lyytinen, Lynne Markus, Franklin Warren Mcfarlan, John Mingers, Enid Mumford, Wanda Orlikowski, N. Venkatraman, Geoff Walsham, John Ward, Charles Wiseman, and Rob Zmud. For US, the set was smaller, comprising Thomas Allen, Marcia Bates, Michal Brittain, Brenda Dervin, David Ellis, William Garvey, Belver Griffith, Carol Kuhlthau, Maurice Line, John Martyn, William Paisley, Robert S. Taylor, Gernot Wersig, and Tom Wilson. The IR set was in size midway between the IS and US set and consisted of Micheline Beaulieu or Hancock-Beaulieu, Nick Belkin, Bertie Brookes, Cyril Cleverdon, Bruce Croft, Carlos Cuadra, Stephen Harter, Peter Ingwersen, Fred Lancaster, Stephen

Robertson, Gerry Salton, Tefko Saracevic, Alan Smeaton, Karne Sparck-Jones, Keith van Rijsbergen, Brian Vickery, and Peter Willett (Appendix 1).

Readers will no doubt be familiar with the names of those working in their subdiscipline, be it IS, US, or IR, and there may appear to some to be a number of perhaps surprising omissions, researchers not on the lists who might be expected to be. There were certainly some surprises for the authors of this article as a number of well known “names” in the fields became “casualties” of the 100 citation cut-off rule. Of course, this cut-off is in some respects arbitrary. It was employed, as previously mentioned, to ensure consistency in comparability of impact across the fields; in part, to ensure that the citation sets consisted of researchers who were central to the fields concerned, and, in part, to keep the resultant sets for the co-citation analysis manageable. If slightly lower cut-offs had been employed, or if different cut-offs had been used in the different fields, more researchers would have been included. But, there seemed no justification for employing different cut-offs across the fields, and even if the cut-off had been slightly lowered or varied, this would not have led to a huge increase in the number of researchers included. Indeed, one of the other surprises of this study was the fact that, despite the very large number of researchers who have contributed to the fields of IS, US, and IR research, a relatively small number of researchers are cited very frequently. However, given the ubiquitous nature of Bradford’s law, perhaps this should not be surprising for information studies researchers.

For the purposes of this study, the sets were of sufficient size and the number and variety of names seemed sufficient to act as reasonable proxies for the discourse communities concerned. It may be argued that there are researchers who combine IS and US or IR perspectives in their research but are not citing any of the above. However, if not one of the researchers in these sets is cited in their articles there would have to be some question as to the extent to which those articles were part of the discourse community of the subfield concerned. In the same way that a bridge which touches neither side is not a bridge. In any case, it seems doubtful that the omission of this or that researcher from a list of over 13,000 citations would make that much difference to the overall result or to increase much the scores for the conjunct sets.

For example, over 50 names of IS researchers were initially selected, of which only 23 had 100 citations or more, even though many of the researchers omitted currently have high status within the IS field. The researchers selected are, however, representative of all the key traditions and trends within the field of IS. The IS researchers were cited in over 850 journals, the top 25 of which are listed in Appendix 2 with comparisons with other studies of IS journals by Walstrom, Hardgrave, and Wilson (1995) and of Gillenson and Stutz (1991) who reported (respectively) on the *attitude* of MIS faculty and professors towards IS journals. Also listed are the findings of Holsapple, Johnson, Manakyan, and Tanner (1994) who rank business computing research journals based on the number of citations to them. As can be seen, our study includes most of the highly ranked works (Appendix 2).

A brief outline of the contributions of these researchers to their different fields will be provided to give an indication of their research interests, before mapping the overlap of research between the two fields, via the citation analysis of the individual impact of the researchers in each field and co-citation analysis of overlap. As readers from an information science background may be less familiar with research or researchers in IS, rather fuller descriptions of the IS researchers interests are provided than those of the US and IR researchers. Further details of the work of individual researchers in IR or US are provided in Ellis’s (1996) and Wilson’s (1994) reviews.

A detailed outline of the research agenda of IS researchers in the UK can be found in Galliers, Mylonopoulos, Morris, and Meadows (1997). Two of the most significant early researchers in the IS field are Peter Checkland and Enid Mumford. Both Checkland and Mumford have focused on

human and organizational issues in IS development. Checkland is one of the most influential and prolific of the IS researchers selected. He was the originator of the “soft systems methodology” and his exposition of “systems thinking” has traveled far beyond the limits of the field of IS (c.f. Checkland, 1972, 1981; Checkland & Holwell, 1998; Checkland & Scholes, 1990). Enid Mumford’s work has focused on participative design of IS (c.f. Mumford, 1983a; Mumford & Henshall, 1979), Sociotechnical Design (Mumford, 1987) and is exemplified in her ETHICS method (c.f. Mumford, 1983b; Mumford & Weir, 1979) for IS development, a method which she has refined over the last twenty years (Mumford, 1995). Lynne Markus’s work on the implementation and design of IS (Markus & Keil, 1994) has received a great deal of recognition within the IS field. Of particular note is her focus on the political aspect of IS implementation and development (Markus 1983; Robey & Markus, 1984).

Niels Bjørn-Andersen (1983, 1985, 1988), Markus and Bjørn-Andersen (1987), and Kumar and Bjørn-Andersen (1990) have all published work in the area of IS development and the theory of IS research. Hirschheim and Lyytinen have recently produced a number of significant texts illuminating the philosophical foundations of IS (Hirschheim, Klien, & Lyytinen, 1995).

Zmud’s work has focused upon IS design methodologies (Zmud, 1984) and the planning and use of IS in large organizations (Boynton & Zmud, 1987; Boynton, Zmud, & Jacobs, 1994). Izak Benbasat’s primary work focuses on individuals’ use of IT, ranging from interface design to analysis of computer-aided decision making. Much of his early work draws upon theory developed within psychology (Benbasat, Dexter, & Masulis, 1981; Benbasat & Taylor, 1978). Benbasat also is known for his work on IS research methods (Benbasat & Weber, 1996). Ives’s early work on user involvement and information system success is well known in the IS field (Ives, Olson, & Baroudi, 1983; Ives & Olson, 1984). He can also be described as the pioneering spirit behind the theory and practice of networked learning in the field of IS. Ives was one of the founding fathers of the IS World Net, which is now a significant electronic resource for IS researchers, and has published an number of articles on this topic (Ives & Jarvenpaa, 1996).

Mingers and Jackson are both leading figures in the UK systems field, sharing strong links to the UK Systems Society, the Organizational Research Society, and an interest in the application of critical theory in IS research. Mingers draws heavily upon contemporary sociological and philosophical thought in his work (Mingers, 1992) and is primarily interested in the nature of information (Mingers, 1995) and in IS research methods. Jackson is one of the key promoters of the concept of Critical Systems Thinking (Jackson, 1992) in IS research.

Walsham (1993), in contrast, is the foremost protagonist of the interpretative paradigm (c.f. Allen & Ellis, 1997) in IS research. His work (using Giddens Structuration Theory), has received a great deal of attention in the field. Walsham is also notable for his work on IS strategy and IS in developing countries. In common with Walsham, Orlikowski is well known for her use of structuration theory and for her work on research approaches to IS (Orlikowski & Baroudi, 1991). Ciborra similarly works within the interpretive tradition within IS. Ciborra’s research concerns the organizational and economic implications of information technology. He has written on topics as diverse as groupware and teamwork (1996) and IS and strategy (1994).

Kling’s impact in the field of IS lies primarily in the social roles and impact of IS (Kling, 1996). Kling’s work has spanned a wide variety of topics from privacy, social control, and information technologies through to social relationships in electronic forums. Kling is also central to the social informatics movement and is editor of the journal *The Information Society*. Kraemer’s work focuses on the organizational impact and value of IS (Mooney, Gurbaxani, & Kraemer, 1996; Pinsonneault & Kraemer 1997). He has also worked in the area of computer policy and is the editor of an oft-

cited work on IS research (1991). Kling and Kraemer share an interest in the organizational impact of IS with McFarlan (Kling, Gurnaxani, Kraemer, McFarlan, Raman, & Yap, 1994).

McFarlan is best known for his work on strategic competition and information technology (McFarlan, 1984; McFarlan & McKenney, 1983). Wiseman's work is also often cited in relation to the exploitation of IS for competitive advantage (Rackoff, Wiseman, & Ullrich, 1985; Wiseman, 1985) as is Lederer's (Lederer & Mendelow, 1986; Lederer & Sethi, 1988). More recent work in this area has been undertaken by Venkatraman, Ward, and Earl. Venkatraman has published a number of influential works on business transformation and IT (Henderson & Venkatraman, 1993; Venkatraman, 1994). Ward has published a number of influential articles on strategic planning for IS and has the definitive text in this area (Ward & Griffiths, 1996). Earl is also well known for his work on IS planning, having enunciated his ideas in both the text *Management Strategies for Information Technology* (1989) and a number of influential articles. Galliers is one of the most prolific of all the current IS researchers, his most influential work being in the area of IS planning (Galliers & Sutherland, 1991) and IS research methods (1992).

Among the pioneers in user studies who continue to be influential are Allen (1977), with his work with scientists and engineers; Paisley, who authored an early ARIST review (Paisley, 1968); Garvey and Griffiths for their work on psychologists in the USA (Garvey, 1979); and Brittain and Line with social scientists in the UK (Brittain, 1970). In the contemporary literature it is difficult to move far without encountering the names of the US researchers Dervin, whose sense-making approach (Dervin, 1983) has been widely cited, or Kuhlthau, whose process model (Kuhlthau, 1993) has also been influential. In the UK, Wilson's (1981) cognitive and affective and Ellis's (1989) behavioural models have been widely cited. Other researchers who have made significant contributions to the field of user studies over the years include Martyn, who wrote another early and influential ARIST review (Martyn, 1974); Wersig in Germany with his work on the problem situation (Wersig, 1971); and Bates (1989) for her work in the USA on information-seeking strategies and tactics of on-line searching.

The classic information retrieval research tradition commences with the Cranfield tests in the 1950s and 1960s, which will always be associated with the name of the late Cyril Cleverdon (1967). The MEDLARS evaluation, described by Lancaster (1968), the work of Vickery (1961) and Cuadra and Katters (1967), and Saracevic's work on relevance judgement (Saracevic, 1975) would also be considered part of the classic tradition Salton's classic research on automated systems with the experimental SMART retrieval system (Salton, 1971). These were fundamental influences for much statistical and probabilistic retrieval research, which has, perhaps, its theoretical zenith in the work of Van Rijsbergen (1979) and Robertson (1977); and empirical in that of Robertson and Sparck Jones (1976) on relevance feedback and Willett on comparisons of Boolean and best match searching (Willett, 1988). The other main strand in information retrieval research is the cognitive approach, represented in the work of Brookes (1977), Belkin (1990), Ingwersen (1992), and Vickery and Brooks (1987). Croft (1987) and Smeaton (1992) combine research aspects from both the statistical and cognitive approaches, and both approaches are well represented in the TREC experiments (Harman, 1993, 1995a; 1995b).

Interestingly, very few researchers work at the boundaries of user studies and information retrieval. The early work of Cuadra and Katter (1967) would fall into this class as would some of the work of Bates (1990) or Saracevic (1975). Ingwersen's (1992) cognitive and Ellis's (1989) behavioural approaches could also be seen as representing contributions to both areas, as could Robertson and Beaulieu's with OKAPI (Robertson, Walker, & Hancock-Beaulieu, 1995). For simplicity, Bates and Ellis were included with the user studies group; Beaulieu, Cuadra, and Katter, and Ingwersen, with the information retrieval group.

As these researchers have been chosen for their contributions to the fields of US and IR research generally the citation search was carried out by cited/author rather than cited article. This is a cruder technique than searching for citations to individual articles. However, as it is not citations to individual articles but citations to the corpus of work of the researchers that is being considered, it is sufficiently accurate for the kind of analysis and comparison being made here. The sets were quite large, and interestingly, and again surprisingly, very similar in size. The IS set comprising 4,566 citations, the US set 4,768 citations and the IR set 4,597. Remarkably, almost 40% of the IS research citations were to only two researchers, Mumford, and Checkland the founder of soft systems methodology. The IR set was also dominated by two names, Lancaster and Salton, who account for 61% of the citations. The US set was more even in distribution, but even so three researchers Allen, Line, and Wilson account for 51% of the citations.

Also remarkable was the very low overlap between the IS and US or IR sets, even lower than the authors had anticipated, and that anticipation had not been high. The combination of the IS set and US set has only 152 citations, and the combination of the IS set and IR set only 72 citations. In comparison the US and IR sets, which might be considered to be disjunct subjects in conjunct disciplines or subdisciplines, had 928 citations. The make up of the combination of information system and US or IR sets was further analyzed to identify the contribution of each cited author to the conjunct sets. This was done by the combining the information system set with the names of the individual US and IR researchers cited, and the US and IR sets with the names of the individual information system researchers cited.

Although, Allen, Dervin, Taylor, and Wilson account for the lion's share of the IS and US researcher (ISUS) subset, the converse US and IS researcher (USIS) subset is fairly evenly distributed. The IS and IR (ISIR) subset is also reasonably evenly distributed, though a few names—Belkin, Ingwersen, Lancaster, and Salton—do predominate. A similar pattern is revealed in the IR and IS (IRIS) subset which has a fairly even distribution with only Kling and Kraemer rising into double figures.

Allen is actually somewhat anomalous in relation to this study, in that his research was not strictly speaking in the "US" area. His work was, essentially, on organizational communication. He is, however, widely quoted and highly regarded in US, so he was included in the "US" citation group. However he may be highly cited in IS research because of his organizational communication studies roots. This would then represent more a link between organizational studies and IS research than between US and IS research, thus further weakening the link between the two. If Allen is removed from the US set the total citation size for the set drops to 3871 and the overlap with the information system set drops to 85.

What this analysis of the four subsets reveals is that, apart from the IS and US researcher (ISUS) subset the contribution of the individual cited researchers to the four conjunct IS and US or IR sets is fairly even. It is also two-way, with roughly equal citations coming from IS to US or IR and vice versa. This demonstrates that, in general, there are not a few "names" who straddle or tenuously link these disparate academic empires. And, if IS, US, and IR research were considered to be part of a broader information studies domain then the connection between these disparate parts of the domain is itself tenuous.

Conclusions

As the above analysis has shown, information science and IS research, are conjunct subjects, in terms of their focus of interests, but remain disjunct disciplines in terms of their disciplinary recognitions. Part of the explanation for this state of affairs is that while there is similarity in the methods adopted, which provides the overlap of interest, it is a superficial similarity. Information

retrieval research, for example, focuses almost exclusively on the information content of the system and deals predominantly with textual information. Information systems research focuses more on the formal modeling of relationships in data and on the organizational context of the system. Similarly, US are predominantly occupied with the use of information services such as libraries or reference databases, or with the use of channels of communication such as journals, books, and conferences. Information systems research focuses on the individual's function or role and on the demands that may be made of formal, data-based IS. In a simplistic fashion, we can say that information science research tends to be concerned with the information content of systems and with the development of more effective information services, while IS research is more concerned with formal organizational relationships to data and the development of more efficient computer-based systems.

However, the differences go deeper. The reasons have to do with the nature of scientific disciplines, the socialization process of the practitioners in the different fields, and, at least in the United Kingdom, with institutional pressures that have brought about structural changes that often have little to do with the disciplines' self-perceptions. Diesing comments that, in terms of segmentation, the social sciences

...resemble various Plains Indian societies, such as the Cheyenne, whose members are divided both into clans and into voluntary soldier societies. One principle of grouping, the clan principle, is the professional field... The other principle of grouping is the method. (Diesing, 1971, p. 22)

It is tempting to suggest that information science, with its close connection to various professional groups, represents the grouping by professional field, while IS represents grouping by method. Certainly, information science research has strong relationships to the professional field, often taking its research problems from the concerns of practitioners. Information systems, on the other hand, at least in the literature, show a concern for methods and formalisms (witness the citations to Checkland and Mumford) that practitioners in the field appear to value less. Introna commented that, as a practitioner

...my everyday work seemed messy, unanalyzable, unarticulatable, unsolvable, and so on. No matter how hard one tried to be the manager that the theory said one ought to be, these eloquent models seemed to crumble in the face of the everyday 'getting the job done'. (Introna, 1997, p. x)

He later notes that, unlike the common understanding of information in both IS and information science,

"...information does not add to our understanding, it merely makes explicit that which we always already understand as part of what it means to be in-the-world." (Introna, 1997, p. 79)

Leaving aside the full implications of the word "merely" in that sentence, this is a position that some researchers in the US area of information science would readily recognize. On the other hand, the difficulties it creates for the IS researcher, with a rational model of data becoming information that changes the understanding of the recipient, are considerable.

Diesing's (1971) comments on the role of conflict are relevant to this discussion, although there is, as yet, little conflict between information science and IS. He notes that conflict between

subdisciplines is essential if the system of the social sciences is to have a unity, since, if a sub-discipline concerned with method becomes too cohesive (experimental psychology is cited as a case in point) it will ultimately stagnate for the lack of constructive conflict with other fields. Paradoxically, however, conflict can only be maintained if the subfields do maintain their own unity, and that is maintained through the control over jobs exercised by the “field elders” (Diesing, 1971, p. 23). Clearly, the exercise of control over jobs is the exercise of power, and Bourdieu takes the analysis of power further in his examination of the faculties of the University of Paris.

The structure of the university field reflects the structure of the field of power, while its own activity of selection and indoctrination contributes to the reproduction of that structure. Indeed, it is in and through its functioning as a space of differences between positions... that... the reproduction of... the field of power is effected. (Bourdieu, 1988, p. 41)

This analysis is taken further by reference to dominant and subordinate faculties

“...the temporally subordinate faculties, the science faculty and, to a lesser extent, the arts faculty, contrast with the socially dominant faculties, more or less indistinguishable in this respect, the faculty of law and the faculty of medicine, through a whole set of economic, cultural, and social differences, where we recognize the essential features of what creates the opposition, at the heart of the field of power, between the subordinate fraction and the dominant fraction.” (Bourdieu, 1988, p. 41)

We would argue that both information science and IS are “subordinate faculties” in Bourdieu’s scheme of things, their lack of power in the university system is indicated (at least in the United Kingdom and also, to some extent, in the United States by their inability to defend their separate identity. For example, in the United Kingdom, there are few separate departments of IS; most are sections of either departments of computer science, or schools of management. The creation of the UK Academy of Information Systems may be seen as an attempt to gain power through the establishment of a society that seeks to lobby the Higher Education Funding Council for separate treatment in the regular Research Assessment Exercise and which also seeks to play a role of the socialization of young researchers into the field through its doctoral workshop programme.

Information science has also found it difficult to establish an identity separate from the field of librarianship from which it emerged. The Institute of Information Scientists was established with very much the same indoctrination agenda as that of the UK Academy, to establish that its members were different from librarians. This agenda failed, principally on the fact that a major proportion of its members were also members of the Library Association. However, information science, has also failed to establish a separate identity because the term has been adopted, on the one hand, by departments of computer science (particularly in Australia) and by departments of secretarial studies, seeking to raise their status in some of the polytechnics that were converted to universities. Information retrieval, in particular, is now as much a subfield of computer science as it is of IS—indeed, one might say “more,” rather than “as much.”

This subordinate position of both fields is reflected in the ability of the academic planning committees of their parent institutions to ignore their claims to separate, disciplinary status by merging them with other departments (with which they may feel they have little in common) or requiring them to expand their roles by taking in other, largely vocational, fields. In other words, their power relationships in the structure are not sufficient to enable them to stand against institutional bureaucracies in the way that Bourdieu’s “dominant faculties,” law and medicine, may do.

In the United States, this lack of power has clearly played a role in the closing of a number of schools of library and information studies, and in the reorganization of others. The closing of well-established schools such as those at the University of Chicago and Columbia University, the loss of separate status of the graduate school at UCLA and its incorporation into the School of Education, the closure of the school at Berkeley and its reopening under a new name, and a number of other mergers can be interpreted as reflecting the low “power budget” of the disciplines.

While there may be no conflict between IS and information science, the lack of contact (at least as revealed by this analysis) points to a desire to maintain separateness in order to focus attention on the institutional and disciplinary claims of each field, so that power can be gained and used to advance individuals and groups within the institution. In other words, the separate identity may have little to do with genuine disciplinary differences and more to do with the search for power.

Remedies

It is tempting to suggest that where a state of affairs is functional for the parties concerned, the idea that it should be “remedied” is not only presumptuous but also unnecessary. There is little if any conflict between IS and information science. Each, in the institutional context, is fighting its own battles, and the protagonists are pursuing separate, if related, research agendas. However, perhaps because of the lack of institutional power, remedies are being imposed or, at least, negotiated.

For example, in a number of institutions around the world apparently disjunct fields are being brought together: The Department of Communication and Information Studies at Queen Margaret College in Edinburgh links two related areas; the Faculty of Communication, at the University of Vilnius in Lithuania brings together information studies, librarianship, “book science,” communication studies, journalism, public relations, IS and, most recently, archives management; in New Zealand the new School of Communication and Information Management at the Victoria University in Wellington has brought together information studies, communication studies and IS, and has recently undertaken an internal strategic planning exercise to address some of the potentially negative effects of the disjunction. In the United States, the School of Information at the University of Michigan has a much wider remit than in its previous existence as the School of Library Science, covering, within its Master of Science in Information Management:

- Archives and Records Management,
- Human-Computer Interaction,
- Information Economics, Management and Policy, and
- Library and Information Services.

Also in the USA, the School of Information Management and Systems at the University of California, Berkeley was established following the decision to close down the intake of students into the School of Library and Information Studies. The proposal document presented a strongly integrative view:

We propose a program that will advance, through teaching and research, the organization, management and use of information and information technology, and enhance our understanding of the impact of information on individuals, institutions, and society. This mission has both a technical component, concerned with the design and use of IS and services, and a social sciences component, concerned with understanding how people seek, obtain, evaluate, use, and categorize information. (University of California, Berkeley, 1995)

In the United Kingdom matters have proceeded somewhat differently, particularly in the information science area. For example, the School of Information Management Management at the University of Brighton was expanded by taking in IS in a reorganization of the Faculty of Information Technology and now has programs in the fields of information and library science, IS, and media-related studies. At Robert Gordon University, Aberdeen, the School of Librarianship has been expanded into the School of Information and Media through the addition of communication and language studies and publishing, while at the University of Sheffield, the Department of Information Studies has expanded through collaboration. It offers the Masters of Science in IS jointly with the Department of Computer Science, dual honors undergraduate programmes jointly with the School of Management in Business Studies and Information Management and Financial Management & Accountancy and Information Management. An M.A. degree in Multimedia Journalism is in development jointly with the School of Journalism. It may be argued, therefore, that whether or not the "field elders" perceive the need for integration, integration is starting to take place.

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References

- Allen, D.K., & Ellis, D. (1997). Beyond paradigm closure in information systems research: Theoretical possibilities for pluralism. In: B. Galliers, S. Carlsson, C. Loebbecke, C. Murphy, H. Hansen, & R. O'Callaghan (Eds), *Proceedings of the Fifth European Conference on Information Systems* (pp. 737–759).
- Allen, T.J. (1977). *Managing the flow of technology: Technology transfer and the dissemination and the transfer of technological information within the R&D organization*. Cambridge, MA: MIT.
- Association for Information Systems. (1998). AIS Charter. Available at <http://www.aisnet.org/constit.html>. Accessed August 18, 1998.
- Association for Information Systems. (1997). *Proceedings of the Association for Information Systems Third Americas Conference on Information Systems*. Available at <http://hsb.baylor.edu/ramsower/ais.ac.97/program.html>. Accessed August 28, 1998.
- Avison, D. & Edgar-Nevill, D. (1998). *Matching technology with organisational needs*. Proceedings of the Third UKAIS Conference. Berkshire: McGraw-Hill.
- Baets, W.J. (Ed.). (1998). *Proceedings 6th European Conference on Information Systems*. Spain: Euro-Arab Management School.
- Bates, M. (1989). The design of browsing and berrypicking techniques for the online search interface. *Online Review*, 13, 407–424.
- Bates, M.J. (1990). Where should the person stop and information search interface start? *Information Processing and Management*, 26, 575–591.
- Bayer, A.E., Smart, J.C., & McLaughlin, G.W. (1990). Mapping intellectual structure of a scientific subfield through author co-citations. *Journal of the American Society for Information Science*, 41, 444–452.
- Belkin, N.J. (1990). The cognitive viewpoint in information science. *Journal of Information Science*, 16, 11–15.
- Benbasat, I., & Taylor, R.N. (1978). The impact of cognitive styles on information systems design. *MIS Quarterly*, 2, 43–54.
- Benbasat, I., & Weber, R. (1996). Research commentary: Rethinking "diversity" in information systems research. *Information Systems Research*, 7, 389–399.
- Benbasat, I., Dexter, A.S., & Masulis, P.S. (1981). An experimental study of the human computer interface. *Communications of the ACM*, 24, 752–762.

- Bjørn-Andersen, N. (1983). Challenge to certainty. Proceedings IFIP WG 8.2 Conference, Minnesota; August 22–24.
- Bjørn-Andersen, N. (1985). IS research: A doubtful science. In E. Mumford, R.A. Hirschheim, G. Fitzgerald, & A.T. Wood Harper (Eds.). (1985). Proceedings of the IFIP WG 8.2 Colloquium, Amsterdam, The Netherlands: Elsevier.
- Bjørn-Andersen, N. (1988). Are 'human factors' human? *The Computer Journal*, 31, 386–390.
- Bottle, R.T. (1997). Information science. In J. Feather & P. Sturges (Eds.) *International Encyclopedia of Information and Library Science* (pp. 212–214). London, New York: Routledge.
- Bourdieu, P. (1988). *Homo academicus*. P. Collier (trans.). Cambridge, England: Polity Press.
- Boynton, A.C., & Zmud, R.W. (1987). Information technology planning in the 1990's: Directions for practice and research. *MIS Quarterly*, 11, 59–71.
- Boynton, A.C., Zmud, R.W., & Jacobs, G.C. (1994). The influence of IT management practice on IT use in large organisations. *MIS Quarterly*, 18, 229–318.
- Bradley, S.J., Willett, P., & Wood, F.E. (1992). A publication and citation analysis of the Department of Information Studies, University of Sheffield 1980–1990. *Journal of Information Science*, 18, 225–232.
- Brittain, J.M. (1970). *Information and its users: A review with special reference to the social sciences*. Bath: Oriel, Bath University Press.
- Brookes, B.C. (1977). The developing cognitive viewpoint in information science. In M. De Mey (Ed.), *International workshop on the cognitive viewpoint* (pp. 195–203), Ghent: University of Ghent.
- Checkland, P. (1972). Towards a systems-based methodology for realworld problem solving. *Journal of Systems Engineering*, 3, 87–116.
- Checkland, P. (1981). *Systems thinking, systems practice*. Chichester, England: John Wiley & Sons.
- Checkland, P., & Holwell, S. (1998). *Information systems and information systems: Making sense of the field*. Chichester, England: John Wiley & Sons.
- Checkland, P., & Scholes, J. (1990). *Soft systems methodology in action*. Chichester, England: John Wiley & Sons.
- Ciborra, C. (1994). *Strategic information systems: A European perspective*. Chichester, England: John Wiley & Sons.
- Ciborra, C.U. (1996). *Gouppware and teamwork*. Chichester, England: John Wiley & Sons.
- Cleverdon, C.W. (1967). The Cranfield tests of index language devices. *Aslib Proceedings*, 19, 173–194.
- Croft, W.B. (1987). Approaches to intelligent retrieval. *Information Processing and Management*, 23, 249–254.
- Cronin B., & Davenport L. (1989). Profiling the professors. *Journal of Information Science*, 15, 13–20.
- Cuadra, C.A., & Katter, R.V. (1967). Opening the black box of relevance. *Journal of Documentation*, 23, 291–303.
- Culnan, M.J., O'Reilly, C.A., & Chatham, J.A. (1990). Intellectual structure of research in organizational behaviour, 1972–1984: A co-citation analysis. *Journal of the American Society for Information Science*, 41, 453–458.
- Dervin, B. (1983). *An overview of sense-making research: Concepts, methods and results to date*. Seattle, WA: School of Communication, University of Washington.
- Diesing, P. (1971). *Patterns of discovery in the social sciences*. Chicago, IL: Aldine Atherton.
- Earl, M.J. (1989). *Management strategies for information technology*. London, England: Prentice Hall.
- Ellis, D. (1989). A behavioural approach to information retrieval system design. *Journal of Documentation*, 45, 171–212.
- Ellis, D. (1996). *Progress and problems in information retrieval*. London, England: Library Association Publishing.

- Galliers, R. (Ed.). (1987). *Information analysis: Selected readings*. Wokingham, England: Addison Wesley Publishing Company.
- Galliers, R. (Ed.) (1992). *Information systems research: Issues, methodology and practical guidelines*. Oxford, England: Blackwell.
- Galliers, R.D., & Baker, B.S.H. (Eds.). (1994). *Strategic information management: Challenges and strategies in managing information systems*. Oxford, England: Butterworth Heinemann.
- Galliers, R.D., & Sutherland, A.R. (1991). Information systems management and strategy formulation: The 'stages of growth' model revisited. *Journal of Information Systems*, 1, 89–114.
- Galliers, R.D., Mylonopoulos, N.A., Morris, C., & Meadows, M. (1997). IS research agendas and practices in the UK. In: D. Avison (Ed.), *Key issues in information systems: Proceedings of the 2nd UKAIS Conference* (pp. 143–185), Berkshire: McGraw-Hill.
- Garvey, W.D. (1979). *Communication the essence of science*. Oxford: Pergamon Press.
- Gillenson, M. & Stutz, J. (1991). Academic issues in MIS: Journals and books. *MIS Quarterly*, 14, 147–452.
- Harman, D.K. (1993). The first text retrieval conference (TREC-1). *Information Processing and Management*, 29, 411–414.
- Harman, D.K. (1995a). Overview of the second text retrieval conference (TREC-2). *Information Processing and Management*, 31, 271–289.
- Harman, D.K. (1995b). The second text retrieval conference (TREC-2). *Information Processing and Management*, 31, 269–270.
- Henderson, J.C. & Venkatraman, N. (1993). Strategic alignment: Leveraging information technology for transforming organisations. *IBM Systems Journal*, 32, 4–16.
- Hirschheim, R.A., Klein, H.K., & Lyytinen, K. (1995). *Information systems development and data modelling*. Cambridge, England: Cambridge University Press.
- Hjorland, B. (1997). *Information seeking and subject representation: An activity-theoretical approach to information science*. Westport, CT: Greenwood Press.
- Holsapple, C., Johnson, L., Manakyan, H., & Tanner, J. (1994). Business computing research journals: A normalized citation analysis. *Journal of Management Information Systems*, 11, 131–140.
- Ingwersen, P. (1992). *Information Retrieval Interaction*. London: Taylor Graham.
- Ingwersen P., & Pors, N.O. (Eds.). (1996). *Information science: Integration in perspective*. Second International Conference on Conceptions of Library and Information Science. Copenhagen, The Netherlands: Royal School of Librarianship.
- Institute of Information Scientists. (1996). *Criteria for information science*. London, England: Institute of Information Scientists.
- Introna, L.D. (1997). *Management, information and power: A narrative of the involved manager*. Basingstoke, England: Macmillan.
- Ives, B., & Jarvenpaa, S.L. (1996). Will the Internet revolutionise business education and research. *Sloan Management Review*, 37, 33–42.
- Ives, B., & Olson, M.H. (1984). User involvement and MIS success: A review of research authors. *Management Science*, 30, 586–603.
- Ives, B., Olson, M.H., & Baroudi, J.J. (1983). The measurement of user information satisfaction. *Communications of the ACM*, 26, 785–793.
- Jackson, M.C. (1992). An integrated programme for critical thinking in information systems research. *Journal of Information Systems*, 2, 83.
- Jackson, M.C. (1997). Critical systems thinking and IS research. In J. Mingers & F. Stowell (Eds.), *Information systems: An emerging discipline?* (pp. 201–238), Berkshire, England: McGraw-Hill.
- Kling, R. (Ed.). (1996). *Computers and controversy: Value conflicts and social choices*. London, England: Academic Press.
- Kling, R., Gurnaxani, V., Kraemer, K.L., McFarlan, F.W., Raman, K.S., & Yap, C.S. (1994). Institutional factors in information technology innovation. *Information Systems Research*, 5, 139–169.

- Kraemer, K.L. (Ed.). (1991). *Information systems research challenge: Survey research methods*, Volume 3. Cambridge, MA: Harvard Business School Press.
- Kuhlthau, C.C. (1993). *Seeking meaning: A process approach to library and information services*. Norwood, NJ: Ablex Publishing.
- Kumar, K., & Bjørn-Andersen, N. (1990). A cross-cultural comparison of IS designer values. *CACM*, 33, 528–538.
- Lancaster, F.W. (1968). *Evaluation of the MEDLARS demand search service*. Bethesda, MD: National Library of Medicine.
- Lederer, A.L., & Mendelow, A.L. (1986). Issues in information systems planning. *Information and Management*, 10, 245–254.
- Lederer, A.L., & Sethi, V. (1988). The Implementation of strategic information systems planning methodologies. *MIS Quarterly*, 2, 445–461.
- Lievrouw, L.A. (1988). Bibliometrics and invisible colleges: At the intersection of communication research and information science. *Proceedings of the American Society for Information Science Annual Meeting*, 88, 54–58.
- Lyytinen, K. (1987). A taxonomic perspective of information systems development: Theoretical constructs and recommendations. In R.J. Bowland & R.A. Hirschheim (Eds.), *Critical issues in information systems research* (pp. 3–41). New York, NY: John Wiley & Sons.
- Markus, L.M. (1983). Power politics and MIS implementation. *Communications of the ACM*, 26, 430–444.
- Markus, L.M., & Bjørn-Andersen, N. (1987). Power over users: Its exercise by system professionals. *CACM*, 30, 498–504.
- Markus, M.L., & Keil, M. (1994). If we build it, will they come: Designing information systems that people want to use. *Sloan Management Review*, 35, 11–25.
- Martyn, J. (1974). Information needs and uses. *Annual Review of Information Science and Technology*, 9, 3–23.
- Martyn, J. (1975). Citation analysis. *Journal of Documentation*, 31, 290–297.
- McCain K.W. (1990). Mapping authors in intellectual space: A technical overview. *Journal of the American Society for Information Science*, 41, 433–443.
- McFarlan, F.W. (1984). Information technology changes the way you compete. *Harvard Business Review*, 62, 98–103.
- McFarlan, F.W., & McKenney, J.L. (1983). The information archipelago: Governing the new world. *Harvard Business Review* 61(4), 91–99.
- Mingers, J. (1992). Criticizing the phenomenological critique: Autopoiesis and critical realism. *Systems Practice*, 5, 173–180.
- Mingers, J. (1995). Information and meaning: Foundations for an intersubjective account. *Information Systems Journal*, 5, 285–306.
- Mingers, J., & Stowell, F. (Eds.) (1997). *Information systems: An emerging discipline*. Berkshire: McGraw-Hill Publishing.
- Mooney, J.G., Gurbaxani, V., & Kraemer, K.L. (1996). A process framework for assessing the business value of information technology. *Database for Advances in Information Systems*, 27, 68–81.
- Mumford, E. (1983a). *Designing participatively*. Manchester, England: Manchester Business School.
- Mumford, E. (1983b). *Designing human systems—the ETHICS Method*. Manchester, England: Manchester Business School.
- Mumford, E. (1987). Socio-technical design: Evolving theory and practice. In E. Bjerknes & Kyng (Eds.), *Computers and Democracy*. Avebury.
- Mumford, E. (1995). *Effective requirements analysis and design: The ETHICS method*. Basingstoke, England: Macmillan.
- Mumford, E., & Henshall, D. (1979). *A participative approach to computer systems design*. Associated Business Press.

- Mumford, E., & Weir, M. (1979). *Computer systems in work design: The ETHICS method*. Associated Business Press.
- Oppenheim C. (1995). The correlation between citation counts and the 1992 research assessment exercise ratings for British library and information-science. *Journal of Documentation*, 51, 18–27.
- Oppenheim C. (1997). The correlation between citation counts and the 1992 research assessment exercise ratings for British research in genetics, anatomy and archaeology. *Journal of Documentation*, 53, 477–487.
- Orlikowski, W.J., & Baroudi, J.J. (1991). Studying IT in organisations: Research approaches and assumptions. *Information Systems Research*, 2, 1–28.
- Paisley, W.J. (1968). Information needs and uses. *Annual Review of Information Science and Technology*, 3, 1–30.
- Paisley, W. (1990). An oasis where many trails cross: The improbable co-citation networks of a multidiscipline. *Journal of the American Society for Information Science*, 42, 459–468.
- Pinsonneault, A., & Kraemer, K.L. (1997). Middle management downsizing: An empirical investigation of the impact of information technology. *Management Science*, 43, 659–679.
- Rackoff, N., Wiseman, C., & Ullrich, W.A. (1985). Information systems for competitive advantage: Implementation of a planning process. *MIS Quarterly*, 9, 285–294.
- Robertson, S.E. (1977). Theories and models in information retrieval. *Journal of Documentation*, 33, 126–148.
- Robertson, S.E., & Sparck Jones, K. (1976). Relevance weighting of search terms. *Journal of the American Association for Information Science*, 27, 129–146.
- Robertson, S.E., Walker, S., & Hancock-Beaulieu, M.M. (1995). Large test collection experiments on an operational interactive system: Okapi at TREC. *Information Processing and Management*, 31, 345–360.
- Robey, D.M., & Markus, L. (1984). Rituals in information systems design. *MIS Quarterly*, 8, 5–15.
- Salton, G. (1971). *The SMART retrieval system experiments in automatic document processing*. Englewood Cliffs, NJ: Prentice Hall.
- Saracevic, T. (1975). Relevance: A review of and a framework for thinking on the notion in information science. *Journal of the American Society for Information Science*, 26, 321–343.
- Saunders, C. (1996). MIS journal rankings. *IS World Net*. Available at <http://is.lse.uk/iswnet/profact/journal.htm>. Accessed August 28, 1998.
- Small, H., & Garfield, E. (1985). The geography of science disciplinary and national mappings. *Journal of Information Science*, 11, 147–159.
- Smeaton, A.F. (1992). Progress in the application of natural language processing to information retrieval tasks. *The Computer Journal*, 35, 268–278.
- UKAIS (1997). Newsletter of the UKAIS 3. Available at <http://www.scs.leeds.ac.uk/ukais/Newsletters/vol3no4.html>. Accessed August 18, 1998.
- University of California, Berkeley (1995). Proposal for a school of information management and systems. Available at <http://info.berkeley.edu/programs/proposal.html>. Accessed August 24, 1998.
- Vakkari, P. (1994). Library and information science: Its content and scope. *Advances in Librarianship*, 18, 1–55.
- Vakkari, P., & Cronin, B. (Eds.) (1992). *Conceptions of library and information science. Historical, empirical and theoretical perspectives*, London, England: Taylor Graham.
- Van Rijsbergen, C.J. (1979). *Information Retrieval*, 2nd. ed. London: Butterworth.
- Venkatraman, N. (1994). It enabled business transformation: From automation to business scope redefinition. *Sloan Management Review*, 35, 73–87.
- Vickery, A., Brooks, H.M., & Robinson, B. (1987). A reference and referral system using expert system techniques. *Journal of Documentation*, 43, 1–23.
- Vickery, B.C. (1961). *On retrieval system theory*. London: Butterworth.

- Walsham, G. (1993). *Interpreting information systems in organisations*. Chichester, England: John Wiley & Sons.
- Walstrom, K., Hardgrave, B., & Wilson, R. (1995). Forums for management information systems scholars. *Communications of the ACM*, 38, 93–102.
- Ward, J., & Griffiths, P. (1996). *Strategic planning for information systems*. Chichester, England: John Wiley & Sons.
- Wersig, G. (1971). *Information—Kommunikation—Dokumentation*. Munchen: Verlag Dokumentation.
- White, H.D., & Griffith, B.C. (1981). Author co-citation a literature measure of intellectual structure. *Journal of the American Society for Information Science*, 32, 163–171.
- White, H.D., & McCain, K.W. (1998). Visualising a discipline: An author co-citation analysis of information science, 1972–1995. *Journal of the American Society for Information Science*, 49, 327–355.
- Willett, P. (Ed.) (1988). *Document retrieval systems*. London: Taylor Graham.
- Wilson, T.D. (1981). On user studies and information needs. *Journal of Documentation*, 37, 3–15.
- Wilson, T.D. (1994). Information needs and uses: Fifty years of progress? In B.C. Vickery (Ed.), *Fifty years of information progress: A Journal of Documentation Review* (pp. 15–51), London, England: Aslib.
- Wilson, T.D. (1997a). Information behaviour: An interdisciplinary perspective. *Information Processing and Management*, 33, 551–572.
- Wilson, T.D. (1997b). Information management. In J. Feather & P. Sturges (Eds.), *International Encyclopedia of Information and Library Science* (pp. 187–198), London, New York: Routledge.
- Winder, R.L., Probert, S.K., & Beeson, I.A. (1997). *Philosophical aspects of information systems*. London, England: Taylor and Francis.
- Wiseman, C. (1985). *Strategy and computers: Information systems as competitive weapons*. Illinois: Dow Jones Irwin.
- Zmud, R.W. (1984). Design alternatives for organising information systems activities. *MIS Quarterly*, 8, 79–93.

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Appendix 1: The Search Results

INFORMATION SYSTEM SET

383 CA 5 "BENBASAT I" AND (INFORMATION OR
SYSTEM?)
105 CA 5 "BJORNANDERSEN N"
717 CA 5 "CHECKLAND P":CA 5 "CHECKLAND
PB"
115 CA 5 "CIBORRA C" OR CA 5 "CIBORRA CU"
200 CA 5 EARL MJ
123 CA 5 "GALLIERS R":CA 5 "GALLIERS RD"
210 CA 5 "HIRSCHHEIM R":CA 5 "HIRSCHHEIM
RA"
526 CA 5 "IVES B" AND (INFORMATION OR SYS-
TEM?)
231 CA 5 "JACKSON MC"
270 CA 5 "KLING R" AND (INFORMATION OR SYS-
TEM?)
348 CA 5 "KRAEMER KL"
143 CA 5 "LEDERER AL"
107 CA 5 "LYYTINEN K"
372 CA 5 "MARKUS ML" AND (INFORMATION OR
SYSTEM?)
389 CA 5 "MCFARLAN FW"
161 CA 5 "MINGERS J"
1106 CA 5 "MUMFORD E"
179 CA 5 "ORLIKOWSKI WJ"
212 CA 5 "ORLIKOWSKI W":CA 5 "ORLIKOWSKI
WJ"
238 CA 5 "VENKATRAMAN N" AND (INFORMA-
TION OR SYSTEM?)
104 CA 5 "WALSHAM G"
167 CA 5 "WISEMAN C"
104 CA 5 "WARD J" AND (INFORMATION OR SYS-
TEM?)
380 CA 5 "ZMUD RW" AND (INFORMATION OR
SYSTEM?)
4566 TOTAL

USER STUDIES SET

897 CA 5 ALLEN TJ
409 CA 5 BATES MJ
175 CA 5 BRITTAIN JM
485 CA 5 DERVIN B
167 CA 5 ELLIS D AND (INFORMATION OR SYS-
TEM?)
440 CA 5 GARVEY WD
348 CA 5 GRIFFITH BC
162 CA 5 KUHLETHAU CC
772 CA 5 LINE MB
288 CA 5 MARTYN J
162 CA 5 PAISLEY WJ
394 CA 5 TAYLOR RS
147 CA 5 WERSIG G AND (INFORMATION OR SYS-
TEM?)
726 CA 5 WILSON TD
4768 TOTAL

INFORMATION RETRIEVAL SET

120 CA 5 BEAULIEU M OR CA 5 HANCOCKBEAU-
LIEUMORCA5 HANCOCK M
492 CA 5 BELKIN NJ
525 CA 5 BROOKES BC
231 CA 5 CLEVERDON CW

354 CA 5 CROFT WB
214 CA 5 CUADRA CA
311 CA 5 HARTER SP
209 CA 5 INGWERSEN P
1444 CA 5 LANCASTER FW
443 CA 5 ROBERTSON SE
1354 CA 5 SALTON G
637 CA 5 SARACEVIC T
113 CA 5 SMEATON AF
157 CA 5 SPARCKJONES K
479 CA 5 VANRIJSBERGEN CJ
345 CA 5 VICKERY BC
143 CA 5 WILLETT P
4597 TOTAL

4566 INFORMATION SYSTEM SET
4768 USER STUDIES SET
3971 USER STUDIES SET NOT CA 5 ALLEN TJ
4597 INFORMATION RETRIEVAL SET
152 INFORMATION SYSTEM SET AND USER STUD-
IES SET
85 INFORMATION SYSTEM SET AND USER STUDIES
SET NOT CA 5 ALLEN TJ
72 INFORMATION SYSTEM SET AND INFORMATION
RETRIEVAL SET
928 USERS STUDIES SET AND INFORMATION RE-
TRIEVAL SET
INFORMATION SYSTEM SET AND USER STUDIES
RESEARCHER (ISUS)
67 CA 5 ALLEN TJ
11 CA 5 BATES MJ
7 CA 5 BRITTAIN JM
28 CA 5 DERVIN B
12 CA 5 ELLIS D AND (INFORMATION OR SYS-
TEM?)
10 CA 5 GARVEY WD
2 CA 5 GRIFFITH BC
10 CA 5 KUHLTHAU CC
7 CA 5 LINE MB
3 CA 5 MARTYN J
5 CA 5 PAISLEY WJ
33 CA 5 TAYLOR RS
7 CA 5 WERSIG G AND (INFORMATION OR SYS-
TEM?)
29 CA 5 WILSON TD

USER STUDIES SET AND INFORMATION SYSTEM
RESEARCHER (USIS)
12 CA 5 BENBASAT I
1 CA 5 BJORNANDERSEN N
14 CA 5 CHECKLAND P OR CA 5 CHECKLAND PB
9 CA 5 CIBORRA C OR CA 5 CIBORRA CU
17 CA 5 EARL MJ
10 CA 5 GALLIERS R OR CA 5 GALLIERS RD
8 CA 5 HIRSCHHEIM R OR CA 5 HIRSCHHEIM RA
23 CA 5 IVES B
2 CA 5 JACKSON MC
20 CA 5 KLING R
8 CA 5 KRAEMER KL
7 CA 5 LEDERER AL
2CA5 LYYTINEN K
15 CA 5 MARKUS ML
19 CA 5 MCFARLAN FW
1 CA 5 MINGERS J
14 CA 5 MUMFORD E
17 CA 5 ORLIKOWSKI W OR CA 5 ORLIKOWSKI WJ
13 CA 5 VENKATRAMAN N
3 CA 5 WALSHAM G
6 CA 5 WARD J
7 CA 5 WISEMAN C
26 CA 5 ZMUD RW
INFORMATION SYSTEM SET AND INFORMATION
RETRIEVAL RESEARCHER (ISIR)
2 CA 5 BEAULIEU M OR CA 5 HANCOCKBEAU-
LIEUMORCA5 HANCOCK
19 CA 5 BELKIN NJ
6 CA 5 BROOKES BC
7 CA 5 CLEVERDON CW
9 CA 5 CROFT WB
4 CA 5 CUADRA CA

8 CA 5 HARTER SP
10 CA 5 INGWERSEN P
24 CA 5 LANCASTER FW
8 CA 5 ROBERTSON SE
16 CA 5 SALTON G
19 CA 5 SARACEVIC T
2 CA 5 SMEATON AF
1 CA 5 SPARCKJONES K
4CA5 VANRIJSBERGEN CJ
10 CA 5 VICKERY BC
1 CA 5 WILLETT P
INFORMATION RETRIEVAL SET AND INFORMA-
TION SYSTEM RESEARCHER (IRIS)
9 CA 5 BENBASAT I
2 CA 5 BJORNANDERSEN N
6 CA 5 CHECKLAND P OR CA 5 CHECKLAND PB
1 CA 5 CIBORRA C OR CA 5 CIBORRA CU
2 CA 5 EARL MJ
2 CA 5 GALLIERS R OR CA 5 GALLIERS RD
6 CA 5 HIRSCHHEIM R OR CA 5 HIRSCHHEIM RA
7 CA 5 IVES B
0 CA 5 JACKSON MC
16 CA 5 KLING R
10 CA 5 KRAEMER KL
0 CA5 LEDERER AL
3 CA5 LYYTINEN K
5 CA5 MARKUS ML
3 CA5 MCFARLAN FW
3 CA5 MINGERS J
8 CA5 MUMFORD E
6 CA5 ORLIKOWSKI W OR CA 5 ORLIKOWSKI WJ
0 CA5 VENKATRAMAN N
0 CA5 WALSHAM G
2 CA5 WARD J
0 CA5 WISEMAN C
8 CA5 ZMUD RW

Appendix 2: Rank Order of IS Journals

Journal Name	Ellis, Allen & Wilson	Walstrom et al. 1995	Holsapple et al. 1994	Gillenson & Stutz 1991
<i>MIS Quarterly</i>	1	1	1	1
<i>Journal of the Operational Research Society</i>	2	Not ranked	Not ranked	Not ranked
<i>Information & Management</i>	3	12	8	12
<i>Systems Practice</i>	4	Not ranked	Not ranked	Not ranked
<i>International J. of Information Management</i>	5	Not ranked	Not ranked	Not ranked
<i>Omega-International J. of Managt Science</i>	6	15	Not ranked	Not ranked
<i>European J. of Operational Research</i>	7	Not ranked	Not ranked	Not ranked
<i>Decision Sciences</i>	8	8	17	4
<i>Management Science</i>	9	4	1	1
<i>Behaviour & Information Technology</i>	10	Not ranked	Not ranked	Not ranked
<i>Journal of Information Technology</i>	11	Not ranked	Not ranked	Not ranked
<i>Communications of the ACM</i>	12	2	2	3
<i>Systems Research</i>	13	Not ranked	Not ranked	Not ranked
<i>Information Systems Research</i>	14	3	Not ranked	Not yet published
<i>Sloan Management Review</i>	15	13	10	13
<i>General Hospital Psychiatry</i>	16	Not ranked	Not ranked	Not ranked
<i>Journal of Management Studies</i>	17	Not ranked	Not ranked	Not ranked
<i>Public Administration Review</i>	18	Not ranked	Not ranked	Not ranked
<i>Inttl. J. of Man-Machine Studies</i>	19	Not ranked	Not ranked	Not ranked
<i>Info. Processing & Management</i>	20	Not ranked	Not ranked	Not ranked
<i>Information Systems</i>	21	Not ranked	Not ranked	15
<i>European J. of Information Systems</i>	22	Not ranked	Not ranked	Not ranked
<i>Decision Support Systems</i>	23	11	5	Not ranked
<i>Accounting Organizations and Society</i>	24	Not ranked	Not ranked	Not ranked
<i>IEEE Transactions</i>	25		5	6
		8		
<i>ACM Transactions</i>	Ranked outside top 25	data base sys 11	data base sys 7	various subjects
<i>J. of Mgt Information Systems</i>	Ranked outside top 25	7	3	5
<i>Journal of the ACM</i>	Ranked outside top 25	Not ranked	31	6
<i>Harvard Business Review</i>	Ranked outside top 25	9	7	10
<i>ACM Computing Surveys</i>	Ranked outside top 25	10	25	9
<i>J. of Info. Systems Management</i>	Ranked outside top 25	17	Not ranked	14
<i>Academy of Management Journal</i>	Ranked outside top 25	14	22	Not ranked
<i>Computer</i>	Ranked outside top 25	Not ranked	14	11
<i>Info. Resources Mgt. Journal</i>	Ranked outside top 25	Not ranked	Not ranked	16