Learning from Failure: Myths and Misguided Assumptions about IS Disciplinary Knowledge

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"The division of men's intellectual lives and activities into distinct disciplines is easy to recognize as fact. But it is less easy to explain... How, for instance, are such disciplines to be classified and defined? Here verbal definitions will hardly help."

--Stephen Toulmin, *Human Understanding*

Abstract. Many different methods have been used to understand the field of information systems, including classification, citation, and exploration of genres and lines of discourse. This paper discusses an approach based on the concept of a *family of fields*, where IS has greater proximity to some fields than to others. Our approach was inspired by field theory and discourse communities as a means to explain the diffusion of scientific research. The family of fields concept proved not to be viable but yielded important lessons for the study of IS and its relationship with other scientific fields. We found that (1) fields are not so easily defined, (2) borrowing of ideas across disciplines is not linear, (3) the concept of a reference discipline is obscured, and (4) we need to ask, what are the requirements for a discipline among the social sciences.

Keywords: failure, scientific disciplines, disciplinary knowledge, reference disciplines, information systems, sociology of scientific knowledge

Prologue

To begin, it is unusual to provide a prologue, however, this research does require some stage setting. There are a number of things that we believed to be true when we first set out, in 1997, to explore the identity and dynamics of the field of information systems (IS). We were concerned with information technology and its role in the knowledge economy, especially the pace of change, and the extent to which we were or weren't living in unusual or accelerated times. We speculated that each era most likely saw itself as unique and important--where the contributions, struggles, and the experiences of its people were unlike that of any other. At the time we took several assumptions about IS for granted. These included that:

- the field of IS can be understood by looking at IS only,
- IS is in a pre-paradigmatic state,
- given time IS will succeed in developing a dominant paradigm, with ruling theory and this would be a prerequisite for becoming a mature field (i.e., we would come to have a core),
- theory is the key to understanding, and is also a bridge to reaching practitioners,
- there is evidence of a cumulative research tradition, and
- because technologies are always changing, old insights are no longer relevant.

Over time, through the processes of conducting a number of studies on the identity and dynamics of the field of IS, we have come to view the above assumptions to be myths, or else reflections of wishful thinking. Our present understanding centers around the following observations, that:

- in order to understand the body of knowledge that makes up IS, it is necessary to investigate working knowledge in other disciplines, and the sociology of scientific knowledge,

[1] The Authors are listed in alphabetical order, but have contributed equally to the article.

- the maturation of the discipline is mixed up with an innovation bias for technology, creating cloudiness and confusion,
- technologies place value on the "new," whereas disciplinary knowledge is about what endures, and
- there may be evidence of a cumulative research tradition in sub-fields of IS (e.g., TAM, GDSS), as yet unknown and largely unresearched.

We explored many different approaches to understanding the field, and met with success using classification methods (Larsen and Levine 2005), citation analysis (Larsen and Levine 2008), and exploration of genres and lines or discourse (Larsen and Levine 2007) We also had high hope for the approach that we used here on *family of fields.* This was inspired by field theory and discourse communities (Latour 1988, Shaw 1990, Pfeffer 1993, Toulmin 2003) as a means to explain the diffusion of scientific research. The family of fields approach proved not to be viable but yielded important lessons that contributed to our journey. Here is our story.

1. Introduction

IS researchers hold wide ranging views on the makeup of IS and other fields. Some have observed that IS research is cited in many scientific fields (see, for example, Backhouse, Liebenau, and Land 1991; Truex and Baskerville 1998; Davis 2000). Under the category of reference discipline (for IS), Vessey, Ramesh, and Glass (2002) include: cognitive psychology, social and behavioral science, computer science, economics, information systems, management, management science, and others. Holsapple, Johnson, Manakyan, and Tanner (1994) distinguish between academic journals and practitioner publications in the area of business computing systems. They further divide academic journals into "business-managerial orientation, computer science-engineering orientation, and general-social sciences orientation" (p. 74). Pfeffers and Ya (2003) distinguish between journals in IS and in allied disciplines. These subdisciplines are seen as making up IS or serving as reference disciplines for IS. Harzing (2012) identifies sixteen subject areas that make up the business domain, of which MIS-KM is one. Her comprehensive list of journals in the business school domain numbers 933. The Association of Business Schools (2011) defines 22 subject fields and lists 821 journals in the field of business. Finally, Taylor, Dillon and Wingen (2010) argue that IS is composed of six sub fields, including: inter-business systems, IS strategy, Internet applications miscellany, IS thematic miscellany, qualitative methods thematic miscellany, and group work & decision support.

Baskerville and Myers (2002) claim that IS has become a reference discipline for other fields. They base this on a three stage model where (1) initially IS imports theories, methods and results from other fields, (2) IS builds content internally, and (3) IS exports its theories, methods and results to other fields. In stage three, IS has become a reference discipline.

To investigate claims that (a) IS has matured and is now a reference discipline for other fields (Baskerville and Myers 2002) and (b) in the tradition of the sociology of science[2] , IS is borrowing from and lending to other fields, we tried to define and operationalize the construct of "referencing disciplines." In other words, how are the processes of maturation--of borrowing, building, and exporting ideas--made visible and how can this phenomenon be systematically verified? Thus, we were interested in developing a robust way to talk about the disciplines that referenced IS and how IS was coming to be referenced by these other fields. We believed that the range of other disciplines and their diversity were important. To explore this, we created a framework based on the concept of *family of fields* and we used this framework as a tool for a deductive analysis of journals from IS and other fields. Hence our research questions are:

> What are the relationships among fields relative to IS? Does the family of fields concept elucidate these relationships and can scientific journals be mapped to a family of fields?

The paper proceeds with our conceptual model and research design, method, discussion, and conclusion.

[2] How is a body of scientific knowledge constituted and matured? Some researchers have referred to this transformation as the sociology of scientific knowledge (Crane 1972; Lodahl and Gordon 1972; Toulmin 1972; Ben-David and Sullivan 1975; Cole 1983; Pfeffer 1993). This is the investigation of science as a social activity, particularly dealing "with the social conditions and effects of science and with the social structures and processes of scientific activity" (Ben-David and Sullivan 1975, p. 203).

2 Conceptual Model and Research Design

Our formulation of the concept of family of fields was made up of four parts. First, recall that *reference disciplines* (Baskerville and Myers 2002) is used in a general manner; thus, we reviewed uses of the term. Second, we explored the relationships among various scientific disciplines, recognizing that some appeared closer to IS than others. We thought that the metaphor of the *family* could effectively illustrate close and distant relationships. For example, siblings are closer than cousins; and first cousins are closer than 2nd cousins. This metaphor offered a vehicle to grapple with IS and its reference disciplines.

We considered a broad distinction between IS and *all* other scientific disciplines lumped together under the heading of Supporting Fields. This corresponds to Pfeffers and Ya's (2003) distinction between journals in IS and in allied disciplines. However, we felt that this differentiation was too crude. For example, most would agree that a field such as software engineering is closer to IS than marketing. This line of thinking led us to distinguish between (1) IS, (2) Related Fields, e.g. software engineering, and (3) Supporting Fields, e.g. marketing. But how sharp is the distinction between IS and Related Fields? To illustrate, we realize that many (U.S.) universities organize decision sciences (DS) and IS in a single department. DS journals publish IS articles and IS journals publish DS findings. Despite the overlap, some maintain that DS is separate from IS. In the family of fields framework, DS and IS are close relatives.

Third, we speculated that Supporting Fields might include disciplines (i.e., marketing) that were connected to IS but more distant than Related Fields. Fourth, and finally, we defined the umbrella term of Wider Fields for those disciplines outside the business school domain – e.g., civil engineering, agriculture, and psychology. Obviously, these differentiations between IS and DS, Related Fields, Supporting Fields, and Wider Fields are imperfect but provide a starting point. Figure 1, below, depicts these categories of referencing fields and their proximity to IS.

Fig. 1. Categories of referencing fields and their proximity to IS.

3 Method

The exploration of family of fields is part of our larger study of IS, focusing on citation analysis and citation patterns of exemplar articles in IS and other scientific fields (Larsen and Levine 2008). Our investigations employ a set of exemplar IS articles since, according to Ritzer (1975), an exemplar is one of the primary components of a paradigm. Kuhn (1970) defines exemplars as "concrete problem-solutions" that can be found in a range of sources including laboratories, examinations, texts, and periodical literature (p. 187). Exemplars are illustrative of important contributions in the field of IS. Consequently, in creating our dataset, we employed three steps: (1) we defined a portfolio of exemplar IS articles, (2) we identified any articles which cited to these exemplars, (3) we coded journals (containing articles citing to the exemplars) into the family of fields scheme. These steps are described below.

3.1 Step 1: Defining a Portfolio of Exemplar IS Articles

We employed two approaches for compiling our list of exemplar IS articles: (1) award winning articles, and (2) evaluation by peers. First, our sample of award winning articles was drawn from *MIS Quarterly* "articles of the year" and Society for Information Management (SIM) competition-winner articles. For the period 1993-1999, *MISQ* named eight articles of the year. For the period 1994-2000, five SIM competition articles were named. Henceforth, these are referred to as "award articles." Second, we reflected that peers might have their personal IS research article favorites. We identified 17 peers who were well known in the community. These were senior scholars, professors from across the globe, who were recognized for their achievements. At the time, an AIS World senior scholars' list (or a basket of journals) did not exist (ICIS 2010 program guide, p. 26). Our 17 peers were contacted by email and asked to nominate their "top four" classic, seminal, or influential articles in the field of IS. After one email reminder, 15 had responded, providing us with 23 "peer-nominated articles" (see Appendix A for details.)

None of the award articles were peer nominated. We refer to the grand total of 36 articles as "exemplar articles" – consisting of the two categories of award articles (13) and peer-nominated articles (23).

3.2 Step 2: Locating the Journals Citing our 36 IS Exemplar Articles

We looked at the 36 exemplar articles and where they were cited in other (articles in) journals. The social sciences citation index in the Thomson Reuters ISI Web of Knowledge was used for this purpose; it is the dominant, authoritative source for scientific research. In all, 418 journals were identified as having articles citing one or more of the 36 exemplar articles.

3.3 Step 3: Coding Journals into Families of Fields

The final step in our data preparation was the allocation of each of the 418 journals (citing the 36 exemplars) into one of the five Families of IS, DS, Related Fields, Supporting Fields, or Wider Fields. We performed separate coding and then joint reliability checks. The process of coding journals required three meetings. In coding, we recognized the need to account for combinations, i.e., IS and DS, etc. We allocated each of the 418 journals to one of the five Families of Fields (see Figure 1) or one of the ten combinations. Meetings were scheduled at least a week apart to allow for reflection.

4 Discussion

In our analysis, we reached a large degree of agreement on journals classified as "Pure IS journals" as in Walstrom and Hardgrave (2001) or "IS research journals" as in Pfeffers and Ya (2003). However, other journals were not so easily classified in their relationship to IS. Examples of journals we view as being a combination of two families are *Communications of the ACM* and *Management Science* – as we see it, belonging to both IS and Related Fields (and within Related Fields, to the sub-fields of computer science and operations research, respectively). We interpret *International Journal of Electronic Commerce* as belonging to IS and Supporting Fields (marketing). Clearly, this analysis involves interpretation. In several cases, we were unfamiliar with a particular journal and struggled with journal names that were ambiguous. The creation and use of coding schemes like ours involve judgment calls, which are open to debate.

We looked for representations of knowledge networks to assist with our coding of journals and their relationships to IS. Baskerville and Myers' (2002) conceptual model of knowledge networks shows IS as a disciplinary node (see figure 2 below).

They do not define what makes these nodes recognizable, but refer in passing to key people, events attended, and core journals. But questions remain: how can we talk about the IS community and others? Is there a "them" and an "us," or is this distinction a red herring? They succeed with an impressionistic representation of IS and the surrounding "other" disciplines. But the clouds they draw around these entities are indeed cloud-like—simply assuming that disciplinary borders exist, without providing any sharp distinctions or definitions.

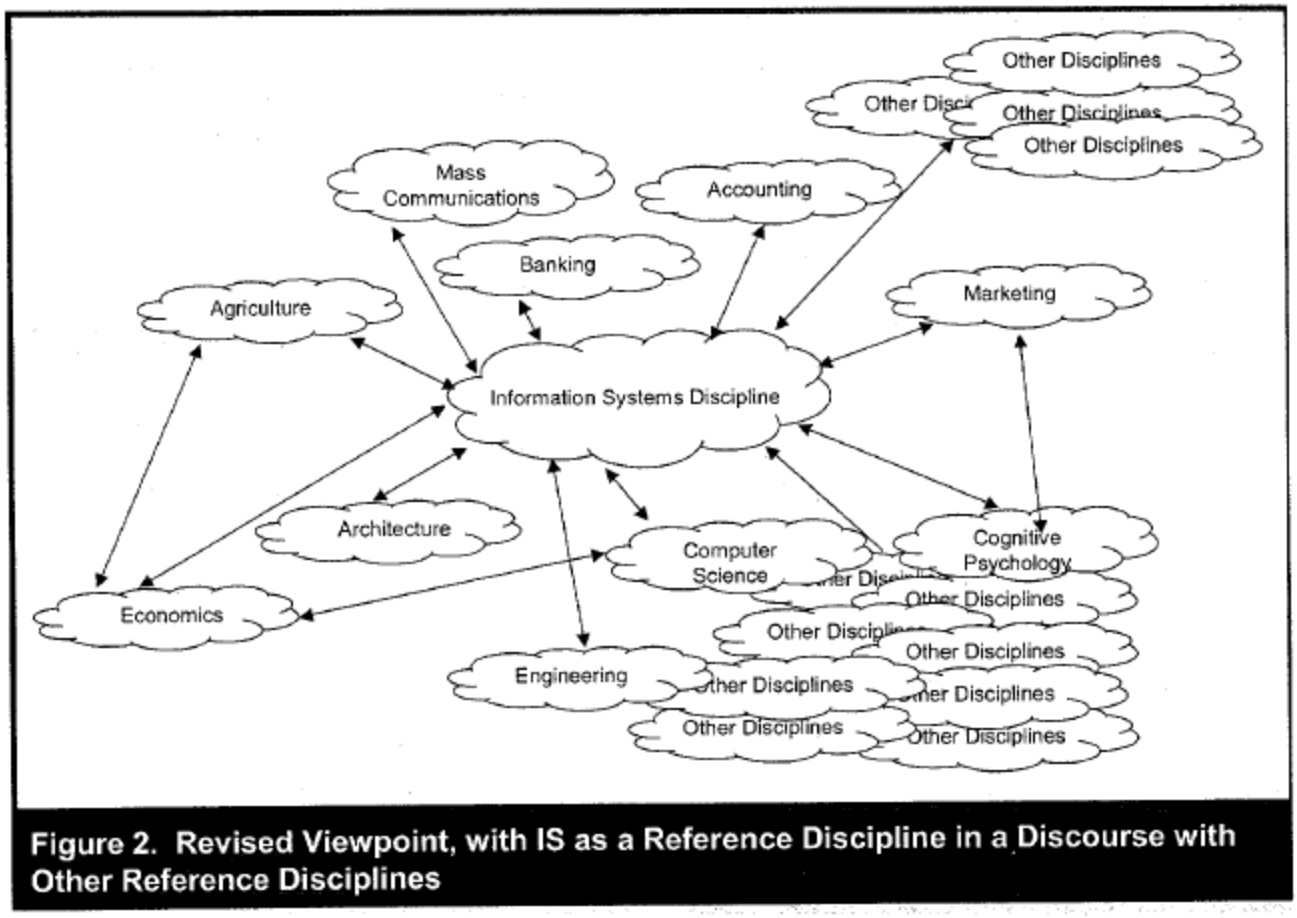

Figure 2. Revised Viewpoint, with IS as a Reference Discipline in a Discourse with Other Reference Disciplines

Figure 2 from Richard L. Baskerville and Michael D. Myers, "Information Systems as a Reference Discipline," *MIS Quarterly* (26:1), 2002, p. 8. Copyright © 2002, Regents of the University of Minnesota. Reprinted by permission.

Our exploration of family of fields and combinations proved equally problematic. Most journal were coded outside of IS and into multiple categories. This resulted in blurred distinctions. Appendix B illustrates the messiness that we tried to contend with in the development of our coding scheme. We were also unable to make claims about specific familial relationships--disciplines were associated rather than connected in a precise manner. Thus, we were unable to come any closer than Baskerville and Myers (2002) in their characterization of IS as a "reference discipline in a discourse with other reference disciplines" (figure 2, p. 8). Due to our increasing concerns about blurred interpretation and unwieldy complexity, we concluded that the family of fields concept was not viable to pursue. Among the preconditions for a family of fields concept is a degree of agreement on subject areas and journal lists. This does not exist, for example, see Association of Business Schools (2011) and Harzing (2012). Nonetheless, we remain convinced that some fields have a closer relationship to IS than others. A deep understanding of proximity among fields also requires further investigation of detailed content, as proximity most likely derives from (a) similar topics or topics under the same umbrella, (b) domain, (c) shared theory, (d) common methods, and (e) common underlying technology.

How, otherwise, might the landscape be depicted? Diagrams differ in their granularity and composition, as well as their underlying theory. If we focus on the sociology of scientific knowledge, specifically the hierarchy of the sciences, we can illustrate the disciplines in closest proximity to IS. Cole (1983) employed Auguste Comte's hypothesis of the hierarchy of the sciences, which maintains "that the sciences progress through ordained stages of development at quite different rates…. The hierarchy of the sciences described not only the complexity of the

phenomena studied by the different sciences but also their stage of intellectual development" (p. 112). Cole refined the hierarchy and developed six salient characteristics: theory development, quantification, cognitive consensus, predictability, rate of obsolescence, and rate of growth. This hierarchy distinguishes between the physical and social sciences, and the in/ability to make verifiable predictions. Figure 3, below, illustrates these two dimensions in our representation of IS and related (sibling) fields.

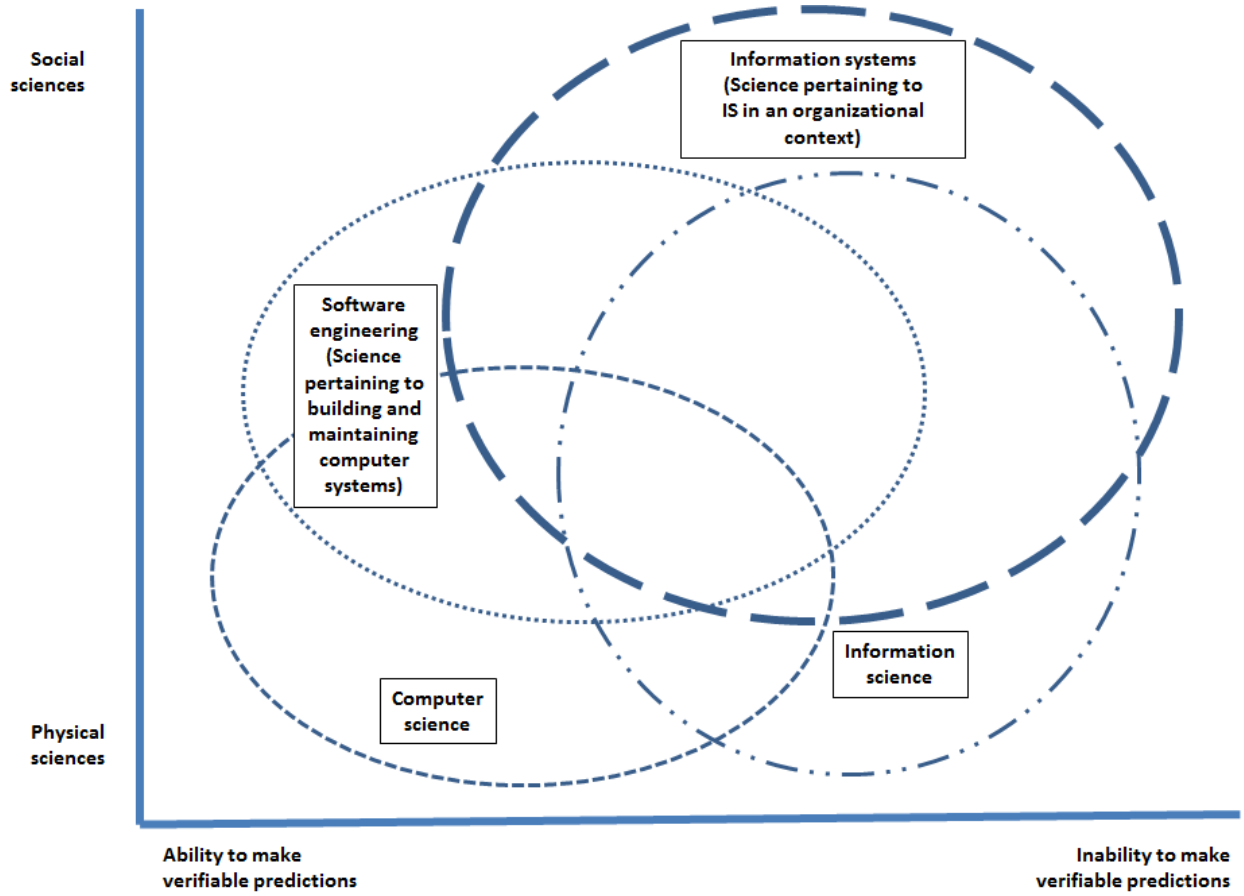

Fig. 3. Information Systems in proximity to sibling fields (adapted from Cole 1983)

This view shows four sibling fields which include their own distinct theories, focii, and research areas. Yet they also exhibit a high degree of overlap and no sharp borders. Similarly, Polites & Watson (2009) find overlap among the areas of computer science, information systems, management--professional, operations research, and multiple/unclassified (see their Figure 2, p. 607). Additionally, we acknowledge the physical sciences' concern with predictability and the social sciences' concern with human activity in organizational settings (description and interpretation). This representation depicts the transactions and exchanges among disciplines, which is also in line with Toulmin's thinking on human understanding and intellectual authority. He states: "By its very nature, the problem of human understanding – the problem of recognizing the basis of intellectual authority – cannot be encompassed within any single technique or discipline. For the very boundaries between different academic disciplines are themselves a consequence of the current divisions of intellectual authority, and the justice of those divisions is itself one of the chief questions to be faced afresh" (Toulmin 1972, p. 7).

Few IS researchers have tackled the topic of disciplinary knowledge but aspects of the evolution of the field of IS have been touched upon (King and Lyytinen 2004; Lyytinen and King 2004; Gregor 2006; Taylor, Dillon, and Wingen 2010; Hirscheim and Klein 2012). Davis (2000) comments on the history of the field, noting that two views have predominated, on: (1) observed systems and organizational functions, and (2) underlying concepts and deep-

structure information phenomena. For the most part, discussion about the field of IS is lively but preoccupied with local issues such as the nature of a core and the role of diversity, and the matter of rigor versus relevance.

5 Conclusions

Our investigation into the relationships among IS and reference disciplines in the form of a family of fields turned out to be a failure. The approach was not viable but yielded four important lessons. We present these lessons followed by our concluding remarks.

First, fields are not so easily defined, and display a great deal of overlap with fuzzy borders as is evident in Appendix C. We discovered that IS is being used in almost any field imaginable, because information systems are in use everywhere and can be the subject of research in any domain. This makes IS and its underlying information communication technology (ICT) a broad area of study with a vast number of opinions and options. Additionally, the discipline of IS often blurs with the issues of ICT in context (e.g., agriculture, medicine, geography, etc). This can also confuse the goals of university education and vocational training. Second, the borrowing of theories and ideas across disciplines is complicated and not linear. The conventional understanding of the maturation of a field describes processes of importing, developing, and exporting ideas. Maturation, including borrowing, is not a clear sequence but rather one that is iterative, reciprocal and networked. Idea development and refinement is messy and unpredictable. Third, the concept of a reference discipline is obscured and even exploded. The term is commonly used and a convenient one but on examination it proved simplistic and not very meaningful. Any discipline can be a reference discipline for IS. Consequently, the term has no specific or special meaning. If we are going to continue to use the term "reference discipline" we would be wise to reexamine it closely and define it more usefully. Fourth, we need to ask: what are the requirements for a discipline, one among the social sciences? Rather than focusing continuously on the content and core of IS, we should pause to define and discuss the criteria for constituting a discipline.

More broadly, some aspects of the diversity and uncertainty that we perceive in IS, may be functions of a larger loss of order and unity, emanating from aging, brittle models of academic institutions. These eroding forms govern our current understanding of disciplines and the university itself—the *house* of learning for *bodies* of knowledge. Reinventing the university and disciplinary knowledge challenges us to look at organizations as ecosystems, rather than as edifices. By doing so, we open the door to seeing the university institution, not as a massive file cabinet or catalogue of content, but through alternative metaphors for networks and systems of systems.

IS is not alone in reexamining its identity and value as a field, within the university, and in relation to industry practice. In addition to fractures in the discipline of Sociology, similar concerns have been expressed by researchers in Organizational Communication (Corman and Poole 2000, as noted in Ashcraft 2001), Organization Science (Rynes, Bartunek, and Daft 2001) and Information Science (Monarch 2000; Ellis, Allen and Wilson 1999). Other signs of disciplines under stress, such as competing for funding and recognition in the university environment, translate into a plethora of applied R&D institutes, including inter-disciplinary centers of an overlapping nature.

We introduced this study by acknowledging our early observations some of which we now see as myths or faulty assumptions. This change of heart occurred over time as we conducted a number of studies on the identity and dynamics of the field of IS, including the present one on family of fields. To make progress in understanding our field, we believe it is necessary to investigate the workings of other disciplines and the sociology of scientific knowledge. We must do this keeping in mind that the maturation of the discipline is clouded by an innovation bias for ICT. IS is a hybrid field built upon technology breakthroughs, "silver bullets", enduring knowledge, and capabilities from the social, engineering, and physical sciences. The first step in making progress is reckoning with this complexity and the challenge it poses.

Epilogue

The end of the research on family of fields is not the end of the story. Taking time for reflection, we were left with standard citation material-- our exemplars and who cites to them. We persisted in asking: what kind of distinctions among scientific fields could be made? How can you identify an IS journal? And, could we reframe our research so that it contributed to an understanding of how knowledge evolves in interaction between IS and other fields? We stepped back to pose the most basic and fundamental question: what constitutes a field? This reassessment opened the door to bodies of literature well outside of IS--to field theory and philosophy of science. We are still grappling

with this question. Given the complexity of categorizing fields, perhaps the only workable distinction that can be sustained is a coarse one between IS, related, and other fields.

The research tradition on the sociology of scientific knowledge holds promise to enrich our theorizing about IS in a holistic manner, rather than in isolation. The IS exemplar articles and citation analysis can be used as a lens and method for an operational investigation into the sociology of scientific knowledge, as applied to IS (Larsen and Levine, forthcoming). Theorizing from this vantage point allows comparisons with the workings of other disciplines and potential insight into how changes in theory and method unfold over time.

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Appendix A: List of Exemplar MIS Articles in Our Sample

MIS Quarterly, Article of the Year

[1] Klein, H.K. and Myers, M.D. (1999) "A Set of Principles for Conducting and Evaluating Interpretive Field Studies in Information Systems," *MIS Quarterly*, vol 23(1), March, pp. 67-94.
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Notes: * = the nomination is a book, hence not found in the social citation index and excluded from the analysis

Appendix B: Coding Scheme

Coding for Decision Sciences and Wider Fields are not included because coding scheme was abandoned at the stage documented below.

I = Clearly an IS journal presenting key issues
I-A = Most probably or nearly clearly a IS journal but declaring a special interest area, for example application, specific technology, etc.
I-D = IS journal within the domain of systems development
I-S = Clearly a IS journal but declaring a special interest area, for example strategy However, the focus in on managerial issues!
I-I = IS journal, focus is on individual, work related issues, etc.

R-A = Related area, various topics, areas, or domains
R-E = Related area; Expert systems, artificial intelligence, or similar
R-K = Related area, Knowledge & new economy
R-L = Related area, e-learning, e-teaching, library sciences, etc.
R-T = Related area; computer science and computer technology
R-W = Related area; wider environment, society, etc.

S = Supporting field and of general nature
S-A = Supporting field, various application domains.
S-B = Supporting field, international or global business
S-C = Supporting field, communication
S-F = Supporting field, finance, accounting or similar
S-G = Supporting field, group related issues
S-H = Supporting field, health care, hospital, etc.
S-I = Supporting field, individual level, for example psychology
S-L = Supporting field, managerial and leadership issues
S-M = Supporting field, marketing
S-P = Supporting field, manufacturing
S-S = Supporting field, systems thinking or other modeling approaches
S-U = Supporting field but unclear what type
S-W = Supporting field, wider environment, society, etc,

H = Hybrid journal, in the sense that it's primary dedication is not IS per ce but allows relatively frequently IS type publications. Examples are in particular Management Science and Organization Science.
H-P = Hybrid, but probably of a practitioner type.
H-T = Hybrid, but mixed with computer science

Notes: I= Field of Information Systems, R=Related Fields, S=Supporting Fields, W=Wider Fields, H=Hybrid Field.

Appendix C: Random Sample of Journals in Supporting and Wider Fields and their ISI Subject Categories

Journal title	ISI SC1	ISI SC2	ISI SC3	ISI SC4	ISI SC5
ACTA Psychologica	Psychology	Experimental			
Annals of Tourism Research	Hospitality	Leisure	Sport	Tourism	
British J. of Mgmt	Business	Management			
Communication Theory	Communication				
Environment and Planning B-Planning & Design	Environmental studies				
Geographical Review	Geography				
Hospital & Health Services Administration	Health policy	Services			
Industrial & Labor Relations Review	Industrial relations	Labor			
Intern. J. of Industrial Ergonomics	Ergonomics				
Intern. J. of Service Industry Management	Management				
J. of Business Ethics	Business				
J. of Documentation	Information science	Library science			
J. of International Business Studies	Business	Management			
J. of Operations Management	Management				
J. of Rural Health	Health policy	Services	Public	Environmental	Occupational health
J. of the Theory of Social Behaviour	Psychology	Social			
Library Quarterly	Information science	Library science			
Medical Care Research and Review	Health policy	Services			
Organization	Management				
Preventive Medicine	Public	Environmental	Occupational health		
Public Administration	Public administration				
Research on Language and Social Interaction	Communication	Linguistics	Psychology	Social	
Social Networks	Anthropology	Sociology			
Systemic Practice and Action Based Research	Management				
Total Quality Management	Management				
Western J. of Communication	Communication				

Key: Subject category (SC)