

EVALUATING ‘DIAGNOSES’, ‘TREATMENTS’ AND ‘INFERENCES’ ACTIVITIES IN THE INFORMATION SYSTEMS PROFESSION

Research in Progress

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Abstract

Information systems (IS) is a field that influences and is influenced by the work of many different academics and practitioners. The influence of IS to other areas of knowledge (i.e. management) has led to debate as to whether IS has become a reference field of knowledge. Focusing on either knowledge elements or knowledge activities of a reference field leaves out consideration of relationships and interactions through time between both.

Following Abbott's sociology of professional knowledge, this paper proposes a triad of analytical categories: 'Diagnoses'; 'Treatments' and 'Inferences' to examine and advance a more comprehensive understanding of the development of IS. Our analysis, based on a pilot survey of five IS journals, suggests that the key focus of IS activity has been on refining methodologies (treatments).

The field has been less explicit and inclusive in generating and disseminating diagnoses and inferences. Those people working in the field can and should make available untapped stocks of knowledge in relation to these two elements whilst attempting to expand the jurisdiction (ownership) of IS over different problems. They can do so by relating more strongly methodologies to how IS problems can be defined and theorized upon. As this is work in progress, we propose a number of implications that we intend to explore in further research.

Keywords: *Information systems; professional knowledge systems; diagnoses; treatments; inferences; jurisdiction; citation analysis*

1 Introduction

The popularity of information systems in the social context of research and practice has led some to argue that this field has become a reference domain, on equal footing with others including management, sociology and economics (Baskerville and Myers 2002). There is debate however, about what constitutes relevant knowledge in the field to be exported to other fields as well as the status of IS as a discipline (Mingers and Stowell, 1997; Wade et al, 2006). For some there should be a clear definition of the boundaries of IS, in other words the knowledge that it should and should not offer so that a core stock of knowledge is maintained, disseminated and refined (Benbasat and Zmud 2003). To others the boundaries of IS should not be rigid as this would constrain innovation and the development of new ideas or areas of application for research and practice (Bryant 2008).

Flexibility means that IS should be best considered as a set of inter-connected communities of practice, which continuously exchange knowledge (Klein and Hirschheim 2008), and under the assumption that knowledge can be consensually acquired and shared (Klein and Hirschheim, 2003).

An alternative to these two perspectives is to identify the stock of IS knowledge that through time becomes relevant to different audiences (Somers 2010), and from there suggest strategies to fill any identified gap. This alternative could shed light on how IS can be concurrently stable and dynamic, and how knowledge emerges to meet the needs of academic and practical audiences and be recognised also as socially relevant and legitimate. Insights obtained can inform further reflection on how knowledge in the IS field can be best developed in the future.

How can this alternative be advanced? This research question is addressed in this paper through examination of the field of IS using Abbott's ideas on the sociology of professional knowledge systems (Abbott 1988; Abbott 2001; Cordoba et al. 2012; Somers 2010). These ideas inform the design and implementation of a pilot study that aims to identify key knowledge activities in the IS field over time. From this identification, some gaps that should be addressed are proposed together with some preliminary conclusions and outline future research directions.

The paper is organized as follows. First, we outline the current debate about information systems (IS) as field of knowledge, presenting ideas from Abbot's notion of the sociology of knowledge professions and consider how they can be used to distil answers to the proposed research question. Then we go on to detail a methodology to investigate IS knowledge as reported by a sample of IS journals and discuss our initial findings. Finally, we draw some preliminary implications and an agenda for further research.

2 IS as a Knowledge Field

To many, IS is a field of knowledge that can offer insights for people dealing with problems related to the design and use of information systems and technologies in organizations. Evidence of the importance of this field is the current existence of a diversity of approaches, models, frameworks and methods that bring together both technical and human activities in order to secure successful adoption, diffusion and use of software applications to support the management of information in organizations (Avison and Fitzgerald 2003; Ilvari et al. 2004), as well as the different professional associations and journals that gather academics and practitioners. A commonly accepted view of an IS is summarized by Avison (1997) as follows:

‘A system which assembles, stores, processes and delivers information relevant to an organization (or to society) in such a way that the information is accessible and useful to those who wish to use it, including managers, staff, clients and citizens. An information system is a human activity (social) system which may or may not involve computer systems’ (p.115).

This view also suggests that “by treating technology as a component [of an IS], researchers are obligated to include other aspects in the system in their research” (Wade et al, 2006, p.265, brackets added).

Despite agreement on the above view of what an IS is, there is currently debate about the knowledge that is needed about it and how relevant it should be for both academia and practice. Some people propose a core and stable set of knowledge elements about: IS development and management processes; human behaviors influencing or resulting from these processes; models, methods and concepts for software coding, testing and quality assurance; representations of data, events and systems structures; expert, decision support, collaborative and transactional application systems (Benbasat and Zmud 2003; Davis 2000; Ilvari et al. 2004). Advancing these elements as well as

defining ideals, concepts and theories to validate and predict knowledge phenomena can help IS become an acknowledged and established knowledge discipline (Hassan, 2011). In this perspective, there is an emphasis on the *knowledge elements* that need to be advanced. There is little precedent on how to do so in a way that IS knowledge becomes relevant to academic and practitioner audiences both within and outside IS.

A contrasting perspective is to offer flexibility and adaptability to people who either contribute to, or use, IS knowledge (Bryant 2008; Somers 2010). IS can be best regarded as being in a continuous state of flux, in which its knowledge is the by-product of interactions within and beyond the discipline (Bryant, 2008). Advocates of this perspective support the generation and sharing of boundary knowledge objects which enable different groups in the IS field (academics, practitioners,) to exchange and negotiate meanings about their own activities (Klein and Hirschheim 2008). This perspective suggests a focus on the interactions between groups within and outside the IS field. It also assumes a degree of consensus and collaboration rather than competition in the generation of knowledge.

A more detailed analysis of how knowledge in IS is generated through time can help ascertain when and how IS has been *both* stable and fluid, as well as what implications can be derived from such dynamics (Cordoba et al, 2012). These implications can inform future research about what is necessary for the IS field to become a reference discipline or a profession. To inform such analysis, in the next section the ideas of Abbott (1988) concerning the sociology of professional knowledge are presented.

3 Abbott on the Sociology of Professional Knowledge

Andrew Abbott (1988), proposed a unifying view of knowledge in academia and practice by linking it to professional work. For Abbott, a profession is a specific set of activities whose knowledge can be used to help a client solve particular problems (1988, chapter 1). Professions have a status that is continuously dependent on social recognition, cultural relevance and legitimacy. To develop and maintain their status, professionals work continuously in the following knowledge generation activities: (1) *diagnosing problems* - identifying and classifying them using the language of the profession; (2) *treating these problems* - applying specialized knowledge to solve them; and (3) *inferring* -reasoning about new or existing problems as well as drawing or refining connections between diagnoses and treatments (Abbott 1988, pp.40-52). These activities are inter-dependent and generate systems of classifications or indices that help researchers, learners or practitioners of a profession identify and deal with particular problems related to their own jurisdiction (owned territory) or venture in dealing with new problems.

Professions generate and maintain a professional knowledge system at two levels: practical and academic (Abbott, 1988, pp.52-57). The practical knowledge component of a profession mainly serves client audiences. Academic knowledge is less practical (it exists in a disassembled state) and is oriented towards abstraction, conceptualization and generalization. Its focus is three fold: research (developing new abstractions and classifications of diagnoses, treatments and inferences); instruction (education); and legitimation (linking professional knowledge to larger cultural and societal values). Through time, professional knowledge diagnoses, treatments and inferences become available to both client and professional audiences. Given that professions are part of a system in which they compete with each other for vacant jurisdiction, competition can emerge from within or outside this system in the form of for instance a more efficient way to diagnose and treat a specific problem, or a new technology or form of work that enables the *commodification* of knowledge about treatments or inferences in the form of, for instance, texts, formulas, tables or graphing tools (Abbott, 1988, p.236).

In order to keep and expand their jurisdictions, professions need to continuously fill existing gaps in the knowledge that they hold through continuous improvement of their diagnoses, treatments and

inferences and with a view to produce abstract knowledge about tasks that can be used to inform other tasks. Professions need to keep a balance between being too abstract (or too focused on inferring new diagnoses, treatments or their classifications) or being too practical (making these elements too portable to use without appropriate reflection or ambiguous inference). In this regard, Abbott (1988) says:

‘Redundancy [of knowledge] will increase efficacy and will thereby help a profession control its jurisdictions. Inconsistency between different ways of construing problems will lead to specialization and possible differentiation in the profession. Large uncategorized [undiagnosed, untreated or not inferred about] areas are certain to encourage extra professional invasion’ (p.56).

Finally, Abbott (1988, pp.215-246) regards the information field as one in which several groups including statistics, accounting, engineering, management, operational research, journalism, marketing, information science and management information systems compete to fulfill a societal function of information provision (quantitative, qualitative). Through time, these groups have become recognized professions (accounting, statistics). Others (operational research, management information systems) have taken territory from others (management) and have specialized in providing information *and* recommendations for action. The field is very dynamic with continuous expansions and contractions. However, Abbott suggests that groups which focus which lose their own academic component or which focus on ‘treatment substitution alone’ will find it difficult to establish and expand professional jurisdiction (p.242). Abstract and practical relevance of their knowledge within and outside their territory should be maintained if not further developed.

4 Mapping Professional Knowledge in the IS field

We use Abbott’s ideas concerning the development of professional knowledge to better understand the dynamics of this field and in particular, how activities of diagnosing, treating and inferring have unfolded through time. By doing so a number of knowledge gaps can be identified and suggestions to address them proposed. The following criteria are used to map these knowledge elements/activities:

(a) *Diagnoses*: characterized by the appearance of classifications of ‘problem’ areas of work in the IS literature, some of which may have been treated previously with existing knowledge but have left some residue. Diagnoses can compete with each other given that people working in the IS field aim to both expand and consolidate knowledge. Competition is apparent when an area of work is being diagnosed and possibly treated with more than one approach, methodology or method.

(b) *Treatments*: characterized by a diversity of knowledge tools (frameworks, methodologies, methods, techniques, models) proposed to tackle ‘diagnosed’ problems or problem areas. As with diagnoses, treatments can be seen as in competition with each other.

(c) *Inferences*: characterized by associations between treatments with diagnoses which are continuously revisited (cited) by IS people in the literature and which enable further definition of diagnoses and treatments, not just routinely work. These are difficult to capture given that in practice, professionals do not often give away their ‘know how’ as a form of maintaining professional jurisdiction. These associations can lead to conceptualizations and abstractions which can then be used to reformulate diagnoses and treatments within or outside the IS field. When a particular association (diagnosis-treatment) is consolidated through time, it can be assumed that professionals are both generating portable knowledge to those outside of a discipline as well as inferring new knowledge. Portability of knowledge helps people to interact with others inside or outside a field, but as mentioned before also puts professional knowledge at risk of ‘commodification’ and hence weakening ownership or jurisdiction. Although some initial insights are provided, this element of knowledge will be further analysed in the next stage of our research.

5 Initial Survey methodology

The survey strategy is depicted in Figure 1. We started by assembling a sample of seven mainstream journals dedicated to publishing academic and practitioner generated research in IS. This is part of a major project in which we plan to systematically search for articles in top information systems journals originating from both the US and EU. The three US-based journals are: Management Information Systems Quarterly (*MISQ*), Information Systems Research (*ISR*) and Journal of Management Information Systems (*JMIS*). We selected four EU-based journals: (1) Information System Journal (*ISJ*) (Journal of Information Systems until 1997); (2) Journal of Information Technology (*JIT*); (3) European Journal of Information Systems (*EJIS*), and (4) Information and Organization (*IO*) (*AMIT* until 2001). This sample of seven journals is a convenience sample that gives a good spectrum of IS journals and we used it here as an initial point to gauge collaboration between the fields of IS. We also intend to include two General Management journals namely Academy of Management Review (*AMR*) and the British Journal of Management (*BJM*) in Stage 2 of the study indicated in Figure 1. Searching journals outside the IS field will gauge how far the diagnoses, treatments and inferring tools developed in IS have traveled and permeated other disciplines.

As this is work-in-progress, we report only the pilot survey (Phase 1 in Figure 1) comprising five IS journals of the seven in our planned sample. We planned to survey the seven journals for the twenty-year period from January 1990 to December 2010, but encountered difficulties with full access to two of the US-based journals (*MISQ* and Systems Research). So in order to make progress, we report only results of our initial survey (searched 27, April 2013) comprising five IS journals, which we believe is still a representative sample of the IS journals: one US-based journal, *Journal of Management Information Systems* (*JMIS*); and four EU-journals: (1) *Information Systems Journal* (*ISJ*); (2) *Journal of Information Technology* (*JIT*); (3) *European Journal of Information Systems* (*EJIS*); and (4) *Information and Organization* (*IO*). Websites visited are listed at the end of the Reference section. To scrutinize these journals, we used relevant keywords to establish the existence of papers explicitly and/or mostly devoted to knowledge elements of *diagnoses*, *treatments* and *inferences*.

The keywords are used as proxies to find out if the triad of elements are present in the paper. An important keyword was that of information systems development (*ISD*). Although we do not equate IS with *ISD*, we believe that *ISD* is a key set of activities that will reflect the triad and we also agree that IS as an artefact cannot exist without *ISD* (Hirschheim et al 1996). This choice does not aim to be exhaustive of what goes on in the IS field, there are a number of influential textbooks in the area of *ISD* (for instance Avison and Fitzgerald, 2003). For Abbott (1988), this is an indication of 'past' jurisdiction or ownership.

As proxies, keywords present strong challenges, even limitations, in that they are not necessarily going to identify the papers containing the elements of the triad of IS practice (diagnosis-treatments-inference). We hope to confirm this in the second stage of the project when we will analyze abstracts of articles initially signaled by the keyword search. Further content analysis complemented by Critical Discourse Analysis (*CDA*) are expected to enhance the results and give a fuller picture.

To identify published articles that report work on the diagnostic-treatment association, we searched for keywords in both the title and keywords of articles. We then grouped the results in the above categories to facilitate interpretation. We compared the number of occurrences across categories, as an imbalance signals *initial gaps and potential loss of ownership or jurisdiction* which can be addressed in future knowledge generating activities in both IS academia and practice. In the next stages of our research we will expand the base of the keywords used and look out for connections between them (for instance by looking at travelling citations as Wade et al, 2006, suggest) as we iterate from interpretation of findings to generating rich insights or implications for action (Walsham 1995).

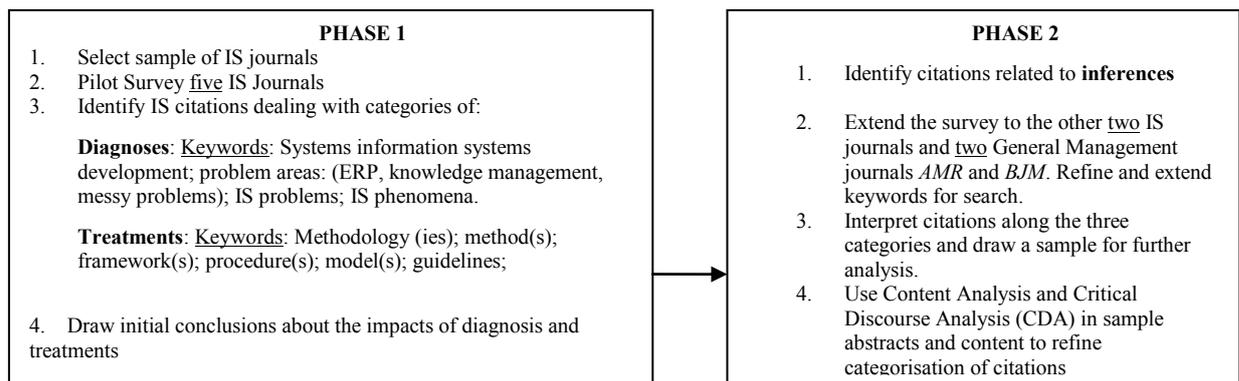


Figure 1. Survey Strategy

6 Initial Results

The findings in each element of the analysis is presented in Table 1. The survey comprised a count of the number of articles using the keywords in both the title and the keywords used to describe the article. This added strength to the search because if the author cites for instance, the phrase “Systems Analysis” in the title and if the same set of words is used in the article keywords, the article was included. The results are only summarized here due to space constraints; examples of papers articulating the deployment of the knowledge elements (diagnoses, treatments) in the five journals are available from the authors. This summary suggests that IS has been largely focused on ‘diagnoses’ activities, that is exploring problems mainly related to *problems* in IS development (158 articles); followed by ‘treatments’ activities via the use of: methodologies (92); methods (88); framework/techniques (157) to address them. Table 1 indicates that there is a variation in the journals’ coverage of the surveyed elements. The journal *IO* attracted the most articles: 62, 59, 46 and 38 in IS developments, method, methodologies and techniques respectively; the other three EU-based journals: *EJIS*, *JIT*, and *IST* reported a similar number of articles along the elements being analysed. Only the US-based journal, *JMIS* registered a lower number of articles.

Journal	IS Diagnoses	IS Treatments		
	Systems Development	Method	Methodology	Framework/Technique
Journal of Management Information Systems (JMIS)	10	3	2	36
Information System Journal (ISJ)	20	4	9	18
Journal of Information Technology (JIT)	28	9	15	32
European Journal of Information Systems (EJIS)	38	13	20	33
Information and Organization (IO)	62	59	46	38
TOTAL	158	88	92	157

Table 1: Number of articles in IS Journals citing keywords associated to the IS triad body of knowledge: Diagnoses-Treatments

Table 2 gives a flavor of the trends during the four 5-years period, signaling that activity in the area of IS development has been more or less maintained. The area can be used by IS people to build further claims on ownership and future professional jurisdiction. This does not mean though, that this area is exclusively owned by IS. It could well be that people from other fields or professions (marketing,

management) see this area as part of their own area of jurisdiction. This possibility needs to be validated in the next stage of the research.

Category	Keywords	1990-1995	1995-2000	2000-2005	2005-2010	TOTAL
IS Diagnosing	Systems Development	68	44	16	30	158
IS Treating	Methodology	46	31	9	6	92
	Methods	30	28	11	19	88
	Framework/Technique	31	28	34	64	157

Table 2: Number of articles in Sample of IS journals citing keywords over period 1990-2010

Furthermore, *diagnosis* tools deployed in the form of Systems development devices were especially popular from 1995 to 2000. *Treatments* are the most populated tools during the 20-year period surveyed; usage of methodologies (92) seem to have been popular from 1995 to 2000; whereas methods have been used more steadily in the 20-years period; frameworks/techniques (157) proposed were also to be in the increase with no pattern discernible.

7 Preliminary Conclusion

The preliminary findings suggest that overall *diagnosis* and *treatments* of (development) problems is taking place within the IS field. The dynamic nature of these knowledge activities/elements also suggests that inference is taking place. What is less clear is how explicit and portable these activities are becoming. An increasing number of techniques at the expense of frameworks, methodologies and methods would indicate that currently some knowledge in the field is being commodified, in other words, it is being made simple to access and use within and outside IS.

Whilst this could help the field in the short term, according to Abbott, this can generate a situation in which IS people will then depend on others to educate clients, ensure the quality of the work that is done and ultimately generate new diagnosis, treatments and inferences. Similar to what has happened with groups in the information field (i.e. management, consultancy), the situation could then contribute to the rise of “small elite professions with intellectual jurisdictions over large areas...they will oversee commodified professional knowledge executed by *paraprofessionals*, serving the elite clients directly themselves” (Abbott, 1988, p.246, italics added). Some minorities within or outside the field would then dictate what can be considered relevant knowledge in IS whilst keeping other knowledge for themselves (including abstract knowledge in the form of theory); if there is no connection between abstraction and treatment, legitimacy and hence territory or jurisdiction in the IS field might potentially be lost (Abbott, 1988, p.103).

A possible strategy to counteract this limitation is also suggested by the preliminary findings. IS people can then review the existing diversity of methodologies, frameworks or techniques and assess if they can help them to infer new knowledge in the form of indigenous problem classifications, treatments or abstractions (i.e. theory). Moreover, IS people should report their inferences more explicitly and comprehensively when, for instance, they undertake more ‘complex’ IS situations or different aspects of it (Wade et al, 2006).

In the next stage of this research, we will enhance the depth of our analysis by looking at a wider and in-depth base of journal articles and other influential areas than IS development (i.e. knowledge management; technology management; innovation). We will expand the base of publications to include practitioner-oriented journals and magazines, keynotes, editorials or any other type of published material. Our interpretation of ‘diagnoses’, ‘treatments’ and ‘inferences’ activities in IS research needs also to be enhanced so that we are able to provide more detail about how to identify and use representative citations in each case.

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