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# Research in Information Systems: Intra-Disciplinary and Inter-Disciplinary Approaches

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## Abstract

The deep embeddedness of information systems (IS) in many areas of human activity poses a dual challenge to the IS discipline: advancing an expanding disciplinary boundary that includes an increasing set of IS topics; and engaging with other disciplines in order to understand IS-enabled phenomena. An inability to meet these challenges could lead to conceptually stunted development of the IS discipline, missed opportunities to inform other disciplines and a failure to effectively contribute to solving the pressing problems of our time. We undertook this study to investigate both how IS research has addressed these challenges in the past and how it can continue to do so in the future. Drawing on the concept of knowledge-materialization through knowledge-creating practice, and based on approaches for disciplinary and interdisciplinary knowledge creation, we theorize four different types of knowledge contribution that IS researchers can produce, encompassing both an intradisciplinary and an interdisciplinary view. We then analyze a wide-ranging sample of research studies published in 176 papers in the AIS basket of eight journals to investigate the nature of their contribution vis-à-vis these types. We find that the predominant types of knowledge contribution are intradisciplinary, with relatively few interdisciplinary contributions. Based on our analysis, we explain why each type of knowledge contribution is important to the IS discipline and provide guidance for IS scholars in planning their research strategies for these contributions. We comment on the implications of our study for IS scholars and for the vigor and growth of the IS discipline.

**Keywords:** IS Discipline, IS Research, Inter-Disciplinary, Intra-Disciplinary, Interdisciplinary, Intradisciplinary, Research, Innovation

Allen Lee was the accepting senior editor. This research article was submitted on August 18, 2016 and went through 2 revisions.

## 1 Introduction and Motivation

Many academic disciplines are grappling with high levels of Information Systems (IS) embeddedness in the phenomena they study—e.g., high speed algorithmic trading and blockchain in finance, technology induced stress and addiction in psychology, technology-mediated markets in economics, and IS-enabled supply chains in operations management. Furthermore, journals from other disciplines are devoting particular departments to the study of these IS-specific topics. For example,

*Production and Operations Management* has a department on e-commerce, focusing on the “synergy between operations and web-based information technology.”<sup>1</sup> Equally, the IS discipline faces challenges associated with studying many different kinds of IS-enabled phenomena. Accordingly, a number of recent special issues in leading IS journals have addressed topics such as “IS and Fintech.”<sup>2</sup> It is

<sup>1</sup> <http://www.poms.org/journal/departments/>

<sup>2</sup> [http://www.jmis-web.org/cfps/JMIS\\_SI\\_Fintech.pdf](http://www.jmis-web.org/cfps/JMIS_SI_Fintech.pdf)

becoming harder to demarcate which phenomena are and are not “IS-enabled.” Furthermore, IS play an essential role in the solutions to difficult societal problems and challenges spanning multiple disciplines, such as sustainability and border protection. The European Research Council’s “EU Societal Challenges”<sup>3</sup> funding program, for example, calls for proposals that demonstrate how IS can “enable new digital social innovation which can better cope with emerging sustainability challenges.”

These conditions create two challenges for the IS discipline. The first is that of developing, nurturing and advancing a constantly expanding disciplinary boundary that includes an ever-increasing set of IS topics and IS phenomena. The second is of engaging with other disciplines to understand IS-enabled phenomena and develop solutions to complex societal and organizational problems. An inability to meet these challenges could lead to insular and conceptually stunted development of the IS discipline, missed opportunities to inform other disciplines, and a failure to contribute to solving the critical issues of our time. We undertook the research described in this article in order to investigate the question: How has IS research addressed these challenges and how can it do so in the future?

The literature provides a few different perspectives regarding how IS researchers can develop the discipline and engage with researchers from other disciplines. One suggests that IS researchers should study problems that are proximate to the IT artifact and thus focus on a core and relatively contained set of topics that should define and strengthen the conceptual boundary of the discipline (Benbasat & Weber, 1996; Benbasat & Zmud, 2003). Another suggests a more pluralistic approach that promotes the study of a diversity of topics both proximal and distal to the IT artifact, and that focuses on the technical and social processes associated with the design, management and use of IS (Robey, 1996; DeSanctis, 2003, Robey, 2003, Agarwal & Lucas, 2005; Bryant, 2008). A third perspective suggests that IS researchers should not only draw from other disciplines such as psychology and computer science in addressing IS research questions, but also conceptually inform these disciplines (Baskerville & Myers, 2003; Nambisan, 2003).

These diverse perspectives collectively suggest that IS researchers should create knowledge that is both specific and internal to the IS discipline, while also seeking to enlighten other disciplines. However, there is little indication of the extent to which IS research is creating these forms of knowledge.

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<sup>3</sup> <https://ec.europa.eu/programmes/horizon2020/h2020-sections>

Even more importantly, there is little guidance regarding how IS researchers can strengthen and perpetuate the disciplinary identity of IS, while simultaneously informing other disciplines.

This paper has three objectives. The first is to develop a conceptualization of IS scholarship that offers both an intradisciplinary and interdisciplinary view, thereby providing a framework for understanding how the IS discipline can evolve within and in interaction with other disciplines. The second is to investigate to what extent this conceptualization is reflected in the research published in top IS journals. The third is to provide guidance for IS scholars to implement the conceptualized scholarship.

The paper is structured as follows. We first provide conceptual background for the evolution of disciplines. We then review approaches for paradigmatic, disciplinary, and interdisciplinary knowledge creation (e.g., Kuhn, 1996; Abbott, 2001) to theorize four different types of knowledge contributions that IS research can produce. We then conduct an analysis of the nature of contribution, vis à vis these types, using a corpus of 176 articles, drawn from the basket of eight AIS journals over the period 2010-2014. From our analysis we describe and qualify each type and explain how it can create particular pathways of development for the IS discipline, bearing in mind our research objective—that is, to investigate to what extent the IS discipline can meet the twin challenges of developing the IS discipline and contributing to other disciplines. We end with a discussion of the contributions and implications of our framework.

## 2 Evolution of Disciplines

In this section we first examine the evolution of disciplines, drawing on the idea of knowledge materialization through knowledge-creating practice. We then describe how such evolution takes place, through intradisciplinary and interdisciplinary approaches to knowledge creation (e.g., Kuhn 1996, Abbott, 2001).

A discipline is a field of study or a body of knowledge that is the object of scholarly attention. The Organization for Economic Cooperation and Development (OECD) defines a discipline as the “tools, methods, procedures, exempla, concepts, theories that account coherently for a set of objects or subjects” (Strober, 2010, p. 13). A discipline thus embodies a set of knowledge distinctions and research practices used by academics to formulate and address specific problems (Abbott, 2001). A discipline typically: has a departmental structure and status in universities; provides a basis for scholarly training, identity and a job market for new doctorates; and may be an area of application in practice. It also

constitutes a basis for organizing academic careers, hiring scholars to teach and research, and forming specializations at undergraduate and/or postgraduate levels. The disciplinary structure autopoietically perpetuates itself by facilitating the training and certification of future discipline professionals and seeking new scholars primarily from its own discipline, but also from cognate and allied disciplines (Abbott, 1998; 2001). In this way disciplines gain and maintain legitimacy over time.

We define the IS discipline as that which studies the human, social, and technological phenomena associated with the design, construction, implementation, and use of computer-based information systems by individuals, organizations, and societies. This definition is drawn from texts and writings that describe topics important to understanding how IS are designed, applied, implemented, and used, and provide impacts to individuals and collectives (e.g., Orlikowski & Iacono, 2001; Benbasat, & Zmud, 2003; Galliers, 2003; Robey, 2003; Laudon, & Laudon, 2014).

Considered ontologically, disciplines are not static in the domain of their investigation or in the topics they study. They can be conceived of as being in a state of flux and boundary shaping. The configuration and reconfiguration of a disciplinary boundary happens through practices of intra- and interdisciplinary engagement that shape the “world” that the discipline seeks to describe, understand, explain, and participate in. A particular discipline engages with this world in order to materialize it in the form of the discipline’s knowledge base, undergoes critical examination and reexamination about what constitutes it, delineates its dynamic relationality with different “worlds” signified by other disciplines, and continually creates and recreates itself (Kuhn, 1996). Disciplines engage internally within themselves and externally with one another to internally and mutually, discursively and iteratively, produce disciplinary knowledge and disciplinary boundaries. This is particularly true of disciplines in the social sciences which tend to lie at the interstitialities between “knowledge and action, facts and values” (Abbott, 2001, p. 8). Disciplinary boundaries, thus, do not have sharp edges. A particular discipline has many topics of study. Over time, the set of topics evolves, with some topics becoming obsolete, some continuing, and others emerging.

## **2.1 Intra-Disciplinary Practices for Disciplinary Evolution**

New topics of research continually emerge in disciplines. This could happen for a number of reasons—for instance, a particular research topic reaches its conceptual limits and is supplanted or complemented by a new, related topic; or,

unconventional ideas find voice to challenge mainstream ideas; or, politically important topics are taken up (Abbott, 2001).

Two key forms of emergence of new topics within a discipline involve the processes of “differentiation” and of creating “fractals” (Abbott, 2001, p.23). In the first, scholars in a particular topic dig deeper into a particular topic, differentiating its subtopics with greater and greater specificity and focus in order to understand details and to tackle its complexity. An example of this can be found in technology acceptance studies in IS. Initially, studies examined key determinants of intention to use a system, such as its perceived usefulness and perceived ease of use (e.g., Davis, 1989). Subsequent studies undertook a deeper examination of each of these concepts, and revealed their antecedents—for example, particular design elements, their relationships to other concepts like actual use behavior, and mediators and moderators of these relationships such as organizational norms and expectations. These developments led to the investigation of still newer subtopics and development of revised models (Venkatesh, Morris, Davis, & Davis, 2003).

The second way involves examining a given topic along a number of categories and then repeatedly splitting it into subtopics, each of which is examined along the same categories. For example, the topic of system implementation at an overall level was first studied in terms of technical, social, and managerial aspects (e.g., Markus, 1983; Laudon & Laudon, 2014). Subsequently, subtopics such as implementation of particular systems/applications (e.g., decision support systems and ERP), were each studied in terms of the respective same aspects—technical, social and managerial. In this way, different technical, social and managerial factors specific to each type of application were revealed. To give another more recent example, the phenomenon of technostress was initially examined in terms of various technostress-creating factors for general applications (Tarafdar, Tu, Ragu-Nathan, & Ragu-Nathan, 2007). Subsequent studies have examined these technostress-creating factors for particular applications such as social media (Maier, Laumer, Weinert, & Weitzel, 2015).

As a result of these two mechanisms—differentiation and fractals—disciplines become imbued with different topics as they evolve. In the IS discipline, the issue of multiple and multiplying topics has been examined in terms of if and how core elements around which IS researchers can focus their efforts can be defined. For instance, some scholars argue that topics immediate to the planning, design, and use of IT artifacts should be studied, and that these should form the core of the IS research space around which clear boundaries and paradigms should be established

for the IS discipline (e.g., Benbasat, & Weber, 1996; Benbasat, & Zmud, 2003; Somers, 2009). Other scholars offer a more pluralistic approach, suggesting that IS researchers should examine a diversity of topics relating to the social, societal and human aspects of the design and use of IS, and allow for a dynamic rather than a static core that pragmatically adapts to changing technologies, as well as their user populations and requirements (DeSanctis, 2003; Galliers, 2003; Robey, 2003; Agarwal, & Lucas, 2005; Bryant, 2008; Clarke, 2015). Recent studies highlight, for example, the opportunity and need for studying IS phenomena that are emerging from the large scale digitization and computerized distribution of social activity (e.g., Sorensen, 2017).

## **2.2 Inter-Disciplinary Practices for Disciplinary Evolution**

The second way in which disciplines evolve happens when scholars from one discipline engage with scholars from other disciplines (Abbott, 2001) through the phenomena they study. For example, the problem of music piracy can be seen as one of unequal distribution of wealth, one of lack of access to education and skills, one of legal and regulatory frameworks, or one of ethics, depending on the disciplinary approach (economics, public policy, law, and ethics respectively). Such topical proximities can facilitate interaction among scholars from different disciplines at the margins of each discipline. Thus, an economist studying the problem of music piracy might try to explain an observed correlation between poor people and people who pirate music, and while focusing on the distribution of wealth, might also consider elements of public policy or law or ethics. Alternatively, a legal scholar, in trying to understand regulatory aspects of music copyright, might also examine economic characteristics—such as lack of education—associated with geographical areas where people engage in music piracy.

As can be inferred from the above example, in studying a particular phenomenon from different disciplinary positions, competition, accommodation, alliance, and absorption take place (Abbott, 2001), as disciplines expand to meet each other. A discipline is therefore like an amoeba, putting out pseudopods as it moves into the spaces of other disciplines. Disciplines may thus be said to collide and intermingle with one another, with the outcome that each discipline may be extended with new topics, proximal to those studied by scholars in other disciplines.

The IS literature has attempted to address the issue of Inter-Disciplinary relationships in a number of ways. The first involves considering the concept of reference or contributing disciplines (Keen, 1980; Lee, 2001). These are disciplines that provide theoretical or methodological frameworks that IS

researchers draw from as they conceptualize research problems. Early studies showed the primary reference disciplines to be computer science, organizational science, and management science (Culnan, & Swanson, 1986). More recent studies have pointed out the stretching and shifting of the boundaries of IS research, as topics and approaches have been drawn from a number of disciplines, such as economics, psychology, sociology, and strategy (Benbasat, & Weber, 1996; Vessey, Ramesh, & Glass, 2002; DeSanctis, 2003). However, and second, while insights from the reference disciplines are valuable, the stance of being informed by them potentially places IS researchers in the position of borrowing from them without contributing to them. Thus, scholars have suggested that not only should IS researchers acknowledge valuable sources of theory and method from other disciplines (Robey, 2003), but the IS discipline should also serve as a reference to other disciplines (Baskerville, & Myers, 2003; Nambisan, 2003). Notably, there is lack of agreement over whether or not this is actually happening (Bernroider, Córdoba, & Pilkington, 2013; Grover, Ayyagari, Gokhale, Lim, & Coffey, 2006; Wade, Biehl, & Kim., 2006). In addition and third, recent commentary calls for IS researchers to engage with wicked problems such as sustainability (e.g., Aanestad, 2017). Such endeavors would require IS researchers to engage with different theoretical areas (e.g., Pries-Heje & Baskerville, 2008), so as to imbibe a wider range of concepts and scholarly traditions in understanding both the organizational and societal significance of digital technologies. Finally, while there is growing recognition that IS research should be interdisciplinary (e.g., Bernroider et al., 2013), there is no clear articulation of what that means and how it can be done.

## **3 Theorizing Knowledge Contributions in Information Systems Research**

Through these two pathways—Intra-Disciplinary perpetuation and Inter-Disciplinary interaction—disciplines are enacted, constructed, and reconstructed, while giving shape to one another.<sup>4</sup>

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<sup>4</sup> For the purpose of this paper, “interdisciplinary” denotes the dictionary meaning, which is “involving two or more academic or scholarly disciplines”; “Inter-Disciplinary” denotes disciplinary evolution wherein scholars of a discipline engage with those of other disciplines; and “Interdisciplinary” denotes transformative concepts and relationships integrating theories and concepts from IS and other disciplines. Analogously, “intradisciplinary” denotes the dictionary meaning, which is “occurring within the scope of a scholarly or academic discipline”; and “Intra-Disciplinary” denotes disciplinary evolution wherein scholars create new knowledge within the discipline.

They unfold both internally and in interaction with others. While studies broadly recognize the importance of each pathway in the IS discipline, as discussed above, there is no theoretically derived conceptualization of the particular types of knowledge contributions for each pathway. As a result, there is a lack of guidance regarding how IS researchers can create knowledge appropriate to each.

We theorize four types of contributions to knowledge that IS researchers can undertake, shown in Figure 1.

These contributions qualify and classify the nature of IS research with a focus on specifying its Intra-Disciplinary and Inter-disciplinary components. Our conceptualization is informed by concepts from texts on the development of disciplines (e.g., Abbott, 2001; Kuhn, 1996), and interdisciplinary research (e.g., Strober, 2010; Derrida, 1980).

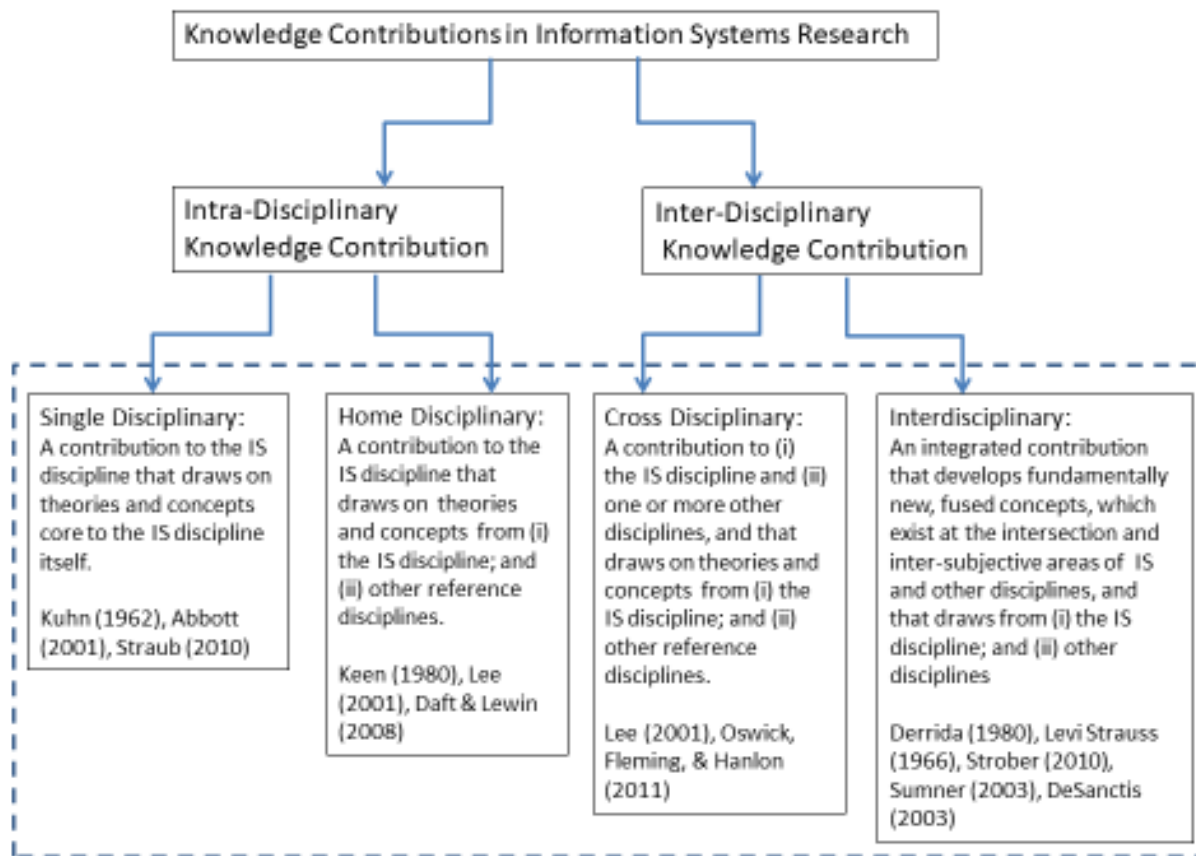


Figure 1. Intra-disciplinary and Inter-disciplinary Research in Information Systems

### 3.1 Intra-Disciplinary Knowledge Contributions in IS

As the IS discipline evolves, IS researchers examine problems and create knowledge about a variety of topics within the discipline. This presents an opportunity to identify contributions that are internal to the IS discipline. We conceptualize these contributions to be of two types, namely, *Single Disciplinary* and *Home Disciplinary*.

#### 3.1.1 Single Disciplinary Contributions

We define a Single Disciplinary contribution to the IS discipline as one that draws on theories and concepts core to the IS discipline itself. Such a contribution incorporates an Intra-Disciplinary focus, and corresponds to the paradigmatic and cumulative tradition (Kuhn, 1996). The literature inputs to the research that constructs this type of contribution are dominated by existing IS disciplinary knowledge, drawn primarily from IS journals and texts. The outputs of the research focus on new IS disciplinary

knowledge—i.e., knowledge that generates new insights about the design, use, management, or impacts of an IT artifact (Straub, 2010). Single-discipline work does not primarily rely on reference disciplines.

### 3.1.2 Home Disciplinary Contributions

We define a Home Disciplinary contribution to the IS discipline as one that draws on theories and concepts both from the IS (or home) discipline, as well as from other reference disciplines (Keen, 1980; Lee, 2001). The literature inputs to the research that shapes this type of contribution include disciplinary knowledge from reference disciplines—for instance, psychology, sociology, strategy and organizational behavior, in combination with existing IS disciplinary knowledge. The outputs of the research focus on the generation of new IS disciplinary knowledge.

## 3.2 Inter-Disciplinary Knowledge Contributions in IS

The design and use of IS pervades many interdisciplinary phenomena exemplified by wicked and urgent problems. To give an example, IS are important to sustainability because they can track, monitor and help influence people's behaviors regarding energy consumption, and facilitate the design and operation of smart energy grids. Understanding how the first can come about would require IS researchers to engage with disciplines such as sociology and public policy; examining the second would require dialogue with disciplines such as control systems and electrical engineering. A research problem that examines the design and benefits of smart grids therefore draws from all of these vastly different disciplines. Similarly, understanding how IS can facilitate social inclusion requires an investigation into the needs and behaviors of different segments of the population—such as remotely located, disabled, or socially disempowered people—requiring inquiry into different disciplines, such as healthcare, gender studies, and public services. Understanding such phenomena requires an understanding of both the design and use of particular IS as well as other disciplines, and is likely to result in contributions to knowledge that span one or more disciplines. IS research thus has an opportunity to inform other disciplines and address complex problems by engaging with research from these disciplines. We conceptualize such contributions to be of two types, namely, *Cross Disciplinary* and *Interdisciplinary*.

### 3.2.1 Cross Disciplinary

We define a Cross Disciplinary contribution as one that contributes new knowledge both to the IS discipline and to one or more reference disciplines. Similar to the Home Disciplinary contribution, the literature inputs to research that makes a Cross

Disciplinary contribution include disciplinary knowledge from both other disciplines and IS. The IS discipline engages with the reference discipline's concepts and theories to produce interactional insights that enrich both (Oswick, Fleming, & Hanlon, 2011). The contribution to the reference discipline(s) is to extend existing concepts and relationships, usually in terms of conceptually new or modified IS-mediated or IS-enabled variables and/or relationships.

### 3.2.2 Interdisciplinary

We define an Interdisciplinary contribution as one that develops fundamentally new, integrated, or fused concepts that exist at the intersection of different disciplines. In this case, those would be of the IS discipline and the other discipline(s).<sup>5</sup> The inputs to the research that makes an interdisciplinary contribution include disciplinary knowledge from IS and other disciplines. In order to make an interdisciplinary contribution, disciplinary concepts are brought to bear on conceptual problems, such that new interpretations for these concepts are created through cross-fertilization, bricolage, and critical encounters with different perspectives (Levi-Strauss, 1966; Derrida, 1980; Sumner, 2003). Interdisciplinary contributions provide perspectives for examining disciplinary concepts in a relational way, through the particularity of their positions within a complex net of interrelations (Massey, 1999) that characterize the research problem. They are formed and expressed through an integration of disciplinary insights (Sumner, 2003). Interdisciplinary contributions arise from approaches that focus on the integration and free-play of theoretical concepts from different disciplines to create fused content (e.g., Derrida, 1980). They often produce cognitive or practical advancement for addressing a complex problem that spans many disciplines.

The phenomena studied by IS researchers are broad in scope, exhibit emergent properties, and embody a variety of possible perspectives. IS scholarship has

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<sup>5</sup> Interdisciplinary research should be differentiated from multidisciplinary work which involves solving a problem that requires practical expertise from different fields to be separately applied, rather than about creating knowledge at the intersection of different disciplines. An example of multidisciplinary work would be building an oil rig that requires engineers and chemists to apply their know-hows. It is also to be differentiated from transdisciplinary work, which involves application of a theory or a concept, across disciplines. Such a theory or concept transcends disciplines and is therefore applicable in many fields. The disciplines do not contribute to the theory or concept, but provide settings in which to apply the transdisciplinary concept or theory. Examples of transdisciplinary concepts include general systems theory or structuration (Strober, 2010).



been undertaken by researchers from different backgrounds and interests (Keen, 1980; Culnan, & Swanson, 1986). Thus, a number of studies have emphasized the importance of interdisciplinary contributions that IS researchers can potentially make (DeSanctis, 2003; Galliers, 2003).

## 4 Classifying Research in Information Systems

In this section we examine how and to what extent our theorized knowledge contribution types find expression in recent IS research. For this purpose, we selected a representative set of papers published in IS journals with the objective of analyzing their contributions within the framing of this classification. Our data collection and analysis involved the following steps: (1) paper selection, (2) discipline code generation, and (3) paper classification. We describe each step below.

### 4.1 Step 1: Paper Selection

We focused on a set of papers that represent high-quality research conducted on a variety of topics in IS and published in journals that are readily accessible to IS scholars around the world. Therefore, we selected papers from the AIS basket of 8 journals: EJIS, ISJ, ISR, JAIS, JIT, JMIS, JSIS, and MISQ.<sup>6</sup> These journals are deemed as being among the “excellent” IS journals by the Association for Information System.<sup>7</sup> To keep the total number of articles manageable and recent, we considered the five year period of 2010-2014. We created a corpus of 176 articles, which we deemed sufficient to assess the current state of the field with respect to the four different contribution types, and which is similar to or greater than the size of the corpora created in previous work that sought to comment on IS research (e.g., Grover, & Lyytinen, 2015). The eight journals collectively published 1407 articles over the five year period. 176 articles thus represents approximately 12.5%, or 1/8th, of these articles. Therefore, in order to select papers, we first created a list of all papers published by each journal over the five year period in chronological order, for a total of eight lists. We then

selected every eighth paper in the sequence from each list. The effect of this sampling strategy is that each journal contributed a different number of papers to the corpus, proportional to the number of papers it published over the five year period. Table 1 in the Appendix shows the total number of papers published in each of the eight journals over 2010-2014; the percentage of the 1407 papers accounted for by these selected papers; the number of papers that we selected from each journal; and the percentage of the 176 papers that the selected papers account for. We did not select papers that we classified as editorials, issues and opinions, research commentaries, philosophical perorations, and solely methodological in focus.<sup>8</sup> The papers included in the corpus cover a wide range of IS research topics across a variety of different levels of analysis, the major epistemological stances (positivist, interpretive, critical), and the primary functional perspectives (behavioral, design, technical).

### 4.2 Step 2: Discipline Code Generation

Next, we generated an initial list of code numbers for different disciplines as shown in Table 2 in the Appendix. The IS discipline was given a code of 1. Disciplines outside IS, but which IS scholars refer to, draw from, or contribute to, and which were encountered in our corpus of 176 papers, were assigned codes from 2 through 25. The management disciplines among these were classified according to the UK Association of Business Schools Journal Guide (2015),<sup>9</sup> which reflects an internationally representative coverage of topics and journals, and is widely accepted as a guide for authors and evaluators for a range of management and related subject areas (Bernroider et al., 2013). The other disciplines, not captured by this list, were classified according to discipline classification lists provided by prior research (Biglan, 1973) and by research funding councils in the US and UK.<sup>10</sup> A more detailed coding scheme was necessary for the IS discipline in order to classify and identify Single Disciplinary and Home Disciplinary IS contributions at the fractal level. We thus identified a further level of division in the form of various subdisciplines of IS, such as IS adoption,

<sup>6</sup> EJIS (*European Journal of Information Systems*); ISJ (*Information Systems Journal*); ISR (*Information Systems Research*); JAIS (*Journal of the Association for Information Systems*); JIT (*Journal of Information Technology*); JSIS (*Journal of Strategic Information Systems*); JMIS (*Journal of Management Information Systems*); MISQ (*MIS Quarterly*)

<sup>7</sup> <http://aisnet.org/?SeniorScholarBasket>. As a starting point we consider these journals and suggest that future studies could look at additional IS journals from other lists such as the Association of Business Schools list.

<sup>8</sup> Details of the exact papers we included in the corpus, as well as selection notes, are available from the authors.

<sup>9</sup> <http://charteredabs.org/academic-journal-guide-2015/>

<sup>10</sup> These include the Engineering and Physical Sciences Research Council ([http://gow.epsrc.ac.uk/Research\\_Topics\\_Def.htm](http://gow.epsrc.ac.uk/Research_Topics_Def.htm)); Economic and Social Research Council (<http://www.esrc.ac.uk/funding/guidance-for-applicants/is-my-research-suitable-for-esrc-funding/discipline-classifications/>); and National Science Foundation (<http://www.nsf.gov/statistics/nsf00322/pdf/xwalk.pdf>) classification lists.

IS use, and IS security. These were given codes from 1.01 to 1.38. For the non-IS disciplines, we used broad codes, so as to retain our IS focus and prevent unnecessary detail. We ensured that codes did not overlap—that is, each code was conceptually distinct from all other codes.

### 4.3 Step 3: Paper Classification

We next coded the 176 papers according to our classification. We undertook a multistep and iterative process to code each paper as described below.

First, each of the two authors independently read each of the 176 papers to search for specific information that enabled classification of the contribution(s) of a paper as Single Disciplinary, Home Disciplinary, Cross Disciplinary, or Interdisciplinary. This reading was necessarily thorough and thus we read all sections of each paper in order to identify: (1) the nature of the contribution; (2) the different IS subdisciplines and non-IS disciplines covered; and (3) the theoretical contributions to each discipline. In

order to classify papers, we defined the following codes. A paper was coded as “SD” if it made a Single Disciplinary contribution, “HD” if it made a Home Disciplinary contribution, “CD” if it made a Cross Disciplinary contribution, and “ID,” if it made an Interdisciplinary contribution at the intersection of the IS discipline and one or more other disciplines. A given paper could be assigned more than one code based on the definitions of the four classification types. For example, if a paper was coded as HD, it could also be coded as ID if it also made the latter type of contribution. A paper coded as CD could also be coded as ID if it also made an interdisciplinary contribution. A paper coded as ID could also be coded as HD if it also made a separate Home Disciplinary contribution to the IS discipline. Likewise, it could be coded as CD if it also made a separate contribution to another discipline.<sup>10</sup> Each paper was thus assigned a single code or a combination of codes. At the end of this step, each paper was classified as shown in Table 1.

**Table 1. Summary Description of Journals and Article Codes**

Journal	SD	HD	CD	ID	HD-ID	CD-ID	Total
EJIS	6	15	4	0	0	0	25
ISJ	4	8	1	0	0	0	13
ISR	9	23	3	0	0	0	35
JAIS	3	11	4	0	0	2	20
JIT	5	8	0	0	0	0	13
JMIS	8	13	4	0	0	0	25
JSIS	3	9	1	0	0	0	13
MISQ	4	18	7	0	1	2	32
Total	42	105	24	0	1	4	176
<b>Total as %</b>	<b>24%</b>	<b>60%</b>	<b>13%</b>	<b>0%</b>	<b>1%</b>	<b>2%</b>	

Notes:

(1) The codes were assigned according to the following logic:

SD: if it made a Single Disciplinary contribution

HD: if it made a Home Disciplinary contribution

CD: if it made a Cross Disciplinary contribution

ID: if it made an Interdisciplinary contribution at the intersection of the IS discipline and one or more other disciplines

HD-ID: if it was coded as both HD and ID

CD-ID: if it was coded as both CD and ID

(2) EJIS (*European Journal of Information Systems*); ISJ (*Information Systems Journal*); ISR (*Information Systems Research*); JAIS (*Journal of the Association for Information Systems*); JIT (*Journal of Information Technology*); JSIS (*Journal of Strategic Information Systems*); JMIS (*Journal of Management Information Systems*); MISQ (*MIS Quarterly*)

The second step was to specify the IS subdisciplines and other disciplines. To begin with, a research assistant in the disciplinary area of IS assigned the IS subdiscipline and discipline codes to each paper according to the code protocol described in Table 2 in the Appendix.<sup>11</sup> To give an example of how this was done, one of the papers (Sun, 2010) contributed to the IS discipline with a focus on the IS-use subdiscipline (1.25) and drew from the reference discipline of Psychology (20). It was thus coded as “HD,” as shown in the first row of Table 3 in the Appendix. Another paper (Schlagwein, & Bjørn-Andersen, 2014) contributed to IS with a focus on the IS-innovation subdiscipline (1.21). It also both drew from and contributed to the reference discipline of Organizational Behavior (17). It was thus coded as “CD.” At the end of this step, each paper was further assigned one or more of the discipline/subdiscipline codes from Table 2 in the Appendix, based on its contributions to the IS discipline (through the IS subdisciplines) and other disciplines.

In the third step, each author independently reviewed all the assigned codes for the respective papers by rechecking the type of contribution and the assigned discipline codes. Occasionally discrepancies arose, where the authors initially disagreed on the codes. For instance, a paper that studied e-commerce behavior from an economics or marketing perspective could potentially be classified as making a contribution to the disciplines of e-commerce, economics, or marketing. The correct classification should reflect the nature of the contribution made in the paper—i.e., “which is (are) the discipline(s) where the contribution(s) is (are) made?” The authors addressed the discrepancies by intensively reading any such papers and then discussing the nature of the contribution. The list of disciplines and their respective codes was iteratively modified by each of the authors as they discussed the papers, identifying new codes and merging codes where appropriate. This process of discipline code and subcode modification involved continuous discussions between the authors to resolve and clarify the codes and contributions. As a result of these discussions, on a few occasions, the classification of a paper was changed, e.g., from HD to CD. Our objective was to achieve complete agreement on all the codes and

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<sup>11</sup> Some of the multicode possibilities for any given paper are ruled out, according to the definitions of each contribution type. For example, a paper coded as SD would not also, by definition, be coded as HD or CD or ID. One coded as HD would not also be coded as SD or CD. A paper coded CD or ID would not also be coded as SD. However, a paper coded as HD or CD could also be coded as ID, and vice versa, that is, a paper coded as ID could also be coded as HD or CD.

coding classifications, rather than a statistical threshold value of interrater reliability. At the end of this process, for each paper, we recorded: (1) a paper identifier, e.g., MISQ 8, ISR 16, JMIS 24; (2) complete citation information; (3) the disciplines and subdisciplines represented in the paper and the accompanying codes; (4) the coding classifications of SD, HD, CD and ID with a “yes” or a “no”; (5) the codes for the specific IS subdisciplines and the non-IS reference disciplines that the paper referenced and contributed to; and (6) the final code/code-combination classification. To illustrate the outcome of the coding process, Table 3 in the Appendix provides these details for eight of the 176 papers in our corpus,<sup>12</sup> including the two mentioned above.

The above steps enabled us to engage in an intensive and rigorous analysis of each paper. Such an analysis was essential and necessary, given the evident detail and complexity required to be considered for identifying the knowledge contributions of each paper and for classifying it accordingly. Adhering consistently to this intensive and rigorous process for each paper enabled us to reach understanding and consensus as to the nature of each paper’s contribution and to identify the IS subdisciplines and non-IS disciplines involved. Table 1 provides a summary of the classifications and their counts for all the papers in our corpus. We find that 24% of the papers were classified as SD, implying that they contributed solely to the IS discipline and drew from IS literature for their motivation and background. The majority of the papers, 60%, belonged to the HD classification. They referenced theories from other disciplines to explain phenomena implicated in the design, use and management of IS. 13% of the papers exhibited a CD classification. With respect to ID, 3% of the papers had an HD-ID or CD-ID classification. No paper had a purely ID classification.

## 5 Analyses and Interpretation: Intra- or Inter-Disciplinary?

Having examined the composition of our sample of recent IS research within the framing of our classification, we next analyze representative examples of each type in depth. Through our analysis, we explain what each type of contribution does and identify the different ways in which each is materialized.

### 5.1 Single Disciplinary Research in IS

In the 42 papers that were classified as SD, 20 IS subdisciplines were recorded. A few subdisciplines

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<sup>12</sup> The complete set of papers and codes is available from the authors.

occurred in multiple papers, e.g., e-commerce (6 papers), IS use (4 papers), and IS adoption, IS acceptance, and software development (3 papers each).

The Single Disciplinary contribution in IS research is required for differentiation and generation of fractals. It is responsible for building a robust, cumulative body of

IS research that embodies its disciplinary distinctiveness. From our analysis of the corpus of papers we find, as shown in Table 2, that this can be done in two ways: (1) investigating new IS topics and adding new IS subdisciplines; and (2) applying and adapting existing IS concepts to explain new IS-enabled phenomena.

**Table 2. Single Disciplinary IS Research**

<b>Objective: Build a robust cumulative body of IS research that embodies the disciplinary distinctiveness of IS.</b>	
Objectives achieved through the following	Examples
Investigating new IS topics and adding new IS subdisciplines.	New topics that relate to how IS can help address or create societal challenges; for instance, reducing corruption and increasing transparency in governments, creating technology addiction, and increasing or reducing the social power of marginalized societies. Tow, Dell, & Venable. (2010) explain why users of social networking websites such as Facebook willingly post personal information; since their objective is to communicate with family and friends, they are unaware of the risks involved. Such information disclosure behavior makes phenomena such as cyberstalking possible.
Applying and adapting existing IS concepts to explain new IS-enabled phenomena.	Conger, Pratt, & Loch (2013) propose a theoretical framework for understanding information privacy by drawing on existing IS concepts such as capabilities of emerging technologies and their use by corporate and illegal organizational entities. They build on prior research that examines personal information privacy as largely determined by the transaction between the customer and the provider of goods and services, versus that determined by additional, third parties. These include other legal data-sharing partners and illegal entities that do not directly interact with the individual, but instead influence personal information privacy through their interaction with vendors and with each other.

With regard to the first way of achieving objectives, increased infusion of IT in work and nonwork activities means that IS researchers are investigating new phenomena, thus expanding into new subdisciplines. For example, IS researchers have recently shown interest in the area of societal challenges (Majchrzak, Markus, & Wareham, 2014). This area could become a new IS subdiscipline, with investigations of new topics that relate to how IS can help address or create societal problems. Other new and related subdisciplines could include, for example, well-being related effects of IS use, IS use in familial social units, and so on. These sorts of Single Disciplinary developments could generate new fractals and create new accumulations of knowledge in new IS subdisciplines. For instance, from our corpus we find in Tow et al. (2010) an explanation of how and why users of social networking websites willingly disclose personal information, making new social media-enabled phenomena such as cyberstalking possible.

Second, use of new IS artifacts and applications generates novel phenomena. New concepts and relationships are required to explain effectively how and why such phenomena play out. For instance, the use of the same smartphone for both work and nonwork purposes creates IS-enabled entanglement between work and nonwork settings. Understanding

this entanglement would entail the pulling together of a number of traditional IS concepts, such as task technology fit, IS use, IS functionality/affordance, and IS-enabled work processes, in order to develop new conceptual explanations of smartphone work and nonwork use. As an example, Conger et al. (2013) examine the problem of information privacy in the context of Internet-enabled transactions. They build on prior research on personal information privacy, which is largely confined to the interaction between the customer and the provider of goods and services. They introduce additional parties that are important to and can exert an influence on information privacy, such as legal data sharing partners and illegal entities, and explain how information privacy is affected by them. The paper contributes to SD research by proposing a new theoretical framework for understanding an existing IS phenomenon—i.e., information privacy—by drawing from existing IS concepts that include capabilities of emerging technologies and their use, as well as new kinds of entities hitherto not studied.

## 5.2 Home Disciplinary Research in IS

The Home Disciplinary contribution to the IS discipline, which involves drawing on theories from other disciplines, constitutes the largest number of papers in our corpus. Of the 105 papers (60% of our

corpus) that we classified as HD, we recorded 29 IS subdisciplines as constituting the home discipline. While a few subdisciplines occurred in multiple papers—e.g., e-commerce (11 papers), IS acceptance (7 papers), IS use (14 papers)—7 subdisciplines occurred in only two papers each, and 6 subdisciplines occurred in only one paper each. There were 20 reference disciplines contributing to this body of HD research, the more frequently occurring ones being psychology (24 papers), strategy (21 papers), and economics (16 papers).

Home Disciplinary IS research, in addition to considering the disciplinary distinctiveness of the IS field, recognizes and addresses the conceptual

diversity of IS-enabled phenomena. Phenomena such as IS innovation or IS acceptance are IS-enabled manifestations of occurrences in other disciplines—in this case, organizational innovation and behavioral psychology respectively—and require insights from these disciplines to be understood and explained. The objective of HD research is thus to explain and analyze diverse, rich, and complex IS-enabled phenomena by bringing to bear insights from appropriate reference disciplines. As explained in Table 3, we find from the papers we analyzed that this can be done in two ways: (1) investigating new IS-enabled phenomena; and (2) developing newly contextualized understandings of IS-enabled phenomena.

**Table 3. Home Disciplinary IS Research**

<b>Objective: Explain and analyze diverse, rich and complex IS-enabled phenomena by bringing to bear insights from appropriate reference disciplines.</b>	
Objectives achieved through the following:	Examples
Investigating a new IS-enabled phenomena.	Feller, Finnegan, Hayes, & O’Reilly (2012) contribute to the understanding of the emerging phenomenon of IS-enabled crowdsourcing for innovation. They explain how organizations can obtain intellectual property from individuals and firms they have no prior relationship with. They draw from the concepts of innovation networks and brokerages to describe how innovation providers and seekers can come together to easily and mutually transfer knowledge from a variety of sources, develop and innovation prioritize problems and solutions, and develop stable relationships over time.
Developing newly contextualized explanations and understanding of an existing IS-enabled phenomenon.	Ravishankar, Pan, & Myers (2013) study an offshoring vendor in India through the anthropological lens of postcolonialism. They show that through the implementation of knowledge management strategies, vendors engage in impression management in tackling power differentials with Western clients and in expressing agency. However, they do not develop customer intimacy/satisfaction as predicted by the literature. The paper applies postcolonialism concepts such as social power differential to the context of IT offshoring in India, a former British colony, and in doing so, reveals a new understanding of an existing phenomenon—that of IT offshoring.

For the first way, in addition to the more common reference disciplines such as psychology and strategy, emerging technologies and the associated phenomena suggest the importance of reference disciplines not commonly considered in Home Disciplinary research. For instance, it has been suggested that human-robot collaboration can be investigated using evolutionary theories (Yoo, Henfridsson, & Lyytinen, 2010), and that IS-driven hypercompetition can be studied using complexity theory (Tanriverdi, Rai, & Venkatraman, 2010). From our corpus, Feller et al. (2012) draw from the concepts of innovation networks and brokerages from the strategy literature, in order to explain how organizations can obtain intellectual property from individuals and firms they have no prior relationship with, thus contributing to an understanding of a new phenomenon—IS enabled crowdsourcing for innovation.

The second aspect of Home Disciplinary research is the contextualization and illumination of the specific setting in which the IS phenomenon being studied

takes place. While reference disciplines provide valuable theoretical insights, these insights were developed in contexts quite different from those where IS research is normally conducted and hence cannot be applied “as is” to IS research problems (Lee, 2001). Contextualizing can take the form of new constructs or relationships that adapt concepts or relationships from a reference discipline. For example, the concept of a “capability” from the strategy literature has been conceptualized as “IS capability” or “IS enabled capability” in IS research. Investigated over a number of studies (e.g., Bharadwaj, 2000; Wade, & Hulland, 2004), IS capability has been conceptualized, defined, operationalized and tested specifically in order to explain IS-related phenomena such as IS-enabled competitive advantage and IS-enabled innovation, contributing to rich, plausible, and relevant understanding of such phenomena; such an understanding would not be possible without

referencing the resource-based view from strategy and recontextualizing it to IS. As an example from our data, Ravishankar et al. (2013) study the phenomenon of offshoring through the anthropological lens of postcolonialism. The authors apply postcolonialism concepts such as social power differential to the context of IT offshoring to India, a former British colony. In doing so, they reveal a new understanding of the phenomenon of IT offshoring, different from the understanding previously articulated in the literature.

### 5.3 Cross Disciplinary Research in IS

In the 24 papers (13% of our corpus) that we classify as Cross Disciplinary, 18 IS subdisciplines are recorded as the home discipline to which the papers make a contribution. While a few of these subdisciplines have multiple occurrences—e.g., IS capability (3 papers), IS healthcare (2 papers), IS implementation (3 papers) and IS strategy (2

papers)—all the others occurred only once. We recorded 11 non-IS disciplines as disciplines that are enriched by the papers. Strategy occurred most frequently (8 papers), followed by psychology and organizational behavior (4 papers), and sociology (3 papers), with all other disciplines having only a single occurrence.

The objective of Cross Disciplinary research is to contribute theoretically to both IS and other disciplines that study IS-enabled phenomena. In addition to the IS subdiscipline that it contributes to, Cross Disciplinary research requires one or more reference disciplines, each of which benefits from or is morphed by it. We find from our analysis, and as shown in Table 4, that this can be done in two ways: (1) by conceptualizing IS constructs and their relationships in ways that theoretically relate them to constructs and relationships in other disciplines; and (2) by considering IS as a reference discipline that can theoretically inform phenomena and problems investigated in other disciplines.

Table 4. Cross Disciplinary IS Research

Objective: Theoretically contribute to other disciplines that study IS-enabled phenomena.			
Objectives achieved through the following:	Examples	Contribution to IS	Contribution to reference discipline
Conceptualizing IS constructs and their relationships in ways that theoretically relate them to constructs and relationships in other disciplines.	Garfield, & Dennis (2012), examining group development in the context of virtual teams who interact through the use of IS, show that teams who use IS-mediated communication follow different processes of group development than those who do not.	Shows how IS-mediation influences the processes of group development.	Psychology: Explains how group dynamics in teams depend on the particular IS and how it is used.
	Young, Kuo, & Myers (2012), drawing on data from use of knowledge management systems in a Taiwanese context, show that when the system had the potential to reveal both the identity and the expertise of contributing experts, it was not used, due to a fear that the same experts would lose “face” if their revealed expertise was found lacking under everyone’s “gaze” within the system.	Reveals reasons that might prevent effective use of the knowledge management system.	Psychology: Establishes that “face” could be influenced or destroyed by electronic systems, thereby revealing a new relationship between an established concept, face, and a new IS—knowledge management systems.
Considering IS as a reference discipline that can theoretically inform phenomena and problems investigated in other disciplines.	Kane, Alavi, Labianca, & Borgatti (2014) juxtapose emerging platforms of IT-enabled social networks with an established typology of social networks to reveal how online and offline social networks are theoretically distinct.	Explains the nature of social media-enabled digital networks.	Sociology: Introduces and describes a new type of network based on social media, informed by the theoretical properties of online networks. In this case, IS is the reference discipline.

The first way requires engaging in a process of two-way exchange between IS and the other disciplines in order to produce insights that are salient for each. Evolving IS capabilities create changes in the structure and dynamics of a number of phenomena studied in other disciplines, for example, group

collaboration, which is influenced by use of IS. Conceptualizing IS centric constructs and relationships to analyze these changes would be a way to contribute to these disciplines. This can be done through a process where concepts from IS and the other discipline are analyzed together to

understand how they can interact with and change one another (Oswick et al., 2011). As an example from our corpus, Garfield, & Dennis (2012) examine group development in the context of virtual teams whose interactions are mediated by IS applications. They find that groups that are not mediated through IS are able to continue using their original organizational routines and can thus quickly get up to speed in their group development. In contrast, IS-mediated groups find their original routines disrupted by IS and must adapt their work practices to its new features. They are slower to get going and follow a staged model of group development. In its Cross Disciplinary contribution, the authors show that IS-mediation influences the processes of group development (contribution to the IS discipline) and that group dynamics in teams depend on the particular IS and how it is used (a contribution to the psychology discipline).

With regard to the second way, considering IS as a reference discipline, we note that the bodies of knowledge unique to the IS discipline include information systems management, development, and use (Baskerville, & Myers, 2003). Cross Disciplinary research should seek to apply these bodies of knowledge to understand emerging phenomena in other disciplines—for instance, smart manufacturing in operations management. The operations management discipline could draw from IS knowledge on systems design and use it to understand how the entanglement of information capturing devices and the design of assembly lines can affect the performance of manufacturing functions. Nambisan (2006) argues that IS could serve as a reference discipline for new product development with studies on the latter drawing from the system design, development, and testing methodologies developed in the IS literature, to understand the development process of new products that have significant IT components in them.

As an illustration, Kane et al. (2014) juxtapose emerging platforms of IT-enabled social networks with an established typology of social networks to reveal how online social networks are theoretically distinct from those that are offline. The distinctiveness is shown to be based on the novel capabilities of social media platforms, which do not exist for traditional social networks. The contribution to the IS literature is made in terms of understanding the nature of social media-enabled digital networks. The contribution to the sociology literature involves introducing and describing the new type of networks based on social media, informed by the theoretical properties of online networks.

## 5.4 Interdisciplinary Research in IS

In our corpus, we found five papers in this category, one coded HD-ID and four coded CD-ID. These papers made contributions at the intersection of IS with operations management, psychology, sociology, and organizational behavior.

The objective of Interdisciplinary research is to create transformative theoretical concepts and relationships by integrating theories and concepts from IS and other disciplines. The new concepts and relationships challenge and transform current/existing formulations and interpretations because they are ontologically different. In the papers we analyzed, we find that Interdisciplinary contributions exist at the conceptual intersections or fusions of multiple disciplines and can be achieved in two ways: (1) revealing, describing, and explaining ontologically new concepts and relationships that illustrate fusion or integration of ideas from multiple disciplines; and (2) integrating theories from different disciplines to apply to a conceptual problem. We illustrate these in Table 5.

**Table 5. Interdisciplinary IS Research**

<b>Objective: Create transformative theoretical concepts and relationships by integrating theories and concepts from IS and other disciplines through new ontological formulations and interpretation.</b>		
Objectives achieved through following:	Examples	Interdisciplinary contribution
Revealing, describing, and explaining ontologically new concepts that illustrate fusion or integration of ideas from multiple disciplines.	Vaast, Davidson, & Mattson (2013) examine how new actor categories with new identities emerge in technology-mediated discourses such as blogging. Fusing the concepts of the social actor and use of IT from the IS literature, and identity from the sociology literature, the paper conceptualizes an ongoing identity formation process at the theoretical intersection of media use practices, identity, and media affordances.	Interdisciplinary concept: Fluid identity through an ongoing process of identity formation. Fused concepts: Social actor and IT use (from IS), and identity (from sociology).
	Integrating the theoretical concepts of collective mindfulness, IT appropriation, technologies-in-practice, and dialectic theory, Carlo et al. (2012) formulate the fused concept of collective minding.	Interdisciplinary concept: Collective minding as the process through which users appropriate IT in dialectic, dual, and collective ways to be simultaneously both mindful and mindless. Fused concepts: IT appropriation, technologies-in-practice (from IS), and collective mindfulness (from psychology)
Integrating theories from different disciplines to solve an IS conceptual problem	Strong et al. (2014) integrate the theoretical concepts of affordances, the materiality of IS, the situated nature of IS use, and the intentionality of the IS user, in order to develop new conceptual formulations to explain organizational change due to the implementation of electronic health records.	Interdisciplinary concepts: “Actualization of an affordance’s potential” and “bundles of interrelated affordances.” Fused concepts: materiality of IS and situated use (from IS), affordances (from sociology), and user intentionality (from psychology).

For the first way, the integrated or fused idea can be a concept, a relationship between concepts or a process. As an example from the papers we analyzed, Vaast et al. (2013) examine how new actor categories with new identities emerge in technology-mediated discourses such as blogging. Fusing the concepts of the social actor and the use of IS from the IS literature and identity from the sociology literature, the authors identify discursive practices through which new identities emerge through the use of social media tools such as blogging. This reconceptualizes the identity formation process at the theoretical integration of media use practices, identity, and media changes, and suggests that identity formation is an ongoing process of enactment that makes for fluid rather than settled identities. The concept of fluidity of identity is an interdisciplinary contribution that emerges as a fusion of ideas from each discipline and ontologically challenges and transforms the hitherto held notion of a stable and constant identity.

With regard to the second, the problem is usually a complex one. Strong et al. (2014) provide the example of the problem of understanding organizational change in a healthcare organization upon implementing an electronic health record (EHR)

system. They integrate the theoretical concepts of affordances (sociology), materiality (sociology), the situated nature of information systems use (IS), and the intentionality of the IS user (psychology), to develop a midrange theory of organizational change from the implementation of EHR systems in healthcare organizations. The theory reveals new conceptual formulations from the integration of the respective disciplinary concepts, such as “actualization of an affordance’s potential” and “bundles of interrelated affordances.” These new formulations are transformative in that they provide new and alternate theoretical organizing, from the fusion of the respective disciplinary organizing ideas, to understand and tackle the problem of why and how organizational change is enacted in healthcare organizations, as a result of EHR implementation.

## 6 Ways Forward: Recommendations and Implications

The research question that stimulated our work in this paper asks how IS research has addressed the twin challenges of developing the IS discipline, while also



engaging with other disciplines. In order to answer this question, we set out the following research objectives: develop a conceptualization of IS scholarship that offers both an Intra-Disciplinary and an Inter-Disciplinary view; investigate to what extent this conceptualization finds expression in current IS research; and provide guidance for IS scholars to implement the conceptualized scholarship. We addressed the first objective by theorizing a

framework for classifying knowledge contributions in IS research, and the second by analyzing the type of knowledge contributions of a five-year representative sample of papers from leading IS journals. We addressed the third objective by drawing from our analysis to (1) articulate the importance and relevance of each type of contribution; and (2) explain how IS scholars, particularly researchers and editors, can practically incorporate these into their work (see Table 6).

**Table 6. Research Strategies for Intra- and Inter-Disciplinary IS-Knowledge Contributions**

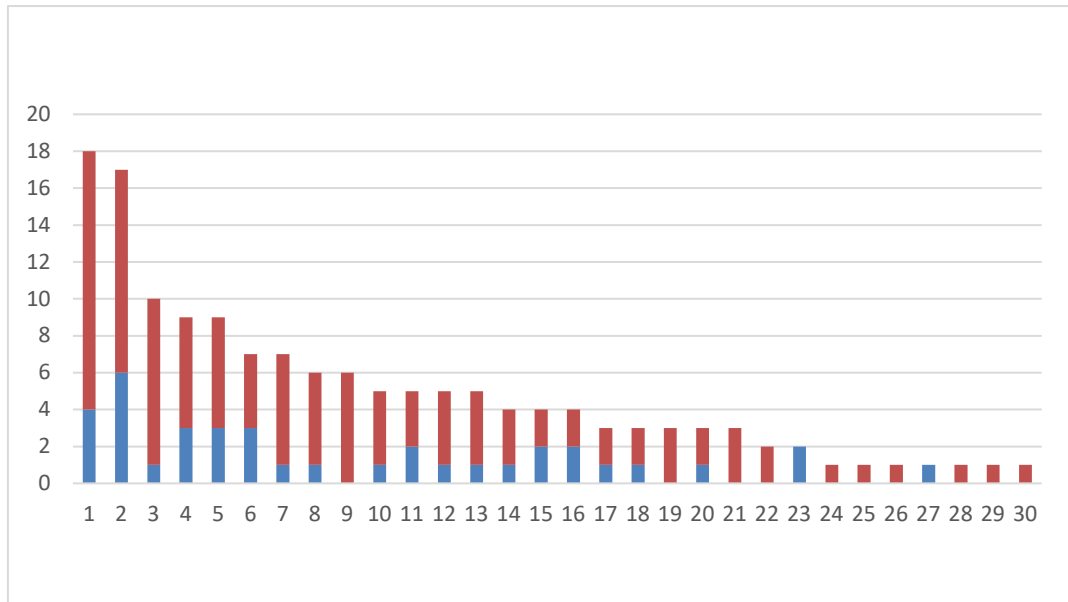
Knowledge contribution	Guidance for research practice
Intra-Disciplinary IS contributions (Single Disciplinary and Home Disciplinary).	<ul style="list-style-type: none"> <li>• Investigate <i>phenomena</i> and <i>problems</i> in a variety of existing IS subdisciplines, as opposed to findings gaps in the literature.</li> <li>• Create <i>new IS subdisciplines</i> to study new IS phenomenon.</li> <li>• Investigate <i>complexity</i> and <i>richness</i> of IS phenomenon by developing theoretical linkages among IS subdisciplines.</li> <li>• Develop <i>concepts and relationships that are distinctive and specific to the IS phenomena</i> that are studied</li> </ul>
Inter-Disciplinary IS contributions (Cross Disciplinary and Interdisciplinary).	<p><b>Contribution related</b></p> <ul style="list-style-type: none"> <li>• Clearly <i>frame the IS knowledge contribution, as distinct from knowledge contributions to the other disciplines.</i></li> <li>• Clearly <i>frame the IS research contributions as distinct from the IS problem solving / consulting contribution.</i></li> </ul> <p><b>Publication related</b></p> <ul style="list-style-type: none"> <li>• Publish the <i>IS contributions in IS journals and other contributions in journals of other disciplines.</i></li> <li>• Publish in <i>interdisciplinary journals</i> that focus on wider domains of human activity spanning multiple disciplines.</li> </ul> <p><b>Institution related</b></p> <ul style="list-style-type: none"> <li>• <i>Manage epistemological and methodological conflict</i> by being mindful of systemic collaboration pitfalls, such as different or even incompatible styles of thought, research training, methods, traditions, vocabulary, disciplinary socialization, and assessment of contribution.</li> <li>• Proactively <i>seek and develop institutional support for interdisciplinary structures and activities</i>, such as research centers, research clusters, doctoral programs spanning multiple faculties/schools, and funding application opportunities.</li> </ul> <p><b>Editorial policy related</b></p> <ul style="list-style-type: none"> <li>• Consider editorial policies such as <i>sections especially devoted to the interdisciplinary contributions</i>, and selection of scholars on editorial boards with experience of making contributions in more than one discipline</li> <li>• Potentially develop a <i>new journal devoted to interdisciplinary IS contributions.</i></li> </ul>

### 6.1 Consolidating through Single Disciplinary and Home Disciplinary IS Research

The Single Disciplinary and Home Disciplinary contributions are collectively predominant (84%) in the corpus of papers we examined, which suggests that IS researchers are both familiar with this kind of research and well poised to continue undertaking it in the future. These two types of contributions are valuable to the IS discipline because they embody areas of distinctiveness that IS researchers are

uniquely capable of developing and deepening. They can be viewed as the *sensing apparatus* for exploring new IS phenomena to investigate and understand. They can enable IS researchers to consolidate and build on past accomplishments in IS research, thereby ensuring and sustaining its currency and relevance. How can IS researchers make these contributions?

We find that the distribution of the 30 IS subdisciplines covered in these two types of contributions is uneven (see Figure 2): 7 subdisciplines (i.e., 22%) account for 50% of the papers and 16 (50%) for 80% of the papers.



■ = Single Disciplinary; ■ = Home Disciplinary

Notes:

- The colors indicate the key above.
- The horizontal axis lists the IS subdisciplines identified below.
- The vertical axis denotes the number of times the respective IS subdiscipline occurs in the papers with the Single- and Home Disciplinary contributions.

1: IS use	7: Systems analysis and design	13: Knowledge management	19: IS affordances	25: Digital business models
2: E-commerce	8: IS implementation	14: Online social networks	20: IS alignment	26: E-government
3: Outsourcing	9: IS strategy	15: Open source	21: IS innovation	27: Privacy
4: IS acceptance	10: Business value of IT	16: Project management	22: Control & audit	28: IS dark side
5: IS adoption	11: IS capability	17: Digital products & services	23: Online communities	29: Virtual teams
6: Software development	12: IS security	18: Healthcare	24: Data modeling	30: Virtual worlds

Figure 2. IS Subdisciplines by Extent of Consolidation: Distribution of IS Subdisciplines in the Single- and Home Disciplinary Contributions

This suggests that most of the consolidation in Intra-Disciplinary IS research is taking place in a few areas, the top four being IS use (18), e-commerce (17), outsourcing (10), IS acceptance (9) and IS adoption (9). This type of concentration exemplifies a risk often associated with disciplinary consolidation: that of asking narrow research questions in an attempt to reduce their complexity (Kuhn, 1996; Abbott, 2001), thus reducing the risk of expected and unsurprising findings largely from literature-based gap-spotting (Sandberg, & Alvesson, 2011), i.e., from testing relationships among known IS constructs, or known IS relationships in different settings within only a few IS subdisciplines. To address this potential problem, IS researchers engaged in these two types of research should investigate *phenomena* and *problems* in a wider variety of *existing* subdisciplines and develop *new* subdisciplines. They should be alert to emerging technologies and their use and examine the associated phenomena not just through the conceptual lenses of existing IS constructs and relationships but also by conceptualizing new constructs and relationships. For example, while the phenomenon of bringing one's own devices to work can have implications for IS security (an existing subdiscipline), it could also have effects on technostress (potentially emerging subdiscipline). While it may be easier to work in the limited number of IS subdisciplines that have a larger base of literature, doing so runs the alarming risk of neglecting new IS phenomena altogether.

Second, IS researchers should develop theoretical *linkages between IS subdisciplines*. This is both because IS subdisciplines can enrich one another and because many IS phenomena span multiple IS subdisciplines. In terms of the former, subdisciplines such as IS implementation, IS use and IS resistance can find conceptually enriching common ground. In terms of the latter, understanding how a firm can acquire and maintain competitive advantage from IT, for instance, spans the subdisciplines of, among others, IS strategy, IS capability, and IS alignment. On examining the number of different IS subdisciplines covered in each paper that made a Single- or Home Disciplinary contribution (n=150), we find that the maximum is 4, minimum 0, average 1.01, and mode 1; 122 papers have one IS subdiscipline. This lack of multiple IS subdisciplines in a single paper suggests that IS phenomena are perhaps not being investigated in their full richness

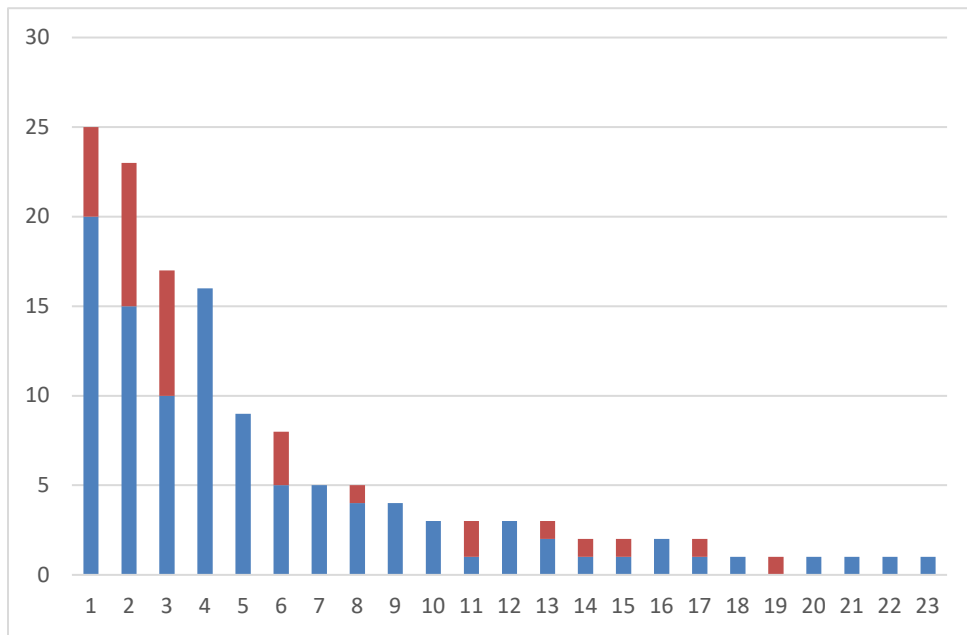
and complexity, reinforcing the concern about narrowly conceptualized research questions.

Third, IS researchers should strive for *disciplinary distinctiveness* and *IS specificity* in the constructs and relationships they conceptualize when making the Home Disciplinary contribution. A recent commentary (Grover, & Lyytinen, 2015) focusing on two of the journals that we include in our corpus, provides evidence of a strong tendency of simply "borrowing" concepts, relationships, and operationalizations from reference theories with minimal theoretical modification, and of failing to engage in theoretical and empirical articulations of the distinctiveness of the IS phenomena examined. This is a pitfall that IS researchers seeking to make the Home Disciplinary contribution can easily fall into, or perhaps have actually fallen into. Going forward, this can be avoided by theoretically modifying and extending the concepts of the contributing disciplines that they draw from.

Relatedly, IS journals should be mindful of how they wish to represent the various subdisciplines. For instance, editors could decide to focus on specific IS subdisciplines as points of distinctiveness in a particular journal or, alternatively, encourage the submission of manuscripts that investigate new IS subdisciplines or the relationships among them.

## 6.2 Boundary Spanning through Cross Disciplinary and Interdisciplinary IS Research

Our analysis revealed a relatively small incidence of the Cross Disciplinary and Interdisciplinary types of research, suggesting IS researchers' relative lack of engagement with them. These two types of contribution are the means through which the IS discipline can engage with other disciplines, *by mutually enriching other disciplines* and *by addressing complex research problems* that require intellectual resources from different disciplines. The disciplines that were most enriched by the papers in our corpus included strategy (8), organizational behavior (7), psychology (5), and sociology (3); the disciplines that were most borrowed from included psychology (20), economics (16), strategy (15), and organizational behavior (10) (see Figure 3).



■ = Home Disciplinary (disciplines most adopted from); ■ = Cross Disciplinary (disciplines most contributed to)

Notes:

- The colors indicate the key above
- The horizontal axis lists the disciplines identified below.
- The vertical axis denotes the number of times the respective discipline occurs in the papers with the Home and Cross Disciplinary contributions

1: Psychology	7: Cognitive science	13: Operations management	19: Computational biology
2: Strategy	8: General management	14: Computer science	20: Health care
3: Organizational behavior	9: Technology management	15: Finance	21: Justice/law
4: Economics	10: Communications	16: HCI	22: Social informatics
5: Operations research	11: Human resources	17: Neuroscience	23: Signal processing
6: Sociology	12: Marketing	18: Philosophy	

Figure 3. Disciplines Most Engaged with: Distribution of Disciplines in the Home and Cross Disciplinary Contributions

While a number of scholars have stressed that IS research should theoretically engage with and enrich other disciplines (e.g., Robey, 2003; Galliers, 2003; Baskerville, & Myers, 2003; DeSanctis, 2003; Wade et al., 2006; Bernroider et al., 2013), there is a lack of critical reflection and guidance on how this can be achieved. To do this, it is important to understand the challenges and dialectal tensions associated with interdisciplinary knowledge contributions. Firstly, the kinds of problems that are more naturally amenable to interdisciplinary research are difficult to conceptualize, not least because of disciplinary and professional imperatives that require clear and specific disciplinary contributions to each discipline. Conceptual integration that takes into account disciplinary advancements is not easy to produce. It creates fused knowledge from

which it can be difficult to untangle the specific contributions to each discipline.

This raises the question of where IS researchers can publish such contributions. Baskerville, & Myers (2003) suggest that IS researchers who contribute to other disciplines should consider publishing their work in the journals of those disciplines. As a practical recommendation, and as illustrated by the papers in our analysis, IS researchers who wish to make the Cross Disciplinary contribution should specify the contributions to each discipline. They can then publish the IS-focused contributions in IS journals and the reference discipline-focused contributions in the appropriate disciplinary journals.

For the Interdisciplinary research contribution, we suggest two guidelines from our analysis. One is to

situate the contribution *in the context of design or use of IS* (Carlo, Lyytinen, & Boland, 2012; Vaast et al. 2013) or *frame it as an explanation of a phenomenon that is enabled by IS design, implementation, or use* (Strong et al. 2014). Both would render it appropriate for an IS journal. Another approach would be to contribute to journals that specifically publish interdisciplinary research.<sup>13</sup> Such journals often focus on a particular domain of human activity and are more open to unconventional theoretical formulations emanating from disciplinary integration that would address problems in that domain. Interdisciplinary contributions often emanate from research projects or grant applications or even consulting projects focused on addressing a specific problem. IS researchers should be careful to specify the *IS research contribution* and distinguish it from the *problem solving / consulting* aspect of the project. They may find that problem-focused research is too situated and limited by time and context to produce enduring disciplinary knowledge that is portable across problems (Abbott, 2001) unless they make efforts to generalize their findings from their immediate context to a new theory that they develop or to an existing theory that they broaden with their new findings (Davison, & Martinsons, 2016; Lee, & Baskerville, 2003).

Secondly, the Cross Disciplinary and Interdisciplinary contributions require researchers from different disciplines to collaborate, because there are cognitive and intellectual limits concerning the extent to which a group of researchers from the same discipline can make these kinds of contributions. It is easy enough to suggest that IS researchers wishing to make these contributions should collaborate with colleagues from other disciplines. However, there are significant systemic barriers to this—such as different or even incompatible styles of thought, research training methods, traditions, vocabulary, disciplinary socialization, and assessment of contribution (Jacobs, & Friekel, 2009; Strober, 2010; Robey, 1996), which can very well lead to epistemological and methodological conflict. It may be easier to collaborate with colleagues from disciplines traditionally within business and management schools; the Cross Disciplinary contribution to these disciplines are therefore likely to be more common for IS researchers. On the other hand, the Interdisciplinary contribution may require

collaboration not only with academics from disciplines such as engineering and design, but also with partners from industry; in both cases, the disciplinary disparity from IS is much greater.

Thirdly, institutional structures and activities that help foster interdisciplinary collaborations include research centers, research clusters, and funding applications. Senior IS scholars should actively influence their institutional environments where possible to provide support for these.

Finally, the Cross Disciplinary and Interdisciplinary contributions pose distinctive issues for journal editors and editorial boards to consider. Should IS journals encourage their submission? Such research is difficult to review from traditional disciplinary viewpoints, and is often regarded as not contributing substantially to any of the disciplines involved (Mansilla, 2006). To the extent that there are few IS researchers making these contributions, it is hard to find reviewers who can review them. Editorial strategies could include sections especially devoted to the Cross Disciplinary or Interdisciplinary contributions, and the appointment of more outward-looking scholars with a track record that indicates competence from both the IS discipline's and other disciplines' point of view, to editorial boards. The creation of a new journal for IS related Cross Disciplinary and Interdisciplinary contributions, is also an option.

### 6.3 Looking Inward or Outward?

Increasingly, there are conflicts between what research funding councils are asking for (i.e., problem-focused Cross Disciplinary and Interdisciplinary research) and what IS scholars and academics find it important, or just easier, to contribute to (i.e., Single Disciplinary and Home Disciplinary research). With ever more research being directed through funding from research councils, which require interdisciplinary research proposals, this is an important matter to consider, for established academics, junior faculty, as well as doctoral students.

Should IS researchers make a choice? While there is no silver bullet for this dilemma, IS researchers should consider the following factors. First, given the cognitive efforts required for multidiscipline understanding, benefits to single discipline specialization include higher productivity in terms of number of publications. On the other hand, interdisciplinary contributions can have greater citation-related impact and visibility (Uzzi, Mukherjee, Stringer, & Jones, 2013; Lamont, 2009). Second, research shows that academic career advancement in a specific discipline is influenced by discipline-specific, but not interdisciplinary, collaboration (Van Rijnsoever, & Hessels, 2011).

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<sup>13</sup> An example is the *Mobilities* journal, (<http://www.tandfonline.com/loi/rmob20>) that focuses on how individuals and organizations negotiate and enact mobility. It publishes interdisciplinary contributions that focus on the impact of various mobility-enabling technologies, ranging from smartphones to self-driving cars and bicycles, and spanning, for example, the disciplines of sociology, management, IS, and science and technology studies.

Thus, academic structures and managers are likely to place primacy on publications in the scholar's home discipline. Third, lists of journals that are relied on for tenure and promotion cases are more often than not discipline specific;<sup>14</sup> evaluating research published in other journals places an overhead on tenure and promotion committees that may not always be welcome. Publishing in journals of other disciplines may thus not be appreciated by tenure and promotion boards.

We stress that both intra- and interdisciplinary IS contributions are important. Nevertheless, each carries potential risks and pitfalls. Inter-disciplinary contributions exemplify the critical role of IS as a key constituent of solutions to complex societal issues such as emergency response, counterterrorism surveillance, sustainable living, smart cities, and so on, and also offer the opportunity to engage with other communities of scholars to jointly address these problems. Given current institutional paradigms in most universities across the world, scholars who are post-tenure may be better placed to take on the task of making these types of contributions. Intra-disciplinary contributions are necessary to be successful in the disciplinary structure in which IS scholars work and in regards to the associated expectations for tenure and promotion. Junior faculty may therefore find it more prudent to make intra-disciplinary IS contributions, especially at the beginning of their careers. In any case, IS departments that have large numbers of academics and doctoral students should instill and develop in their members the range of values and research skills that can enable them to consider and undertake both intra- and interdisciplinary contributions.

#### 6.4 Publishing Indirect IS Contributions in IS Journals or Non-IS Journals?

So far we have discussed papers which make one of four types of contributions to the IS discipline. However, our corpus also had a set of papers that did not make a contribution to the IS discipline at all. Four papers had a Single Disciplinary contribution to non-IS disciplines: two each in Marketing and Strategy. Twelve papers had a Home Disciplinary contribution, where neither the discipline contributed to (i.e., home discipline), nor the discipline referenced

from, was IS. The home disciplines were Marketing (7), Strategy (3), Operations Management (1) and Law (1), and the reference disciplines were Economics (9), as well as one each for Psychology, Strategy, and Operations Research. This prompted us to ask: Why would these papers find their way to IS journals? Looking for an answer, we found that the research contributions in these papers were not directly related to IS. They considered not the design, implementation, or use of IS, but the marketing of (digital) products such as music, or the strategy choices of (IT services) firms. For example, two of the Single Disciplinary contributions (in marketing) consisted of identifying successful strategies for the marketing of apps and digital music respectively. One of the Home Disciplinary contributions (in strategy) examined diversification choices for IT firms, and another (in law) evaluated how digital music piracy was socially influenced. Such papers would be of interest to the respective disciplines to which they make their contribution, yet researchers in those disciplines *may not read IS journals*.

There was another set of papers which made a Home Disciplinary contribution to another discipline, *with the reference discipline being IS*. The other disciplines included operations management (3), strategy (4), law (1), and finance (1). As an example, one of them studied how operations in healthcare are improved using healthcare IT, drawing from IS concepts such as system resistance and avoidance of use. These papers showcased the value of IS as a reference discipline. Publishing them in journals of the respective disciplines may increase the citations of important and relevant IS topics in journals of *other* disciplines. This has been a thorny and contentious matter for IS researchers and a subject of much debate (Baskerville, & Myers, 2003; Grover et al., 2006; Wade et al., 2006).

Clearly, IS researchers who wish to make Single or Home Disciplinary contributions to other disciplines should consider publishing in the respective disciplinary journals. From our corpus, marketing (9), operations management (3), and strategy (8) appear to be the more prominent. While this may lessen the count of a researcher's IS publications, it may lead to greater impact and visibility of their contributions among *relevant* readers, thus leading to increased citations. Relatedly, editors and editorial boards of IS journals must consider policies regarding how papers making these sorts of contributions can be developed and supported in a way that increases their visibility in the respective disciplines, and whether or not they should be published in IS journals.

#### 6.5 Future Extensions and Limitations

Our study is limited in some ways. First, it does not include journals outside the IS discipline that publish

<sup>14</sup> In the U.S. and many Asian countries, IS departments in most universities refer to some version of lists of IS-specific journals such as the AIS Senior Scholars basket. Universities in the EU and Australia similarly consider lists of IS-specific journals. Universities in the UK consider the ABS list, which includes journals from other management disciplines as well.

IS research contributions. Thus we do not consider IS contributions that may have been published in these journals. We find (see Figure 3) that Psychology, Strategy, and Organizational Behavior are the disciplines most engaged with. Future studies could include journals from these disciplines, as well as those that publish research in more than one discipline, including IS, in order to consider a wider representation of journals (for example *Management Science*, *Organization Science*, *Decision Sciences Journal*, and *IEEE Transactions on Engineering Management*). Second, we focus on research articles, and we do not focus on specific authors from the IS discipline who may publish IS-related contributions in journals of other disciplines. Third, and relatedly, we do not study IS contributions of researchers from other disciplines, published in journals from other disciplines. It would be interesting for future studies to investigate if such papers acknowledge or invite dialogue with papers in IS journals on the same topic.

Notwithstanding these limitations, our study provides a springboard for future work and reflection by IS scholars in a number of ways. First, our theorization of the four types of contributions can be used by IS scholars, editors, and doctoral students to assess and evaluate the kind of research they wish to undertake and publish, and to strategize its framing. Second, we note that, like any other discipline, the IS discipline is perpetually configured and reconfigured by the deliberate and convergent actions of IS scholars. The disciplinary world that the IS discipline seeks to understand is not an arbitrary or static construction; IS scholars are responsible for its continual (re) emergence. Our study prompts them to (1) reflect on their knowledge creating choices; (2) potentially

select choices that they find appropriate; and (3) consider corresponding knowledge-creating practices. In doing so, it provides guidance to researchers and editors to reconsider and change the objectives, practices, and ambit of their work. Third, scholars have suggested that, but not explained how, the IS discipline should examine the content and domain of its scholarship on an ongoing basis (e.g., Robey, 2003). Our study can be used as a basis for understanding and describing the state of IS research during various time periods, vis-à-vis its proclivity towards Intra-Disciplinary and Inter-Disciplinary knowledge contributions. While we find from our study a predominance of Intra-Disciplinary contributions, a similar exercise conducted at a future time and with a different set of papers may reveal a different distribution.

## 7 A Wide Worldview of Information Systems Research

We suggest that IS researchers should generate knowledge that is both specific to our own discipline and that informs other disciplines, according to the four types we conceptualize. We envision IS, as we show in Figure 4, as a *flexibly stable* discipline that has both (1) a consolidated deep structure (through the Single and Home Disciplinary contributions); and (2) a periphery of flux (through the Cross Disciplinary and Interdisciplinary contributions). We argue for a novel and broad worldview, a *Weltanschauung* of the IS discipline that can leverage the value of both Intra- and Inter-Disciplinary contributions, reflected in the four types of knowledge contributions.

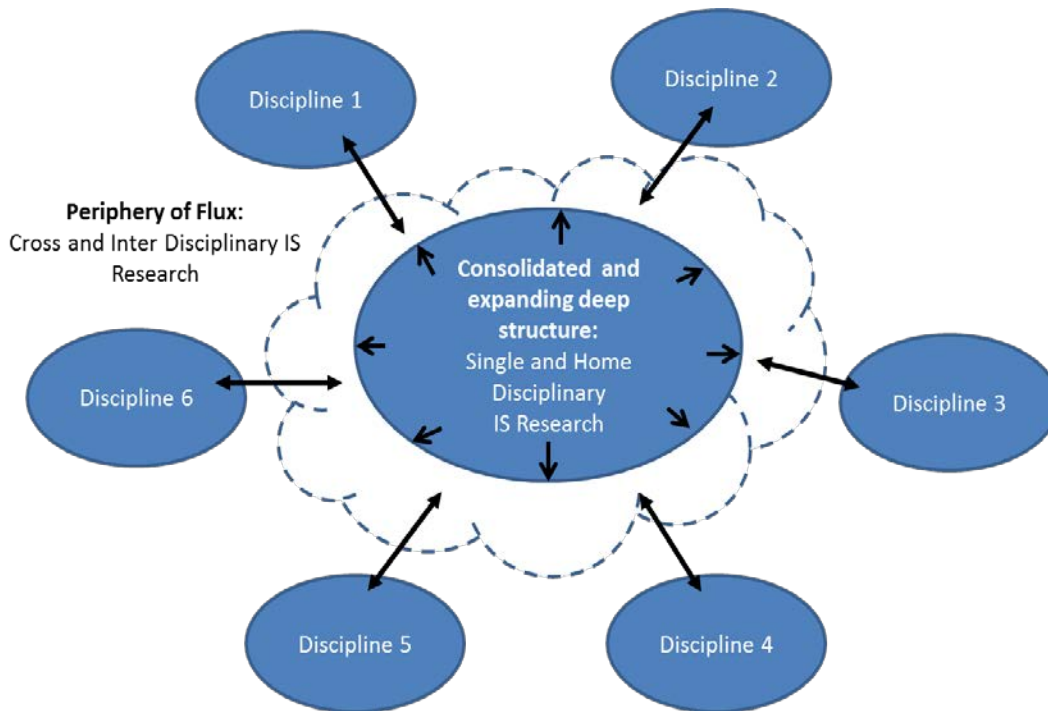


Figure 4. Information Systems as a Flexibly Stable Discipline

Scholarship confined to a single discipline often consists of asking relatively narrow questions with the objective of getting more accurate answers, which is important for developing the discipline's corpus of knowledge. However, it may be that in such a case, "extraordinary" research problems are not considered (Kuhn, 1996). While it is helpful, as past studies commenting on IS research have done, to point out the tensions and incompatibilities between the idea of a cumulative tradition that defines a core set of IS topics and that of a flexible core that permits a broad range of IS topics, it is time to acknowledge that what is needed is to be both interdisciplinary and yet retain and strengthen an IS core. This paper starts a conversation about how that can be done. We provide practical guidance for IS scholars in planning their research strategies for both intra- and interdisciplinary IS knowledge contributions. In doing so, we articulate ways to break the vicious and unhelpful cycle of the dominant, *scripted and formulaic* type of IS theorization that primarily replicates concepts from other disciplines, as recently reported in two of the IS discipline's top journals (Grover, & Lyytinen, 2015).

In conclusion, IS researchers should forcefully and clearly articulate the role of the IS discipline in the complex and interdependent disciplinary ecosystem that is emerging, in order to tackle the business and

societal problems of our times. The IS discipline needs a robust disciplinary core that is strong in its indigenous understanding of IS phenomena *together* with a supple and open-minded disciplinary boundary that can confidently engage with other disciplines. In order for that to happen, IS researchers should mindfully consider not only what they wish to study, but also how to frame their knowledge contributions appropriately and publish them strategically. It is our hope that our conceptualization and illustration of the four types of IS knowledge contributions and guidance regarding their practice speak both to the perpetuation of IS as a discipline and to its relevance in a wider, interdisciplinary world.

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## Appendix

**Table A1. Articles Published By and Selected From Eight Journals**

<b>Journal name</b>	<b>Number and percentage of articles published in 2010-2014 (total of 1407 broken down by journal)</b>	<b>Number of articles selected for our analysis (every 8th article published for each journal was selected for a total of 176)</b>	<b>% of the total of 176 articles for each journal</b>
EJIS	197 (14%)	25	14.2%
ISJ	106 (7.5%)	13	7.4%
ISR	280 (19.9%)	35	19.9%
J AIS	157 (11.2%)	20	11.4%
JIT	106 (7.5%)	13	7.4%
JMIS	199 (14.1%)	25	14.2%
JSIS	106 (7.5%)	13	7.4%
MISQ	256 (18.2%)	32	18.2%

*Note:* EJIS (*European Journal of Information Systems*); ISJ (*Information Systems Journal*); ISR (*Information Systems Research*); J AIS (*Journal of the Association for Information Systems*); JIT (*Journal of Information Technology*); JSIS (*Journal of Strategic Information Systems*); JMIS (*Journal of Management Information Systems*); MISQ (*MIS Quarterly*)

**Table A2. Discipline Codes (Management Disciplines from the ABS List are in Italics)**

<b>Code</b>	<b>IS Subdisciplines</b>	<b>Code</b>	<b>Non-IS Disciplines</b>
1.01	Business process management	2	<i>Accounting</i>
1.02	Business value of IT	3	Cognitive science
1.03	Control/audit	4	Communication
1.04	Data modeling	5	Computer science
1.05	Digital business models	6	Computational biology
1.06	Digital products & services (including music etc.)	7	<i>Economics</i>
1.07	E-Commerce (including online advertising, mobile apps, etc.)	8	<i>Finance</i>
1.08	E-Government	9	<i>General Management</i>
1.09	Healthcare IS (including eHealth and Telemedicine)	10	Healthcare
1.10	Information/data privacy	11	Human computer interaction
1.11	IS acceptance	12	<i>Human resource management</i>
1.12	IS adoption	13	<i>Justice/law</i>
1.13	IS affordances	14	<i>Marketing</i>
1.14	IS alignment	15	NeuroScience
1.15	IS appropriation	16	<i>Operations management</i>
1.16	IS avoidance	17	<i>Organizational behavior</i>
1.17	IS capability	18	<i>Operations research</i>
1.18	IS dark side (e.g., technostress)	19	Philosophy
1.19	IS human resource	20	<i>Psychology</i>
1.20	IS implementation	21	Social informatics
1.21	IS innovation	22	Sociology
1.22	IS resistance	23	<i>Strategy</i>
1.23	IS security	24	<i>Technology management</i>
1.24	IS strategy	25	Signal processing
1.25	IS use (includes use of various kinds of systems)		
1.26	Knowledge management		
1.27	Online communities		
1.28	Online social networks		
1.29	Open source software development		
1.30	Outsourcing/offshoring		
1.31	Project management		
1.32	Service oriented architecture		
1.33	Software development (including algorithm development)		
1.34	Software industry		
1.35	Standards		
1.36	System analysis and design		
1.37	Virtual teams		
1.38	Virtual worlds		

Table A3. Sample Coding Illustration

Paper identifier	Citation information	Disciplines	D1 code	D2 code	SD	HD	CD	ID	Paper classification
JAIS 8	Sun (2010)	D1: IS use D2: Psychology	1.25	20	No	Yes IS use (1.25)	No	No	HD
JAIS 152	Schlagwein & Bjorn-Andersen (2014)	D1: IS innovation D2: OB	1.21	17	No	No IS innovation (1.21)	Yes OB (17)	No	CD
EJIS 8	Kreps (2010)	D1: IS use D2: Philosophy	1.25	19	No	Yes IS use (1.25)	No	No	HD
JSIS 48	Dhillon et al. (2011)	D1: IS implementation D2: OB	1.20	17	No	No IS implementation (1.20)	Yes OB (17)	No	CD
MISQ 192	Vaast (2013)	D1: IS use D2: Sociology	1.25	22	No	No IS use (1.25)	Yes sociology (22)	Yes IS use (1.25) sociology (22)	CD-ID
JMIS 192	Barua & Mani (2014)	D1: IS outsourcing D2: Strategy	1.30	23	No	Yes IS outsourcing (1.30)	No	No	HD
ISR 16	Tiwana & Konsynski (2010)	D1: IS alignment	1.14		Yes IS alignment (1.13)	No	No	No	SD
ISJ 80	Conger et al. (2013)	D1: Information privacy	1.10		Yes Information privacy (1.09)	No	No	No	SD

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