1

Evolving Discipline of Information Systems

1.1 Introduction

This chapter gives its readers an overview of the Information Systems (IS) discipline and discusses how the discipline has evolved during its relatively brief history. To achieve this goal, it uses two approaches: first, an analysis of the most highly cited articles within the discipline and second, an introduction to broad, self-reflective scholarly conversations that have taken place within the discipline.

This chapter does not, however, intend to present a comprehensive history of the field. There are many reasons underlying this choice. One of the most important ones is the recent Journal of Association for Information Systems special issue on the history of the IS field published in 2012 (Hirschheim et al., 2012). Particularly an article by Hirschheim and Klein (2012) provides a very thorough and comprehensive historical analysis of the IS field. It would be difficult, if not impossible, to add anything substantive to its 50 pages written over a 12 year period (Hirschheim et al., 2012, p. iv) in a short book chapter. Despite its length and depth, the Hirschheim and Klein (2012) article is highly readable, and it is an excellent starting point for anybody who wants to understand where the IS field came from, where it currently is, and where its future could be. A more condensed version of this history is available in Section 1.2.2 of Hirschheim and Klein (2003).

The analytical approaches chosen for this chapter have two goals: First, the chapter wants to provide its readers with an overview of the topics that have been most influential in the course of the history of the IS field. Second, the chapter introduces a contextual structure that helps in positioning the chapters in this volume in the broader context of the field. Both the analysis of the highly cited articles and the review of the broad conversations provide insights regarding the topics that the field itself and those using its results have considered most important.
1.2 Analysis of Most Highly Cited Scholarly Work in Information Systems

The first approach to describing the discipline of IS is based on a comprehensive attempt to identify about 100 most highly cited articles published by IS scholars at any time during the field’s history. These scholarly works are then used to discover the patterns they reveal about the core topics and areas of interest within the field. There is no straightforward way to identify the pool of all scholarly articles within the IS field, and thus, a number of mechanisms were used to add articles to this pool. The first was to approach the problem through highly cited scholars and assume that their most highly cited articles would be among the target group. Consequently, one of the starting points for forming the article pool was Hu and Chen’s (2011, Table 1.1) list of 85 highly productive IS researchers with high H index values. The other approach to forming the pool was to identify key IS journals and choose the most highly cited articles for each of them. The journals included the premier journals chosen by the IS senior scholars (in alphabetical order: European Journal of Information Systems, Information Systems Journal, Information Systems Research, Journal of AIS, Journal of Information Technology, Journal of MIS, Journal of Strategic Information Systems, and MIS Quarterly). In addition to these eight, Decision Sciences, Decision Support Systems, and Management Science were covered. Moreover, the citations for key articles of well-known authors not included in the first group were also evaluated. It is possible that this approach left out published works that should have been included, but it is likely that these would not have had a material impact on the story that the data tell.

<table>
<thead>
<tr>
<th>Category</th>
<th>Sum of Citation Index Values</th>
<th>Total Number of Articles</th>
<th>Average Citation Index Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. User acceptance and use of IT</td>
<td>15,918</td>
<td>23</td>
<td>692</td>
</tr>
<tr>
<td>2. Impact of IT on organizations</td>
<td>4,107</td>
<td>11</td>
<td>373</td>
</tr>
<tr>
<td>3. Methodology</td>
<td>3,407</td>
<td>8</td>
<td>426</td>
</tr>
<tr>
<td>4. Media and organizational communication</td>
<td>3,292</td>
<td>6</td>
<td>549</td>
</tr>
<tr>
<td>5. Knowledge management</td>
<td>3,265</td>
<td>7</td>
<td>466</td>
</tr>
<tr>
<td>6. IS success</td>
<td>2,628</td>
<td>4</td>
<td>657</td>
</tr>
<tr>
<td>7. IT and business performance</td>
<td>2,619</td>
<td>7</td>
<td>374</td>
</tr>
<tr>
<td>8. Trust</td>
<td>2,552</td>
<td>7</td>
<td>365</td>
</tr>
<tr>
<td>9. Electronic marketplaces</td>
<td>1,962</td>
<td>4</td>
<td>491</td>
</tr>
<tr>
<td>10. Adoption</td>
<td>1,881</td>
<td>3</td>
<td>627</td>
</tr>
<tr>
<td>11. Group support systems</td>
<td>1,843</td>
<td>4</td>
<td>461</td>
</tr>
<tr>
<td>12. User satisfaction</td>
<td>1,375</td>
<td>3</td>
<td>458</td>
</tr>
<tr>
<td>13. Design science</td>
<td>1,027</td>
<td>2</td>
<td>514</td>
</tr>
<tr>
<td>14. IT implementation</td>
<td>1,019</td>
<td>3</td>
<td>340</td>
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<tr>
<td>15. Self-efficacy</td>
<td>946</td>
<td>2</td>
<td>473</td>
</tr>
<tr>
<td>16. Managerial IT use</td>
<td>761</td>
<td>2</td>
<td>381</td>
</tr>
<tr>
<td>17. Artificial intelligence</td>
<td>701</td>
<td>1</td>
<td>701</td>
</tr>
<tr>
<td>18. Coordination</td>
<td>647</td>
<td>1</td>
<td>647</td>
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<tr>
<td>19. Enterprise systems</td>
<td>595</td>
<td>1</td>
<td>595</td>
</tr>
<tr>
<td>20. IS continuance</td>
<td>365</td>
<td>1</td>
<td>365</td>
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<td>21. Discipline identity</td>
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<td>356</td>
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<tr>
<td>22. Data quality</td>
<td>316</td>
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<td>316</td>
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<tr>
<td>23. IS effectiveness</td>
<td>256</td>
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<tr>
<td>24. Outsourcing</td>
<td>224</td>
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</tr>
<tr>
<td>25. Electronic commerce</td>
<td>173</td>
<td>1</td>
<td>173</td>
</tr>
</tbody>
</table>
The citation counts were retrieved from two sources: Google Scholar (using Publish or Perish; see Harzing, 2007) and Social Science Citation Index (SSCI). The citation counts were retrieved during a single day in June 2012. The value used in this analysis for ranking purposes was based on the formula (Google Scholar count/4 + SSCI count)/2. Obviously, this is not an attempt to determine a real citation count; instead, it provides a citation index that gives more weight to the SSCI count but still takes into account the significantly higher nominal values of Google Scholar (see Meho and Yang, 2007 for a justification to use both Google Scholar and SSCI). The citation counts have not been adjusted based on the publication year; this analysis will naturally leave out the most recent influential articles. This is not a problem, given the purpose of this chapter, which intends to identify the themes and topics that the field of IS has focused on and contributed to over its history.

Using an arbitrary cutoff point of 1000 Google Scholar citations, the analysis identified a list of the 105 articles, which is in Appendix 1.A. In addition to the year, author, and journal information, the table also presents a categorization for each of the papers. The categories used in this analysis are at a lower level of abstraction than, for example, those derived in Sidorova et al. (2008), because the purpose of the analysis was to illustrate the scholarship topics that the most highly cited IS articles during the past 30 years represent. The author of this chapter categorized the articles based on their title and abstract; if necessary, the full article was used to determine the proper category. The categorization and category development process was iterative: during the first round, each article was assigned to an initial category, which was potentially modified for clarity and consistency during subsequent rounds.

In this chapter, the focus is on the content of the most highly cited articles (instead of, for example, the authors or the institutions). Again, the purpose is to demonstrate through the most actively used scholarly contributions what topics the IS field, those external fields benefiting from it, and the practitioner community value most highly based on the use of the scholarship. Next, the key categories discovered in the analysis will be described.

### 1.2.1 Description of Identified Categories

Table 1.1 includes a list of the categories that emerged from the classification process; in addition to the category name, the table includes the sum of citation index values for the articles in the category, the number of articles in each category, and the average of citation index values in each category. The categories are sorted by the sum of the citation index values.

The rest of the section will discuss the key characteristics and the most important research themes featured in each of the categories.

#### 1.2.1.1 User Acceptance and Use of IT

By far, the most actively cited category is user acceptance and use of information technology (IT). The seminal works in this category are Davis (1985, 1989) and Davis et al. (1989), which introduced the Technology Acceptance Model (TAM). These articles were then followed up by a number of influential efforts to evaluate and extend TAM, such as Taylor and Todd (1995b), Gefen and Straub (1997), Venkatesh and Davis (2000), and Venkatesh et al. (2003). Applications of TAM to various contexts have also had a strong impact and been cited widely (e.g., Koufaris, 2002; Gefen et al., 2003; Pavlou, 2003). The field as a whole has spent a significant amount of time and effort discussing the contributions and the future of TAM (including a special issue in the Journal of AIS; Hirschheim, 2007). The core premise of TAM is simple: it posits that the probability of a user’s behavioral intention to use a specific IT is based on two primary factors: perceived usefulness and perceived ease of use, the former directly and the latter both directly and mediated by perceived usefulness. The research building on the seminal articles over a period of 25 years has expanded the scope significantly and made the theory much more complex. TAM and related research specifically focus on individual users.

TAM has been so dominant that it has become the default conceptual model for any research on antecedents of IT adoption and use. For example, when Agarwal and Karahanna (2000) introduced
1.2.1. Impact of IT on Organizations

The second most widely cited category is labeled *Impact of IT on organizations*, and it is dominated by Wanda Orlikowski's work. Most of the articles in this category provide perspectives on and guidance for studying, understanding, and making sense of the role of IT in organizations (e.g., Orlikowski and Baroudi, 1991; Orlikowski and Gash, 1994). Many of them follow a structurational perspective, which, based on the structuration theory by Giddens, explores how structures emerge from the interactions between the users and the technology (Orlikowski and Robey, 1991; Orlikowski, 2000). For this perspective, it is particularly important to understand how the use of technology contributes to and is associated with innovation, learning, improvisation, and emergent practices in organizations. One of the key insights revealed through this stream of research is the essential role of unintended and unplanned uses of technology and the strong impact these uses have on organizations. Technology and its users interact within organizations in a myriad of highly complex ways, and the users’ reactions to technology and technology-based solutions are typically impossible to fully anticipate. In this volume, Sawyer and Jarrahi (Chapter 5) discuss structuration at a more detailed level.

The articles that focus specifically on IT and organizational change form an important subcategory. Some of them explore the theories of and methods for analyzing and understanding the relationship between technology and organizational change. For example, Markus and Robey (1988) review the theories about the impact of technology on organizations with an explicit intent of improving the qualities of these theories. Orlikowski and Robey (1991), in turn, suggest a theoretical framework (based on Giddens’ structuration theory) for guiding studies on two areas that are closely linked to IT-enabled and induced organizational change: systems development and the effects of IT use on organizations. Orlikowski (1993b) takes a closer look at the role of specific systems development tools (CASE tools) in organizational change processes. In another widely cited paper, she (Orlikowski, 1996) provides a detailed look at how small, frequently repeated actions by organizational actors while making sense of a new IT and applying it to their everyday work lead to organizational change.
In this volume, Markus discusses the complex relationship between IT and organizational structure (Chapter 67). Jarvenpaa’s chapter on open innovation management illustrates the very significant impact IT has had on the development of innovation management, an essential organizational capability (Chapter 68).

Returning back to the highly cited articles, two papers in the IT and organizational change subcategory take quite a different approach from the ones discussed earlier. Both Henderson and Venkatraman (1993) and Venkatraman (1994) are more prescriptive in their approach, explicitly providing guidance regarding the ways IT can be used to enable certain types of organizational transformation processes. Henderson and Venkatraman (1993) also suggest an important mechanism for understanding and guiding the alignment between IT and business strategies (strategic integration) and the fit between business and IT infrastructures (functional or operational integration). Venkatraman (1994) presents a five-level model to describe different types of IT-enabled business transformation, starting from localized exploitation and moving through internal integration, business process redesign, and business network redesign to business scope redefinition.

In this volume, several chapters discuss related issues, including Luftman on alignment (Chapter 65), and both Rossi & Lindman and Devadoss the relationship between organizational transformation processes and the design, implementation, and use of large-scale enterprise systems (Chapters 23 and 24, respectively).

1.2.1.3 Methodology
The next most widely cited main category of IS research articles consists of those providing guidance on methodology to the community. The most influential articles have covered case research (Benbasat et al., 1987; Walsham, 1995), interpretive field studies (Myers, 1997; Klein and Myers, 1999), structural equation modeling (Chin, 1998; Gefen et al., 2000; Chin et al., 2003), and instrument validation (Straub, 1989).

1.2.1.4 Media and Organizational Communication
The list of frequently cited article categories continues with media and organizational communication. In this category, by far the most influential paper is Daft and Lengel’s (1986) study on the reasons why organizations process information and the relationship between structure, media characteristics (specifically, media richness), and organizational information processing. A common general theme within this category is the impact of communication media on organizational communication effectiveness. The emergence of e-mail and its impact on managerial communication has been of particular interest (Sproull and Kiesler, 1986), together with media selection (Daft et al., 1987). Markus (1987) and Yates and Orlikowski (1992) have produced widely used general analyses of interactive media and genres of organizational communication, respectively.

1.2.1.5 Knowledge Management
Knowledge management is the next highly influential category. In this area, a review article by Alavi and Leidner (2001) is clearly the most widely cited contribution to the literature, demonstrating the usefulness of high-quality integrative summaries (see also Alavi and Leidner, 1999). Alavi and Leidner also articulate the key positions of the longstanding debate regarding the relationship between data, information, and knowledge, an essential question when the focus is on understanding how knowledge management differs from and depends on information and data management. Davenport et al. (1998) have contributed another broadly used (although significantly more practically focused) review article, which emphasizes the importance of knowledge management projects and explores their success factors. The factors that motivate individuals within an organization to share their knowledge and contribute it to the relevant organizational knowledge management systems have been a specific question of interest, explored by Wasko and Faraj (2005) and Bock et al. (2005).

In this volume, Newell and Marabelli (Chapter 17) provide a comprehensive overview of the current status of knowledge management research and practice.

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1.2.1.6 IS Success

The meaning, role, and importance of IS success is the focus of four highly influential articles that have explored the question of what it means to achieve success with IS. The seminal article in this area is DeLone and McLean (1992), which was later updated by the same authors 10 years later (DeLone and McLean, 2003). Seddon’s respecification and extension of the original model (Seddon, 1997) has also reached a strong position as a widely cited article. The original DeLone and McLean paper identified six interdependent IS success constructs: system quality, information quality, use, user satisfaction, individual impact, and organizational impact. These constructs are organized into a process model with organizational impact as the ultimate IS success construct affected either directly or indirectly by the others. The updated 2003 model added a third quality dimension, service quality, recognized the connection between intention to use and use, and replaced all impact measures with a single net benefit construct.

DeLone, McLean, and Sederer continue to build on their earlier work, evaluate its impact, and propose new directions for future work in Chapter 70 of this volume.

1.2.1.7 IT and Business Performance

Another significant area of interest in IS research is the relationship between IT and business performance, often explored using the methods and approaches of economics. Two highly influential papers in this category (Mata et al., 1995; Bharadwaj, 2000) have adopted the resource-based view of the firm as the underlying perspective for exploring the role of IT as a source of competitive advantage. Mata and colleagues concluded that of the five factors that they analyzed conceptually, only one (managerial IT skills) is likely to be a source of competitive advantage; the others (access to capital, proprietary technology, technical IT skills, and customer switching costs) do not satisfy the criteria that would grant them this role. Bharadwaj (2000) categorizes IT resources into three groups: IT infrastructure, human IT skills (managerial and technical), and IT-enabled intangibles (such as customer orientation, knowledge assets, and synergy). Based on an empirical analysis, she comes to a different conclusion compared to Mata et al., stating that “IT capability is rent generating resource that is not easily imitated or substituted” (p. 186), attributing the ability to sustain superior performance to time compression diseconomies, resource connectedness, and social complexity.

Two authors who have contributed very significantly to the discussion regarding the relationship between IT and business performance are Brynjolfsson and Hitt. In this analysis, four of their articles were included among the most highly cited ones: Brynjolfsson and Hitt (1996, 2000), Hitt and Brynjolfsson (1996), and Brynjolfsson (1993). Two of them (Brynjolfsson, 1993; Brynjolfsson and Hitt, 1996) analyzed the widely cited productivity paradox of computing (which refers to the invisibility of the effects of IT in aggregate output statistics). By analyzing firm-level data, the authors discovered that IT spending (both capital and labor) had a significant impact on firm output and concluded that at least in their sample the paradox had disappeared. Brynjolfsson and Hitt (2000, p. 45) emphasized the role of IT as a “general purpose technology” that enables complementary innovations, such as new business processes and new organizational and industry structures. The authors further emphasized the importance of performing the analysis at the firm level instead of evaluating only economies or industries at the aggregate level.

In this volume, Chapter 71 by Hoadley and Kohli and Chapter 72 by Mithas and Lucas explore the questions related to the business value of IS/IT investments, each with their own distinctive perspective.

1.2.1.8 Trust

IS research on trust has achieved a highly visible status, gaining it the eighth place in this analysis. This category has two clearly different elements: trust within virtual teams (Jarvenpaa and Leidner, 1998; Jarvenpaa et al., 1998) and trust in the context of consumer electronic commerce or electronic markets (Jarvenpaa et al., 1999; Gefen, 2000; McKnight et al., 2002; Jøsang et al., 2007). These two streams are
connected through the trust construct itself, but the contexts and core issues are quite different. In the
former, the key questions are related to the role of trust (or the lack thereof) in the context of globally
distributed teams that are conducting work without the benefit of establishing personal relationships
in a face-to-face environment. In the latter case, the focus is on the mechanisms through which virtual
marketplaces and the organizations maintaining them can create trust that has the potential to alleviate
the users’ concerns regarding the risks associated with the marketplaces. In both cases, the scholarly
work has improved our understanding of how trust is formed and maintained in environments where
physical presence is missing.

This volume recognizes the importance of trust in the design and use of IS by including a dedicated
chapter related to this topic area (Chapter 41 by Li).

1.2.1.9 Electronic Marketplaces

Moving forward in the list of categories of influential, highly cited articles, the next one focuses on
electronic marketplaces. Malone et al. (1987) wrote a pre-electronic business (as we know it now) analysis
of electronic markets and hierarchies, stating insightfully “We should not expect electronically intercon-
nected world of tomorrow to be simply a faster and more efficient version of the world we know today.
Instead, we should expect fundamental changes in how firms and markets organize the flow of goods
and services in our economy” (p. 497). This has definitely been the case, and the transformation process
is not over yet. A few years after Malone et al. (1987) and Bakos (1991) analyzed the potential strategic
impact of electronic marketplaces, focusing on key dimensions of the impact of the digitalization of busi-
ness: reduction of search costs, network externalities, technological uncertainty, switching costs, and
economies of scale and scope (p. 308). Bakos (1997) takes a closer look at the reduction of buyer search
costs and their impact on electronic marketplaces. Brynjolfsson and Smith (2000) compare conventional
and Internet retailers to each other, with a specific focus on the impact on Internet retailing on pricing.

1.2.1.10 Adoption and Diffusion of IT Innovations

Adoption and diffusion of IT innovations has been an influential area of research, exemplified in our
group of highly cited articles by Cooper and Zmud (1990), Moore and Benbasat (1991), and Karahanna
et al. (1999). Cooper and Zmud studied the adoption (allocation of resources to acquire the innovation)
and infusion (achieving high levels of effectiveness with the innovation) of an organizational innova-
tion (material requirements planning systems, precursors of current ERPs), finding significant differ-
ences in factors that affect adoption compared to those affecting infusion. Moore and Benbasat focused
on individual adoption of an IT, developing an instrument for measuring perceptions that might have
an impact on the adoption process. Moore and Benbasat’s work was strongly based on Rogers’s theory of
innovation diffusion (Rogers, 2003) and the five attributes of innovations identified by Rogers (relative
advantage, compatibility, complexity, observability, and trialability). Both the instrument introduced in
this article and the development process have been widely used. One of the adopters of the instrument
was Karahanna et al. (1999), who examined at the individual-level pre-adoption and post-adoption
beliefs and attitudes, demonstrating the fundamental importance of perceptions regarding usefulness
and enhancing one’s image post-adoption.

In the context of this volume, issues of technology adoption are most visible in Chapter 38 on
individual-level technology adoption research by Venkatesh et al. and in Chapter 45 in which Grudin
explores factors affecting the adoption of new communication and collaboration technologies in orga-
nizations. These chapters do not, however, incorporate the innovation diffusion perspective.

1.2.1.11 Group Support Systems

The next topic was prominently featured in the IS literature in late 1980s and early 1990s: group (decision)
support systems (GSS) and other collaborative systems. The most highly cited paper in this category, DeSanctis
and Poole (1994), could also have been categorized based on the way it introduces the adaptive structuration
theory as an approach to study the role of technology in the context of organizational change. The empirical
context for the paper is, however, GSS (or GDSS, as the authors call it). The article presents seven propositions of the adaptive structuration theory and explores the applicability of the theory to the study of GSS use in a small group context. The key issue it highlights (in addition to the theoretical contribution) is that the introduction of the same technology may lead to widely different organizational outcomes and that the effectiveness of technology use is dependent on how it is appropriated at a specific organizational context. An earlier article by DeSanctis (DeSanctis and Gallupe, 1987) presents a framework for the study of GSS, demonstrating the importance of group size, the proximity of the group members, and the nature of the task as important contingency variables.

DeSanctis represents a GSS research tradition that emerged from the University of Minnesota; another very significant center for this research was the University of Arizona, where the work by Nunamaker and his research team led to a long stream of research contributions and software products in this area. The most highly cited of these articles is Nunamaker et al. (1991), which presents a summary of research conducted at the Arizona research program on electronic meeting systems (EMS). In addition to the framework for the study of these systems, the article gives a good overview of the Arizona approach that combines the design and implementation of technology artifacts with research on them both in the laboratory and in the field.

The current state of GSS research and the broader area of research on enhancing team-level problem solving and decision making is reviewed by de Vreede et al. in Chapter 44 of this volume. In addition, Poltrock provides a comprehensive overview of a closely related area, computer-supported cooperative work, in Chapter 43.

1.2.1.12 User Satisfaction

Before the emergence of the TAM research and focus on perceptions of perceived ease of use and usefulness, several papers were published on user satisfaction. Bailey and Pearson (1983) described the process of developing an instrument for measuring “computer user satisfaction.” Despite the name, the construct itself has little to do with computers per se. Instead, the instrument appears to capture at a very broad level users’ satisfaction with the services that the IT (EDP) department provides (the instrument includes questions related to, among others, top management involvement, charge-back method for payment for services, and relationship with the EDP staff with 36 other categories). This is understandable given the time when these data were collected (around the time when first PCs were introduced).

Ives et al. (1983) fine-tuned the Bailey and Pearson instrument and developed a short form of it. The scope of the issues that the two instruments measure is equally broad; interestingly, the authors suggest that the instrument can be used to “evaluate an IS or general systems development effort in an organization.” Doll and Torkzadeh (1988) reported on the development of a different type of a satisfaction instrument, which was intended to focus on the users’ satisfaction with the outcomes and ease of use of a specific application (instead of, say, the general satisfaction with the IS department). The resulting instrument was designed to capture data on five factors: content, accuracy, format, ease of use, and timeliness. Even though the seeds of the ideas underlying TAM are clearly included in this article, it is interesting to note that the work was parallel with that of Davis (whose dissertation was published in 1985).

1.2.1.13 Design Science

There are only two articles in the following category, design science, but particularly the more highly cited of them, Hevner et al. (2004), has already had a very impressive impact on research within the field despite its recent publication date. The popularity and influence of this article can be at least partially explained by its focus on an issue that is fundamental from the perspective of the identity of the IS field. It gave revived legitimacy for the design science paradigm in IS research at a time when many thought that only the behavioral research paradigm would survive. Hevner et al. built on earlier work, such as Nunamaker et al. (1990) and March and Smith (1995), the latter of which is the other highly cited article.
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in this category). Hevner et al. (2004) articulate a conceptual framework that positions IS research in the context of both the environment within which the accumulated body of knowledge is applied and the knowledge base that the research develops. They also specify a set of prescriptive guidelines for conducting design research.

Hevner provides an in-depth introduction to design science research and discusses its achievements and future in Chapter 22 of this volume.

1.2.1.14 IT Implementation

The final category with more than two articles is labeled *IT implementation*. The three articles in this category, Markus (1983), Kwon and Zmud (1987), and Orlikowski (1993b), all explore questions related to IS implementation from a broad perspective that acknowledges the richness and complexity of the factors which affect the successfulness of IT implementation in organizations. In one of the early classics of the IS literature, Markus (1983) compares three theories (people-determined, system-determined, and the political variant of interaction theory) regarding the causes of resistance against the implementation of a new IS and finds support only for the political variant of interaction theory. Kwon and Zmud (1987) present a stage model for IT implementation activities, and Orlikowski (1993) develops a theoretical framework that helps us understand a variety of “organizational issues” in the context of the adoption and use of CASE tools. The key lesson from all of these is that technical issues are seldom (if ever) the sole reason for difficulties or failures of IS implementation processes.

1.2.1.15 Other Categories

The remaining 11 categories of widely cited articles each have only one or two articles (in most cases one) and have a citation index value less than 1000. To keep the length of the material reasonable, these categories will not be discussed at a more detailed level.

1.2.2 Mapping of Categories of Interest to Prior Models

This section will briefly analyze the relationship between the categories identified in this chapter and discussed earlier (1–14) and those specified in two recent citation analysis–based articles that evaluate the status and development of the field of IS: Sidorova et al. (2008) and Taylor et al. (2010). Using different approaches, these articles provide a useful and interesting analysis of the identity of the field based on an analysis of published literature. Both analyses track the change of the field over time, demonstrating how the key areas of interest have changed.

As Table 1.2 shows, the mapping between Sidorova et al. (2008) and the categories identified in Section 1.2.1 is straightforward, particularly after two of our categories (IS Success and Adoption and Diffusion of IT Innovations) were divided into two new ones based on the level of analysis (individual vs. organizational). The most significant insight from this analysis is the dearth of articles on IS development among the most highly cited IS studies—the only category that fits at least partially with IS development is design science (in which both articles advocate for more research on design science and provide guidelines for it, instead of presenting empirical evidence). Based on our analysis, most highly cited articles in the field of IS do not cover topics that are related to analysis, design, or coding of system solutions. Overall, IT and organizations and IT and individuals dominate; IT and markets and IT and groups have two and one subcategories associated with them, respectively.

Mapping to Taylor et al. (2010) was significantly more difficult than completing the same process in the context of Sidorova et al. (2008), at least partially because of the broad and somewhat amorphous boundaries of Taylor’s IS Thematic Miscellany and Qualitative Methods Thematic Miscellany categories. The results of the matching process are included in Table 1.3. Not surprisingly, IS Thematic Miscellany covers the largest number of subcategories, while the rest are distributed equally over the other categories.
One interesting question worth exploring is the shifts in the topics on which the field has produced highly cited articles. Table 1.4 shows for each of the 5 year periods starting from 1980 and ending in 2009, eight (or fewer, if the total number of categories represented was smaller than eight) most highly cited categories and the total number of articles and the sum of the citation metric counts from that time period.

There are a few categories that have stayed highly influential throughout the timeframe that is being evaluated. The consistency with which User acceptance and use of IT has maintained its top position is remarkable: it held the top or the second position throughout the 1985–2004 time period, dropping to the second place only once. Impact of IT on organizations was also included in the top eight categories for each of the time periods in 1985–2004, but with much modest rankings (except 1990–1994 when it held the top position). Another topic area with a consistent high-visibility presence throughout the observation period is IS success, although its positions at the top have been more periodic, punctuated

Other categories have gained a high-impact status later and then maintained it. *IT and business performance* emerged in 1990–1994 and has stayed as a top category ever since. Both *Knowledge management* and *Trust* have stayed as highly influential areas of research since they entered the top topic rankings in 1995–2009.

Research on *User satisfaction* and *IT implementation* peaked in 1980s. *Media and organizational communication* and *Group support systems* were in the center of the discipline between 1985 and 1995;
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research in these areas has not regained the same type of prominence later, although it will be interesting to see what impact a recent article by Dennis et al. (2008) will have, given that it builds heavily on the earlier media research tradition. In addition, several topics earned a visible position once based on one or two highly influential articles. These include Electronic marketplaces in 1985–1989 (Malone et al., 1987), Adoption in 1990–1994 (Cooper and Zmud, 1990; Moore and Benbasat, 1991), Coordination in 1990–1994 (Malone and Crowston, 1994), Self-efficacy in 1995–1999 (Compeau and Higgins, 1995; Compeau et al., 1999), Design science in 2000–2004 (Hevner et al., 2004), and Artificial intelligence in 2005–2009 (Adomavicius and Tuzhilin, 2005). These are obviously all important research areas, but still much less consistently prominent than those that have maintained top positions throughout the time period.

1.2.4 Summary

The analysis of the most highly cited articles in the field of IS demonstrates unequivocally the dominance of the research on User acceptance and use of IT. About 30% of the total citation index values to these top articles referred to this category, within which research based on the TAM and its derivatives (such as Unified Theory of Acceptance and Use of Technology or UTAUT; Venkatesh et al., 2003) dominates. As Venkatesh et al. describe both in this volume (Chapter 38) and in Venkatesh et al. (2007), TAM has been replicated in a variety of contexts to show its generalizability, its predictive validity has been demonstrated through a number of studies, it has been shown to perform better than competing models, and it has been expanded to study the antecedents of its key constructs. Despite (or maybe because of) the dominant position of TAM, the question about its value and future is controversial in the field of IS, as demonstrated, for example, by the Journal of Association of Information Systems special issue in 2007 entitled “Quo Vadis TAM—Issues and Reflections on Technology Acceptance Research” (Hirschheim, 2007).

While technology acceptance research focuses on individuals and their decisions regarding technology, the second highly influential research category, The Impact of IT on Organizations, specifically emphasizes issues at the organizational level. In this research, the key questions are related to the impact of IT on how organizations can and do change in the context of technology introductions and interventions. Particularly interesting are the unintended consequences that emerge when users find ways to appropriate the technology in ways that aligns with their goals, sometimes in a way that is very different from the designer’s or management’s intent.

Overall, the analysis in this chapter illustrates both the broad diversity of the research in the field and the dominance of some of the approaches. These results suggest the IS discipline strives to understand questions as diverse as the following (and naturally many more):

- Why do users choose to accept some technologies readily and others not at all?
- What are the mechanisms through which IT affects organizations and can be used to transform them?
- How do people make decisions regarding communication options using computer-based technologies?
- What structures, incentives, and technologies should organizations have in place to ensure success in knowledge management?
- How do we define and measure the success of IS in organizations?
- Do IT-based solutions really have a measurable impact on business performance?
- What impact do various technologies have on the formation and maintenance of trust in virtual environments?
- What are the special characteristics of electronic marketplaces and how do they operate?
- What are the factors that determine whether or not an individual or an organization adopts an IT solution and how an IT innovation spreads among individuals and organizations?
It is interesting to note that our analysis of the most influential papers in IS research included very few that are related to areas that many faculty members in the field consider to be its core and that form the key elements of the IS curriculum recommendations (see, e.g., Topi et al., 2010): data, database, and information management; systems analysis and design (the analysis, design, and implementation of systems that utilize computing technology); or IT infrastructure (design and implementation of computing artifact that provide either processing or communication capabilities).

1.3 Key Conversations within the Field

During its history, the IS discipline has engaged in a number of highly intensive conversations reflecting on its own identity and position in academia in which many of the leading authors of the field have participated. All these discussions consist of a number of connected journal articles and/or book chapters. There is no formal way of identifying these conversations in an exhaustive way and thus, while this chapter covers a few well-known representative examples of these dialogues, it makes no claims regarding completeness. The purpose is to use this as another mechanism to illustrate topics that have had in a central role within the IS community.

1.3.1 Rigor and Relevance

One of the most persistent topics discussed by the IS community is the question about the relevance of IS research and the relationship between relevance and scientific rigor. This conversation has been ongoing throughout the history of the field, punctuated by a number of highly intensive periods. One such period was the publication of a number of Issues and Opinions articles on this topic in the March 1999 issue of MIS Quarterly. Benbasat and Zmud (1999) made, without hesitation, a claim that most IS research “lacks relevance to practice,” identified this as a significant weakness of the field, and suggested approaches for changing the situation. In an interesting response to Benbasat and Zmud (1999), Davenport and Markus (1999) agree that the problem exists but they believe that an even more profound change to the field is needed—for example, moving further in our desire to emulate other management disciplines, IS should use medicine and law as our role models. In another response, Lyytinen (1999) calls for large and heterogeneous research teams that are able to attack large-scale problems from multiple perspectives. He also suggests that this debate looks quite different depending on the geographic context (e.g., the United States vs. Europe).

The next major event in this ongoing discussion was a large number of opinion pieces published in CAIS in 2001 as a “special volume on relevance,” following a particularly vigorous discussion on IS world (an electronic distribution list for the IS community). Given that the total number of articles in this particular conversation episode is close to 30, it is not possible to address all the issues covered at a detailed level or give justice to individual contributions. In his introduction to the special volume, Gray (2001) summarizes the outcomes of the conversation by identifying as common themes that IS research should be relevant and that practitioners do not read academic literature. The authors do, however, provide a wide variety of explanations regarding why this might be the case and what the field should do about the situation.

Over the past several years, this topic has been frequently discussed in articles published in top IS journals. For example, Rosemann and Vessey (2008) lamented the lack of progress in achieving a higher level of relevance despite the active conversations and provided specific guidance regarding the ways in which the IS community could improve the relevance of its research. They suggest a multilevel approach, which would address the problem at the institutional, project governance, and research process levels. They advocate for the use of the “applicability check” method as an integral part of the research process as a way to ensure that a research project achieves its relevance objectives. In another MIS Quarterly article, Klein and Rowe (2008) proposed modifications to the doctoral programs that would make them more attractive to professionally qualified students and potentially help them publish in forms and
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Outlets that are interesting to practitioners. Also in MISQ, Gill and Bhattacherjee (2009) found that the ability of the IS discipline to inform its constituents has declined, not improved, despite the high level of attention given to the question. They present five very specific proposals regarding actions the field should take in order to improve its relevance, emphasizing strongly the importance of these actions to ensure the ability of the field to survive.

Every episode of the rigor vs. relevance discussion tends to end with a prediction that the conversation will again lift its head in a few years. This is, indeed, likely to continue to be the case: despite the widely recognized ongoing challenge with relevance and the prescriptive guidance given, little seems to have changed. At the same time, demonstrating the relevance of the field for various stakeholder groups, such as practitioners, students, and public funding sources, has become increasingly important. This is clearly an area where much more work and specific action are needed, particularly if the field desires to be recognized among the practitioners as a source of valuable new practices, fresh ideas, and competent graduates.

1.3.2 Legitimacy and Core of the Discipline

Another very intensive debate within the field of IS has been related to the feeling of anxiety about the legitimacy of the discipline and the associated search for the disciplinary core. Lyytinen and King (2004) provide an excellent concise description of the history of what they call “anxiety discourse,” starting from Dearden’s (1972) MIS is a Mirage and including strongly worded concerns by acknowledged leaders such as Culnan and Huff (1986), Benbasat and Weber (1996), and Straub (1999). Since its beginning, the field has been unsure about itself, to the extent that—paraphrasing Weber—it cannot even agree whether or not it suffers from an identity crisis (Weber, 2003). Lyytinen and King (2004) identify the lack of a strong theoretical core as one possible reason underlying the anxiety (although they do not believe that to be the case). Not surprisingly, there have been many related debates regarding whether or not the field should have a one strong focused core and if it should, what it should be.

The key articles of this conversation and authors’ commentaries on their own work a few years later are captured in an important book edited by King and Lyytinen (2006). A comprehensive review of the individual articles or the issues covered in this dialogue is not possible within the scope of this chapter; instead, we will provide a short summary of the key questions and strongly encourage the interested reader to read the King and Lyytinen (2006) book.

One of the key questions debated in this context is whether or not the IS field should have a strong shared identity in the first place. Some very senior scholars within the field have over the years expressed a strong need to identify and articulate the identity of the field so that it can be more unified and defend its legitimacy more easily (e.g., Benbasat and Weber, 1996; Benbasat and Zmud, 2003; Weber, 2006). For example, Benbasat and Weber (1996) very clearly state that “[w]e run the risk, therefore, that diversity will be the miasma that spells the demise of the discipline” (p. 397). Particularly Benbasat and Zmud (2003) led to a number of contributions from other leading academics in the field to defend an opposite perspective that highly values diversity without articulated boundaries (DeSanctis, 2003; Galliers, 2003; Robey, 2003; Ives et al., 2004; see also Robey, 1996; Lyytinen and King, 2006). No true compromise or integrated position has emerged, although seeds of that can be seen already in Benbasat and Weber (1996), who recognize the need for both focusing on the core and achieving diversity around it. According to Taylor et al. (2010), the field has done this by maintaining a “polycentric core” while allowing for a diversity of methods, topics, and research contexts. Whinston and Geng (2004) suggest that allowing “strategic ambiguity” is important to allow continuous innovation within IS research, while still maintaining the centrality of the IT artifact.

Another frequently revisited topic addressed by the most senior members of the IS community is whether or not the field is in crisis. Markus (1999) made an important contribution to this discussion in a book chapter with a provocative title “Thinking the Unthinkable—What Happens if the IS Field as we...
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Know it Goes Away.” Her insightful views regarding the changes needed to the field are still important. Strong concerns regarding enrollments throughout the early 2000s and funding challenges caused by the great recession of 2007–2009 have strengthened the calls for quick action. For example, Hirschheim and Klein (2003) use the question related to the existence of the crisis as a framework to present their own suggestions regarding the state of the field and the direction it should take (interestingly, they end up not taking a stand regarding the existence of the crisis). For Benbasat and Zmud (2003), the crisis is specifically an identity crisis, with potentially very serious effects on the field. Galliers (2003) adopts a very different position, explicitly “deny[ing] that we are at a crossroads in the field” (p. 338). No consensus has emerged regarding this issue, either.

Yet another widely debated topic is the role of the “IT artifact” within the IS discipline. Orlikowski and Iacono (2001) call the IS discipline to engage more deeply in the process of understanding the IT artifact, which they defined as “those bundles of material and cultural properties packaged in some socially recognizable form such as hardware and/or software” (p. 121). After articulating five different views of technology (tool, proxy, ensemble, computational, and nominal), they demonstrate how the great majority of IS articles published in Information Systems Research in 1990s are either ignoring the IT artifact entirely or view it from perspectives that hide the significant interdependencies between system characteristics and the social and organizational context in which the systems are used. Orlikowski and Iacono (2001, p. 133) present a beautiful articulation of the special contribution the IS discipline can make at the intersection of technology and the contexts in which it is used, if it takes seriously its role in understanding the IT artifact in a deeper way:

However, none of these groups attempts to understand the complex and fragmented emergence of IT artifacts, how their computational capabilities and cultural meanings become woven in dense and fragile ways via a variety of different and dynamic practices, how they are shaped by (and shape) social relations, political interests, and local and global contexts, and how ongoing developments in, uses of, and improvisations with them generate significant material, symbolic, institutional, and historical consequences. Yet, this is precisely where the IS field—drawing as it does on multiple disciplines and different types of analyses—is uniquely qualified to offer essential insights and perspectives.

Building on Orlikowski and Iacono (2001), Weber (2003) and Benbasat and Zmud (2003) make a strong call for the centrality of the IT artifact and “its immediate nomological net” (Benbasat and Zmud, 2003, p. 186) within the IS discipline. For Benbasat and Zmud, the IT artifact is “the application of IT to enable or support some task(s) embedded within a structure(s) that itself is embedded within a context(s)” (p. 186) Others, such as Galliers (2003) and DeSanctis (2003), strongly advocate for the need to let the field move without constraints created by the need to link the research to the IT artifact, however it is defined. Recent reviews of the discipline’s areas of focus (Sidorova et al., 2008; Taylor et al., 2010) both suggest that in practice, the field continues to embraces a broad perspective without constraints and at best a polycentric core with extensive surrounding diversity.

1.3.3 Reference Disciplines

The final broad discussion topic that the field of IS engages in at regular intervals is that of the relationship between IS and other disciplines, particularly from the perspective of identifying which discipline is serving as a reference discipline to the other. From the early days of the IS discipline, the field has been characterized as one that has its roots in a number of reference disciplines, such as computer science, economics, and psychology (Keen, 1980), management and organization science in addition to computer science (Culnan and Swanson, 1986) or, increasingly, marketing in addition to economics and less computer science (Grover et al., 2006). In the early days of the field, many faculty members had backgrounds in these fields, which (and many others, such as sociology, social psychology, philosophy,
and organizational behavior) also were the source of key theories, conceptual frameworks, and methodological innovations for IS. This continues to be the case (Grover et al., 2006).

The key question more recently has been whether or not IS has reached a status of being a reference discipline itself, contributing to other fields. This is another area where an intense debate appears to continue without a conclusion: some authors (Baskerville and Myers, 2002; Grover et al., 2006) firmly believe that there is strong evidence that IS has emerged as a real reference discipline for related fields whereas others disagree or at least skeptical (e.g., Wade et al., 2006; Gill and Bhattacharjee, 2009). In a recent editorial, Straub (2012) points out that at least one requirement of IS serving as a reference discipline is fulfilled: over its relatively brief history, IS has been able to develop native theories, such as TAM and UTAUT (Section 1.2.1.1 of this chapter), task-technology fit theory (Section 1.2.1.1), adaptive structuration theory (Section 1.2.1.11), and the information success model (Section 1.2.1.6). Regardless of the extent to which IS serves as a reference discipline to other areas of study, the discipline has advanced very significantly from the times when it was solely depending on other fields in terms of its theories and methodologies.

1.4 Summary and Conclusions

This chapter has taken us through the most influential categories of IS research during the past 30 years and a number of ongoing or frequently reemerging scholarly conversations within the field. This last section of the chapter will discuss some of the implications of the findings described earlier.

In Section 1.2.4, the following questions were used to illustrate in practical terms the diverse nature of the most widely cited IS research:

- Why do users choose to accept some technologies readily and others not at all?
- What are the mechanisms through which IT affects organizations and can be used to transform them?
- How do people make decisions regarding communication options using computer-based technologies?
- What structures, incentives, and technologies should organizations have in place to ensure success in knowledge management?
- How do we define and measure the success of IS in organizations?
- Do IT-based solutions really have a measurable impact on business performance?
- What impact do various technologies have on the formation and maintenance of trust in virtual environments?
- What are the special characteristics of electronic marketplaces and how do they operate?
- What are the factors that determine whether or not an individual or an organization adopts an IT solution?

Level of analysis varies from individual to societal, and research methods are equally varied. Philosophically IS researchers view these questions through multiple lenses. The field does not have a shared view regarding whether or not this diversity is good (as indicated in Section 1.3.2). Even if the field came to the conclusion that this diversity should somehow be harnessed, finding practical mechanisms for doing so is difficult (except through very specific editorial policies in our top journals). Still, it is important to keep emphasizing the importance of building cumulative results (Keen, 1980) that will continue to build toward the discipline’s own Body of Knowledge.

As discussed earlier, the discipline continues to suffer from an uncertainty regarding its own academic legitimacy and whether or not the field is in crisis. Self-reflective evaluations are important for the development of the field; at the same time, it is essential that an unnecessarily large share of the discipline’s top resources is not used on introspective processes. To thrive, the field needs to develop a shared understanding and, indeed, an identity that gives its members a sense of belonging and a basis on which to build the inter- and transdisciplinary collaboration that will be increasingly important.
One surprising result that emerged from the analysis presented in this chapter is the very insignificant role that articles focusing on core IS education topics have among the most influential IS research articles. One can legitimately wonder why research on systems analysis and design, data management, IT infrastructure, enterprise architecture or even IT strategy, management, governance, and acquisition has no visibility among the most highly cited works (together with IS project management, these form the core topics in the latest IS model curriculum, IS 2010; Topi et al., 2010). Maybe even more surprisingly, where are information-related topics? Given the recent emergence of iSchools (sometimes under the informatics title, sometimes information science, or simply information) as serious research enterprises, is the strongest expertise related to information and related topics any more within the field of IS—or has it ever been there? How long can the field make strong claims regarding its true contributions to the practice of IT if its most influential research is very far from these topics?

At the same time, this volume of the Computing Handbook includes a large number of excellent examples of outstanding scholarly work in areas that have been traditionally considered the core in IS (at least in IS education), demonstrating that this work exists and is thriving. It has just not been cited (i.e., used by others) at the same level of intensity as the research that emerged on the top in this analysis. Citations per se are not of importance, but they have an increasingly significant role as a core metric within the research enterprise. In addition, they tell at least a partial story about which research gets noticed and which does not. Also, one has to wonder what these results suggest about the possibilities for integration of research and teaching in the IS field, given that the most highly visible research topics are not aligned with what we teach.

If our focus in education will increasingly move toward general business topics such as, for example, creativity, business process design, service design, or organizational innovation, what differentiates us from other fields within business that have these same interests (such as operations management or marketing)? It appears that Orlikowski and Iacono’s (2001) call to move toward a deeper understanding of and stronger theorizing about the IT artifact is as relevant as it was more than a decade ago. Shouldn’t IS find its legitimacy and focus in the areas where a true understanding of information and IT is integrated with a true understanding of a domain that wants to benefit from effective and efficient use of information and IT resources? This essential space is there for us to keep and nurture—this is the area that we are uniquely qualified to occupy.

1.A Appendix

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