Abstract

The information systems (IS) research community has long engaged in dialogue as to the core of IS and the discipline’s legitimacy within business schools. Our concern is that efforts to protect the discipline by theorizing the IT artifact may have diverted attention from conceptualizing information as the dependent variable, through which we assess the effectiveness of our true core subject matter—information systems. To evaluate this supposition, this study employs a text-mining software, Leximancer v.4, to analyze the content of editorials published in AIS “basket of six” journals between 2002 and 2014. Preliminary results hint at subtle changes in themes, as well as the meaning and relevance of “information” over time. Once analysis is complete, we will draw on the findings to suggest potential opportunities and directions for IS research that treat information (the end) as seriously as its means (the IT artifact).

Keywords: IT artifact, formats, instructions, length, conference publications
Introduction

The information systems (IS) research community has long been engaged in reflective discussions about the nature of the IS discipline. To that end, one article, “Desperately Seeking the "IT" in IT Research--A Call to Theorizing the IT Artifact” (Orlikowski and Iacono 2001), has exerted considerable influence in defining the discipline’s core subject matter and priorities. In this work, the authors assert that the IS field is “premised on the centrality of information technology in everyday socio-economic life…. [yet] the field has not deeply engaged with its core subject matter—the information technology (IT) artifact” (p. 121). Since its publication in 2001, the article has been cited more than 2000 times according to Google Scholar, reflecting its influence on IS research. This year's conference theme presupposes “that while technology is a critical means,” information, not technology, is of “ultimate interest and value.” That is to say, that information, not the IT artifact, is the “improved something” by which we measure the “effective design, delivery, and use of information systems” (Keen 1980, p. 14). Lacking a clear conceptualization of information prevents the IS research community from engaging deeply with our true core subject matter—information systems.

We believe, that in an effort to theorize the IT artifact, the IS research community may have neglected its dependent variable—information. To evaluate this supposition, this study examines editorials published in major IS journals for the period, 2002-2014. Editorials reflect on and set directions for IS research (Walsham 1995). Because editorials direct IS researchers’ attention to what to study and how, they provide a barometer of the extent to which IS research has conceptualized or engaged with the information artifact since the publication of Orlikowski and Iacono’s (2001) seminal article. Specifically, we ask: “Where is the “information” in Information Systems research?” The goal of this research-in-progress is to suggest potential opportunities and directions for IS research that treat information (the end) as seriously as its means (the IT).

The paper unfolds as follows: First we briefly review the reflective discussions that have helped define the IS discipline. Then, we outline the influence of these discussions on IS research. Next, we describe our method for evaluating the IS community’s engagement with information and report progress to date. The paper concludes with a description of future steps.

Defining the Information Systems Discipline

At the first International Conference for Information Systems, Peter Keen (1980) suggested that Management Information Systems (MIS) was a sub-discipline, like organizational behavior, rather than a formal, classical, discipline. To be considered a classical discipline, Keen argued, the field needed to answer several key questions. One of Keen’s concerns was the lack of a cumulative tradition: “the field has been driven by changes in technology, rather than by issues of management, information and systems that are independent of specific technologies” (p. 13). In pondering the IS research community’s ability to evolve into a classical discipline, Keen concluded that “[MIS] must obviously go beyond fads and reactions to new hardware and offer something that remains meaningful as technology changes.” Most importantly, Keen (p. 12) makes explicit that “effectiveness” refers to “a literal economy of information and [reference disciplines may be any that] deal with assessments of performance or valuation of information.”

In the early days of the IS field, others expressed similar notions about the importance of information to defining our emerging discipline. For example, Ackoff (1967) discussed how managers use/misuse information when expressing his concerns about management information systems. Davis (1974, p. 12) defined MIS as “an integrated man/machine system for providing information to support the operation, management, and decision making functions in an organization.” Banville and Landry (1989) suggested that “MIS [had] made significant contributions in many domains of knowledge” (p. 58) due to the originating perspective of researchers on management, information, systems, or a combination of the three. Early IS literature suggests that information, not technology, is at the core of the IS discipline.

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Over time, the focus on information waned, as new issues and debates arose within the field. IS faculties in many universities were trying to break free of the field’s roots in sub-disciplines, such as accounting and management, and establishing IS as its own discipline. Following Keen’s (1980) advice, the IS research community established rigorous and respectable journals (e.g., *MIS Quarterly* and *Information Systems Research*) and conferences (e.g., *International Conference on Information Systems*). Research progressed from frameworks to research models, leading to calls for researchers to build on others’ work in the IS field to develop, extend, and test IS theory.

**Diversity in Information Systems**

By the mid-1990’s, the lack of a core in IS was becoming a cause for concern. To that end, Benbasat and Weber (1996) offered a commentary in which they noted that differences existed in how North American and European IS researchers viewed the quest to build legitimacy in a traditional academic sense. The authors noted that, while North Americans were pursuing positivistic views and rigid application of theory, Europeans sought more diversity in research methods and types of theory. The article identified diversity within the field in terms of problems, theories, and research methods and posed several questions regarding the boundaries of the discipline, evaluating IS research, and influences on progress. Benbasat and Weber suggested that embracing diversity may be hurting the IS discipline and expressed the need “to articulate the core of the discipline...[which gives] IS its distinctive character, and if one exists might be narrow and fairly well defined” (pp. 388-389).

In response, Robey (1996) stated that rather than being a detriment, diversity of methods, theories and problems were a strength of the IS field. He argued that IS journal editors had encouraged participation in its journals by researchers outside the boundary of IS, in order to broaden the ideas and application of IS research. Nevertheless, he encouraged disciplined diversity, in that research aims should relate “to the practical interests in the IS field” (p. 406) and allow for multiple theories and methods to study phenomena to yield new insights. In doing so, Robey argued that the IS field was unlikely to identify a core and encouraged collaboration as a means of coping “with the threat posed by diversity.”

**The IT Artifact**

In 2001, Orlikowski and Iacono added to the debate, suggesting that the lack of attention to the IT artifact in theory was limiting the potential of the IS discipline: “Much IS research draws on commonplace and received notions of technology...as a consequence, IT artifacts in IS research tend to be taken for granted or are assumed to be unproblematic” (pp. 121-122). The authors explored how technology was perceived in articles published in *Information Systems Research* throughout its first decade (1990-1999) and noted that others had expressed concerns with narrow views of technology during the 1980’s. Orlikowski and Iacono argued that for the IS discipline to offer meaningful contributions, IS researchers must keep the IT artifact at the core of their research, rather than taking it for granted.

Orlikowski and Iacono’s (2001) work represents an important movement toward the type of unification in IS that, coincidentally, the paper’s accepting editor (Benbasat) had called for earlier. It is possible that this movement triggered a “hyper-focus” on the IT artifact as the means, to the detriment of information, as the end. The focus on the IT artifact was supported by an ongoing dialogue about the identity of the field.

**Identity Crisis**

In 2003, Benbasat and Zmud assessed the state of the IS discipline, stating that:

IS scholars research and teach a set of diverse topics associated with information technologies, IT infrastructures and IT-enabled business solutions (information systems, and the immediate antecedents and consequences of these information systems (e.g., managing, planning, designing, building, modifying, implementing, supporting, and/or assessing IT-based systems that serve, directly or indirectly, practical purposes). (p. 184)

These authors argued that, to gain legitimacy, the IS discipline should protect its identity by researching its core, the IT artifact, within a common nomological net. Benbasat and Zmud called for researchers to focus on phenomena related to how IT artifacts are developed, used, and impact their context. In their concluding comments, the authors suggested that the IS research community was borrowing too much
from other domains and that IS researchers avoid treating the IT artifact (and IS systems) as a “black box.”

After the publication of Benbasat and Zmud’s (2003) article, a large number of papers were published that expressed support, concerns, or stimulated further dialogue. Articles appeared in many outlets including MIS Quarterly, Journal of the Association for Information Systems, Communications of the Association for Information Systems, as well as in books on the IS field (King and Lylytinen 2006).

**Lingering Concerns**

The debates over diversity, the core subject matter of our discipline, and the focus on the IT artifact and its nomological net, reflected valid concerns about the future and legitimacy of IS as a discipline at particular points in time—for example, when the Association to Advance Collegiate Schools of Business (AACSB) was considering removing information systems as a core course within its standards. During this period of heightened self-reflection, MIS Quarterly’s then Editor-in-Chief, Ron Weber, wrote an editorial questioning whether the IS discipline had a core and suggesting that a search for one may be “unproductive” (Weber 2003). Indeed, Weber appeared, initially, to refute ideas that meaningful IS research would focus on the IT artifact: “the core, if one exists, will not lie in theories that account for information technology-related phenomena. Rather, it will lie in theories that account for information systems phenomena.” Nevertheless, the editorial ended with (what amounts to) a strong endorsement of the IT artifact, when Weber stated that senior editors at MIS Quarterly would likely consider Orlikowski and Iacono’s (2001) and Benbasat and Zmud’s (2003) position to be:

a reasonable basis for evaluating whether a paper falls within the boundaries of our discipline and thus potentially is a suitable publication in the MIS Quarterly... for authors who intend to submit their papers to [MISQ], I believe it will be helpful if they reflect on whether they have made ‘errors of exclusion’ or ‘errors of inclusion.’ If so, their papers might best be submitted elsewhere. (p. x)

While no single article is responsible for setting IS research priorities, the cumulative effects of the ongoing debate about the IS discipline’s “core”, together with editorials such as this, helped convince the IS research community that in measuring “the effective design, delivery, and use of information systems in organizations,” the “improved something” referred to by Keen (1980, p. 13), refers to the IT artifact, not information, as Keen had intended.

Years (and, in some cases, decades) later, these commentaries (among others) still resonate. Doctoral students read these debates and are influenced by their themes. Junior scholars and mid-career faculty “fall in line” with their rhetoric in pursuit of recognition and promotion. Over time as these direction-setting initiatives have become codified into the IS knowledge base, articulating the IT artifact within its nomological net has become a dominant paradigm in IS research. This paradigm influences how research is carried out, what theories are deemed appropriate, and what topics are acceptable. Therefore, it is appropriate to explore how IS research has been influenced by definitions of the IS discipline.

**The Influence of Definitions on IS Research**

Research commentaries and editorials influence researchers in their research design (Walsham 1995). To demonstrate this point, we note some well-developed research streams that emerged in North America but are broadly applied.

**Technology-Based View**

Technology acceptance is one of the most mature research areas in IS. The dominant theories in this area adopt a technology-centric view. For example, Davis et al.’s (1989) technology acceptance model (TAM) has a stated goal of providing “an explanation of the determinants of computer acceptance that is general, capable of explaining user behavior across a broad range of end-user computing technologies and user populations...” (p. 985, our emphasis). Further, the measurement items in the original model show that Perceived Ease of Use refers wholly to the technology, while items for Perceived Usefulness are only indirectly related to the benefits of the information or outputs of technology use.
One of the many updates to TAM is the unified theory of acceptance and use of technology (UTAUT) (Venkatesh et al. 2003). This model was developed based on a review of technology acceptance models, and focuses on behavioral intentions and use of technology. Consistent with TAM, items for each construct give primacy to technology. In our view, information (as an output of the system) may be relevant in measuring Performance Expectancy, which is defined as “the degree to which an individual believes that using the system will help him or her to attain gains in job performance” (p. 447).

The task technology fit (TTF) model by Goodhue and Thompson (1995) was motivated because “[t]he linkage between information technology and individual performance has been an ongoing concern in IS research” (p. 213). Goodhue and Thompson explain that their Technology-to-Performance Chain recognizes “that technologies must be utilized and fit the task they support to have a performance impact, this model gives a more accurate picture of the way in which technologies, user tasks, and utilization relate to changes in performance” (p. 216). In defining tasks, Goodhue and Thompson provide an example of processing queries against a database, but do not specifically refer to information.

While these are only three models/theories in the IS field, these foundation papers have garnered over 50,000 citations combined in Google Scholar. If the studies that built on these models were also considered, the true impact of this research stream on the IS discipline would be even greater. Yet, remarkably, these models almost completely disregard improved information as measurable outcomes of technology acceptance and use. Therefore, we sought to identify literature streams within IS that have a stronger focus on information.

**Information-Based View**

DeLone and McLean’s (1992) research seeks to identify the dependent variable in the IS discipline (i.e., success) by focusing on the role of information in an information system. In developing the IS success model, DeLone and McLean refer to information as “the output of an information system or the message in a communication system” (p. 61). Drawing on arguments formulated by Mason (1978) they explain that an IS “creates information, which is communicated to the recipient who is then influenced (or not!) by the information. In this sense, information flows through a series of stages from its production through its use or consumption to its influence on individual and/or organizational performance” (p. 61). In the development of their model, it is interesting to note that they explicitly articulate an information quality construct, with system quality developed to represent technology.

Another literature stream with a focus on information is the burgeoning sub-discipline of NeuroIS. With its focus on using neurophysiologically-based recording technologies to investigate IS problems, one might think that NeuroIS adopts a technology-based view. However, in this stream researchers use technology to record neurophysiological data (as information derived from the brain) to complement existing sources of information. This information has been found to be beneficial to: “(1) development and use of systems, (2) IS strategy and business outcomes, and (3) group work and decision support” (Dimoka et al. 2012, p. 680). Thus, NeuroIS presents a new form of information that can be collected about individuals, which may in turn affect IT.

While other domains within IS are also information-focused, the IS success model and NeuroIS were chosen as two areas of inquiry (one traditional; one new) that demonstrate how an information-based focus can open up avenues for investigating the effective design, delivery, and use of information systems.

**Research Method**

**Data Collection & Analysis**

To evaluate the IS field’s interest in conceptualizing or engaging with the “information” artifact since the publication of Orlikowski and Iacono’s article, we examine editorials published in leading IS journals for the period, 2002-2014. Following prior work (e.g., Walsham 1995), we chose editorials because their rhetoric informs the field about what to study and how. Further, many of the commentaries referred to in this study relied on editorial statements to understand and explain patterns in IS research (e.g., Benbasat and Weber 1996; Robey 1996). Our sample is drawn from five of the six leading IS journals: *European Journal of Information Systems* (EJIS), *Information Systems Journal* (ISJ), *Information Systems Research* (ISR), *Journal of Management Information Systems* (JMIS), and *MIS Quarterly* (MISQ). In
2007, based on a recommendation from the IS Senior Scholars Consortium, the Association for Information Systems (AIS) adopted these journals as the ‘basket’ of top six journals in the IS field (Liu and Myers 2011). The Journal of the Association for Information Systems (JAIS) was excluded from our sample because it has infrequent editorials that are rarely written by an editor-in-chief. In total, our dataset comprises 333 editorials: 83 from EJIS, 62 from ISJ, 33 from ISR, 78 from JMIS, and 80 from MISQ.

Leximancer v.4 is used for conducting content analysis on the data. Leximancer is a sophisticated text analytic tool that uses metrics from Bayesian Theory, as well as algorithms from computational linguistics and physics, to extract semantic and relational meaning from collections of documents. To examine dominant themes and potential changes in discourse surrounding “information” in editorials between 2002 and 2014, we first combined data from all journals. Next, we separated the combined dataset into four datasets for finer analysis, covering the periods: 2002-2005, 2006-2008, 2009-2011, and 2012-2014. An initial pass to automatically generate concepts was performed separately on each dataset. Following prior IS studies (e.g., Indulska et al. 2012; Indulska and Recker 2010), the resulting thesaurus was edited to remove concepts that did not add meaning (e.g., journal names, editor and author names). After this step, Leximancer’s default operating parameters were used to extract meaning for each period. Information is displayed in a heat map representing themes (i.e., clusters of concepts, named after the most prominent concept in a cluster), concepts, and their interrelationships (Smith and Humphreys 2006)². To illustrate, Figure 1 displays heat maps for the periods 2002 – 2005 and 2012 – 2014. The color of each circle represents the extent to which a theme is connected to other concepts in the heat map. “Hot” colors (e.g., red, orange, yellow) signify dominant themes, while “cold” colors (e.g., green, blue, purple) indicate themes that are less important.

Figure 1. Heat Maps for 2002-2005 (left) and 2012-2014 (right)

Preliminary Findings

In 2002 – 2005, Leximancer extracted 60 concepts from the editorial articles. As depicted in Figure 1, the dominant themes during this period were: Systems (red, 100% connectivity), Research (orange, 97% connectivity), and Management (orange-yellow, 63% connectivity). In 2012-14, the dominant themes were: Use (red, 100% connectivity), Social (orange, 76% connectivity), and Data (orange-yellow, 54% connectivity). Seventy-four (74) concepts were extracted in this later period.

² For more information about Leximancer, please refer to www.leximancer.com.
Our preliminary findings (summarized in Table 1) suggest subtle changes in themes, as well as the meaning and relevance of “information” over time. During 2002-2005, “information” often appeared in the same text segments as “systems” (82% likelihood) or “technology” (55% likelihood) and was directly linked to these concepts but not to “management”, “data”, “knowledge,” “analysis,” “use,” or “quality.” Analysis of the pathways between “information” and its related concepts indicates that these relationships are mostly oriented around technology. For example, considering information management, the relative contributions of information (0.11) and technology (0.89) in the knowledge pathway indicates that information management is oriented toward technology management, rather than information. This relationship changes over time as “technology management” is subsumed within the broader concept of “information systems management.” Notwithstanding this point, information management remains more focused on technology than information.

### Table 1. Themes and Related Concepts Identified Across 2002-2014

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<th>Period</th>
<th>Dominant themes (and concepts within themes)²</th>
<th>Information and its related concepts</th>
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| 2002 - 2005 | **Systems** (systems, information, development, technology, organizational, context, field)  
Research (research, theory, need, focus, understand, knowledge, methods, problems, believe, social, view)  
Management (management, process, organizations, model, present, business, impact, successful, associated, factors). | 1. The relationships between “information” and “management,” “data,” and “analysis” are oriented around technology.  
2. The relationship between “information” and “quality” mostly understood in terms of the development process.  
3. The relationship between “information” and “knowledge,” is focused on knowledge within the IS field. |
| 2006 - 2008 | **Developing** (developing, technology, organizational, organizations, business, understanding, focus, context, support, implementation, social)  
Research (research, systems, information, design, contribution, problems, critical)  
Process (process, management, knowledge, need, software)  
Use (use, model, analysis, adoption, standards, order, online) | 1. The relationships between “information” and “management,” “data,” “quality” and “knowledge” understood in terms of information systems.  
2. The relationship between “information” and “analysis,” remains oriented around technology.  
3. The relationship between “information” and “use,” still synonymous with IS use. |
| 2009 - 2011 | **Use** (use, model, process, analysis, results, factors, support, change, present)  
Development (development, theory, work, social, need, knowledge, contribution, understanding, projects, lead)  
Information (information, systems, management, focus, literature)  
**Note:** “Development,” which in this period focuses on theory development is not the same as the “Developing” theme (06-08), or “development” concept (02-05), which focused on system development. | 1. The relationship between “information” and its related concepts in this period can be understood in terms of two distinct discourses:  
a) Information privacy and trust in the online context.  
b) Theory development in information systems research.  
2. The relationship between “information” and “use” remains synonymous with IS use. |
| 2012 - 2014 | **Use** (use, systems, information, process, management, project, level, media, software)  
Social (social, related, technology, organizational, context, role, change, form, communication, digital)  
Data (data, analysis, model, need, impact, time, community, quality) | 1. Information has lowest relevance of entire data collection period (61%) as the field cools on privacy and security. Information subsumed within use.  
2. Information’s relationships with other concepts is less clear: variously understood in terms of technology, sociotechnical, process, users, models and business analytics. |

²Themes are italicized and associated concepts shown in parentheses. A period’s dominant theme is presented in bold and underlined with its associated concepts also bolded.
The periods 2009 – 2011 and 2012 – 2014 are particularly revealing. With a relevance score of 82%, “information” emerges as a dominant theme between 2009 and 2011. Exploring the relationship between “information” and its related concepts reveals two distinct discourses underlying this shift: (1) information privacy and trust in the online context, and (2) theory development in IS research. Still, 2012 – 2014, shows a marked decline (61% relevance) in discourse about “information,” as the field cools on privacy and security issues and research attention shifts to data science and business analytics. Moreover, the relationships between “information” and other concepts become less clear; “information” is varyingly understood in terms of technology, sociotechnical issues, users, models, and business analytics.

**Future Steps**

We caution that the results presented here are preliminary. Still, our initial findings lend weight to concerns that the field is missing opportunities to engage meaningfully with the information artifact. Moving forward, we will use Leximancer to conduct a more extensive analysis of our data. For example, it is possible to parse the data annually and by journal. Given the debate over diversity, it is worthwhile to examine the extent to which our European and US-based journals have diverged (or converged) in editorial policies over time. Additionally, we are interested in exploring concepts such as “technology” and “use” more deeply, particularly as these relate to other concepts. As Table 1 demonstrates, the meaning of specific concepts can change of time. For example, the “Development” theme, which in 2009-2011 focuses on IS theory development, does not have the same meaning as the “Developing” theme in 2006-2008 or the “development” concept in 2002 – 2005, which focused on system development. Given the “Big Data” phenomenon, it will be interesting to explore whether a similar shift is taking place in the meaning of “Data” and the implications of such for IS research. We might also conduct a similar exercise by examining the changing meaning of “system” within our field. Our exploration may lead to new classifications of sub-disciplines within IS that should be accounted for by editors, through special issues, and by hiring bodies at universities. In future publications, we seek to identify a research agenda to guide IS researchers on alternatives to the technology-based view.

**Conclusion**

Over the past twenty years, the IS research community has been engaged in a strong dialogue as to the core of IS and the legitimacy of the discipline within business schools. In 2001, Orlikowski and Iacono’s seminal work marked a distinct shift in focus to the IT artifact, with the IS community following suit. Our concern is that focusing on the IT artifact has diverted research attention from developing a conceptual definition of information. As the ultimate dependent variable, information is the means by which we measure the effectiveness of our true core subject matter—information systems. As Weber (2003) noted, “Our discipline is called the information systems discipline, not the information technology discipline... Information technology is simply the platform or resource on which we build information systems.”

To uncover trends in how IS research has conceptualized or engaged with information, this study analyzes editorial articles published in the AIS “basket of six” journals between 2002 and 2014. Preliminary results hint at subtle changes in themes, as well as the meaning and relevance of “information” over time but also indicate that the meaning of information has not yet gained equilibrium. Our future efforts seek to further explore the meaning of information and related concepts across our journals and over time. Once analysis is complete, we will draw on the findings to suggest potential opportunities and directions for IS research that treat information (the end) as seriously as its means (the IT).

Keen (1980) stated, “Until we have a coherent definition of information, we have nothing to measure. Surrogates for improved information, such as user satisfaction, or terminal hours of usage, will continue to mislead us and evade the issue of a theory of information for MIS.” As a community, let us reconsider some of our early ideas as a foundation for exploring the nature and theoretical influence of information in an increasingly digital world.
References