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Thirty Years of IS Research: Core Artifacts and Academic Identity

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Abstract:

This paper puts forward an academic identity for the IS discipline which emerges out of its displayed academic artifacts – namely, papers published in two of the discipline's major journals (Information Systems Research and MIS Quarterly) between 1977 and 2006. Our study focuses on two specific attributes of these papers: the focal IT Artifact and the IS Theme. An analysis of 1056 papers reveals an academic identity characterized by a relatively persistent focus on a small set of IT Artifacts and a similarly small set of IS Themes. The analysis suggests that our academic identity is indicated by two central and enduring intellectual cores associated with a handful of IT Artifacts and IS Themes, which have captured the attention of IS researchers over three decades. This academic identity may be described as the scientific study of the design, development, and management of information technologies, as well as their use by and impact on individuals, groups, and organizations. Of particular interest are information technologies (and their specific components) that enable communication, collaboration, and decision making. A follow up analysis of the papers published in 2007 and 2008 provides support to the central and enduring nature of our discipline's intellectual core.

Keywords: academic artifacts, academic identity, IT Artifact, IS themes, IS research

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I. INTRODUCTION

Recent years have brought about a debate within the IS discipline concerning indicators of its academic identity, and the desire to identify an intellectual core that will be strongly associated with IS research. Such core is said to play an important foundation for the creation of IS theories. Within this debate, the role of the IT Artifact has been widely discussed, with Orlikowski and Iacono [2001] directing the attention of IS scholars to an apparent lack of engagement with what they considered the core subject matter of our discipline. As a solution, they prompted IS scholars to begin theorizing explicitly about the IT Artifact. Benbasat and Zmud [2003] proposed the IT Artifact and its immediate nomological network as a core for the IS discipline. King and Lyytinen [2004] also suggested that focusing on the IT Artifact would be effective in establishing our academic identity. Other IS researchers, however, voiced their concerns that, although our academic identity is likely to be associated with the IT Artifact, emphasizing an IT Artifact-based core may be an overly narrow focus for the discipline [e.g., Agarwal and Lucas 2005]. Echoing a similar concern, Weber [2003] suggested expanding the search for our academic identity to include IS phenomena (as opposed to IT phenomena) by identifying and classifying the foci of IS researchers.

Motivated by these calls for deeper engagement with the discipline's core, this study aims to shed light on our academic identity by building on the notions that we are what we do [Dutton 2003], what we possess [Belk 1988], and in the context of an academic discipline, what we study and publish [Johnson 2001]. Accordingly, we examine the discipline's journal publications – as represented in two of the discipline's main journals: *Information Systems Research (ISR)* and *MIS Quarterly (MISQ)*. In line with the above mentioned IS literature, we focus on two key paper attributes which were identified in the preceding paragraph as important indicators of our academic identity: namely, the IT Artifacts studied in these papers and the papers' IS Themes. We present a detailed view of these identity indicators and their roles in IS research over time to provide insights into our academic identity. We believe that examining both the IT Artifact and the IS Theme is warranted since: (1) not all papers zoom in on a particular IT Artifact; and (2) juxtaposing these two distinct paper attributes will serve as a stronger indicator of our academic identity than treating them in an undifferentiated manner or focusing on only a single attribute.

The paper begins with an overview of the identity literature to establish context and motivation for this study. Borrowing the notion of organizational identity, we further focus on the identity of an academic discipline. Next, a theory of artifacts is reviewed to explain how artifacts of various kinds may be used to study identities. Following a research methodology section, key findings are presented and described. These findings are then interpreted in light of the paper's main objectives. The paper concludes with implications for IS research, and suggestions for future work.

II. IDENTITY

To provide a suitable lens for studying the academic identity of the IS discipline we examine the literature on organizational identity. Note that organizational identity is not limited to commercial, hierarchical organizations, but may also be applied to various forms of social groups, communities, and collectives [Rafaeli et al., 1997]. Recognizing the IS discipline to be a collective of IS scholars who publish in IS journals suggests that this lens may be used to guide the search for an IS academic identity. For presentation purposes, we thus employ the term "collective identity" in this section, to discuss the identity of the IS discipline.

A *collective's identity* represents members' shared sense of who they are and how the collective should be presented to an external audience [Albert and Whetten 1985; Corley and Gioia 2004]. It is important for several reasons. First, a strong and cohesive identity is associated with improved performance [Brown et al., 2006]. Second, unambiguous and consistent identity can increase members' knowledge contributions [Agarwal and Ma 2007]. Third, lack of identity may be detrimental to survival efforts, impairing efforts to recruit, integrate, and socialize new members [Gongla and Rizzuto 2001]. Fourth, identity is generally recognized as an antecedent of legitimacy [Foreman and Whetten 2002]. And fifth, identity indicates to insiders and outsiders alike what actions and behaviors they can expect from the collective [Hsu and Hannan 2005]. Linking this last point back to the notion of legitimacy, a collective that exhibits actions incongruent with its espoused identity is perceived as unpredictable and untrustworthy [Whetten 2006]. Such is the case of identity crisis.

Identity crisis describes a situation where there exist discrepancies between a proclaimed identity and actual actions and behaviors [Corley and Gioia 2004]. In our academic context, a discipline may experience an identity crisis when

it does not study particular phenomena or a dominant design, or when the changing and evolving phenomena do not follow clear and unique trajectories over time and across circumstances [Agarwal and Lucas 2005; Benbasat and Zmud 2003; King and Lyytinen 2004]. While not all IS researchers agree on the nature of such crisis [e.g., Agarwal and Lucas 2005; King and Lyytinen 2004], there appears to be general agreement that the debate itself is healthy for the IS discipline [Sambamurthy 2005]. Accordingly, this paper seeks to inform this debate, beginning with a discussion on the process of establishing identity.

Central, Enduring, and Distinctive Characteristics

Clueing others about an identity often involves carrying out the same actions repeatedly, leaving distinctive marks regardless of the circumstances [Whetten 2006]. Establishing such identity may be an outcome of an introspective and retrospective process initiated by the collective's members in search of a sense of self, or it may be a result of a process executed by an outside audience trying to make sense of the collective's actions and behaviors [Hsu and Hannan 2005; Whetten 2006]. Outsiders in the context of academia can be other disciplines such as marketing and organizational studies, people who are outside of the academic world but read our academic publications, or IS Ph.D. students who try to make sense of their new community.

Regardless of the source of the identification process, a collective's identity is likely to be found by identifying those characteristics that are *central, enduring, and distinctive* [Albert and Whetten 1985]. A *central* characteristic is one which is seen as essential and important to the members of the collective in terms of conveying its identity [Albert and Whetten 1985]; an *enduring* characteristic exhibits relative permanency over time [Elsbach 2004]; and a *distinctive* characteristic sets the collective apart from other collectives [Whetten 2006].

Focusing again on the context of an academic discipline, we suggest that studying and publishing research on specific phenomena is an indication that these phenomena are essential and important to the academic discipline. A discipline's academic identity may be inferred from a persistent attention to particular phenomena that can be communicated persuasively to stakeholders [Agarwal and Lucas 2005; King and Lyytinen 2004]. Moreover, when the discipline maintains this attention over time, by continuing to study and publish research on the same central phenomena, these phenomena are perceived as enduring. Finally, if these phenomena are also different from those studied and published by other disciplines, then they indicate an academic distinctiveness. Accordingly, we propose that an identification of central, enduring, and distinctive research phenomena may be used to establish our academic identity. Next, we develop a theoretically driven approach for examining research phenomena as conveyors of academic identity.

Identity and Artifacts

Artifacts (e.g., logos, publications, and Web sites) are symbols displayed and communicated by collectives, either intentionally or unintentionally, and are viewed by observers as historical records of deliberate and conscious acts. As such they are seen as important and essential to their displayer, and are deemed central. Furthermore, when they are repeatedly observed over time and across circumstances, those artifacts are associated with stability (or enduring) and are construed as strong indicators of identity [Elsbach 2004; Morand 1995].

Identity is strongly associated with displayed artifacts which are considered by those who view them to be outcomes of planning and choice. Observers of artifacts believe they are purposefully displayed for communicating identification messages [Rafaeli and Vilnai-Yavetz 2004]. Indeed, Belk [1988] elucidated the link between artifacts and identity by referring to *possessions* as *the extended self*. This notion was also supported empirically for organizations, for example, by Winter et al. [2003] who noted that executives choose and purposefully display artifacts to assist with the creation of organizational identity. In addition, the permanency of certain artifacts and the fact that they may exist independently of their displayers make them a powerful source of central and enduring characteristics of their displayers. Consequently, artifacts play an important role in constructing, anchoring, and perpetuating identities [Elsbach 2004; Mehta and Belk 1991; Pratt and Rafaeli 1997; Tian and Belk 2005].

Although artifacts may be the tip of the "identity iceberg," their objective attributes are often the first things noticed by observers. Accordingly, *artifact attributes* are the main source of information used to make sense of identity [Rafaeli and Vilnai-Yavetz 2004]. Accordingly, by observing and analyzing the attributes of artifacts displayed by a collective, it may be possible to arrive at an accurate and revealing assessment of the collective's identity [Elsbach 2004].

Tying the preceding discussion to our focus on the identity of the IS discipline, we propose to study our *academic artifacts* and their attributes as a first important step in establishing our academic identity. (Note that the terms *academic artifact* as well as *artifact* are different than the term *IT Artifact*, which is also used in this paper). But what are the academic artifacts of the IS discipline? According to Swanson and Ramiller [1993] an academic journal is a property or possession of its discipline. As such, a journal may offer an enduring account of a discipline's research

history, presenting important information on the discipline's structure and evolution and helping to define the discipline it represents. Furthermore, Swanson and Ramiller note that the research presented in academic journals indicates academic identity. Therefore, journal publications – peer reviewed and widely distributed and displayed over time – may be seen as some of our most prominent and lasting academic artifacts.

This paper aims to contribute to the discussion on our academic identity by carefully analyzing the IS discipline's journal publications as the focal academic artifact, as represented in two of the discipline's main journals – *ISR* and *MISQ*. Following Elsbach [2004], we further focus on the attributes of these artifacts. Specifically, we examine the following two attributes: the *IT Artifact* studied or described and the *IS Theme* examined. Although other paper attributes may exist (such as research methodology and theoretical foundations) our focus on the IT Artifact and IS Theme is guided by the requirement for an identity to be distinctive [Albert and Whetten 1985]. We note that many IS scholars suggest that the IT Artifact is what makes us distinct in an academic sense [e.g., Benbasat and Zmud 2003], with others also suggesting the addition of the IS Themes that are studied [e.g., Agarwal and Lucas 2005; Myers 2003]. Building on the above, we identify the IT Artifacts and IS Themes studied in these papers as primary indicators of our academic identity. We subscribe to the notion that, in tandem, these two attributes indicate our academic distinction as implied in the IS literature, and focus our research efforts on identifying an IT-based and/or IS-based core that is both central and enduring. To the extent that we are successful in our efforts, then we will have established our academic identity. Note that *establishing* an identity is not the same as *advocating* for one. Our goal is not to argue for the appropriateness of one identity or another but instead to suggest what identity will be inferred by those who examine our academic artifacts.

Finally we note that the focal attributes in this paper, the IT Artifact and IS Theme, are distinct paper attributes, and various research combinations may result from studying different IT Artifacts within the context of a single IS Theme, or from studying the same IT Artifact in the context of different IS Themes. For example, Suh and Lee's [2005] focal IT Artifact is *Consumer Website*, whereas the IS Theme is *System Design & HCI*; Arnold et al.'s [2006] IS Theme is also *System Design & HCI*, but their focal IT Artifact is a *Knowledge Based System*; finally, Van der Heijden's [2004] focal IT Artifact is *Consumer Website* but the IS Theme is *IS Success*. Thus, we conceptualize a two-dimensional identity plane defined by both IT Artifacts and IS Themes.

In the remainder of this paper, we present our findings and insights from the suggested bottom-up approach of analyzing academic artifacts' attributes. Before doing so, we describe in depth the methodology applied in analyzing journal publications.

III. RESEARCH METHODOLOGY

To study the issues raised in the previous sections we created a dataset consisting of all the papers published in *Information Systems Research (ISR)* and *MIS Quarterly (MISQ)*, since their inception dates (1990 and 1977, respectively) and up to the end of 2006. Hence, our unit of measurement, or observation, is individual papers published [Rousseau 1985]. Overall, we reviewed and coded 1056 papers including research articles, research notes, research essays, commentaries, and theory and review manuscripts. We did not examine editorials, errata notes, and letters to the editor (mostly published in the early issues of *MISQ*). For each paper, the following attributes were coded: the primary IT Artifact (e.g., Decision Support System, E-mail, and Enterprise Resource Planning) discussed in the paper and the IS Theme of the paper (e.g. Outsourcing & Governance of IT, System Design & HCI, and Business Value & Strategic Impact of IT). This section describes in detail the data collection process and its outcomes.

Coding and Classification of IT Artifacts

There is much disagreement among IS scholars over where to draw the boundaries around technologies that qualify as IT Artifacts [Whinston and Geng 2004]. For example, the Internet is considered an IT Artifact by Agarwal and Lucas [2005], while Benbasat and Zmud [2003] argue that the Internet is a generic entity that should not be treated as synonymous with the concept of an IT Artifact. The lack of agreement over what constitutes an IT Artifact can be discerned from the definitions in Table 1.

A review of Table 1 indicates that there is, however, general agreement that IT Artifacts are what Hevner et al. [2004] consider as *instantiations*. The other five definitions do not seem to consider models and methods as IT Artifacts. Thus, we adopt this view and recognize as IT Artifacts artificial systems which are either prototyped or implemented. Hence, *a composite made up of some combination of software, hardware, database and network components with an information processing capability aimed at enabling individual, group and organizational tasks* appears to be largely accepted as a definition of an IT Artifact. We use this definition to guide our IT Artifact coding process.
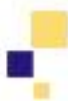
Table 1. IT Artifact Definitions		
Author	**Year:Page**	**Definition**
Ein-Dor and Segev	1993:167	"…any computerized system with a user or operator interface… provided the computer is not physically embedded."
Orlikowski and Iacono	2001:121	"…those bundles of material and cultural properties packaged in some socially recognizable form such as hardware and/or software."
Benbasat and Zmud	2003:186	"…the application of IT to enable or support some task[s] embedded within a context[s]."
King and Lyytinen	2004:541	"…systematic processing of information in human enterprise."
Hevner et al.	2004:77	"…constructs [vocabulary and symbols], models [abstractions and representations], methods [algorithms and practices], and instantiations [implemented and prototype systems]."
Agarwal and Lucas	2005:394	"…the integration of the processing logic found in computers with the massive stores of databases and the connectivity of communication networks."

In coding IT Artifacts we focused on the *primary* IT Artifact discussed in the papers and observed the details provided by the authors of the original papers – i.e., the IT Artifact's label, features, functionalities, capabilities, and intended use. Table 2 provides examples of the IT Artifact coding process. In cases where no specific IT Artifact was discussed, the paper was coded as having no IT Artifact [for example, Bassellier and Benbasat 2004; Benaroch et al., 2006]. In cases where no *single* primary IT Artifact could be identified, the paper was coded as having *multiple* IT Artifacts. For example, Pavlou and El-Sawy [2006] provide equally detailed descriptions of a project and resource management system, a knowledge management system, and a cooperative work system. Similarly, Ba et al. [2001] focus on group decision support systems, knowledge management systems and supply chain management systems.

Table 2. Coding Examples for IT Artifacts		
IT Artifact	**Example**	**Source**
Virtual Workplace System	"The Virtual Workplace System is an Internet-based application aimed at allowing a large number of users at different physical locations to telecommute [interact real-time with each other, exchange information, and work together, as they would in a conventional office setting]. Target users for the system are knowledge workers who spend a large part of their work day using a computer and attending group/team meetings related to various projects."	Venkatesh [1999:246]
Decision Support System	"We define a DSS as a packaged software application that uses analytical models to transform business data into numerical and graphical reports to help users make business decisions more easily and effectively… the presence of built-in analytical decision models is essential, distinguishing a DSS from a more general-purpose tool like Excel. Also, DSSs for resource allocation differ on analytical model sophistication, ranging from relatively simple descriptive response models to sophisticated normative optimization models providing problem-specific recommendations."	Lilien et al. [2004:217]
Knowledge-Based System	"Knowledge-based systems [KBS] and other forms of intelligent systems are frequently used to capture key knowledge and expertise from individuals within an organization. They make organizational knowledge usable by other decision makers."	Arnold et al. [2006:80]
Enterprise Resource Planning System	"…ERP… systems are commercial software systems that automate and integrate many or most of a firm's business processes. Sometimes called enterprise systems, ERP systems promise integration of business processes and access to integrated data across the entire enterprise… Furthermore, companies that implement the systems have the opportunity to redesign their business practices using templates imbedded in the software…"	Gattiker and Goodhue [2005:560]

The above coding process resulted in over 100 distinct IT Artifacts studied or described during the past three decades in ISR and MISQ. A second stage in this coding process was then guided by information provided by the authors of the papers reviewed concerning the type of the specific IT Artifact. In particular, where the authors of the

paper reviewed and identified a particular IT Artifact as a specific type of system (e.g., a group support system or a decision support system), this self-identified type was used to code the artifact in the paper. For example, Ramesh and Whinston [1994] discuss an IT Artifact called Argumentative Reasoning Facilitation System, which they describe as a type of a *Group Support System*. Sabherwal and Chan [2001] describe a Market Information System, which they link to a *Management Information System*. And Schocken and Jones [1993] study a Model Management System which they associate with a *Decision Support System*. This categorization has the added advantage that it allows us to distinguish between true technological evolution and evolution of labeling [Ein-Dor and Segev 1993]. In addition to relying on information provided within the papers, our review of papers was conducted in a reverse chronological order, beginning with papers published in December 2006 and going back until issue 1 of volume 1 in each journal was reached. The reverse chronological order coding process was chosen since we believe that the notion of *backward compatibility*, which applies to IT products [Orlikowski 2002], also applies to IT research. In particular, an assumption was made that authors of recent papers are likely to acknowledge similarities between the IT Artifact described in their papers and those described in older papers, thus helping in coding IT Artifacts.

Table 3. Coding Examples for IS Themes		
Paper Reviewed	**IS Theme Coded**	**Justification of IS Theme**
Lee et al. [2004]	*Outsourcing & Governance of IT*	Title: "IT outsourcing strategies: Universalistic, contingency, and configurational explanations of success…" Abstract: "Focus on individual outsourcing strategies has often yielded contradictory findings and recommendations…" Keywords: "IT outsourcing, outsourcing success…" Introduction: "Research on information technology [IT] outsourcing has identified…"
Levina [2005]	*IS Development Cycle [System Development, Implementation, Maintenance, Reliability, & Security]*	Title: "Collaborating on multiparty information systems development projects," Abstract: "… the information systems development process… studies of a Web-based application development project… collaborative practices that unfold among diverse professionals in ISD projects…" Keywords: "systems analysis and design…" Research questions: "[1] how do people from diverse professions and organizational settings collaborate on ISD projects, and [2] how does their diversity influence the systems they eventually design?"
Hong and Tam [2006]	*IS Success [IT Adoption, Resistance, Satisfaction, & Use]*	Title: "Understanding the adoption of multipurpose information applications…" Abstract: "The current study attempt to understand individual adoption of IT innovations that are used beyond work settings…" Keywords: "technology adoption and use…" Research questions: "[1] What are the factors that determine the adoption of multipurpose information appliances in nonwork settings? [2] How do these factors affect users' intentions to adopt these technologies?"

Coding IS Themes

The coding of the IS Theme of the paper was based on a holistic understanding of the key issues and objectives described and studied by the authors of the analyzed papers (e.g., technology adoption, satisfaction with IT, system development, and governance of IT). Several elements – i.e., research objectives, title, abstract, dependent variable(s), conceptual model, and the conclusions – were instrumental in identifying the IS Theme of the paper. To facilitate the collection of IS Theme data, a preset list of IS Themes was used. In particular, each of the first two authors went over 150 randomly selected papers and compiled a list of IS Themes. The two lists were then compared and discussed until both authors agreed that the combined list was exhaustive in terms of adequately covering the observed set of IS Themes. An additional review of 50 randomly selected papers by each of the two authors did not result in any changes to the IS Themes identified on the list. This list of IS Themes is presented in Table 5 in the Findings section. Table 3 provides examples for the coding of IS Themes.

Data Collection

The first two authors coded all papers used in our analysis. To ensure rigor in the data collection process, a staged approach was taken: *First*, a random subset of 50 papers was selected from both ISR and MISQ. One of the authors then thoroughly read each of the papers and coded the desired paper attributes (i.e., the IT Artifact and the IS Theme of the paper). A second author followed an approach similar to that applied by Swanson and Ramiller [1993], scanning the papers and focusing on their key elements; namely, the paper's title, abstract, keywords, research

questions, hypotheses/propositions, dependent variable, figures/theoretical model, and conclusions. A comparison of the attributes coded by both authors indicated that the second, less cognitively-taxing scanning method did not omit relevant data and was thus deemed appropriate for further data collection. *Second*, to assure inter-rater reliability in the coding of the data and to facilitate replication of the study, the first two authors went through two individual data collection rounds, coding a random sample of 50 papers in each round. At the end of each round coded attributes were compared and disagreement (i.e., different coding for the IT Artifact or the IS Theme) was measured and discussed. At the end of this process, satisfactory agreement (over 90 percent of the papers) was obtained for the IT Artifact attribute but not for the IS Theme attribute, at which point the above list of IS Themes was created and used in the coding of papers. A third sample of 50 papers was coded using the list of IS Themes, resulting in a greater than 90 percent level of agreement for both coded attributes (full agreement was obtained for 47 out of 50 papers). At this point, 200 papers had already been examined and discussed by both authors. The remaining 856 papers were then divided between the first two authors for individual reviewing and coding.

This section described our approach to data collection and the process of coding the two paper attributes identified as relevant for our study. We now turn to present our findings before moving on to discuss their importance and implications for our academic identity.

IV. FINDINGS

We reviewed a total of 1056 papers published in *MISQ* during the years 1977-2006 (inclusive) and in *ISR* during the years 1990-2006 (inclusive). Of these papers, 560 (53 percent) directly discussed some IT Artifact as well as an IS Theme, whereas the remaining 496 papers presented an IS Theme but did not explicitly study or discuss an IT Artifact. Thus, all the papers were assigned a value identifying the IS Theme attribute but only about one half had a specific value assigned to their IT Artifact attribute. To facilitate our discussion we refer to papers describing one or more IT Artifacts as *IT Artifact papers*. We describe our findings in six time periods – each consisting of five years of publications. A five year time period was deemed to be a reasonable methodological compromise between the desire to be able to compare periods as well as observe trends over time, and the need to average out short term fluctuations such as special issues. Tables 4 and 5 below provide an overview of our findings within each period, with Table 4 focusing on the papers' IT Artifacts and Table 5 on the papers' IS Themes.

The first column in Table 4 (labeled *IT Artifact*) lists 11 IT Artifact groups. Grouping of related IT Artifacts was intended to facilitate the presentation of the findings and the subsequent discussion as we explain shortly. The second column, *% out of IT Artifact papers per period*, summarizes the percent of representation of IT Artifact groups out of all IT Artifact papers within each period. We explain the grouping of IT Artifacts in greater detail and provide relevant justification from the literature, before discussing our findings in depth.

The first IT Artifact group presented in Table 4 is *Management Support Systems*, including Decision Support Systems (DSS), Management Information Systems (MIS), Executive Information Systems (EIS), Expert Systems, and Knowledge Based Systems (KBS). DSS and MIS are often tightly linked in the IS literature [e.g., Houdeshel and Watson 1987; Pieptea and Anderson 1987], a trend which dates back as early as 1979 [e.g., Murray 1979]. Walls et al. [1992] coined the term "management support systems" – which we adopt here – to refer to DSS, MIS, and EIS combined. We also include Expert Systems and KBS in this group, guided by literature which links expert systems to DSS [e.g., Remus and Kottemann 1986; Mookerjee et al. 1995; Jiang et al. 2005] and KBS to expert systems [e.g., Gregor and Benbasat 1999].

The next IT Artifact group presented in Table 4 is that of *Communications and Collaboration Tools*, including Group Support Systems (GSS) and Computer Mediated Communications (CMC) tools. This grouping is consistent with Swanson and Ramiller [1993] and reflects the fact that it is often difficult to separate the communications aspect within collaborative systems [e.g., Alavi et al. 2002; DeSanctis and Gallupe 1987; Miranda and Saunders 2003].

Interorganizational Systems is the third group presented. This group is created by joining Electronic Data Interchange-based systems (EDI), private network-based Interorganizational Systems (IOS), E-Markets, Supply Chain Management systems (SCM), and Internet based IOS. The link between EDI and IOS is fairly common in the IS literature [e.g., Chwelos et al. 2001; Mukhopadhyay et al. 1995] as well as the link between E-Markets and IOS [e.g., Bakos 1991; Choudhury et al. 1998]. Subramani [2004] also suggests the link between SCM and IOS.

Table 4. Summary of IT Artifacts Representation						
IT Artifact	**% out of IT Artifact papers per period**					
	I **50**	**II** **66**	**III** **96**	**IV** **108**	**V** **110**	**VI** **130**
Management Support Systems: DSS; MIS; EIS; Expert Systems; KBS	**56%**	**30%**	**30%**	**44%**	**15%**	**11%**
Communications and Collaboration Tools: GSS; CMC	-	**12%**	**13%**	**23%**	**26%**	**12%**
Interorganizational Systems: EDI; IOS; Electronic Markets; SCM	-	5%	7%	6%	**11%**	**14%**
Infrastructure Services: Hardware; Operating System; Networks; Databases	8%	**17%**	**14%**	10%	**12%**	10%
Enterprise Applications: Enterprise Systems; ERP; HR IS; Accounting IS; Inventory IS; CRM	8%	6%	8%	2%	1%	8%
Knowledge and Document Management Systems: DMS; KMS	2%	-	3%	4%	4%	8%
Operational Systems: POS/Electronic Payment System; TPS	2%	-	-	2%	5%	-
Resource Management Systems: Chargeback System; Resources Allocation System	-	3%	4%	-	2%	-
Computer Integrated Manufacturing and Engineering: MRP; CAD; CAM; CASE	**12%**	3%	6%	4%	1%	1%
Consumer Website	-	-	-	-	3%	**24%**
Computer Graphics	-	8%	1%	-	1%	1%
Multiple IT Artifacts	8%	9%	10%	2%	11%	3%
Other[1]	4%	8%	3%	4%	8%	9%

[1] Automated Data Collection Technology, Benchmarking System, Claim Processing System, Computer-Based Modeling System, Computer-Based Monitoring, Computer-Based Tutorial/Technology-Mediated Learning Environment, Creativity Support System, Data Warehouse, Digital Rights Management System, Information Retrieval, Intranet, Performance-Monitoring System, Security System, Service-Support System, Word Processing, Workflow Technology

Fourth is the group titled *Infrastructure Services*, which contains Hardware, Networks, and Databases [e.g., the definition of Infrastructure Services in Bharadwaj 2000]. This group also includes Operating Systems, which are often considered part of the organizational IT infrastructure [e.g., Armstrong and Sambamurthy 1999].

Next, the group of *Enterprise Applications* includes IT Artifacts classified in the papers reviewed as Enterprise Systems, Enterprise Resource Planning (ERP) systems, and what would today be viewed as individual modules of ERP such as HR IS, Accounting IS, Inventory Control Systems, and CRM systems [Ranganathan and Brown 2006].

Finally, we created additional groups of *Knowledge and Document Management Systems* [e.g., Alavi and Leidner 2001 for a link between the systems], *Operational Systems* representing Point of Sales systems (POS) and Transaction Processing Systems (TPS), *Computer Resource Management Systems* grouping chargeback systems with computer resource allocation systems, and the final group of *Computer Integrated Manufacturing and Engineering*, including MRP, CAD, CAM, CAD/CAM, and CASE tools. This last group was guided by both Doll and Vonderembse [1987] and Ein-Dor and Segev [1993].

Two more IT Artifacts are presented without the group context; namely *Consumer Website* and *Computer Graphics*. These IT Artifacts did not fit well into any of the groups and were sufficiently represented in our dataset to merit separate inclusion in Table 4.

The row indicating *Multiple IT Artifacts* at the bottom of Table 4 represents papers in which two or more IT Artifacts were directly studied or described but were it was not possible to identify a single primary IT Artifact. The row

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indicating *Other* consists of distinct IT Artifacts with only a limited representation within the dataset and was created for presentation purposes. An enumerated list of IT Artifacts included in the *Other* group appears in the note at the bottom of the table.

Table 5a. IS Theme Distribution by Period - IT Artifacts Papers

Theme ⇓ Period ⇨	All	I	II	III	IV	V	VI
Business Value & Strategic Impact of IT	8%	6%	8%	13%	6%	5%	12%
Economics of IT	3%	-	-	1%	1%	7%	6%
Ethics & Privacy	1%	-	-	2%	2%	1%	2%
Individual/Group Performance & Decision Quality	12%	2%	3%	11%	23%	16%	10%
Introspective Studies: IS Research and Identity	3%	-	2%	1%	5%	5%	2%
IS Success: IT Adoption, Resistance, Satisfaction, & Use	14%	4%	8%	11%	15%	15%	21%
IT Professionals	-	2%	-	-	-	-	1%
IT-Based Innovation	2%	2%	-	2%	-	5%	2%
IT-Driven Institutional Transformation	6%	-	3%	2%	6%	13%	6%
Knowledge & Information Management	2%	-	-	-	1%	2%	5%
Outsourcing & Governance of IT	6%	14%	23%	11%	1%	2%	-
System Design & HCI	24%	18%	24%	16%	30%	22%	27%
IS Development Cycle: System Development, Implementation, Maintenance, Reliability, & Security	18%	52%	30%	29%	10%	7%	8%

Table 5b. IS Theme Distribution by Period - Papers with no IT Artifact

Theme ⇓ Period ⇨	All	I	II	III	IV	V	VI
Business Value & Strategic Impact of IT	8%	2%	2%	8%	8%	8%	13%
Economics of IT	5%	2%	-	5%	5%	7%	6%
Ethics & Privacy	3%	-	-	2%	2%	3%	7%
Individual/Group Performance & Decision Quality	2%	-	-	-	2%	3%	3%
Introspective Studies: IS Research and Identity	14%	2%	4%	14%	15%	18%	18%
IS Success: IT Adoption, Resistance, Satisfaction, & Use	10%	5%	2%	10%	6%	14%	13%
IT Professionals	8%	10%	16%	7%	15%	5%	3%
IT-Based Innovation	2%	-	-	-	3%	2%	4%
IT-Driven Institutional Transformation	5%	2%	2%	1%	9%	7%	2%
Knowledge & Information Management	2%	-	-	-	2%	1%	5%
Outsourcing & Governance of IT	22%	44%	43%	23%	16%	18%	13%
System Design & HCI	3%	-	2%	6%	3%	1%	3%
IS Development Cycle: System Development, Implementation, Maintenance, Reliability, & Security	18%	32%	29%	24%	15%	14%	11%

Table 5c. IS Theme Distribution by Period - All Papers Reviewed

Theme ⇓ Period ⇨	All	I	II	III	IV	V	VI
Business Value & Strategic Impact of IT	8%	4%	5%	10%	7%	7%	12%
Economics of IT	4%	1%	-	3%	3%	7%	6%
Ethics & Privacy	2%	-	-	2%	2%	2%	4%
Individual/Group Performance & Decision Quality	7%	1%	2%	6%	13%	10%	6%
Introspective Studies: IS Research and Identity	8%	1%	3%	7%	10%	12%	8%
IS Success: IT Adoption, Resistance, Satisfaction, & Use	12%	4%	5%	11%	10%	14%	17%
IT Professionals	4%	5%	7%	3%	7%	2%	2%
IT-Based Innovation	2%	1%	-	1%	1%	4%	3%
IT-Driven Institutional Transformation	5%	1%	3%	2%	8%	10%	4%
Knowledge & Information Management	2%	-	-	-	1%	1%	5%
Outsourcing & Governance of IT	14%	27%	31%	17%	8%	10%	6%
System Design & HCI	14%	10%	15%	11%	17%	12%	16%
IS Development Cycle: System Development, Implementation, Maintenance, Reliability, & Security	18%	43%	30%	27%	12%	11%	10%

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Table 5 presents an overview of the IS Themes studied during all periods reviewed. The Table consists of three parts. The first (5a), presents the percent of papers studying each IS Theme out of the total number of IT Artifact papers reviewed in each period (each period is represented by a separate column). The second part of the table (5b) presents the percent of papers studying each IS Theme out of the number of papers which did not study or describe an IT Artifact. Finally, the third part (5c) displays the percent of papers studying each IS Theme out of the total number of papers reviewed in each period.

We now turn to discuss the central and enduring nature of our findings concerning these two paper attributes. We suggest that few dominant IT Artifact groups and IS Themes within each period would indicate the core's centrality, whereas small variations between the periods can be seen as an indication that the core is enduring.

Period I – 1977 to 1981

Discussing first the IT Artifacts studied during this period, 56 percent of IT Artifact papers focused on studying Management Support Systems making it the dominant IT Artifact group for period I. The second prominent group of IT Artifacts studied during this period was Computer-Aided Manufacturing and Engineering, accounting for an additional 12 percent of the IT Artifact papers reviewed. Table 4 provides a complete summary of our findings for IT Artifacts in period I.

In terms of IS Themes, within the subset of IT Artifact papers, the IS Development Cycle theme was most prominent (52 percent), followed by the System Design & HCI (18 percent), and Outsourcing & Governance of IT (14 percent). Within the remaining subset of papers, the most common IS Themes were Outsourcing & Governance of IT (44 percent), IS Development Cycle (32 percent), and IT Professionals (10 percent).

Period II – 1982 to 1986

Focusing on the IT Artifacts studied during this period (summarized in Table 4), 30 percent of IT Artifact papers focused on Management Support Systems, again making it the dominant IT Artifact group for period II. The second IT Artifact group emerging during this time period was Infrastructure Services, accounting for 17 percent of the IT Artifact papers (mainly due to studies focusing on database technologies). Finally, a third emerging group was that of Communications and Collaboration Tools, accounting for 12 percent of the IT Artifact papers in period II.

Moving to the IS Themes of the papers reviewed during this period (Table 5), the trend from period I continues within the subset of IT Artifact papers, but with a more uniform distribution of the three themes of the IS Development Cycle (20 percent), System Design & HCI (24 percent), and Outsourcing & Governance of IT (23 percent), compared with period I. There are no noteworthy changes within the subset of papers not directly discussing a specific IT Artifact. Thus, overall we note no drastic shift in the IS Themes studied between periods I and II.

Period III – 1987 to 1991

Focusing on the IT Artifact, 30 percent of IT Artifact papers focused on Management Support Systems, sustaining its prominence in period III. The other two IT Artifact groups maintaining their presence during this period are Infrastructure Services (14 percent) and Communications and Collaboration Tools (13 percent). Thus, we do not observe any drastic change in the core IT Artifacts studied between periods II and III.

Moving to the IS Theme, the leading three themes within the IT Artifact papers from periods I and II remain important, although their combined relative share of all papers reviewed is declining (from 84 percent in period I, to 77 percent in period II, to 56 percent in period III). Three emerging themes now fill this gap with the Business Value & Strategic Impact of IT accounting for 13 percent of the papers and both IS Success (combining studies of IT Adoption, Resistance, Satisfaction, and Use) and Individual/Group Performance & Decision Quality accounting for 11percent of IT Artifact papers in this period. Another noteworthy change is the emergence of the Introspective Studies theme within the no IT Artifact group (14 percent), as studies become increasingly rigorous and discussions of research methods ensue. The IT Professionals theme captures less attention this period, but additional attention is dedicated to IS Success within this group (10 percent in period III as opposed to 2 percent in period II).

Period IV – 1992 to 1996

The leading three groups of IT Artifact from period III maintain their central position with the Management Support Systems group increasing its academic dominance (44 percent of IT Artifact papers), largely due to enhanced focus on knowledge based systems during this period. Communications and Collaboration Tools also continue to grow in importance, now capturing the focus of 23 percent of the IT Artifact papers. The Infrastructure Services group, while still among the top three groups of artifacts, slips to third place, accounting for only 9 percent of the IT Artifact papers.

Moving to the IS Themes of the papers, period IV brings about a shift, with the greatest focus targeted towards System Design & HCI (30 percent of IT Artifact papers), and with the leading theme from the previous periods, i.e., IS Development Cycle, now being the focus of only 10 percent of the IT Artifact papers. The two emerging themes from period III continue to grow, with Individual/Group Performance & Decision Quality accounting for 23 percent of IT Artifact papers, and IS Success accounting for 15 percent of these papers. Within the no IT Artifact group, four equally important themes share the lead during this period: namely, IS Development Cycle (15%), Outsourcing & Governance of IT (16 percent), IT Professionals (15 percent), and Introspective Studies (15 percent).

Period V – 1997 to 2001

While the top three IT Artifact groups maintained their lead, Communications and Collaboration Tools moved to the forefront during period V, followed by Management Support Systems and Infrastructure Services. An emerging group – Interorganizational Systems (IOS) – which has been steadily increasing over time (from no representation in period I, to an average of 6 percent of IT Artifact papers over the last three periods, to 11 percent in period V) is now the fourth most dominant group, with a nearly equal share as Infrastructure Services. This increase in the IOS focus coupled with the emergence of the Consumer Website IT Artifact (3 percent), and the focus on public networks within the Infrastructure Services group (approximately one third of this group's papers) reflects the increased importance of Internet based IT Artifacts during period V.

Period V is characterized by a nearly equal focus on four IS Themes within the IT Artifact group, namely: IS Success (15 percent); System Design & HCI (22 percent); Individual/Group Performance & Decision Quality (16 percent); and the emerging theme of IT-Driven Institutional Transformation (13 percent). The dominant theme from previous periods, the IS Development Cycle, now accounts for only 7 percent of papers in this group. The same four themes continue to dominate the no IT Artifact group, with Introspective Studies accounting for 18 percent of papers, IS Success accounting or 14 percent of papers, Outsourcing & Governance of IT accounting for 18 percent of papers, and the IS Development Cycle accounting for 14 percent of papers.

Period VI – 2002 to 2006

Period VI brings about a substantial change in the core IT Artifacts studied, with the Consumer Website IT Artifact taking the lead, accounting for 24 percent of the IT Artifact papers. Combined with Interorganizational Systems, these two groups account for 38 percent of all IT Artifact papers. Both the Communications and Collaboration Tools and the Management Support Systems groups are still prominent during period V,I accounting for 12 percent and 11 percent of the IT Artifact papers, respectively, and followed closely by the Infrastructure Services group (10 percent).

In terms of IS Themes, period VI again displays a diminished role of the IS Development Cycle theme within the IT Artifact papers group, and an increase in studies focusing on the Business Value & Strategic Impact of IT (12 percent). The themes of IS Success and System Design & HCI continue to dominate this group accounting for 21 percent and 27 percent of paper, respectively. Papers in the no IT Artifact group cover the same four themes from the previous period, namely: IS Success (13 percent), Introspective Studies (18 percent), Outsourcing & Governance of IT (13 percent), and IS Development Cycle (11 percent), as well as the emerging theme of Business Value & Strategic Impact of IT (13 percent).

A Central and Enduring Core

Our analysis and discussion above indicate the presence of an IT Artifact core for the IS discipline. This conclusion is based on the observation that our academic artifacts have been persistently characterized by a relatively small set of IT Artifact groups during a period of 30 years. Our close examination of the focus on trends of IT Artifact papers reveals a consistent focus on Management Support Systems, Communications and Collaboration Tools, and Infrastructure Services, throughout the 30 year period. To this fairly stable core are added Interorganizational Systems and Consumer Website in the last two periods, indicating a potential evolvement of the core in line with technological innovation [Benbasat and Zmud 2003]. We further note that the relative importance within the core did not remain constant along all time periods, with the exception of Infrastructure Services. The Management Support Systems group exhibits a mix of cyclicality coupled with a downward trend, the Communication & Collaboration group exhibits a single maximum, and the Interorganizational Systems and Consumer Website groups exhibits an upward trend. Drawing on the theory of artifacts reviewed earlier in the paper [e.g., Belk 1988; Elsbach 2004] we suggest that the IT Artifact groups in the core are likely to be perceived as strong identity indicators by those who attempt to infer our academic identity.

Focusing on the IS Themes studied, our analysis revealed that the IS Themes studied within the IT Artifact papers are different from those studied within papers without an explicit IT Artifact. Specifically, a non-parametric χ^2 test showed significant differences in terms of the distribution of the IS Themes between these two sets of papers (compare the "All" columns in Tables 5a and 5b). The most notable differences are in the Individual and Group

Performance and Decision Quality, IS Research and Identity Crisis, IT Professionals, Outsourcing and Governance of IT, and System Design & HCI themes. These differences may not be surprising, considering that an IT Artifact is generally required when studying its design and interface or its impact on users. Alternatively, identifying an IT Artifact may be less important when studying IT professionals and their management or when engaging in an introspective exercise into the discipline's main academic issues. This is where our approaches to analyzing the data separately for those papers with and without an IT Artifact becomes truly valuable, as these differences suggest that treating these groups in an undifferentiated manner will give a false signal of our academic identity. This is because a single distribution of themes (such as the one shown in Table 5c) is simply a mixture of the two separate distributions.

Our analysis of IS Themes indicates the presence of an IS Theme core for the IS discipline. Within the IT Artifact group, four IS Themes account for 68 percent of studies across all periods, namely: IS Development Cycle, System Design & HCI, Individual/Group Performance & Decision Quality, and IS Success. The no IT Artifact group's core consists of IS Development Cycle, Outsourcing & Governance of IT, IS Success, accounting for 64 percent of all papers, with a weaker presence of the IT Professionals theme at some periods, bringing this total share to 72 percent.

A Look Ahead: Analysis of 2007-2008 Publications

Although not sufficient for an additional period of analysis, data from 2007-2008 papers published in *ISR* and *MISQ* were analyzed to shed additional light on the above identified core. We found that the percentage of papers studying or explicitly describing an IT Artifact (i.e., IT Artifact papers) remains relatively stable: 56 percent in 2007 and 2008 compared with 54 percent in period VI. Within these papers, four of the five IT Artifact groups from period VI retained their central position in the IT Artifact core: Management Support Systems, Communication & Collaboration, Interorganizational Systems, and Consumer Website. Examining the IS Themes, both within the IT Artifact papers and the papers which did not explicitly study IT Artifacts, we report there were no significant changes to the above identified IS Theme core, except a small increase in studies of IT professionals within the no IT Artifact group. Overall, we note that our findings from 30 years of research analyzed seem to hold for 2007-2008.

Opening the IT Artifact Black Box

Our previous discussion revealed that whether an IT Artifact is studied or explicitly described in a paper makes a difference in terms of the paper's IS Theme. However, it is possible that the relationship between IT Artifacts and IS Themes is more complex, with the latter being contingent on the particular type of IT Artifact. We explore this contingency in this section.

To open the IT Artifact black box we analyzed the relationship between the focal IT Artifact and the IS Theme within the IT Artifact papers. Our analysis showed that the choice of an IT Artifact group affects (or is affected by) the choice of an IS Theme. In other words, while distinct, these two paper attributes appear to be correlated. To see this, we examined the relationship between the IT Artifact groups that were part of the IT Artifact core for at least two time periods and the IS Themes that accounted for at least 10 percent of all IT Artifact papers between 1977 and 2006. Accordingly, the relationships between the following IT Artifact groups; Management Support Systems, Communications & Collaboration Tools, Infrastructure Services, and Interorganizational Systems, and the following IS Themes; System Design & HCI, IS Development Cycle, IS Success, and Individual/Group Performance & Decision Quality were examined.

We observe the following: (1) when the focal IT Artifact is from the Management Support Systems (MSS) group, the most common theme is System Design & HCI (47 percent); (2) when the focal IT Artifact is from the Communications & Collaborations (C&C) group, the most common theme is Individual/Group Performance & Decision Quality (61 percent); (3) when the focal IT Artifact is from the Infrastructure Services (I/S) group, the most common theme is IS Development Cycle (42 percent), and; (4) when the focal IT Artifact is from the Interorganizational Systems (IOS) group, the most common theme is IS Success (47 percent).

To assist with the description of the relationship between IT Artifact groups and IS Themes, a correspondence analysis (CA) was undertaken. CA is a useful data reduction technique for analyzing the relationship between two categorical variables. The distance between any two categories of the two variables – i.e., IT Artifacts and IS Themes – reflect their relationship. Close proximity between any pair of an IT Artifact group and an IS Theme indicates strong association. The χ^2 statistic is used to test the hypothesis that there is no relationship between IT Artifacts and IS Themes. With nine degrees of freedom, the 99.173 χ^2 statistic suggests that the null hypothesis can be rejected. Overall, the CA indicates that there is a strong relationship between IT Artifacts and IS Themes, and that certain combinations are more likely than others. We further illustrate this relationship in Figure 2.

This finding suggests that not only the mere presence or absence of an IT Artifact correlates with the paper's IS Theme, but also the specific type of IT Artifact. Hence, when classifying IS Themes it is important to recognize the focal IT Artifact, since the latter appears to affect (or be affected from) the choice of the former.
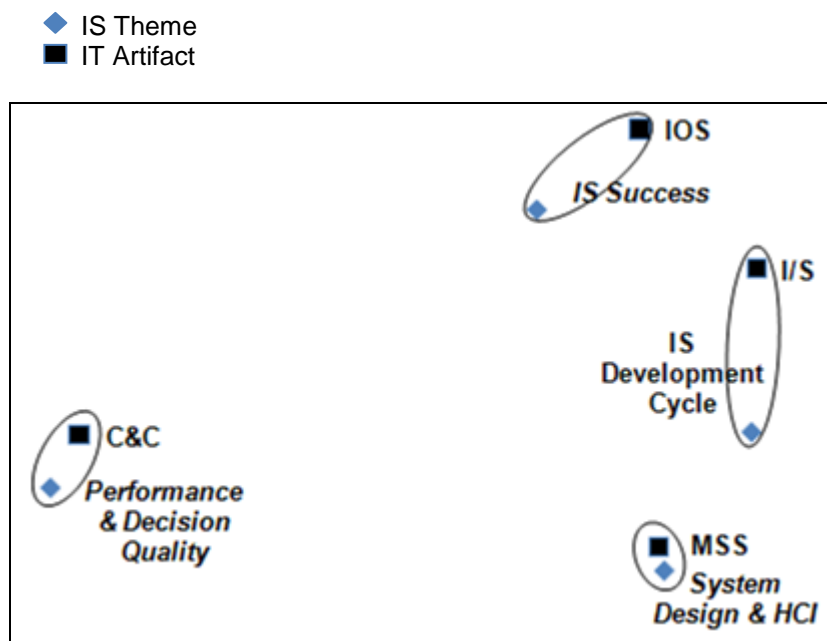

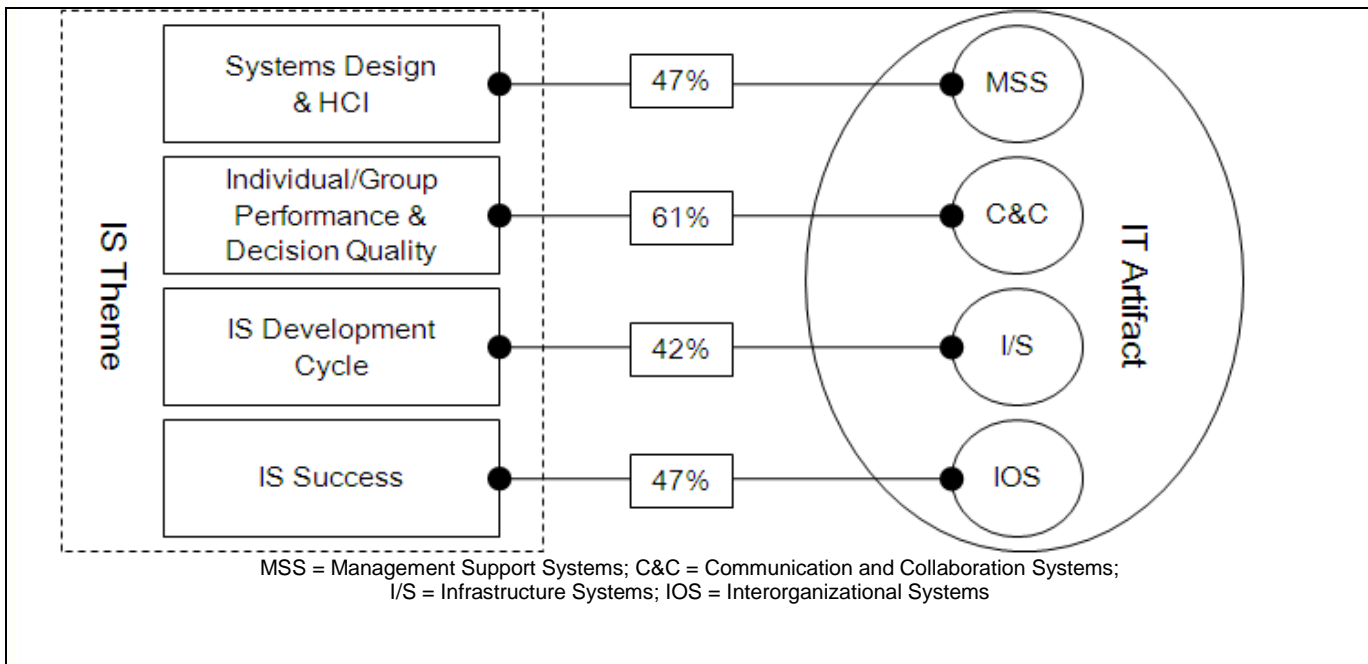**Figure 1. Perceptual Map from Correspondence Analysis**

MSS = Management Support Systems; C&C = Communication and Collaboration Systems;
I/S = Infrastructure Systems; IOS = Interorganizational Systems

Figure 2. Opening Up the IT Artifact Black Box: Linking IS Themes with IT Artifacts

Another useful way to look into the IT Artifact core is to consider which time periods were most influential in terms of research on the IT Artifact groups. The spatial map from the correspondence analysis is presented in Figure 3. According to this figure (and Table 4), research on Computer-Integrated Manufacturing and Engineering (CIM) was primarily done in period I; research on Management Support Systems (MSS) was primarily conducted during periods I, II, III, and IV; much of the research on Infrastructure Services (I/S) was done during periods II, III, and IV, and; research on consumer Web sites (Web site) was mainly done during period VI.
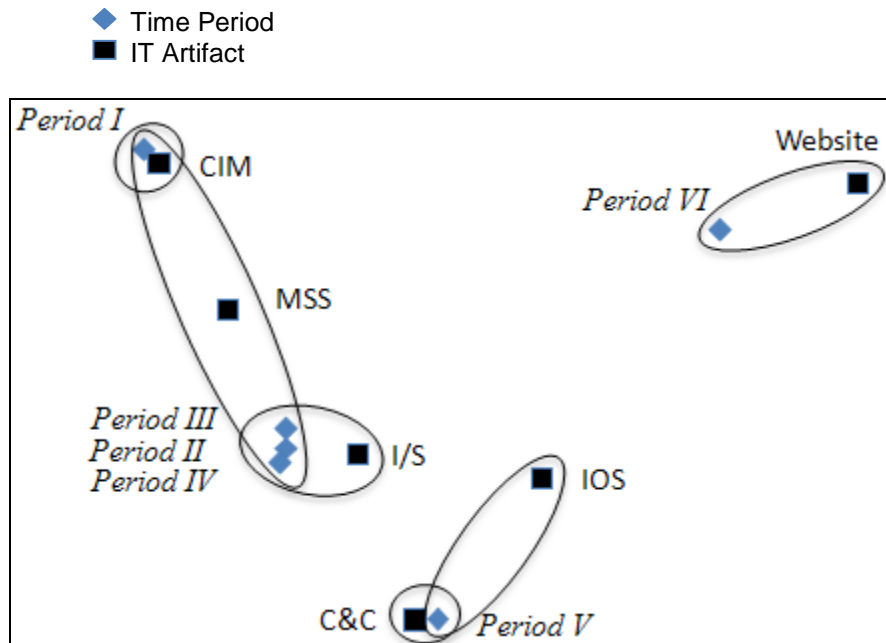
Figure 3. Perceptual Map from Correspondence Analysis

V. DISCUSSION

This section discusses the above findings in light of the paper's objective – i.e., studying our academic identity as it emerges from a historical analysis of the discipline's academic artifacts.

The search for an academic identity and the desire to gain academic legitimacy are not unique to IS scholars. Other, more mature, disciplines have traversed similar paths and experienced similar challenges on their way to establishing their discipline's academic status. For example, it took many efforts for Statistics to separate itself from one of its academic forefathers – i.e., Mathematics – [Bessant and MacPherson 2002; Mason 2004]. Similarly, Organization scholars worked hard to develop new theories for organizations and a sense of shared intellectual history as a means of establishing identity and legitimacy [Augier et al. 2005].

Motivated by the desire to shed light on our academic identity and noting the link between identity and artifacts, our study has focused on the IS discipline's most prominent academic artifacts – i.e., its journal publications. Specifically, we have analyzed all the papers published in *Information Systems Research (ISR)* and *MIS Quarterly (MISQ)* since their respective inception dates and up to the end of 2006 (1056 papers), identifying and coding two key attributes – the primary IT Artifact and the IS Theme – creating a unique dataset.

An important insight arises from our findings: there are two main indications that a central and enduring core exists within the IS discipline. First, IT Artifacts are studied or explicitly described in more than 50 percent of the papers published in *ISR* and *MISQ* (referred to here as IT Artifact papers), with a few IT Artifact groups accounting for a large percent of the these papers. It is interesting to note here that in 2001 Orlikowski and Iacono called for more focus on the IT Artifact in IS studies. Indeed we observe a small increase in the number of IT Artifact papers in subsequent periods (from 51 percent in period V, to 54 percent in period VI, to 56 percent in 2007-2008), indicating a potential positive response to this call. Second, a small group of IS Themes is sufficient to describe many of the papers (both with and without an IT Artifact) published in *ISR* and *MISQ* during a period of three decades. Moreover, the two attributes exhibited relative permanency, indicating their enduring nature.

Building on the above, we suggest that the IS discipline has a central and enduring core, which, while not completely static, may be characterized by persistent attention to a small set of IT Artifacts and a similarly small set of IS Themes. Specifically, our academic identity can be described as *the scientific study of the design, development, and management of information technologies, as well as their use by and impact on individuals, groups, and organizations. Of particular interest are information technologies (and their specific components) that enable communication, collaboration, and decision making.* This enduring focus on a small set of IT Artifacts and IS Themes reflects on our discipline, informing its members as well as outsiders of its academic identity.

We note that we do not judge this artifact based academic identity as being right or wrong for the IS discipline, nor do we claim that these IT Artifacts and IS Themes should be the criteria by which all future studies are weighed. Instead, we argue that those who try to make sense of the IS discipline (e.g., academics from other disciplines, IS Ph.D. students, and IS practitioners) and establish its present identity are likely to associate it with these central and enduring attributes. These attributes are considered central because, given their dominance within many time periods, they indicate their importance to the IS discipline (Why publish research on unimportant phenomena?). Furthermore, their relative permanency – between periods – is an indication of their enduring importance to IS researchers. We also note that our findings concerning core IS Themes point to a conclusion not unlike the one reached by Swanson and Ramiller [1993]: "If there is any unity to the research stream, it may be in its consistent attention to the basic issue of how IT may best be organized, directed, and applied" [pg. 326]. These similarities, reached by two different studies, further indicate the focus and persistence of the IS Themes studied.

VI. IMPLICATIONS FOR IS RESEARCH AND LIMITATIONS

The study's findings suggest that contrary to a common perception, the IS discipline has an academic identity as described above. In this final section we put forth an explanation of this contradiction, discuss the implications of our conclusions for IS research, and offer some directions for future work. Before doing so, we acknowledge the limitations of this study.

First, our findings and conclusions are based on IS research that was published in two journals – *Information Systems Research (ISR)* and *MIS Quarterly (MISQ)*. This choice was derived from: (1) our research objective – i.e., historical analysis of academic artifacts; (2) the fact that *ISR* and *MISQ* are consistently ranked among the top IS journals by independent institutions such as The Financial Times and by members of the IS discipline[1]; and (3) the common practice of viewing these journals as premier publication outlets for considerations of tenure and promotion [Valacich et al. 2006]. Therefore, we believe that a historical analysis of these two journals is likely to reveal our academic identity as it is inferred by outsiders. We note, however, that in its early years, *MISQ* had a reputation of a journal with a narrow range of acceptable topics, which may have skewed the results. Future studies may choose to replicate or extend this study by conducting a similar analysis of papers published in other premier IS journals, such as the *Journal of the Association for Information Systems*.

Second, our data cannot tell whether the prominence of the *Consumer Website* IT Artifact during period VI is an enduring characteristic of IS research or a temporary event associated with market fads. Only future analysis of a similar nature will provide a definite answer to this question. To offer some insights on this issue, we conducted a further analysis of the papers published in *ISR* and *MISQ* in 2007 and 2008, which indicated that this surge may not be temporary and instead reflect a lasting trend. Specifically, during these two years, 33 percent of all IT Artifact papers focused on or studied a consumer Web site.

Third, given the scope of this study, only the central and enduring characteristics of the focal academic artifact's attributes were identified. Focusing on journal publications within the IS discipline, we could not draw a defensible conclusion regarding their distinctiveness. Nevertheless, considering that many IS scholars consider IT artifacts and IS Themes to be distinctive characteristics of the IS discipline [e.g., Agarwal and Lucas 2005; Lyytinen and King 2006; Weber 2003], we believe that the central and enduring core identified in this study is also distinctive, making it a strong indicator of our academic identity. Furthermore, while researchers in other disciplines may study an IT Artifact, it is less likely that they will do so within the context of an IS Theme. As we contend in this paper, it is not the mere study of an IT Artifact that separates us from other disciplines, but rather the combination of such studies with specific IS Themes.

Fourth, by relying on the descriptions of the authors of the original manuscripts we believe that we were able to objectively create meaningful IT Artifact groups. However, different classification methods, which will undoubtedly result in different IT Artifact groups, might reveal useful insights that can complement the ones provided in this paper.

Finally, as academic artifacts, peer reviewed papers possess more than the two attributes examined in this study; namely, IT Artifacts and IS Themes. Future studies may study additional paper attributes, such as research methods and theoretical foundations. Although we did not code the papers' theories in this study, we discuss how this attribute might impact our academic identity.

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[1] http://www.isworld.org/csaunders/rankings.htm

The Double Edged Sword of Theories

We suggest that the apparent contradiction between the prevailing belief that the IS discipline lacks an academic identity and the findings of this study, which indicate the existence of an academic identity, may be explained by noting the salience of theories in the life of academics [King and Lyytinen 2004], and acknowledging the lack of a prominent theoretical core for the IS discipline [Baskerville and Myers 2002]. Specifically, it appears that our academic identity, which is associated with certain IT Artifacts and IS Themes, may be obscured by the absence of core IS theories, thereby leading to the unwarranted conclusion that the discipline is suffering from an identity crisis. Hence, while there is much to be said in favor of an application of a wide theoretical foundation within a discipline, extensions of existing theories, and reliance on multiple theories within a single study [e.g., Orlikowski and Barley 2001; Robey 1996], without a dominant IS Theory core the proliferation of theories and the heavy reliance on non-IS theories in IS research [Baskerville and Myers 2002; Weber 2003] makes this attribute a weaker indicator of our academic identity [Weber 2006]. Moreover, as the theory attribute is highly visible to external observers who are also likely familiar with many of the theories applied, the lack of central and enduring IS theories potentially distracts such observers from seeing other academic artifact attributes (e.g., IT Artifacts and IS Themes) and may ultimately lead them to conclude – unjustifiably – that the IS discipline has no academic identity.

Juxtaposing the lack of an IS Theory core against the central and enduring cores associated with IT Artifacts and IS Themes is particularly glaring. The persistent and narrow focus on certain types of IT Artifacts and IS Themes is sharply contrasted with the large number of theories presently borrowed and referenced from other disciplines. As researchers, we should explore our limitations in creating unique IS theories. To this end, the study's findings can provide an important first step in theorizing about: Why certain IT Artifacts received relatively consistent attention (e.g., Infrastructure Services) while others have lost ground (e.g., Computer Integrated Manufacturing and Engineering)? Why some IS Themes are gaining momentum (e.g., IS Success) while others exhibit constancy (e.g., System Design & HCI) or cyclicality (IT Professionals)? Why, as a discipline, we choose to focus on certain IT Artifacts, IS Themes, or combinations of IT Artifacts and IS Themes, and not others? And finally, why have we not been successful in leveraging the knowledge gained from persistently studying these IT Artifacts and IS Themes to generate unique IS theories? The IS discipline is bound to benefit from engaging in a discussion over such questions and from searching for a cause and a remedy.

Directions for Future Research

Our study offers several important implications and brings up future research directions for the IS discipline. First and foremost, our findings suggest the existence of an academic identity which can improve our collective understanding of *who we are as a discipline* and *what we have achieved so far*. We encourage IS researchers to consider and evaluate this artifact based academic identity and its key indicators – specifically, the core IT Artifacts and IS Themes – and engage in a constructive discussion over its meaning for the discipline. If this academic identity is deemed adequate for the discipline then it should be strengthened, perpetuated, and proudly communicated to new members of the discipline and to external audiences. Otherwise, it should be changed or extended to reflect IS researchers' shared sense of who they are as an academic discipline. In particular, the insights discussed in this study can help us make new choices and lay out new directions if the identity reflected by our most prominent academic artifacts contradicts our espoused or desired identity. Such self reflection is by, its own right, a venue for future research.

Second, we note that the findings presented in this paper and the ensuing discussion were associated with the most central and enduring IT Artifacts and IS Themes we identified. Future research seeking to contribute to the identity discussion may do so by exploring the *absence* of certain types of IT Artifacts and IS Themes. For example, our findings indicate that the Computer Aided Manufacturing and Engineering group briefly grabbed the attention of IS researchers (period I) but has since all but disappeared. It would be interesting to understand the causes of this phenomenon and consider the possibility that technological improvements over the past quarter of a century merit revisiting IT Artifacts that are associated with organizations' physical activities.[2] In addition, we observe that ethical, legal, and moral aspects of computing receive virtually no attention in IS research published in *ISR* and *MISQ*. We note that a similar observation was made by Swanson and Ramiller [1993]. Studying these IS themes may prove useful in developing unique and interesting IS theories capable of transcending the boundaries of our discipline and guiding research in other disciplines. Another IS Theme that may benefit from enhanced attention is that of IT Professionals. This theme has been represented in only two percent of the papers published in *ISR* and *MISQ*

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[2] We note here that many ERP systems, which belong to the Enterprise Applications (EA) IT Artifact group, contain an optional Manufacturing module that can be seen as a technological descendent of MRP (from the Computer Integrated Manufacturing and Engineering (CIM) IT Artifact group). Accordingly, CIM and EA may be regarded as one IT Artifact group. However, since the papers we examined did not appear to make such a connection, perhaps because the ERP systems were studied for their non-manufacturing capabilities, a more conservative categorization of two distinct IT Artifact groups was preferred.

during the last two periods. Recent development in mobile computing [e.g., Lyytinen and Yoo 2002] may have had dramatic impact on IT professionals' ability to balance work/life, their willingness to adopt new technologies, and their overall welfare and careers. This direction may also be conducive to the development of IS theories positioned to increase the status of the discipline as a reference discipline. It is interesting to note that our analysis of the papers published in 2007 and 2008 shows an increase in the percentage of papers whose IS Theme is IT professionals [from 2 percent in period VI to 7 percent]. Perhaps IS researchers are beginning to recognize the need to understand how IT professionals are affected by emerging technologies that blur the boundaries between work and leisure activities and between the home and office environments.

Building on the observation that the vast majority of IS research focuses on commercially oriented organizations, it may be possible to enhance the relevance of the IS discipline by examining IT Artifacts and IS Themes within the context of non-commercial institutions such as government agencies and volunteer-based organizations. If these institutions design, implement, use, and manage different IT Artifacts than those identified as core in this study, or use different practices and success measures, then our collective understanding of information systems is likely to expand. A non-formalized realization of this issue may be behind the slightly increasing interest in health IS in the discipline and, in particular, the trend to establish i-schools independent of any specific faculty. This would seem to indicate increasing realization of the general nature of the IS phenomena. IS researchers may further contribute to the identity discussion by empirically tracing the evolution of IT Artifacts, looking for unique trajectories that will indicate the academic core's path dependencies – an indication that the discipline maintains its identity while responding to environmental pressures [Benbasat and Zmud 2003]. Finally, additional extensions to this study may involve studying other academic artifacts that may serve as indicators of our academic identity such as doctoral dissertations. Alternatively, our academic identity may be extended beyond the scope of the academic discipline to include practitioners and industry associations.

Conclusions

This study identified central and enduring attributes of a key academic artifact – i.e., journal publications – and examined them with the lenses of organizational artifacts and identity. Out of this process emerges an academic identity for the IS discipline. Specifically, we suggest that this identity may be described as: *the scientific study of the design, development, and management of information technologies, as well as their use by and impact on individuals, groups, and organizations. Of particular interest are information technologies (and their specific components) that enable communication, collaboration, and decision making.* Coupled with the general recognition that IS phenomena distinguishes us from other disciplines, the IT Artifacts and IS Themes identified as the core of the discipline in this paper are likely to indicate our academic identity. This conclusion is based on an objective analysis of our academic identity as informed by some of the discipline's most prominent academic artifacts and is intended to promote discussion and reflection rather than serve as criteria for evaluating future work or to judge the merits of such an identity.

Focusing on a theoretical core might result in a conclusion that the IS discipline suffers from an identity crisis. However, a broader look which takes into account other attributes of the academic artifact should lead to a different conclusion. Specifically, by recognizing our focused and persistent attention to small sets of IT Artifacts and IS Themes it is possible to identify a central and enduring core which conveys a clear academic identity.

Our findings can be used by the editors of IS journals to promote understudied areas of research. This would be particularly useful if the IT Artifacts and IS Themes we study convey an identity which the IS discipline believes contradicts its espoused academic identity. In such a case, focusing on different IT Artifacts and IS Themes can help steer the discipline toward a more desirable direction. As an academic discipline, we have the power to influence the identity we present to relevant stakeholders by modifying the attributes of the academic artifacts we prominently exhibit. If we subscribe to the notion that identity is an antecedent of legitimacy and if we believe that our academic identity is not conducive to attaining legitimacy, then we should work to change it. If we avoid change, then we should acknowledge the role of academic artifacts' attributes as identity indicators. Hence, repeatedly studying the same IT Artifacts and IS Themes over time and across circumstances signifies our discipline's central and enduring core, implicitly giving observers the "go ahead" to use this core to establish our academic identity. If we espouse a certain identity but the attributes of our most prominent academic artifact convey a different identity, then we are bound to be seen as experiencing an identity crisis.

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