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Information Technology and Organizational Contexts: Orienting Our Work Along Key Dimensions

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Abstract

The locus of the Information Systems discipline is at the intersection of organizations, people, and those technologies and systems specifically related to the acquisition, storage, analysis, interpretation, and communication of data. However, much of the published research is trifurcated, emphasizing one dimension and virtually ignoring the others. We argue that a deeper understanding of and an appropriate emphasis on the technological dimension, the information technology artifact, will significantly benefit research in the discipline. By doing this in a manner that explicitly recognizes the organizational and human contexts, we will better orient our work toward the needs of our various constituencies. We look at two specific examples of potentially rich areas of enquiry: workflow management and the semantic Web. Using a design science paradigm, we describe how these two can serve as exemplars to address the key research concerns of the discipline. We conclude by discussing the roles that authors, journals, and the discipline itself can play in addressing the challenges that are presented.

Introduction

Dependency upon information technology for daily operations and for strategy implementation has become so commonplace that technology decisions and policies have moved from the backroom to the boardroom, and advertising for information technology artifacts has moved from technical reference manuals to the broadcast media. Buzzwords such as "on demand computing," "integrating the enterprise," and "Internet time" fuel the notion that the "right" information technology can effortlessly transform a stagnant, lumbering organization into a lean and efficient one. The reality is that organizations and the information technologies that support them are both artificial systems that must be interdependently and intentionally designed and implemented considering the capabilities and shortcomings of the people who will ultimately be responsible for their success or failure and the business environment in which they must operate.

The field of Information Systems is fundamentally about the development and effective application of information technologies and systems by people within organizational and societal settings. While the discipline, as it is defined in an academic environment, finds itself cast with a variety of faculty affiliations, it is well understood that the nature of enquiry in which it engages is applied and interdisciplinary. At the first International Conference on Information Systems conference held 26 years ago, this aspect of the field was emphasized and the notion of "reference disciplines" was widely discussed (Keen, 1980). The general conclusion from this discussion reiterated the fact that the intellectual agenda of the field must encompass multiple perspectives and methodologies if the field were to advance and cement its place among other functional areas in academia. In the past 26 years, we have evolved in a manner that has reflected this thinking about who we are and what we do intellectually.

Several models of information systems departments exist in academia today. In some cases, they are part of a business school and sit alongside departments such as operations management, marketing, finance, and accounting. In an alternative model seen widely in universities outside North America, they are part of Science or Engineering faculties along with Computer Science, Software Engineering, and Information Science. A model that is becoming increasingly popular is the School of Information Studies that embraces the business, engineering, and social aspects of the field. This seems to be an academic structure most closely aligned with the ideas presented at the inaugural ICIS conference.

Regardless of their academic affiliations, members of the IS community represented at conferences such as this one share an intellectual map that guides research, teaching, and other academic endeavors. The glue that holds us together is the effective utilization of information technology—the IT artifact—which addresses human and organizational tasks and problems. Whether it is the study of how organizations should or should not implement enterprise-wide information systems, how technology can enable globally distributed teams to accomplish their tasks, how a new technology-enabled approach to decision-making may result in improved productivity, what makes people accept and adopt new technologies, or how to assess the economic value of alternative digital rights assignment approaches, the common thread is the IT artifact, its capabilities, impacts, appropriation, value, implementation, etc.

In this paper, we argue that discussions about the IT artifact itself should play a prominent role in our research agenda. Whether it is dissemination of our research through journals and conferences, design of curriculum and the resulting graduate profiles at all levels, or the professional persona that we project to stakeholders outside our immediate discipline and academia, emphasizing the central role that technology plays in what we do is essential. Our premise is that as a field, paying greater attention to information technology can only strengthen our identity as an academic discipline.

If our field is fundamentally about the rich interactions that occur when organizations, people, and technology interact (Lee 1999), then surely a core aspect of our research must include the study of the technology itself. The rate of technological change in our field is perhaps unmatched by any other. This presents a vast opportunity for us to conduct research and train our students in a field that is constantly faced with change. It is, therefore, crucial that we are engaged in a prominent manner in the exposition of ideas relating to technology *creation* as well as its implementation and adoption.

In addressing questions about how the technology can or does work, we need to understand how organizations and people work. Our contention is that these are interdependent, systemic, and synergistic: *technologies* transform people and organizations; *organizations* transform people and technologies; *people* transform technologies and organizations (Lee 2000). It is the interplay of these that defines the strengths of our discipline, rooted in the computational and engineering sciences as well as the organizational and social sciences. It is this interaction among people, organizations, and technology that provides our academic niche. In business schools, the emphatic presence of technology differentiates us from the other functional areas. In schools of science and engineering, the organizational and human imperative differentiates us from the technologists.

Our position is this: We must be proactive with respect to emerging and envisioned technological capabilities. We cannot merely wait passively while technologies are developed and engaged by our constituents and then study how, why, when, or where they should (or should not) be adopted. We must use knowledge of organizations, people, and technology to envision and develop new technological capabilities that will address the needs of our constituencies.

A Research Approach

The value of research in any academic discipline is defined by the constituency that comprises and supports it (Denning 1997; Tsichritzis 1999). In the Information Systems discipline, this constituency can be found both in organizations that procure and implement information technologies and in organizations that develop and deploy them. It includes IS academic researchers, IS managers, and, more and more commonly, general and upper level managers in a wide variety of organizations. The results demanded by this constituency are (1) innovative IT artifacts that enable organizations to effectively and efficiently address business tasks and problems and (2) the knowledge of how to effectively choose, appropriate, implement, and integrate such artifacts into an organization. Innovative IT artifacts extend the boundaries of known applications of IT by addressing important problems heretofore not thought to be amenable to computational approaches (Markus et al. 2002; Walls et al. 1992). Knowledge of how to effectively choose, appropriate, implement, and integrate them into an organization unlock their organizational value. These are the fundamental issues that IS researchers must address (Benbasat and Zmud 1999).

Addressing these issues requires an understanding of phenomena that occur at the intersection of organizations, people, and information technologies—the locus of the information systems discipline (Lee 1999). Researchers must develop and justify theories, deep-principled explanations of these phenomena (March and Smith 1995). Such theories are valuable in understanding what has happened, why it happened, and possibly in anticipating what will happen with respect to such phenomena.

While such theories may be explanatory as well as causal in nature, their relevancy and value are determined by the degree to which they enable the creation of work systems that improve organizational performance (Alter 2003). This is fundamentally a design task requiring researchers to develop and evaluate innovative IT artifacts that push beyond the boundaries of known applications and bring about desired conditions (Boland 2002; Markus et al. 2002). To appreciate the importance of this design task, one must first recognize that business organizations and the information technologies that support them are both intentionally designed artifacts (Bunge 1985; Simon 1996). Their characteristics are molded by their designers to achieve specific purposes. They are ultimately evaluated by their effects on firm performance. To the degree to which organizations can shape human behavior (e.g., through training and reward structures), people, although not artificial, also have an element of design.

Much IS literature has explored characteristics of organizations and people while ignoring salient characteristics of information technologies (Orlikowski and Iacono 2001; Weber 2003). As a result, much of this research is equivocal. Orman (2002), for example, eloquently describes the folly of posing a theory to explain or predict the effects of information technology on organizational structure without including design characteristics of the implemented IT artifact and without including design characteristics of the organization. Any such theory must include these or limit its claims to the combined characteristics of people, organizations, and information technology included in the study.

We define the *IT artifact* as a combined hardware and software system that is designed and implemented within an organizational context and whose purpose is to collect, organize, and store data, and transform it into information needed for operating and managing the organization. Such artifacts are designed for specific purposes and are used (or not used) by people within that organizational context. We recognize that the use (appropriation) of IT artifacts may or may not be as intended by the designers (DeSanctis and Poole 1994). We also recognize that the design of such IT artifacts may be appropriate and effective in some organizational contexts but not in others and that appropriateness and effectiveness change as organizations and people change over time.

We argue that adequately addressing these research questions requires behavioral science, organization science, and design science research paradigms (Hevner et al. 2004). Behavioral science research paradigms are commonly applied in research articles published in information systems research journals. We do not discuss them further. However, design science concepts and its use as a research paradigm are less commonly used. Hence we begin with a brief overview of design science. We then explore two emerging research areas, namely *workflow management* and the *semantic Web* to illustrate how the combination of behavioral science, organization science, and design science research paradigms can be effectively used. We then discuss the challenges to authors, journals, and the IS discipline itself of engaging these divergent research paradigms. We conclude with steps to overcome these challenges and bring into balance the human, organizational, and technological foundations of our discipline.

Design Science

Simon (1996) defines a number of aspects of the design science that are salient to this discussion. He describes the rudiments of design science as a science of the artificial, being rooted in management sciences and computational modeling. As a research paradigm, it is based upon five constructs.

1. **Problem Conceptualization**: the identification of the task, problem, root causes, and purposes to be fulfilled by the artifact.

2. **Objective Function**: the specification of the metrics that will be used to evaluate the resultant design; a quantification of the goals. Metrics for the effective evaluation of IT artifacts are often complex and under-researched.

3. **Constraints**: identification and specification of the physical and theoretical laws or limitations imposed on the designed artifact by the technologies with which it will be constructed (inner environment) and the context in which the designed artifact is intended to be used (outer environment).

4. **Decisions**: specification of those aspects of the designed artifact that are under the control of the designer; often specified as design decisions having costs and benefits relative to the objective function.

5. **Solution Space**: the set of feasible designs; those designs that meet all of the constraints and through which the designer must search for an effective (satisfactory) design.

The resultant design must be in conformance with laws governing the real world. Often, however, we do not know or understand these laws fully. We must rely on incomplete (kernel) theories (Markus et al. 2002; Walls et al. 1992) in the development of prototype artifacts, which themselves provide insight into such laws. That is, the design science research paradigm relies on building artifacts in order to understand the laws governing the constraints, the design decisions, and their effects on the objective function and the solution space itself. This is particularly challenging when the problem of interest is the identification and definition of problems and solution methods within an organizational context and the organizational context is itself not well-understood or is evolving.

Applying these principles to IT artifacts, it is often difficult to conceptualize the problem; however, it is clear that business organizations are concerned about effectively and efficiently using information technology to improve business performance. Ultimately the objective function is cast in economic terms. Constraints are technological, organizational, and behavioral. Technological constraints are constantly changing as new IT capabilities are developed. Furthermore, constraints may be artificially imposed by an organization because advancements in technologies, organizational structures, and human capabilities are not fully appreciated. Organizations must consider the effects of policies developed in consideration of a prior technological age. Security, privacy, and knowledge management are key examples of areas where technological advances require organizations to rethink policies and procedures related to organizational and IT design decisions. Similarly, advances in technology present design decisions and alternatives that greatly expand the solution space and require management consideration. Workflow management and the semantic Web are two such technological advances and will be addressed below.

March and Smith (1990) and Hevner et al. (2002) differentiate four types of IT artifacts: constructs, models, methods, and instantiations. Constructs are vocabulary and conceptualizations that enable communication and description of problems (phenomena), solution components, constraints, and objectives. Examples in the context of IS research include data modeling formalisms (grammars), ontology, taxonomies, agents, object-orientation, use cases, expertise and knowledge representation formalisms, and artifact evaluation metrics. Models use these constructs to represent problems and solutions. Examples include design patterns and templates, specific domain ontologies, data cube representations, and specific problem representations (e.g., casting the growth of electronic marketplaces in a game-theoretic framework or casting investment in emerging information technologies in a real options framework, or casting database and network design problems into a mathematical programming framework). Methods are algorithms or guidelines that enable the construction and use of instantiations—computer-based systems implemented within an organization. Examples of methods include systems analysis and design techniques, collaborative technologies, design guidelines, optimization algorithms, and decision support tools. Examples of instantiations include expert systems, agents for specific purposes, vigilant systems (Walls et al. 1992), and systems that support emergent knowledge processes (Markus et al. 2002).

Each type of IT artifact may constitute a contribution to research knowledge. Constructs, models, and methods are evaluated with respect to their ability to improve performance in the development and use of information systems. Instantiations or implementations demonstrate the feasibility of utilizing information technology artifacts for a given task. They often embody newly developed constructs, models, and methods and contribute to our understanding of the capabilities and limitations of emerging technologies. They are evaluated with respect to their effectiveness and efficiency in the performance of the given task.

Summarizing design science as a research paradigm, we observe that

1. IT artifacts have no special dispensation from natural or behavioral laws. Researchers utilizing a design science paradigm must be cognizant of existing (kernel) theories and prior design knowledge that affect their problem domain. These include organizational and behavioral theories as well as technology and system-based knowledge gained in prior studies.

2. Organizations are themselves designed artifacts within which IT artifacts are implemented and used by people. Researchers must recognize the interdependencies among organizational design, IT artifact design, and the capabilities and limitations of the people for whom these artifacts are intended. IT artifacts and organizational artifacts jointly define the environment in which human behavior occurs.

3. Behavioral IT theories are cast both in organizational contexts and in the context of the capabilities (design) of the IT artifacts in which behavioral phenomena are studied. Reasoned and justified explanations or predictions of phenomena must recognize the context of the IT artifact in which they are positioned.

Workflow Management

The design-science paradigm can be applied to workflow management. Workflow management is "a proactive computer system that manages and coordinates the flow of work (electronically) among participants, according to a procedure consisting of a number of tasks. It coordinates user and system participants, together with the appropriate data resources, which may be accessible directly by the system or off-line, to achieve defined objectives by set deadlines."[1] It focuses on managing business processes rather than documents. The study of business processes has been justified by linking streamlined business processes directly to organizational productivity. There is little doubt (1) that this is an important area of study in the organizational sciences and (2) that business schools are in a preeminent position to carry out this work. Research in this area, alternatively called business process management, business process engineering, or business process reengineering, spans multiple disciplines typically found in a business school. The need to create and study innovative IT artifacts that provide support for business process management, however, does not yet appear to be adequately appreciated. In this section, we motivate the study of workflow management focusing on the core IS research issues.

Perhaps the most widely recognized authority on workflow management concepts and definitions is the Workflow Management Coalition.[2] Its focus is the automation of business processes that are well-defined and follow a well-understood set of organizational procedures. Such processes typically encompass the execution of tasks among organizational participants resulting ultimately in the successful completion of the objective of a complex interorganizational business process. To provide a broader understanding of workflow management in a business context, a more abstract perspective is provided by Basu and Kumar (2002). They state that business processes are combinations of specific transformational tasks that produce identifiable outputs. Further, these processes may relate to a *value system* that may span organizational boundaries. The combination of these perspectives provides fertile ground for IS researchers. First, the domain addresses the fundamental nature of organizational work—business processes, a concept long familiar to IS researchers. Second, computer-based tools may be used to model business processes in order to accurately reflect the way organizations work. Third, computer-based tools can be applied to successfully support such processes through familiar configurations such as e-business, supply and demand chain management, and other collaborative work systems among organizations. These all offer rich opportunities for IS researchers.

The fundamental aspect of workflow management systems consists of a set of well-defined process components. We already mentioned tasks as an integral component of the process. Modeling these tasks accurately is a key aspect of workflow management. Several issues must be taken into account as part of this modeling activity including the creation of constructs (i.e., language) within which to define and communicate workflow problems and solutions and methods to transform problems into solutions. A minimal definition of a *task* must include the inputs that it requires, the transformed outputs that it produces, and the organizational value of the task. For tasks to proceed through to completion, resources must be devoted to them. These resources may be specific individuals, roles, or other processes within different organizational partners. Tasks, by definition have a temporal dimension to them which must be tracked. A task's relationships with other tasks that make up the business process must also be defined. Constraints that apply to a task must be taken into account to reflect organizational and human realities.

Workflow management systems are responsible for the proper modeling of business processes by taking into account these various components that make up units of definable work. The links between business process modeling formalisms and workflow management modeling should be obvious to the reader. The interaction among the two research communities that have addressed these issues can only result in positive outcomes for IS research. Modeling as a research activity has been a fundamental aspect of researchers in almost every traditional business discipline. The application of sound modeling techniques in this context provides a solid link between the IS discipline and business strategy, operations and supply chain management, marketing, etc.

IS researchers can also contribute to knowledge about workflow management through their knowledge of interorganizational systems. Technological support for systems spanning organizational boundaries has been an area of study in the IS field for many years. Supply and demand networks that make up organizational value chains in many businesses today fundamentally depend on the definition of cross-organizational business processes. Further, the deployment of Web-based solutions to support these processes offers a rich area of application for workflow analysis and management. Enterprise application integration, Web services and service-oriented computing are key ideas that fall squarely in this domain. Organizational collaboration through

[1] **www.organized-living.com/industryterms.html**.

[2] The Workflow Management Coalition (www.wfmc.org) is a nonprofit international group of researchers, vendors, and user organizations. A key function that they perform is to establish standards for workflow technologies to ensure that software products are interoperable.

shared business processes can be achieved through a range of contractual arrangements among the partners involved in the value chain. These arrangements can be tightly defined with expected interactions that need to be managed. On the other hand, the interactions can be loosely defined to enable the *ad hoc* delivery of a product or a service based on on-the-fly compositions from an upstream product or service network. The facilitation of this type of organizational functioning is well-suited to the deployment of effective workflow management systems.

One of our main objectives as IS researchers ought to be that our work is recognized as being of value to various constituencies in addition to our own discipline. A key constituency is the business world. By demonstrating that our research is grounded in practice and can contribute to the effective functioning of modern organizations, we enhance the perceived value of what we do. This requires a careful balance between the rigor of doing high quality research and the applicability of the research outputs to organizations at large. Workflow management is a topic that is ideally suited to realizing this balance. Too often, our research community is a phase behind researching technologies that are used in the workplace. While it is important to study how effectively various technologies are being used in organizations (a dominant theme of our research), it is equally important to be involved in creating innovative IT artifacts that can be used by organizations. Workflow management as a concept fits well with today's dominant business models, technical frameworks, and available tools. As IS researchers, it is up to us to bring them all together in a meaningful way. The impact on productivity gains must be effectively measured and related to specific workflow management technologies and capabilities to demonstrate the value of this work.

From the perspective of a business school, research of this nature is attractive as it shows the vast potential it has for doing cross-disciplinary work. The obvious disciplinary partners are supply chain and operations management, business strategy, logistics, and marketing. By emphasizing innovative technological capabilities and the role that the technology can play in an organizational context, the opportunity for collaborative research is an attractive proposition. Such research activities offer the possibility of showcasing innovative technologies used in innovative ways to important external stakeholders and emphasizing the integrative nature of research in an applied faculty. In many parts of the world, research funding is dependent on demonstrating the connection between academia and industry, even though the source of the funding is a national research foundation. Research and funding opportunities for applied work also exist in industry through collaboration with industry-based research laboratories. Workflow management offers the perfect opportunity to tap into these sources of research funding.

As an academic community, there are several ways by which the IS researchers can assert a unique identity for our discipline while retaining the value of doing collaborative work with our colleagues. We are often asked whether what we do can be done by someone else. The implication is that the technology can be studied by computer scientists while the applications can be studied by the various existing disciplines that already exist and preceded us. Workflow management is a perfect example where we can demonstrate the necessity of a group that understands the fundamental nature of both the technology and the application domain. While some may not be interested in developing the standards and technologies themselves, we are all interested in the proper application of the standards and the technologies in an organizational context. The context is what defines our work. Workflow management is an example of an area of enquiry where the removal of either the technology or the business context diminishes the value of the work substantially.

Examples of viable research issues that would be of interest to the IS community using a design science paradigm include

- The design of multi-organizational systems (e.g., supply chain applications) with workflow optimization
- Modeling paradigms to support workflow design and their applications in large organizations
- Design alternatives for service-oriented versus production-oriented workflow systems
- Coordination support in multi-partner service chains

The key in all of these research issues is the explicit linkage of the technology with the organizational and human implications. While the focus of any of the above issues is the technology itself, the application of the technology is essential to invoke the interest of our stakeholders.

Semantic Web

The semantic Web (Berners-Lee et al. 2001) is an envisioned future for the World Wide Web. In it, computer programs, intelligent software agents, act on behalf of humans to conduct a variety of information-search, communication, and decision-making tasks. If, when, and to the extent that it becomes a reality, it could have significant impacts not only on the way in which business is conducted but ultimately on the way in which society operates. The fundamental research questions are technical,

organizational, and behavioral. The bulk of research, however, has been technical, addressing questions related to the capabilities of software systems to interoperate, communicate, and use shared semantics and ontologies. We argue that design science, organizational science, and behavioral science research must be conducted if we are to capitalize on the potential of this technology and avoid undesirable side effects.

To understand the research questions and implications of the semantic Web, consider how a procurement manager might search for and select products to purchase and vendors from which to purchase them. Before the emergence of the World Wide Web, search was performed manually. Vendors used a variety of methods to reach potential customers and potential customers used a variety of methods to find potential vendors. Paper-based directories were published, salespeople made sales calls, print and broadcast media advertised products, direct mail catalogs were sent, etc. Searching in this way is extremely expensive and time consuming—so much so that many organizations developed "partnerships" with vendors simply to avoid searching for better products. Switching costs were increased further when trading partners developed automated mechanisms to exchange information about orders, shipments, receipts, and payments. Electronic data interchange (EDI) was an early automation mechanism aimed at reducing costs for both trading partners. Although standardized documents are defined, EDI trading partnerships are relatively expensive to set-up. Specific product, pricing, delivery, and payment mechanisms must be defined in advance and shared between partners. XML is rapidly replacing EDI because of it flexibility in defining information to be exchanged; however, trading partnerships based on XML suffer the same set up costs as EDI. Trading partners must agree upon tags and naming conventions and must define specific product, pricing, delivery, and payment mechanisms. When defined specifically for one partnership and integrated with supply chain management systems and interorganizational workflow systems, XML can further contribute to increased switching costs.

In the envisioned semantic Web many of these tasks are performed by software agents rather than by humans. A purchasing agent (software) can search the World Wide Web for vendors who are capable of providing the desired products. Availability, quality, price, and delivery options are assessed and the best vendor selected. If desired, the purchasing agent can negotiate any of these with selling agents at the different vendors prior to placing an order. Order tracking is performed by order tracking (software) agents that interact with production management (software) agents. If these decide that a purchase order must be expedited, the purchasing agent negotiates with the vendor's sales agent to determine costs and the feasibility of expediting the order.

There are two types of research questions that must be addressed before such a scenario can become a reality. The first are design questions. The second are behavioral and organizational questions. The technical questions deal with the feasibility of developing the capabilities needed to enable such software agents to operate. What are the constraints that must be addressed? How will security be maintained? How will different agents communicate and interoperate? How will a purchasing agent "know" that a vendor (1) is legitimate, (2) has the required products, (3) has the offered prices, (4) has the delivery options and costs, etc. Human purchasing agents interacting with human sales agents use language and shared vocabulary to communicate such information, and even then disagreements and misunderstandings occur. How can we design language and vocabulary that software agents "understand"?

The behavioral and organizational questions are equally important. Clearly at least some version of this future scenario will prove to be technically feasible. What can organizations do to understand and take advantage of these capabilities? Will organizations need fewer human purchasing agents? What skills will be required to perform and manage the purchasing task when software purchasing agents are available? How extensively should an organization use such agents? How will software agents be "managed"? How will they fit within the overall framework of organizational and interorganizational workflow systems? Who will develop such software agents? If they are purchased, will they be "customizable" to enable different negotiation mechanisms and purchasing policies to be implemented? How will such customization impact organizational policies and work rules? Can such software agents be trusted? Who will certify them? Can competitive advantage be sustained if all competitors are using the same language and vocabulary to negotiate with all potential vendors? Should an organization make a commitment (1) to using software purchasing agents? (2) to a specific standard for language and vocabulary? (3) if so, under what conditions (i.e., when)? (4) if not, what is the risk of being at a competitive disadvantage?

We argue that the constituency to which IS researchers are responsible must be informed of the capabilities being investigated by design science research and they must be informed of the knowledge necessary to understand how such capabilities can be effectively implemented within an organization. We argue that both of these perspectives must be represented within the IS research journals.

Challenges

Our concern is that research dealing with emerging and technologically advanced topics such as workflow management and the semantic Web are underrepresented in the highest quality IS research journals. These technologies are in the developmental stage and would greatly benefit from an understanding of how technology influences organization and human behavior and how organizational and human behavior influences technology (Lee 2000). This is a challenge to both IS researchers and to the IS community that needs to facilitate the dissemination of such research. In this section, we summarize these challenges and pose ways of addressing them. Our hope is that this will result in a more vibrant and well rounded academic community capable of signaling our technological identity to relevant stakeholders. We will address three major types of challenges: author-based, journal-based, and discipline based.

Author-Based Challenges

Authors tend to write in the manner to which they are accustomed. These styles are in part determined by an individual's academic training, typically based on design science, organization science, or behavioral science. Potential authors need to make a demonstrable effort to fit the presentation style with the needs of the journal. For example, an article on workflow management appearing in an ACM journal would require a very different style compared to one appearing in a management journal. While the main topic is the same, the emphasis and the exposition must suit the publication medium.

A recent submission to a top-ranked IS journal addressed a topic of interest to workflow management researchers. It studied two alternative strategies for maintaining a smooth flow of work on the work floor and drew heavily from well-respected workflow management literature. However, it was not positioned to address the relevant managerial and organizational issues and therefore was not deemed suitable for publication in that journal. To be appropriate for this journal requires a focus on managerial and organizational issues in workflow management. For example, the authors could have theorized about how to implement workflow management systems successfully, which features (capabilities) of the workflow management system should be considered during the implementation process, and how newly developed capabilities contribute to the success or failure of such an implementation. They could have drawn from the considerable research about implementation strategies that has been published in IS journals.

Alternately they could have used a case study approach to understand the appropriation strategy that resulted in "workarounds" in the workflow systems described in the manuscript and proposed capabilities that would have eliminated the need for such workarounds. Adaptive structuration theory (DeSanctis and Poole 1994) or the organizational imperatives of technology use (Orklikowski 2000) could have been particularly useful in informing the authors' analysis. Similarly, explicating the design theories (Markus et al. 2002) underlying the implementations and implementation problems would have informed managers of the interactions among capabilities and implementation strategies. This example demonstrates that the authors could have written a paper reflecting the journal's mission without sacrificing the design science contributions. This could have been accomplished by paying particular attention to the manner in which the research issues are addressed, and taking special care that the organizational implications of the technology are explicitly acknowledged.

Journal-Based Challenges

Editorial board members tend to think in terms of the kinds of research they do. They may not be as familiar with other research topics and methodologies. It is a challenge for members of editorial boards to suspend their biases when evaluating research written from perspectives different from their own.

Hence, rather than expect members of editorial boards to adopt a new perspective when assessing papers from a different research perspective, it may be easier to ask experts from that research perspective to serve on the board. There are two challenges to implementing such a strategy. First, many boards make appointments based upon the quality of past reviewing efforts. However, if articles on a topic are not typically submitted to the journal, it is difficult for researchers from that area to have a reviewing track record for that journal. Thus, editors-in-chief may be hesitant about making appointments of researchers when they do not know how responsible they are in meeting deadlines, in providing developmental reviews, and, especially, in keeping the journal's mission in mind when making accept/reject decisions. A second, and lesser, problem, is that even if there are researchers from a particular research area appointed to the board, papers on that topic still may not be submitted. Consequently, those editorial board members may have little actual involvement in the journal's review process. Hopefully this problem is short-lived as researchers recognize that the journal is signaling them that their research topic is considered appropriate for the journal.

Another very important signal that the journal sends out about what is appropriate is the statement of the journal's mission. A journal's mission may not be written in such a way as to encourage research on technologies. Thus, it is important for editorial boards to periodically evaluate the mission statement to ensure that it is not unintentionally limiting the types of submissions it receives.

Discipline-Based Challenges

Social constructions within the discipline may diverge from editorial statements defining the mission of a journal. The editorial board may be willing to accept certain types of technical, organizational, or behavioral research, but researchers in the discipline may have formed a different image of the journal. Hence, researchers in such areas as workflow management and the semantic Web may believe that a journal will not publish their research when in fact this is not the case. While it may have been true of a journal in the past, it may no longer be the case. The editor-in-chief may signal that such topics are appropriate by editorial board appointments and special issues. In addition to the inhibiting effects of social constructions working against submissions of certain research topics to journals, the nature of journals must also be considered when assessing discipline challenges.

Still another discipline challenge that is experienced by all researchers in the discipline is the challenge of getting research past the journal's gatekeepers. We believe that reviewers in the IS discipline tend to view their role as *gatekeepers* whose job is to prevent research articles from being published rather than as *colleagues* whose job is to insure that the most useful research is published. Were reviewers more developmental in their reviews (see Lee 1995) and more open to making suggestions for improvement rather than identifying what are, in their minds, "fatal flaws" to keep articles from being published, we believe the value of published research would be greatly enhanced. That is not to say that research with fatal flaws should be published in our best research outlets, but that authors of an article that contains fatal flaws need guidance in avoiding such problems in future projects.

Strategies for Dealing with the Challenges

Author-Based Strategies

There are several strategies that researchers could adopt to increase the likelihood of their research being published in top-ranked IS journals. First, authors are encouraged to read the instructions to authors, and articles published in journals to which they want to submit, and to write their articles to correspond to the mission and traditional journal formats. Second, they should also look for signals that the journal is sending out about their research topics such as editorial board appointments and special issue topics. A third strategy is to attend author workshops such as those that have been offered in conjunction with ICIS over the last few years and incorporate workshop recommendations into their research. But the most effective strategy is likely to be the most difficult to implement: that is, to collaborate with colleagues who have a different perspective. This article represents an attempt at such a strategy. Each author has a different perspective. No author is completely satisfied with the result. We continue to face major differences in perspectives, opinions, definitions, and even in the definition of the IS discipline. Yet we believe that collaborations of this type are crucial to the development of the discipline.

Authors would do well to vet their ideas before submitting their research to top-ranked journals. It is particularly important to get feedback from audiences who have a different research orientation. It is the job of authors to convince such an audience of the value of their work. In extreme cases an author may need to consider enlisting a coauthor who has the appropriate focus. Workshops and conferences are good forums for receiving feedback about how to make research more appealing to broader audiences. Authors could ask senior researchers in the field to review their papers and explicitly ask them to suggest ways to make their research more appropriate for submission to top-ranked journals. In summary, authors must assume responsibility for positioning their papers.

Journal-Based Strategies

In the interests of keeping the discipline vibrant, journals must also frequently reevaluate the journal's mission. Editorial board appointments could include researchers in underrepresented emerging or critical areas.

Also, in an attempt to encourage research in emerging or critical areas, journals must be open to special issues. For example, in order to encourage more design science submissions that further its mission, *MIS Quarterly* recently announced a special issue

on Design Science. *Information Systems Frontiers* recently published a special issue on Design Science and Information Systems. *Information Systems Research* publishes a broad mix of research and regularly publishes design science and behavioral science research. The editorial board is reflective of this commitment. There are other encouraging signs in our community. An international conference exclusively dedicated to Design Science and Information Systems (**http://ncl.cgu.edu/designconference/**) and an AISWorld page dedicated to the same topic (**http://www.isworld.org/Researchdesign/drisISworld.htm**) are encouraging signs that our community sees the value of this type of work.

Discipline-Based Strategies

As a discipline, more and more researchers have been calling for improvements to the reviewing process. In response to a proposal by past Association for Information Systems (AIS) President Rick Watson to have a certification process for reviewing, a committee has been formed, chaired by Jane Webster, to look at discipline-wide approaches to improving the reviewing process. In a recent editorial, the editor-in-chief of *MIS Quarterly* called for more developmental reviewing, and has initiated more formal training of associate editors to promote developmental reviewing. Similarly, the editors of other journals are also attempting to encourage more developmental reviewing. This requires a major commitment from the senior researchers to review articles that are not within their major research area or from their research perspective.

The IS discipline is a dynamic one. Concerted efforts on the part of authors, journal editors, and the entire community are needed to ensure that it remains viable over time. Further, the use of knowledge about organizations, people, and technology are all important in envisioning and developing new technologies, and effectively utilizing older ones.

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