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The Emerging Distributed Information Systems Infrastructure: Some Implications for IS Research and Teaching

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INTRODUCTION

The rapidly evolving Worldwide Information Infrastructure (WII) (Neumann, 1994), of which the Internet is arguably the most visible component, marks the emergence of the information superhighway. The WII is very broad in scope and may be seen as a worldwide super-set of the National Information Infrastructure (NII). The NII consists of: (1) thousands of interconnected, interoperable telecommunication networks; (2) computer systems, televisions, fax machines, and other "information appliances"; (3) software, information services, and information databases (e.g., "digital libraries"); and (4) trained people who can build, maintain, and operate these systems. In the future, the NII will enable all Americans to get the information they need, when they need it, where they need it, for an affordable price ([HTTP://WWW.NTIA.DOC.GOV/](http://WWW.NTIA.DOC.GOV/)).

In this paper, we use the term "Distributed Information Systems Infrastructure" (DISI) for a restricted subsystem of the WII consisting of *all networked computers and the distributed information systems* they represent. This paper proposes a framework to organize and view the major components of the DISI and suggests a classification scheme for information tasks. The paper identifies and examines some key issues relating to the content and process of *IS* research and *IS* teaching.

Why can't existing *IS* frameworks be used directly to study the DISI? Classical *IS* frameworks have been invaluable in guiding *IS* work in the last two decades, but they were developed with traditional *IS* in mind and fall short in capturing the unique aspects of the emerging DISI. It is clear that the DISI significantly differs from conventional *IS* in characteristics as well as in the types of opportunities it offers and the consequent risks.

FRAMEWORK

When viewed as a system, the DISI is clearly more than an aggregate of tools, resources, expertise, and technologies. What should its components be? Building upon classical *IS* and organizational frameworks (Ives *et al.*, 1980; Leavitt and Whistler, 1958; and others), it is useful to view the DISI system as consisting of PEOPLE who use CONVENTIONAL INFORMATION SYSTEMS and DISTRIBUTED RESOURCES AND TOOLS in order to perform GOAL-oriented TASKS based upon STRATEGIES for effective management and

use of INFORMATION in specific ENVIRONMENTS. While many of the entity classes have been described in some form or the other in prior *IS* frameworks, there are important differences in scope and semantics. These differences are described in the full paper.

IMPLICATIONS

The implications of the DISI for *IS* research and teaching are many and substantive. It is not the intent of this paper to present a comprehensive listing of issues in these areas. Rather, the purpose is to present some key issues and suggest how the framework may help generate further issues.

***IS* Research Content**

Research efforts focusing on the content of DISI have mostly concentrated on the development of tools and technologies. By contrast, there is a notable lack of empirical research on information users, their relationship with the tools and tasks, and the quality of information they receive from the DISI system. Neither has there been much empirical research on the multi-faceted issues faced by organizations who perceive the tremendous potential of the DISI but are not sure how to tap this potential. The DISI framework may be used as a starting point for generating research ideas by examining the congruence of fit between multiple pairs of entities (Nadler and Tushman, 1980). For example, important research issues revolve around the *relationship between conventional IS and DISI tools and resources*. One issue is how organizations can link their conventional *IS* with DISI tools and resources. Clearly existing *IS* can benefit by integrating with a rich and diverse source of hard-to-obtain information. There is a need for studies that a) identify organizational information needs not met by conventional *IS* and b) propose ways to meet those needs using the DISI or some combination of the DISI and conventional *IS*. For example, one study has looked at the role of the Internet in providing external information for strategic decisions (Pawar and Sharda, 1995). The study recognizes that the Internet can be effectively utilized as a source of information on customers, competitors, and government policies. In order to do so, the study relates information search strategies (or scanning modes) such as undirected viewing, conditioned viewing, informal search, and formal search (Aguilar, 1987) with organizational strategies and Internet tools.

***IS* Research Methods**

The DISI has the potential to significantly influence *IS* research methods. A prominent development on the World Wide Web in this regard is the notion of collaboratories. Examples of *IS* collaboratories include: a) the ISWorld Net ([HTTP://WWW.COX.SMU.EDU/MIS/ISWNET/HOME.HTML](http://www.cox.smu.edu/mis/iswnet/home.html)) founded by Blake Ives and b) the Center for Information Systems Management at UT Austin's MIS forum directed by Andrew Whinston ([HTTP://CISM.BUS.UTEXAS.EDU/ISSUES/IINDEX.HTML](http://cism.bus.utexas.edu/issues/index.html)). The collaboratories are designed to be much more than mere news groups or simple sources of *IS* information. They allow *IS* professionals world-wide to communicate and collaborate on projects.

IS Teaching

The DISI has implications for the issues covered in *IS* courses (i.e., the content of *IS* courses) as well as the ways in which *IS* courses are taught (i.e., *IS* teaching methods).

IS Course Content

It is becoming commonplace in *IS* courses to provide undergraduate and graduate students with experience in using Internet-based tools such as WWW, Gopher, FTP, Telnet, and others because recruiting organizations look for Internet experience in MIS graduates. However, it is clear that *IS* teaching must go beyond making students simply *familiar* with the tools and resources of the Internet. Students must understand the implications of the DISI to *IS* practice and research. Organizations have started using the DISI for innovative applications of electronic commerce, gathering market intelligence, providing and receiving technical support, advertising, and improvement of product quality, among others. *IS* students must be made aware of these applications. Another result of the emerging DISI is the reexamination and questioning of widely established issues in the *IS* literature. For example, *IS* notions such as management levels and information types of strategic planning, tactical planning, and operational control may be questioned in the face of flattened organizational hierarchies, organizational teams, and virtual corporations.

Many *IS* courses focus on the information provider's perspective by giving students opportunities to develop informational materials (such as home pages) for the WWW. Some academic *IS* programs have full-fledged courses on issues relating to the DISI. Others incorporate this information in their telecommunications courses. A related development is the creation of new programs of study in telecommunications management (see, e.g., [HTTP://ORCS.BUS.OKSTATE.EDU/MSTM.HTML](http://ORCS.BUS.OKSTATE.EDU/MSTM.HTML)), a response to the growing demand for professionals with

interdisciplinary knowledge of technology and management aspects of telecommunications.

IS Teaching Methods

IS teaching methods are also changing as a result of the emerging DISI. The use of electronic mail in *IS* courses is common. But in recent months, the rapid developments on the World Wide Web and the free availability of WWW browsers to academic communities have created many new opportunities for dissemination of course-related information, creation of electronically taught *IS* courses, easy availability of course syllabi of professors teaching *IS* courses in other universities, and availability of scenario analyses or case studies via laboratories such as the IS World Net.

CONCLUSION

This paper proposes a framework to organize and view the major components of the DISI, suggests a classification scheme for information tasks, and identifies and examines some key issues relating to the content and process of *IS* research and *IS* teaching.

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Note: A full version of this paper is available with the authors.