

A Study of Key IS Issues for Effective IS Programs

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INTRODUCTION

The field of information systems (IS) is undergoing a revolutionary change in the 1990's. In the turbulent business environment, rapid changes in information technology (IT) coupled with plummeting cost have opened a whole new horizon of IS management. IT has become the major tool of reengineering for the business sector and society as a whole [1].

All these changes in IS roles and IT call for greater responsibility and leadership from IS professionals. IS professionals have responded in various ways. These include studies of critical IS issues [2,3], relationship of IS research to practice [4,5], and critical skills and knowledge requirements of IS professionals [6,7]. Professional societies such as ACM, AIS, DPMA, and ICIS have proposed IS curriculum models for viable IS programs [8]. However, IS practitioners face many technical and organizational challenges arising from complicated and rapidly changing organizational needs, while IS educators get blamed for teaching obsolete IT and issues that are no longer primary concern to practitioners. It is necessary to develop IS programs that reduce the problems experienced by both practitioners and educators.

The objective of this study is to develop specific recommendations to build effective IS programs that keep pace with rapid changes in the IS environment and reflect industry needs. To achieve this objective, a survey of IS practitioners and educators was conducted to identify key IS issues for the near future, to analyze the differences in the degree of importance of IS issues as perceived by practitioners and educators, and to develop guidelines for effective IS education programs based on the survey and analysis results.

Thirty IS issues obtained from various sources were used for the survey. The survey results show there are some differences in perceived degree of importance of IS issues between practitioners and educators. Recommended guidelines to build effective IS programs include (a) issues such as IS strategic planning and disaster recovery need to be emphasized more, (b) issues such as project management and management support systems need to be emphasized less, and (c) issues such as the Internet and IS ethics need to be developed more.

LITERATURE REVIEW

Previous studies of the key IS issues can be classified into two categories, key IS issues of IS professionals and the relationship between IS practice and academic research. Studies to determine key issues have been conducted in many ways including surveys in a series [2,9,10,11], in international perspective [12], in the

public sector [13], and in the IS research community [3]. Although it is difficult to generalize the survey results due to their different perspectives, some issues have been consistently ranked high in all surveys. These issues are IS strategic planning, IS alignment in an organization, and organizational learning.

Studies regarding relationship between IS practice and academic research report a gap in the perception of importance of IS issues. Teng and Galletta's [14] survey of IS academics shows that IS academics' research emphasis mapped well to the practitioners' 1984 survey in MIS Quarterly, but not to the 1987 and 1991 surveys. Four studies that compared practitioners' survey results and analysis of research articles report differences between what IS practitioners consider important and what IS researchers emphasize [3,5,15,16]. These studies also found IS research focused more on issues that were considered significant to IS practitioners in earlier surveys.

It is reported that there is a gap in the expectations between industry needs and academic preparation, despite a shared vision of the future IS professionals [6,7]. Failure to respond to changes by IS curriculum models and lack of contact or understanding between practitioners and educators are considered as the two main reasons for the mismatch [17]. Professional groups have proposed IS curriculum models to reduce the existing gap [8,18]. However, it appears educators have difficulties in implementing proposed IS curriculum models due to the limited number of courses to be offered, lack of required resources, and rapid changes in the technological and business environment.

RESEARCH METHODOLOGY

A list of key IS issues was developed from three different sources: IS journals, previous surveys, and introductory level IS textbooks. Because it is difficult to analyze all IS-related journals, the top four IS journals were used [19]. These journals are MIS Quarterly, Communications of the ACM, Journal of MIS, and Information Systems Research. Key words from all articles in recent issues of these journals (1990 - 1994) were reviewed, and related keywords were grouped into key IS issues. In grouping related keywords into key IS issues, key IS issues from four surveys in MIS Quarterly [2,9,10,11] were used as the basis of grouping. This was done because of their wide acceptance in various issue survey articles for comparison of their survey results [5,12] and validity [20]. Issues from introductory level IS textbooks [21,22,23] were also used to reflect an educators' point of view. A list of thirty key IS issues was constructed for the survey based on these three sources.

The questionnaire was prepared by randomly sequencing thirty IS issues. It was finalized after modifications through two pilot surveys of MBA students in both introductory and advanced IS courses. The questionnaire was mailed to 900 IS practitioners at Fortune 500 companies [24] and 350 educators in U.S. universities [25] in the Fall of 1995. Subjects were asked to rate each issue on a 7-point scale of 1 for 'least important' to 7 for 'most important' based on how important each issue is for their organizations or for education over the next three years. There were total 191 responses for a 15.3% response rate: 140 from practitioners and 51 from educators. The profile of survey participants is summarized in Table 1.

FINDINGS AND DISCUSSION

Table 2 shows the survey results, long-term trends of key IS issues, and classification of issues into technical and managerial issues. Seven new issues appeared in this survey compared to previous surveys: four technical issues (client/server computing, software reengineering and maintenance, groupware, and the Internet) and three managerial issues (IS education and training, IS ethics and legal issues, and outsourcing). These issues will increasingly become more critical in the future as organizations depend more on IT in the globalized business environment. Unlike previous surveys, more technical issues (70%) are ranked in the top ten than managerial issues (30%) in this survey. The long-term trends clearly show that the percentage of technical issues has been increasing while that of managerial issues has been decreasing in the top ten list. This change is mainly initiated by the transition from stand-alone systems to a network-based IS platform. Considering the speed of changes in IT, it is expected that this trend will continue.

Network-related issues such as telecommunications and networking, information security and control, client/server computing, distributed systems, and disaster recovery are ranked high in the overall rankings. The emergence of these issues may be closely related to rapid technical advancement in telecommunications and changes in the business environment toward globalization [26]. Because telecommunications and network systems become the essential backbone of globalized organizations, it is not surprising to find these issues ranked high.

Table 1. The Profile of Survey Participants

Practitioners (n=140)		Educators (n=51)	
Industry:		Affiliation by school:	
• Manufacturing (n=45)	32%	• Within business school (n=44)	86%
• Service (n=95)	68%	• Within other schools (n=7)	14%
		Affiliation by department:	
		• Independent IS dept. (n=19)	37%
		• Interdisciplinary dept. (n=32)	63%
Position:		Position:	
• Executives (n=21)	15%	• Full professor (n=17)	33%
• Middle Managers (n=55)	39%	• Associate professor (n=21)	41%
• Developers (n=64)	46%	• Assistant professor (n=8)	16%
		• Others (n=5)	10%

Key IS issues surveyed in 1995	overall rank(rating)	practitioners rank(rating)	educators rank(rating)	issue rank by year of survey				T/M
				1989	1986	1983	1980	
Telecommunications and networking	1(5.47)	2(5.47)	1(5.46)	10	11	13	3	T
Competitive advantage and strategic IS	2(5.35)	1(5.50)	10(4.96)	8	2	NR	NR	M
Having a responsive IT infrastructure	3(5.16)	5(5.21)	5(5.04)	6	NR	NR	NR	T
Improving information security and control	4(5.12)	4(5.21)	13(4.86)	19	18	14	12	T
Aligning the IS organization with the enterprise	5(5.12)	10(5.11)	2(5.14)	7	5	7	9	M
Client/server computing	6(5.09)	9(5.11)	8(5.02)	NR	NR	NR	NR	T
Managing data resources	7(5.08)	11(5.08)	3(5.08)	2	7	9	4	M
Software reengineering and maintenance	8(5.05)	6(5.19)	16(4.69)	NR	NR	NR	NR	T
Developing information architecture	9(5.05)	7(5.18)	18(4.68)	1	8	NR	NR	T
Developing and maintaining distributed systems	10(5.04)	12(5.07)	11(4.96)	12	NR	NR	NR	T
Disaster recovery	11(5.02)	3(5.29)	24(4.29)	20	NR	NR	NR	T
IS education and training	12(4.99)	14(4.97)	5(5.04)	NR	NR	NR	NR	M
IS development and tools	13(4.97)	15(4.96)	9(5.02)	9	NR	NR	NR	T
Understanding the role and contribution of IS	14(4.97)	18(4.94)	4(5.06)	11	4	15	NR	M
Improving IS strategic planning	15(4.96)	8(5.17)	23(4.40)	3	1	1	1	M
Integrating IT with existing systems	16(4.88)	16(4.95)	16(4.69)	22	10	3	NR	T
Facilitating and managing end-user computing	17(4.82)	16(4.95)	21(4.47)	18	6	2	11	M
Measuring IS effectiveness and productivity	18(4.81)	19(4.73)	5(5.04)	16	9	5	2	M
Organizational learning	19(4.78)	13(5.04)	28(4.06)	5	3	6	8	M
IS human resources management	20(4.56)	20(4.72)	27(4.14)	4	12	8	7	M
Enabling EDI	21(4.56)	22(4.57)	20(4.52)	12	14	NR	NR	T
Organizational impact of IS	22(4.55)	24(4.51)	19(4.65)	21	NR	NR	NR	M
Groupware and GDSS	23(4.50)	23(4.53)	22(4.43)	NR	NR	NR	NR	T
Project management and IT investment	24(4.45)	21(4.64)	29(3.94)	15	16	10	NR	T
The Internet	25(4.41)	26(4.23)	12(4.92)	NR	NR	NR	NR	T
IS ethics and legal issues	26(4.28)	29(4.11)	14(4.73)	NR	NR	NR	NR	M
Managing global information systems	27(4.27)	25(4.27)	25(4.29)	22	NR	NR	NR	M
Multimedia and hypertext	28(4.27)	28(4.12)	15(4.70)	24	NR	NR	NR	T
Management support systems	29(4.16)	27(4.16)	26(4.18)	17	NR	10	5	M
Outsourcing of IS operation	30(3.93)	30(4.05)	30(3.60)	NR	NR	NR	NR	M

(Notes: NR means an issue was not ranked. T indicates technical issues, and M is for managerial issues. See Ball and Harris [9], Dickson et al. [10], Brancheau and Wetherbe [11], and Niederman et al. [2] for survey ranks of 80, 83, 86, and 89, respectively).

In the overall rankings, two new issues, client/server computing and software reengineering and maintenance, are ranked in the top ten. In the globalized business environment of the 1990's, organizations are flattening their structures to be more responsive to customers and the marketplace. Client/server computing is considered as a major tool for this organizational restructuring. Client/server computing is also an enabling technology to adopt emerging technologies such as data warehouses, open systems, and workflow automation. It is expected that investment in client/server computing applications will grow rapidly throughout the decade. Although it is widely known that more than 50 % of IS resources are used to maintain existing systems [21], IS professionals did not seem to pay proper attention to the reengineering and maintenance issue. This issue is becoming more important as many legacy systems of organizations become rapidly obsolete and the life cycle of technology gets shorter and shorter. Increasing complexity and exorbitant cost of systems development are other contributing factors to the importance of this issue.

Four issues were ranked relatively low compared to previous surveys. These issues are IS strategic planning, organizational learning, IS human resources management, and management support systems. This result does not necessarily mean that the absolute importance of these issues is reduced. After being ranked high in previous surveys of the 1980's, these issues became mature with experience, and their relative importance is not as high as that of immature and emerging issues.

Disaster recovery and IS strategic planning are ranked in the top ten by practitioners, but not in the overall rankings in Table 2. Being the guardians of information systems in organizations, practitioners become very conscious about the vulnerability of information systems on which their critical businesses depend. The ubiquitous presence of information systems and the remote access to them over networks increase the IS practitioners' attention to the disaster recovery issue. On the other hand, the IS strategic planning issue had been ranked at the top in the 1980's. With more emphasis on using various IT for competitive advantage, it looks that practitioners consider the IS strategic planning issue important in turbulent times with rapid changes in the technological and business environment.

Traditionally, educators ranked highly issues related to system development and implementation [6]. While the importance of these issues has relatively decreased, educators ranked more managerial issues such as IS education and training, understanding the role and contribution of IS, and IS effectiveness and productivity measurement in the top ten. Contrary to expectation, educators consider many emerging issues such as the Internet and multimedia more important compared to practitioners.

RECOMMENDATION FOR THE EFFECTIVE IS PROGRAM

Survey results indicate many changes in the perceived importance of key IS issues compared to previous studies. To develop an effective IS education program, it is necessary to analyze the differences in the degree of importance of IS issues as perceived by practitioners and educators, to understand trends of IS issues, and to change the IS program based on the analysis results. For pur-

poses of analysis, we investigated which issues are considered more or less important in each group by comparing the rating of each issue with the average rating of thirty issues of each group (4.83 for practitioners and 4.67 for educators). For example, the disaster recovery issue is rated 5.29 by practitioners and 4.29 by educators. That is, this issue is considered more important by practitioners, and less important by educators. Those IS issues that need to be emphasized more, emphasized less, or developed more in the IS program, based on the analysis results and long-term trends from Table 2, are identified.

There are four issues that are considered more important by practitioners and less important by educators: disaster recovery, IS strategic planning, end-user computing, and organizational learning issues. With rapid changes in the technological and business environment and increased involvement of end users, these issues are expected to be critical in the near future. These issues need to be emphasized more in the IS program for future IS professionals to be properly prepared. Issues that are considered less important by practitioners, and have declining ranking trends need to be emphasized less in the IS program. These include IS effectiveness and productivity measurement, IS human resources management, project management, and management support systems issues. As technologies mature and industrial experience accumulates, it is considered that the importance of these issues has relatively decreased. Emerging issues that are considered more important by educators, and less important by practitioners, need to be developed more in the IS program. These are the Internet, multimedia, and IS ethics and legal issues. Even though the Internet and multimedia are new issues, they have enormous potential for enhancing communication and coordination in the globalized business environment. Ethical and legal issues will be raised as individuals and organizations depend on IT more and more in the information age. Materials related to these issues need to be developed more for the appropriate education of future IS professionals.

CONCLUSION AND SUMMARY

A survey was conducted to identify key IS issues for the near future, and to analyze the differences in the perceived importance of IS issues between practitioners and educators. Based on survey and analysis results, this study provides recommendations to build effective IS programs that keep pace with rapid technological changes and reflect industry needs.

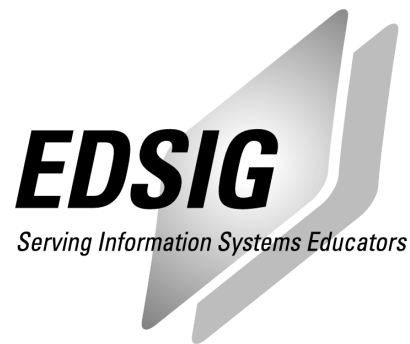
There are noticeable findings from the survey. First, network-related issues such as telecommunications and networking systems, information security and control, client/server computing, distributed systems, and disaster recovery are ranked high. This may reflect changes in organizations towards a "virtual organization", which is characterized by responsiveness and flexibility in a globalized market without temporal and spacial boundaries. Second, two new issues that were never ranked in previous surveys are now ranked in the top ten. These are client/server computing and software reengineering and maintenance. This result shows changes in organizations to a network-based IS platform and the increased importance of software resources as organizational assets. Third, long-term trends show that technical issues are now getting more attention from IS professionals than managerial issues.

Considering the speed of IT changes, it is expected that this trend will continue for a while. Fourth, contrary to previous findings, educators consider emerging issues such as the Internet, multimedia, IS education and training, and IS ethics more important than practitioners. This seems to reflect educators' serious concern for preparing future IS professionals with the appropriate knowledge and skill sets for quickly changing industry needs.

For future IS professionals to play the role of change agents in turbulent times, the IS community should share the vision and collaborate to provide effective IS programs. It is necessary to revise and update IS programs in order to keep up with the changes identified from survey and trends analysis results. To reflect industry needs more effectively, it is necessary that some IS issues be more emphasized, less emphasized, or more developed in IS programs based on analysis of long-term trends and differences in perceived importance of IS issues between practitioners and educators.

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