Critical IS Issues in the Network Era

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A survey of IS academics and practitioners was conducted to identify key IS issues. The list of key IS issues used in the survey includes five new issues that were not present in previous surveys. These issues are Software Reengineering and Maintenance, Client/Server Computing, IS Education and Training, the Internet, and IS Ethics and Legal Issues. Due to the transition of IT platforms from mainframes and microcomputers to network computing, telecommunications and network-related issues are ranked high in the survey. The long-term trends in the ranking of issues over prior surveys indicate that the percentage of technical issues in the top ten is rising while the percentage of managerial issues is declining. A comparison of practitioner and academic rankings of IS issues reveals that academics rank managerial and emerging issues higher than practitioners.

During the 1990s, concepts of information systems have changed dramatically, as changes have occurred in both the underlying technologies and every aspect of business. The ever-increasing capacity and speed of information technology (IT), coupled with plummeting costs, have opened a whole new horizon of information systems (IS) management. IT has moved from centralized to ubiquitous computing, and has become a major tool of reengineering in the business sector and in society itself (Hammer & Champy, 1993). Externally, society is changing from an industrial economy to an information-based economy, and business is shifting from local to global markets (Baskerville et al., 1994). Internally, organizations are changing their structures from hierarchical to horizontal and virtual structures. IS departments have responded by changing from centralized and task-oriented structures to distributed and service-oriented structures, and from technology-focused to people-focused. All these changes in the technological and business environments call for new leadership and responsibilities for IS professionals.

The IS community, defined as professionals in both IS research/education and IS practice (Dickson et al., 1984), has responded to these changes in various ways. One continuous effort has been to direct the focus of IS management by identifying the key IS issues that help practitioners perform their jobs more effectively (Brancheau et al., 1996). Another research effort has been to examine the relationship between IS practice and academic research (Szajna, 1994).

The objectives of this study are: (1) to identify the newly emerging IS issues that reflect recent changes in IT and business environments and the major driving forces behind changes in the perceived importance of IS issues, (2) to study changes in the perceived importance of IS issues, (3) to analyze the long-term trends in key IS issues, and (4) to find the relationship between practitioners and academics in the perception of IS issues. With the changes in the economy and IT mentioned above, we expect dramatic changes in the way IS must be managed, and in the perceived criticality of IS issues by IS professionals. We also expect that technical issues will continue to get more attention than managerial issues in the near future as shown in the survey by Brancheau et al. (1996).

Unlike most previous studies that surveyed IS practitioners only, we have surveyed both IS academics and practitioners. It has been argued that these two IS constituencies have incongruent interests. IS research is driven by long term and normative issues while IS practitioners are interested in issues of immediate concern (Palvia et al., 1996). Our position is, however, that practitioners and academics play complementary roles as problem/opportunity finders and solution providers, respectively. We therefore attempted to examine this relationship based on our survey results.

Literature Review

Previous studies of key IS issues have focused either on the key IS issues as perceived by IS professionals or the relationship between IS practice and research. To determine

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the critical IS issues, the Society for Information Management (SIM) has conducted a number of surveys over the past 15 years (Ball & Harris, 1982; Dickson et al., 1984; Brancheau & Wetherbe, 1987; Niederman et al., 1991; Brancheau et al., 1996). Other surveys of key IS issues have been carried out in the international arena (Deans et al., 1991; Watson & Brancheau, 1991; Watson et al., 1997) and the public sector (Caudle et al., 1991). Finally, there have been a number of analyses of IS publications (Swanson & Ramiller, 1993; Palvia et al., 1996).

The results of previous surveys of key IS issues are summarized in Table 1. The first three columns show the top ten issues of IS practitioners as found in studies published in MIS Quarterly since 1987. Four IS issues were consistently ranked in the top ten in all three practitioner surveys. These issues are: IS strategic planning, IS alignment with the organization, data resource management, and information architecture. The last column lists top ten issues of IS academics from the analysis of IS publications by Palvia et al. (1996).

Previous studies regarding the relationship between IS practice and research report a gap in the perceived importance of IS issues between practitioners and academics (Farhoomand, 1987; Grover & Sabherwal, 1989; Teng & Galletta, 1990). One assertion is that current IS research generally focuses on issues considered to be important by IS practitioners in the early 1980's (Szajna, 1994). According to this assertion, past studies of key IS issues as perceived by practitioners can be used to project the IS issues that will be given attention by researchers in the near future. However, in the recent study which compared IS research with previous key IS issue studies of practitioners, it was found that the practitioner issues were not leading indicators of future research publications (Palvia et al., 1996). Table 1 shows both similarities and differences in the perceived importance of IS issues between practitioners and academics. As indicated by the asterisks in the last column, the only topics studied by academics that were not in the top ten list in the three practitioner surveys are DSS/ESS and expert systems. The other eight issues are in the top ten list in practitioner surveys. When the top ten issues of academics are compared with those of each practitioner survey, there are not many overlapping issues between two surveys: three in 1986, five in 1989, and four in 1994 survey. Further studies need to be conducted to explain the differences or similarities in the issues considered important by these two IS constituencies. We return to this issue later in the paper.

Research Methodology

This research began with the preparation of a comprehensive list of key IS issues compiled from three different sources: (1) previous surveys, (2) top IS-related journals, and (3) introductory level IS textbooks. Four surveys published in MIS Quarterly (Ball & Harris, 1982; Dickson et al., 1984; Brancheau & Wetherbe, 1987; Niederman et al., 1991) were used as the basis for identifying key IS issues because of their wide acceptance (Deans et al., 1991; Szajna, 1994) and validity (Hartog & Herbert, 1986). To include IS issues from IS publications, we used the top four IS journals identified by (Holsapple et al., 1994). They are: MIS Quarterly, Communications of the ACM, Journal of MIS, and Information Systems Research. All issues of these journals between 1990 and 1995 were reviewed for key words to prepare the frequencies of their appearance in articles. Finally, keywords from introductory level IS textbooks (Laudon & Laudon, 1994; Martin et al., 1994; Schultheis & Sumner, 1995) were used to include the educators' point of view.

We screened out keywords that were too broad (e.g., information systems and MIS research), too technical (e.g., geometric algorithms and lambda calculus), from other disciplines (e.g., macroeconomics and marketing), or simply irrelevant (e.g., business history and travel industry). Relevant keywords from IS publications and textbooks were compiled, and grouped according to the list of key IS issues from the previous surveys of practitioners published in MIS Quarterly. Most of the keywords from IS publications and textbooks were

Table 1: Top Ten Issues as Perceived by IS Professionals

		Practitioners		Academics
Rank	1986 Survey (Brancheau & Wetherbe, 1987)	1989 Survey (Niederman et al., 1991)	1994 Survey (Brancheau et al., 1996)	89-93 Analysis (Palvia et al., 1996)
1	IS Strategic Planning	Information Architecture	Technology Infrastructure	DSS/ESS*
2	Competitive Advantage	Data Resource	Business Process Redesign	Software Development
3	Organizational Learning	IS Strategic Planning	Distributed Systems	Telecom. Systems
4	IS Role & Contribution	IS Human Resources	Information Architecture	IS Strategic Planning
5	IS Organization Alignment	Organizational Learning	Telecom. Systems	IS Human Resources
6	End-user Computing	Technology Infrastructure	Software Development	End-user Computing
7	Data Resource	IS Organization Alignment	Data Resource	Expert Systems*
8	Information Architecture	Competitive Advantage	IS Human Resources	IS Effectiveness
9	IS Effectiveness	Software Development	IS Organization Alignment	IS Role and Contribution
10	Technology Islands	Telecom. Systems	IS Strategic Planning	Competitive Advantage

Table 2: The Profile of Survey Participants

Practitioners (n=140)		Academics (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%

matched with issues from the previous surveys of practitioners published in MIS Quarterly. However, we discovered five new issues that were not included in the previous studies. The five new issues include three technical issues (Client/server Computing, the Internet, and Software Reengineering and Maintenance) and two managerial issues (IS Education and Training, and IS Ethics and Legal Issues).

A questionnaire was prepared by randomly sequencing the IS issues identified in the above process. The survey was pre-tested and modified twice using MBA IS concentration students, most of whom were full-time IS practitioners. This resulted in a list of 30 IS issues for the survey (see Table 3). The modified questionnaire was mailed to 900 IS practitioners at Fortune 500 companies (ACR, 1994) and 350 academics in universities (MISRC, 1992). Participants were asked to rate each issue for its importance over the next three years for their organizations in the case of practitioners or for research and education purposes in the case of academics. Each issue is rated on a 7-point scale with 1 being least important and 7 being most important (Rosenthal & Rosnow, 1984). There were a total of 191 responses with a 15.3% response rate: 140 from practitioners and 51 from academics. The profiles of the survey participants are summarized in Table 2.

Findings and Discussion

Table 3 provides the rankings of the thirty issues obtained by averaging the responses of each set of respondents separately. Based on the classification by Niederman et al. (1991), the issues are classified into two classes, technical and managerial issues, as indicated by T or M respectively in the last column. In the following section, we discuss the results of the IS practitioners' ranking to identify changes in the perceived importance of IS issues. We limited this discussion to the top ten issues following the format of the Society for Information Management (SIM) surveys (Brancheau & Wetherbe, 1987; Niederman et al., 1991; Brancheau et al., 1996), given its prevalent use by similar studies (Watson et al., 1997).

Discussion of Practitioners' Ranking

The issue of Competitive Advantage and Strategic Information Systems is ranked first in importance by the practitioners. It is interesting to find that this issue was the seventeenth-ranked issue in the last SIM survey (Brancheau et al. 1996). With rapid changes in IT, the fusion of telecommunications and information systems, and the current business

Table 3: Summary of Survey Results

Issue #	IS issues	Practitioners Rank (Rate)	Academics Rank (Rate)	Class
1	Competitive Advantage and Strategic IS	1 (5.50)	10 (4.96)	M
3	Telecommunications and Networking	2 (5.47)	1 (5.46)	T
24	Disaster Recovery	3 (5.29)	24 (4.29)	T
20	Improving Information Security and Control	4 (5.21)	13 (4.86)	T
4	Having a Responsive IT Infrastructure	5 (5.21)	5 (5.04)	T
29	Software Reengineering and Maintenance *	6 (6.19)	16 (4.69)	T
10	Developing Information Architecture	7 (5.18)	18 (4.68)	T
18	Improving IS Strategic Planning	8 (5.17)	23 (4.40)	M
23	Client/server Computing *	9 (5.11)	8 (5.02)	T
13	IS Organization Alignment	10 (5.11)	2 (5.14)	M
15	Managing Data Resources	11 (5.08)	3 (5.08)	M
7	Distributed Systems	12 (5.07)	11 (4.96)	T
30	Organizational Learning	13 (5.04)	28 (4.06)	M
14	IS Education and Training *	14 (4.97)	5 (5.04)	M
6	IS Development and Tools	15 (4.96)	9 (5.02)	T
8	Integrating IT with Existing Systems	16 (4.95)	16 (4.69)	T
21	Facilitating and Managing End-user Computing	16 (4.95)	21 (4.47)	M
12	Understanding the Role and Contribution of IS	18 (4.94)	4 (5.06)	M
16	Measuring IS Effectiveness and Productivity	19 (4.73)	5 (5.04)	M
11	IS Human Resources Management	20 (4.72)	27 (4.14)	M
19	Application Portfolio and Project Management	21 (4.64)	29 (3.94)	T
2	Enabling EDI	22 (4.57)	20 (4.52)	T
26	Groupware	23 (4.53)	22 (4.43)	T
22	Organizational Impact of IS	24 (4.51)	19 (4.65)	M
25	Managing Global Information Systems	25 (4.27)	24 (4.29)	M
28	The Internet *	26 (4.23)	12 (4.92)	T
5	Management Support Systems	27 (4.16)	26 (4.18)	M
9	Multimedia and Hypertext	28 (4.12)	15 (4.70)	T
27	IS Ethics and Legal Issues *	29 (4.11)	14 (4.73)	M
17	Outsourcing IT	30 (4.05)	30 (3.60)	M

Notes: *'s indicate new issues identified in this survey, scale is ranged from 1 being least important to 7 being most important, and classes are based on the Niederman et al. survey (1991)

trend towards globalization and alliances, organizational experience changes in relationships with suppliers, customers, and competitors. In this environment, organizations should transform themselves and develop technology-based strategies to sustain competitiveness (Bradley et al., 1993). As IT is an enabler of this organizational transformation (Parker, 1996), IS practitioners consider their roles critical for transforming the business to gain competitive advantage.

Telecommunications and Networking is ranked second in this survey. In the last five years, business trends such as globalization and increased competition, and the development of electronic commerce on the Internet have made Telecommunications and Networking a vital issue. The trend toward globalization has made effective communication over the limits of time and space critical for the smooth functioning of organizations (Chidambaram & Chismar, 1994), and telecommunications and network systems have become the backbone of globalized organizations (Keen, 1988). Telecommunication-related issues are closely related to the Competitive Advantage and Strategic Information Systems issue. Telecommunication systems' ability to bring people and their work together over geographical and temporal boundaries opens a new way to create a competitive advantage by accelerating the development of 'just-in-time' strategic information systems (Parker, 1996).

Disaster Recovery, which was never considered critical in the 1980's, is ranked third in this survey. A series of major disasters that caused the destruction of computer centers and communications facilities during the early 1990's has raised the perceived importance of the Disaster Recovery issue (Laudon & Laudon, 1994). IS practitioners have also become more conscious of the vulnerability of information systems as critical business systems depend increasingly on IT (Neumann, 1995). Because different organizations have different IT environments and recovery needs, guidelines are needed to assist management in determining an appropriate disaster recovery strategy (Fried, 1995). As telecommunications and networks become the major platform of IS services, Disaster Recovery is expected to remain as one of very important issues because the distributed nature of telecommunications and networks makes IT more susceptible to natural disasters as well as man-made ones (Lock et al. 1992).

Information Security and Control is ranked fourth by the practitioners. In a distributed environment, it becomes more difficult to ensure the availability, integrity, and confidentiality of information, and at the same time to protect information from unauthorized access, modification, and destruction. However, Information Security and Control was not highly ranked by IS practitioners in the previous MISQ surveys. A study by Loch et al. (1992) finds many MIS managers underestimate the potential risk of threats to information systems. The ubiquitous presence of information systems and the remote access to them over networks increases the importance of the Information Security and Control issue (Fried, 1995). IS practitioners also realize that business operations may depend on the quality of their information security (Baskerville, 1996). The growing importance of Information Security and Control is reflected in this survey.

IT Infrastructure has been identified in recent years as having a critical impact on the firm's ability to use IT competitively (Duncan, 1995), and is ranked fifth in importance. This result confirms the expectation of the previous survey (Brancheau et al. 1996), which predicted the rising importance of the technology infrastructure issue. As organizations move into the network era (Bradley et al., 1993), maintaining stable and responsive technology infrastructure with telecommunications and network systems will continue to dominate IS management. The IS practitioners in this survey seem to recognize that building and maintaining a responsive IT infrastructure is a key IS function with the increase of end-user computing, client/server computing, and outsourcing, which are fundamental to IS operations (Watson et al., 1997).

Software Reengineering and Maintenance is ranked for the first time in this survey and is already in the top ten as the sixth most important practitioner concern. Though it has long been pointed out that more than 50 % of the IS budget is spent on maintaining existing systems (Martin et al., 1994), the IS community did not pay much attention to this issue according to prior surveys. The situation is getting worse as many legacy systems become obsolete and IS departments grapple with the year 2000 problem (DeJager & Bergeon, 1997). Because of the increased recognition of information and information systems as organizational assets, and the need to control costs, the importance of Software Reengineering and Maintenance to remain a top issue for IS management in the future.

Information Architecture is ranked seventh in this survey. This issue is concerned with how different classes of information are related to the major functions of the organization (Niederman et al., 1991). Information Architecture encompasses all the information the organization requires, internal and external, in whatever form it is stored (Gule & Grover, 1994). Because information architecture establishes decision-making principles and standards for the use of information as a business resource, it has remained highly ranked (Brancheau et al., 1996).

IS Strategic Planning is ranked eighth. This issue was continuously ranked at or near the top in the 1980's. With more emphasis on using information technologies for competitive advantage, IS Strategic Planning needs to be coupled closely with the goals of an organization, and furthermore, IS strategic plans can play a vital role in business strategy. Even though its ranking has dropped compared to the surveys conducted in the 1980's, practitioners still acknowledge the importance of IS Strategic Planning in turbulent times.

The ninth ranked issue, Client/server Computing, is included for the first time in this survey. The development of a networked IT platform obviously makes Client/server Computing important as the IS community tries to provide new

ways of gaining competitive advantage by linking resources in the changing global business environment. Client/server Computing allows end users to meet their own needs for information access and manipulation. That is, Client/server Computing provides a way of empowerment. As organizations evolve into more modular and compact forms, Client-server Computing allows them to become more responsive to business needs (Parker, 1996).

Finally, IS Organization Alignment is ranked tenth by the practitioners in this survey. Organizations change themselves to compete in the new business environment through business process reengineering, information empowerment, and organizational restructuring. The IS organization should therefore align itself with the enterprise to be effective in supporting organizational change. In particular, IT practitioners may be alert to this issue in response to the criticism that IS organizations are too slow and too maladaptive for today's high-speed business changes (Allen & Boynton, 1991).

We limited this discussion to the top ten issues following the format of the Society for Information Management (SIM) surveys (Brancheau & Wetherbe, 1987; Niederman et al., 1991; Brancheau et al., 1996) because of its prevalent use in similar studies (Watson et al., 1997). However, cautions should be taken in interpreting the meaning of ranking. As summarized in the Appendix, the results of a series of pairwise t-test with the practitioners' mean scores for issues show that the mean differences among some issues are statistically insignificant. Therefore, the differences in ranking should be interpreted with caution. This is particularly the case for the top ten issues in which the mean scores of the first eight issues are not significantly different.

Long-term Trends over Surveys

Table 4 shows the long-term trends of IS issues as perceived by practitioners over six MISQ surveys of IS professionals since 1980. Four issues are ranked in or near the top ten in all surveys. They are Telecommunications and Networking, Improving IS Strategic Planning, IS Alignment with the Organization, and Managing Data Resources. The ranking of Telecommunications and Networking has constantly increased over the last 12 years, while the rankings of the other three issues have dropped slightly. The increasing ranking of Telecommunications and Networking shows the evidence the emergence of the network era, which was accelerated by the explosion of public use of the Internet (Business Week, 1995). As the life cycle of information technology becomes shorter, IS Strategic Planning, IS Organization Alignment, and Managing Data Resources are expected to remain important in the near future (Brancheau et al., 1996).

Though they were not highly ranked, there are a number of other issues that were ranked in all previous surveys. These include Organizational Learning, End-user Computing, Measuring IS Effectiveness and Productivity, and IS Human Resources Management. These issues are expected to be constantly mentioned in future surveys because they represent essential IS activities regardless of changing IT platforms.

As mentioned earlier, five new issues were identified from our analysis of IS publications and textbooks that were not included in previous surveys. Among these issues, only two are ranked in the top ten issues - Software Reengineering

Table 4. Long-term Trends of Perceived Importance of IS Issues over Surveys

Issue	Rank by Year					
	95	94	89	86	83	80
Competitive Advantage and Strategic IS	1	17	8	2	NR	NR
Telecommunication and Networking	2	5	10	11	13	3
Disaster Recovery	3	NR	20	NR	NR	NR
Improving Information Security and Control	4	NR	19	18	14	12
Having a responsive IT infrastructure	5	1	6	NR	NR	NR
Software Reengineering and Software Maintenance	6	NR	NR	NR	NR	NR
Developing Information Architecture	7	4	1	8	NR	NR
Improving IS Strategic Planning	8	10	3	1	1	1
Client/Server Computing	9	NR	NR	NR	NR	NR
IS Alignment with the Organization	10	9	7	5	7	9
Managing Data Resources	11	7	2	7	9	4
Distributed Systems	12	3	12	NR	NR	NR
Organizational Learning	13	14	5	3	6	8
IS Education and Training	14	NR	NR	NR	NR	NR
IS Development and Tools	15	6	9	13	4	NR
Integrating IT with Existing Systems	17	NR	22	10	3	NR
Facilitating and Managing End-User Computing	16	16	18	6	2	11
Understanding the Role and Contribution of IS	18	13	11	4	15	NR
Measuring IS Effectiveness and Productivity	19	11	16	9	5	2
IS Human Resources Management	20	8	4	12	8	7
Application Portfolio and Project Management	21	15	15	16	10	NR
Enabling EDI	22	19	12	14	NR	NR
Groupware	23	11	NR	NR	NR	NR
Organizational Impact of IS	24	NR	21	NR	NR	NR
Managing Global Information Systems	25	NR	22	NR	NR	NR
The Internet	26	NR	NR	NR	NR	NR
Management Support Systems	27	NR	17	NR	10	5
Multimedia and Hypertext	28	NR	24	NR	NR	NR
IS Ethical and Legal Issues	29	NR	NR	NR	NR	NR
Outsourcing IT	30	20	NR	NR	NR	NR

NR stands for Not Ranked. Note: The rankings for the years 95, 94, 89, 86, 83, and 80 were obtained, respectively, from the present study, Brancheau et al. (1996), Niederman et al. (1991), Brancheau & Wetherbe (1987), Dickson et al. (1984), and Ball & Harris (1982).

and Maintenance (#6) and Client/server Computing (#9). Disaster Recovery and Improving Information Security and Control, which were never ranked in the top ten in previous surveys, are ranked third and fourth, respectively, by the practitioners in this survey. The increasing importance of these issues appears to be related to the migration of the IT platform to telecommunications and network computing (Applegate et al., 1996). New IT platforms that allow remote access over time and space, make safeguarding IS and information a much more important issue.

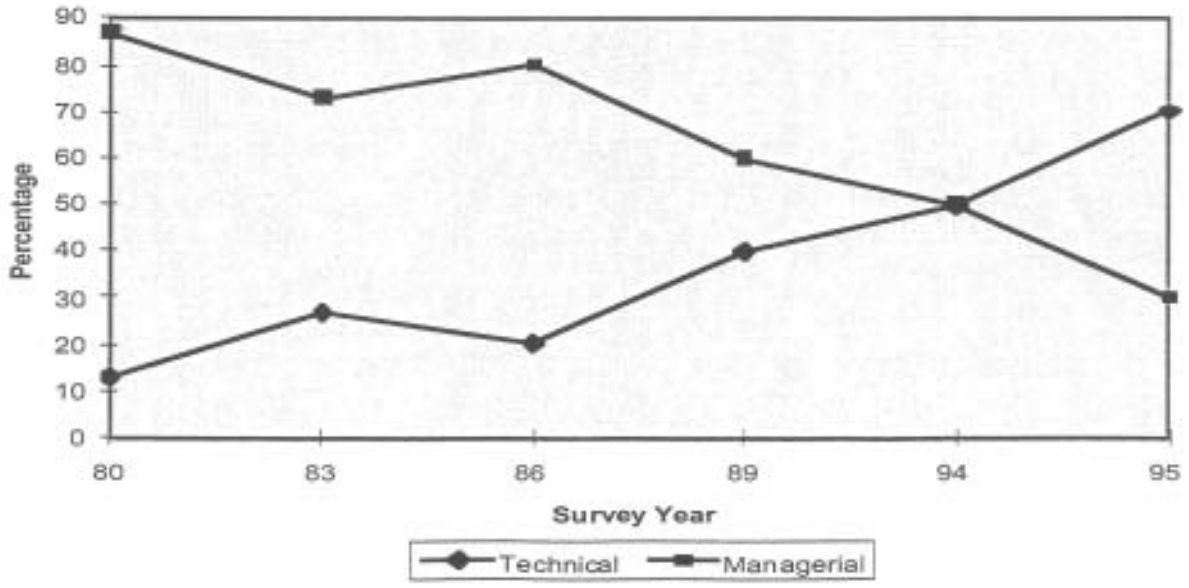
In Figure 1, the percentages of managerial and technical issues among the top ten issues of each survey are plotted over the six surveys. The long-term trend clearly shows that the percentage of technical issues in the top ten is rising while the percentage of managerial issues is declining. Finally, in this (most recent) survey, the percentage of technical issues (70%) in the top ten exceeded that of managerial issues (30%). We believe that the transition of the IT platform to a network environment in the early 1990's has accelerated this trend in the relative importance of technical issues. Because business requirements for speed, flexibility, and responsiveness drive the importance of technical issues (Brancheau at al., 1996), it is expected that this trend will continue for a number of years. On the other hand, as the IS community matures, it has become more familiar with managerial issues, which do not vary in great degree over different technologies. Managerial issues may therefore have declined in relative importance in the minds of practitioners.

Comparison of Practitioner and Academic Rankings of IS Issues

The differences in issue orientation between IS practitioners and academics have been reported previously (Ball & Harris, 1982; Farhoomand, 1987; Szajna, 1994; Trauth et al., 1993). In our survey, we have found similarities as well as differences between the rankings of IS practitioners and academics. The Spearman rank correlation coefficient between the two rankings is 0.40, which indicates a moderate relationship. The rank correlation between IS practitioners and academics rankings was significant with a 95 percent confidence level, but not at a 99 percent confidence level. These results indicate that IS practitioners and academics have a shared vision of the importance of key issues (Trauth et al., 1993). However, there is also some disagreement between the two groups. To identify which issues are significantly different and which are in agreement between the two groups of respondents, we performed t-test for each issue on the difference between the mean scores of IS practitioners and academics. Testing the significance of the mean difference is more meaningful than comparing the two rankings of each issue because rankings are determined by the mean values whose differences are, in many cases, statistically insignificant. From the t-test, we found that ratings of ten issues are significantly different, indicating a definite gap between what IS practitioners and academics consider important. These issues are summarized in Table 5. An interesting finding is that four of the IS practitioners' top ten issues, but none of the IS academics' top ten issues, appear in the table.

To see the general trend of the relationship between the practitioners and academics rankings, 30 issues included in the survey are plotted in Figure 2. Issues along the diagonal line in the figure reveal agreement between IS practitioners and academics as to their importance (right, top) or unimportance (bottom, left). Among the newly identified

Figure 1: Long-term Trends of Managerial and Technical Issues Over Surveys



issues in this survey, Client/server Computing (ranked #9 by practitioners, and #8 by academics) is the only one ranked in the top ten by both practitioners and academics. Unlike practitioners who ranked Software Engineering and Maintenance (#6, #16) in the top ten, academics include IS Education and Training (#14, #5) in their top ten list. Academics' serious attention to IS education and training appears to reflect their concern to prepare future IS practitioners with the right knowledge and skill sets for emerging technology issues such as Client/server Computing (#9, #8) and the Internet (#26, #12).

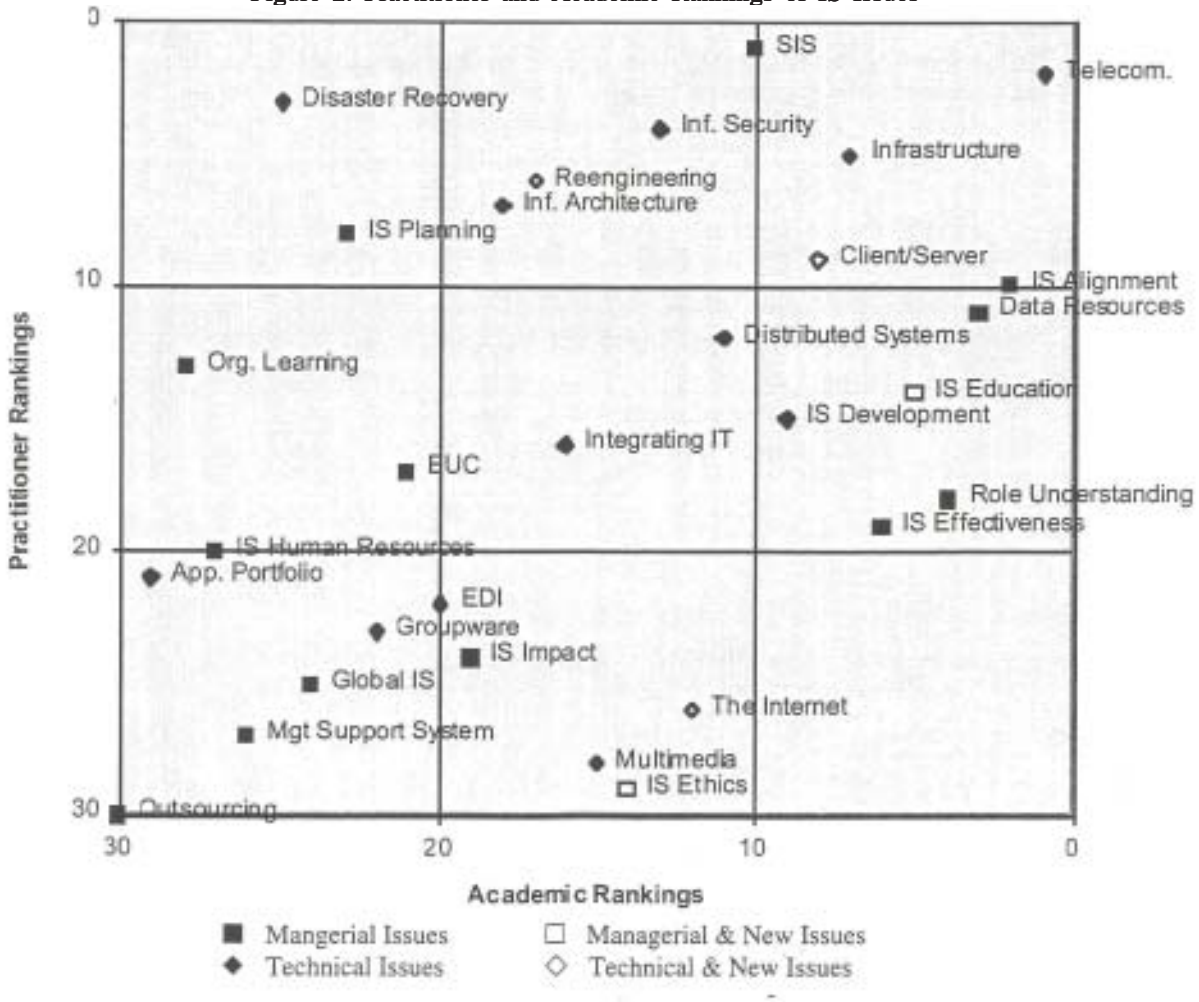
Table 5 Significantly Different Issues

Ranking (P/A)	Issues	Practitioners Mean	Academics Mean	p-value
3/24	Disaster Recovery	5.29	4.28	0.000
6/16	Software Reengineering & Maintenance	5.18	4.69	0.018
7/18	Developing Information Architecture	5.17	4.68	0.018
8/23	Improving IS Strategic Planning	5.16	4.40	0.001
13/28	Organizational Learning	5.04	4.06	0.000
20/27	IS Human Resources Management	4.71	4.14	0.023
21/29	Application Portfolio & Project Management	4.64	3.93	0.002
26/12	The Internet	4.22	4.91	0.004
28/15	Multimedia and Hypertext	4.11	4.70	0.006
29/14	IS Ethics and Legal Issues	4.11	4.73	0.012

Significantly different at a = 0.05 (P/A) : Practitioners/Academics

In general, academics ranked emerging issues higher than practitioners. This may be because the emerging issues in the survey were broadly defined, making them less meaningful to IS practitioners who are concerned with more narrow and specific issues (Watson et al., 1997). Among seven emerging issues that were never ranked in the 1980's, academics ranked five issues higher than practitioners. Client/server Computing (#9, #8), IS education and Training (#14, #5), The Internet (#26, #12), IS Ethical and Legal issues (#29, #14), and

Figure 2: Practitioner and Academic Rankings of IS Issues



Multimedia and Hypertext (#28, #15) belong to this category. Software Engineering and Maintenance is the only issue that is ranked higher by practitioners.

The survey results reveal that practitioners are concerned more with technical issues (3 managerial versus 7 technical in the top ten), while academics are more interested in managerial issues (6 managerial versus 4 technical in the top ten). Four out of five issues ranked in the practitioners' top ten, but not in the academics' top ten, are technical issues. Conversely, four out of five issues ranked in the academics' top ten, but not in the practitioners' are managerial. Managerial issues such as IS Organization Alignment, Understanding the Role and Contribution of IS, and Measuring IS Effectiveness and Productivity are ranked in the top ten by academics. This implies that IS academics currently focus more on organizational and business issues rather than technical ones.

Academics also continue to focus on traditional IS issues. This is confirmed by the comparing top ten academic issues of this survey with the results of previous practitioner surveys. This comparison shows that, among eight "old" IS issues that are currently in the academics' top ten, six issues (75%) were included in the practitioners' top ten in 1989, and five issues (63%) in the practitioners' top ten in 1986.

While the differences between the perceptions of what is important by practitioners and academics raise interesting questions, we do not mean to imply that the rankings of these two groups should coincide. First, both groups view the field from different vantage points. For example, at the time of the survey, academics were probably in a better position to foresee the emerging importance of the Internet and multimedia. Second, in deciding research directions, academics must decide where they can best apply their academic training and competence. Some of the issues ranked relatively high by practitioners such as Disaster Recovery, Information Security, and Information Architecture may be better tackled by computer scientists and/or practitioners than IS academics.

Limitations of the Study

Caution should be exercised in interpreting the results of this study. One of the concerns is the survey response rate of 15.3%. Though the absolute number of responses (from 140 practitioners and 51 academics) was larger than in the previous survey studies by Brancheau & Wetherbe (1987), Niederman et al. (1991), and Brancheau et al. (1996), the respondents may not represent the whole spectrum of the IS community.

Another limitation of this study is the definition of issues. Some issues describe very specific IS activities such as disaster recovery, EDI, and the Internet, some issues such as organizational learning or organizational impacts are defined very broadly, and some issues are overlapping such as client/server computing and distributed systems. This problem, however, is not limited to this study. It is inherent in all previous surveys. Therefore, in comparing the results of this study to the previous survey results, we need to carefully look at what each issue really meant. As Watson et al. (1997) point out, it is time to revise and redesign the key-issues framework to provide meaningful survey results that will help IS practitioners plan and manage the IT activities of their organizations and will guide IS academics in their choice of research topics.

Conclusion and Summary

This study developed a new list of critical IS key issues to reflect the changes in the IS field since the last key IS issue survey. The new list was developed from three distinct resources: previous surveys, top IS journals, and introductory IS textbooks. This list contains five new issues that had not appeared in previous surveys: Client/server Computing, Software Reengineering, IS Education and Training, the Internet, and IS Ethical and Legal Issues.

There are several important findings from this study. The first finding is that the rankings of this survey indicate the transition of the IT platform toward telecommunications and network environment. Academics and practitioners ranked Telecommunications and Networking as the first and the second most important issue, respectively. The ranking of this issue has increased continuously over the surveys (See Table 4). Several other network-related issues are also ranked in the practitioners' top ten, which include Disaster Recovery (ranked #3), Information Security and Control (#4), and Client/server Computing (#9). We believe that the emergence of these issues is related to the development of a networked environment coupled with changes in business environment. Network-related issues are so important in managing new organizational forms such as virtual organizations through the linking of geographically scattered functional units. Because telecommunications and network systems are the backbone of any virtual organization, it is not surprising to find that network-related issues are ranked high. In essence, these findings imply that the network era has begun, and we expect that network-related issues will gain further momentum in coming years.

The second finding is that there are some differences between the issues considered important by academics and practitioners. Most importantly, IS academics focus more on managerial issues, while practitioners are concerned more with technical issues. This implies that IS education might be out-of-sync. More studies are needed to develop guidelines for effective IS curriculum models. Because it takes time until important issues of one IS constituency get serious attention of other constituency, it seems critical to establish an effective communication channel between academics and practitioners to enable a more synergistic relationship.

With regard to the issue raised earlier concerning the possible lag of academic research behind with respect to the concerns of practitioners, the evidence from this survey is

mixed. On one hand, academics in general rank emerging issues, such as IS Education and Training, the Internet, IS Ethical and Legal Issues, and Multimedia and Hypertext, higher than practitioners. Academics are also in tune with practitioners on the increasing importance of network-related issues. On the other hand, according to the current survey, academics are relatively more interested in managerial issues -- a situation reminiscent of practitioner concerns during the 1980's. It seems therefore that academics are pursuing new opportunities while still working on some of the more traditional problems of the field.

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