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# Securing the Future of Information Systems as an Academic Discipline

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# SECURING THE FUTURE OF INFORMATION SYSTEMS AS AN ACADEMIC DISCIPLINE

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## Abstract

*There are reasons to be concerned about the future of the academic discipline (or field) of Information Systems. Enrollments have dropped, survey courses are questioned, some writers have suggested that the IS function will soon disappear, and some well-known schools have yet to acknowledge the existence of a new academic discipline. These events are enough to create uncertainty in a relatively young field less than 40 years old. Is there a real crisis, or is the current situation temporary? The paper evaluates six pessimistic arguments about the field.*

*Overall, while problems exist, we believe the prognosis is good. The need for and the value of the IS function and systems continue to be high. Investment continues to be strong. The preconditions are in place for continued strength for the IS academic discipline. Are there things the field needs to do right in order to secure the future of the field? Perhaps muddling along will work, but proactive actions are more likely to be successful. This paper makes five recommendations for proactively making sure the field prospers and makes real contributions through our research, our teaching, and our relationships with other academic fields and practitioners.*

## Introduction

The paper has three parts. The first discusses six current developments that are often presented as pessimistic views of the future of the academic discipline of information systems. The second part provides background to recommended action by a short survey of four inherent strengths or comparative advantages of IS in academia. The third part of the paper contains five recommendations to secure the future of the field.

To ensure clarity, we define Information Systems. *Information systems* is used to refer to systems, an organization function, and an academic discipline. In an organization context, it refers to

- Systems that deliver information, computing, and communications services to an organization and its work systems, and
- The organization function that plans, develops, implements, operates, and manages the information system resources

In an academic context, information systems is applied to an academic discipline or academic field that focuses on information systems and the IS organization function as areas of academic interest, expertise, research, and teaching.

## Part I: Is the Sky Falling? Critics, Pessimists, and Optimists

There are many critics of Information Systems as an academic discipline. Some of their criticisms may be right. The criticisms can be analyzed as pessimistic views on a number of issues. Six pessimistic views are explained. They are in two groups. The first group relates to the future of the IS function. Since the future of the function has a direct effect on the academic field, these criticisms are important. The second group relates to concerns about the academic field within academic units. For each of these pessimistic views, there are alternative views and explanations.

### *Issues Related to the Future of Information Systems as an Organization Function*

In a relatively short period of time since the first commercial computers were installed in business organizations in 1954, there have been incredible changes in the information and communications technology available to organizations. There have been corresponding major changes in organization use of these technologies in systems to perform organization activities. The IS function plans, develops, implements, and manages technology and systems-related resources. Information systems are an area of ongoing, major investment. These systems provide economic benefits and, when combined with other organization systems, may provide competitive advantage. They are a source of risk. Failure to design properly, to incorporate required features, or to operate correctly and securely may lead to significant organization risks and potential failures. As examples,

- Visa U.S.A. Inc. and American Express Co. are terminating their contracts with a credit card transaction processing company that was hit by hacker attacks, potentially exposing 40 million card numbers to online intruders. The spokesperson for Visa said that the action was taken after “an internal and forensics review of its processing practices demonstrated that...it did not have the appropriate controls in place to protect cardholder information” (Weiss 2005).
- Outages of eBay systems for e-commerce on many days during April 2003 resulted in significant damage to the reputation of the company and demands for compensation.

The future of the IS function in organizations is very important to the future of the IS academic discipline. Modern universities create new academic units when there are new bodies of knowledge, a need for new experts, and a need to prepare students for new jobs. The IS organization function is strong evidence of the importance of the IS body of knowledge. As long as this function continues to be important to organizations and continues to receive significant investment, there will be a need for IS academic programs of education and research.

Given the substantial benefits from IS and risks from poor systems, poor security, or poor management of systems, why are there concerns about the future of the IS function? The pessimists make two main arguments relative to the future importance of the organization function: outsourcing and commodity technology.

**Pessimist argument 1: Outsourcing.** Given the expertise required to provide modern IT/IS support, the argument is that a specialized external provider can do a better job at less cost. The argument makes the analogy of electricity: an organization does not generate its own electricity; rather, it buys electricity on demand from a specialized utility company. The results to date suggest that the argument is supported for some specialized services such as a worldwide telecommunications network, but results are less clear and perhaps dubious for complete outsourcing. Even if there is partial outsourcing or off-shoring of some functions (e.g., a call center), these activities must still be managed relative to business requirements, and the IS function persists as a significant organization function.

**Pessimist argument 2: Commodity technology.** One of the arguments for a strong IS function has been competitive advantage derived from IT/IS. If the IS function innovates with technology and systems to provide unique capabilities, there can be significant competitive advantage. The pessimistic argument is that IT is so standardized that it is a commodity (Carr 2003). The implication is that no organization can have competitive advantage through information and communications technology because competitors can easily acquire the same capabilities. The argument must be rejected. The fallacy in this argument is that competitive advantage rarely comes solely from information technology alone (because it is easily copied) but from the organizational system in which the technology is a part. There are two potential failures related to information and communications technology leading to loss of competitive advantage: the first is failure to adopt appropriate information and communications technology and the second is failure to use it effectively in organization systems. Both will put an organization at a competitive disadvantage. Examples illustrate these concepts.

- Tracking technology to track location and delivery of an order is based on readily available technology. However, there were significant differences in the impact of the tracking technology when it was embedded in the systems of Federal Express versus the systems of the United States Post Office.
- GPS technology is a commodity. General Motors OnStar system created a competitive advantage not simply because of GPS technology, but with GPS embedded in a system of automobile sensors and human service personnel.
- Amazon sells books and other products online. The technology for keeping track of book inventory and fulfilling online orders is fairly simple to replicate. However, the delivery system, the relationships with used book suppliers, loyal customers who write product reviews, and other Amazon systems that utilize technology are difficult to replicate. As a result, Amazon has retained a competitive advantage.

### ***Issues about the Future of Information Systems as an Academic Discipline***

There are pessimistic arguments that focus not on the IS function but upon the academic units that teach and research IS. These four pessimistic arguments relate to recent drops in IS course enrollment, resistance to IS instruction for all students, resistance to IS as an academic field based on diversity or lack of coherence in research, and resistance in some universities to IS as a new academic discipline.

**Pessimist argument 3: Drops in IS course enrollment.** The drop in enrollments in IS courses and the drop in IS majors have been significant as evidenced by numerous reports and individual experiences. The result has been an oversupply of teaching staff. There were two bubbles in demand for courses and majors that occurred close together. The first was hiring for the Y2K problem in connection with the fear that many applications would not work properly when the date changed to 2000s instead of 1900s. This inflated demand somewhat. The second was hiring in connection with the significant surge in e-commerce applications and related companies (the so-called “dot.com companies”). The combination of factors created short term demand in excess of long term demand. This demand surge was followed by a correction when few new positions were available, particularly with consulting firms. Since students and their advisers follow the job market, the result was a significant drop in enrollment. Similar drops in demand have happened before in other fields in the university. Several years ago, the job market for engineering graduates was poor for about two years. During that time, student enrollment in engineering dropped significantly. The job market demand returned to normal after three or four years, and the demand for graduating engineers was greater than the supply.

- One school, in investigating a significant drop in applications to its IS major, found that an important factor was the advice given to students by high school and university advisers. The advisers were aware of the current drop in IS employment and gave broad, near-term advice that did not consider longer-term prospects.
- During the dot.com bubble, students became aware of the job opportunities in dot.com companies. They also understood that e-commerce was changing the nature of many organization processes and, therefore, they should understand e-commerce. When the dot.com bubble burst, the job market in e-commerce was reduced both by the reduction in new companies but also because failures in dot.com companies released experienced employees who competed for jobs that would otherwise have gone to new graduates.

The optimistic counter to this pessimistic argument is that demand returns to normal after a period of dislocation like Y2K and dot.com. There is already evidence that demand is increasing from the abnormal lows.

**Pessimist argument 4: Resistance to IS instruction for all students.** Within business schools, there is still some resistance to a required IS course. This resistance seems to have grown in concert with drops in IS enrollment as job opportunities became fewer. The resistance can usually be traced to lack of knowledge of the nature and importance of IS by non-IS faculty, the desire to restrict the number of required courses in order to give students more options, and the nature of the IS courses as now taught. With regard to the non-IS faculty, their academic training and background may not have included sufficient IS to comprehend its role within an organization. Many of them view IS as programming, personal productivity tools, or general computing technology. An optimistic view is that new non-IS faculty members are likely to have better appreciation of the importance of IS as an academic discipline. In the competition for a restricted number of required courses, IS courses can compete well if the course content and course delivery offer compelling evidence of value. Articulating the compelling value of an IS course or courses will require convincing messages not only to students but also to other business faculty who oversee majors in other

functional areas (e.g., Marketing, Finance, etc.). With regard to the nature of the courses, there is a market mechanism that encourages new syllabi and new textbooks. The best ones survive; others fail. The optimistic view is that the market will deal with the course content problem. These issues will be discussed further in Recommendation 4.

**Pessimist argument 5: Resistance to Information Systems as an academic field based on diversity or lack of coherence in research.** Some academics in the field (and outside the field) have remarked on the diversity of research topics and diversity of research methods. This can be a problem because the field may be perceived as a set of fragmented groups with diverse topics. On balance, however, the diversity can add significant value. The optimistic view is that the field supports a fairly open market for ideas and research based on a variety of methods. It has not created barriers to topics and methods. The field has, in fact, encouraged interpretive methods and design science. Although not perfect, the research market mechanism encourages interesting research based on appropriate methods. Individual research projects typically do not, however, result in immediate actionable, teachable results. When a number of research studies have addressed an interesting issue, the market tends to reward the researcher who can synthesize them and extract the essence as quantitative relationships, principles, concepts, and precepts for practice.

Although there is still debate about rigor versus relevance and positivist versus interpretive versus design science methods, the debate has to a great extent been resolved in favor of a portfolio of methods, each applied suitably and correctly. There is general recognition among IS researchers that appropriate methods may depend on the age of a topic, prior research, availability of data, and skills of the researcher.

**Pessimist argument 6: Resistance in some universities to Information Systems as a new organization discipline.** The argument is that since some leading business schools do not have IS departments (or focused groups), this is a sign of weakness for the field. The reasoning seems to be that the leading schools will be at the forefront in all innovations and changes in pedagogy and research. The historical record for universities does not support this reasoning. Sometimes leading institutions innovate, but often they do not. It would be helpful to the field if all leading schools were in agreement, but it is not necessary. Many professors took their degrees before IS became an important new function. Others did not include IS in their basic course work. Some academics appear to have narrow, incomplete, or naïve views of the new field. Moreover, the recent introduction of new university units (e.g., schools of Informatics, schools of Information, etc.), separate from business schools, may be creating further resistance. While these units often have clear and separate educational and research missions from business school IS departments, the differences are not readily apparent to non-IS faculty, students, university advisers, or recruiters. Some examples of resistance illustrate this issue.

- A respected professor in finance said he understood IS. He undertook to develop a faculty activities information system based on spreadsheet technology. The system was a complete failure. The failure was due to his lack of understanding and appreciation for requirements determination, participative design methods, interfaces, controls, appropriate processing methods, databases, and other information included in the basic content of information systems courses.
- A well-regarded marketing researcher was an advocate of data mining. He made it a part of his research agenda. He seemed to not appreciate the IS faculty members who had expertise in databases and data mining. As a result, he was an expert user but lacked understanding and appreciation for the systems, processes, and expertise that provided the databases and other technology to support his vision of marketing use of data mining.
- When a university adviser at one university met with a freshman-level student to discuss degree options and found the student was interested in information technology, the adviser directed the student to the School of Informatics, never considering whether the IS department within the business school was a better fit for the student's interests and career goals.

The optimistic view about resistance in some schools is a market view. Innovation often comes from schools that are not comfortable and secure in their current position; schools with entrenched reputations often spurn innovation. For schools slow to innovate and change, the market for ideas and the demands of students and recruiters finally push them to make changes. Introducing a new discipline frequently depends on a small number of faculty members who become interested in the new field and its potential. The small numbers of change agents means the innovative changes are fragile and can have forward and backward movements. In other words, the market view is consistent with some resistance from a few leading schools and for successes and failures in the change process.

### ***Conclusions about the Future Based on Pessimistic and Optimistic Views***

The short discussion of pessimistic and optimistic views of information systems as an academic discipline suggests a conclusion: the fate of the academic field is associated with the continued important role of the IS function and what we do relative to the internal dynamics and market conditions that govern academic fields.

The continued important role of the information systems function in organizations is crucial. A strong, vital function with employment opportunities for graduates supports a strong academic field. The employment opportunities are in companies, consulting firms, etc.

As an academic discipline, we can provide input to the ongoing exploration of the organization, roles, duties, and operations of the IS function. The need for all graduates to understand the IS function and how its processes support organization systems also presents a compelling argument for IS academic courses. Majors need to understand a unique set of concepts and methods for dealing with IS issues including the analysis and design of systems. The pessimistic views of outsourcing and technology as a commodity are not compelling arguments against a viable, healthy, important organization function.

The pessimistic views related to IS as an academic field suggest the need for aggressive action on the part of the IS field. In general, the pessimistic views of the academic field can be overcome by our own actions. In some cases, there is a market for ideas and pedagogy that can assist us.

- The recent drops in IS course enrollment may be the result of market disturbances, but this can be countered by a coherent, well-reasoned message to advisers, students, and other business school faculty about the future for positions in IS.
- The resistance to IS instruction for all organization students may be countered by improved materials and pedagogy for the introductory courses. This will be explored in Recommendation
- Resistance to IS as an academic field based on diversity or lack of coherence in research is best dealt with by good research and by research that creates coherent principles from a body of diverse research. Strong, resilient principles can emerge from a synthesis of diverse research. This has the potential to demonstrate that the diversity of research approaches and methods is advantageous in the complex world of IS in organizations.
- The resistance in some universities to IS as a new discipline will respond to favorable market conditions for graduates, excellence in research, and by excellence in teaching. With regard to the relatively recent emergence of nonbusiness technology and systems schools, the market for education and degrees will help define the different roles. For IS in business schools, the best approach is to clearly articulate the role of IS in organizations and the important intersection of IS with other business functions (e.g., Marketing, Accounting, etc.), the value of IS to these functions, and the necessity of IS education to every business graduate and professional.

The discussion of issues provides the basis for recommendations. In order to formulate the recommendations, we first note some of the inherent comparative advantages of the IS academic discipline.

## **Part II: Comparative Advantages of Information Systems**

For IS faculty, it seems readily apparent that IS possesses several comparative academic advantages. These include

1. The relationship between the needs of the IS organizational function and the academic program that can respond to these needs
2. The relationship between IS and technology-enabled organization systems
3. The pervasive use of systems concepts and systems thinking in IS practice and teaching
4. The relationship of IS to modeling organizational behavior and data

**IS organization function.** The relationship between the IS function and the academic IS program has already been explained. The comparative strength for an academic field from the existence of an organization function is not unique to IS, but it is important for IS because it provides evidence that there is a body of knowledge, expertise, and jobs with specialized activities.

The level of investment, the dependence of the organization on IS, and the risks associated with IS indicate that the function is vital and important. As long as this function continues to be important to organizations and continues to receive significant investment, there will be a need for IS academic programs of education and research. The reasoning is that an important, investment-healthy organization function leads to an important, healthy academic field.

**Technology-enabled organization systems.** The comparative advantage of the IS function relative to the technology-enabled systems in organizations is because the function has the responsibility for acquiring the systems, operating the technology that provides the services and actions of the systems, making sure the systems are available when needed, and ensuring security. No other function in the organization has the expertise to handle the activities to support the availability of the systems. Today's trend toward more and more integration of systems increases the importance of the activities and services of the IS function in managing these integrated services.

**System concepts and systems thinking.** Information systems have unique characteristics. These systems are created by humans with human actors, technology artifacts, and procedures that direct the actions and interactions of the parts. They exhibit characteristics of open systems such as goals and feedback. System performance may depend on the stresses, motivation, and satisfaction of the human participants. Since the purpose of systems is to perform tasks in an organization, the IS field must understand IS artifacts (hardware, software, and databases), human participants, organizations, business processes, and applications. While system concepts and systems thinking are used in many fields, they are not developed strongly in most of the fields because the concepts are not central to their teaching or research mission. For the IS field, system concepts are central and focused on vital activities. They are used in the design of systems, the development process for systems, the operation of systems, the updating of systems, and the control and security of systems. As such, the IS field is in a unique position to research and teach the application of system concepts and systems thinking. System concepts and systems thinking have applicability to other organization disciplines, so the IS academic discipline has a comparative advantage in developing and teaching this subject matter. Lessons from IS successes and failures can be used to teach the active use of systems thinking to all students. Many IS academics believe we should have a greater emphasis on "systems" in IS; others have written extensively on the central role of systems and systems thinking in teaching IS.

**Behavior and process modeling.** Behavior and process modeling describe in a formal way how things happen in organizations. There are events that trigger processes. There are objects in the organization that behave: they use data, produce data, and transform data to information and knowledge. These behaviors are modeled in order to understand things that happen—processes and processors. Behavior modeling is done in the context of organization systems. It provides description and documentation of what the organization does, what causes it to be done, when it is done, and how things change in response to the behavior. This modeling is also necessary in order to understand the data requirements and the data model for an organization. The processes performed by IS practitioners incorporate behavior modeling, usually within a development methodology employed by the organization. Because it is one of the core bodies of knowledge for the field, behavior modeling is a subject of research and teaching.

### **Part III: Recommendations for Securing the Future**

Having described the pessimistic and optimistic views and the comparative advantages of IS as an academic discipline, five recommendations are proposed for actions that will make a difference.

1. Be proactive in defining our domain and articulating the importance of its parts.
2. Be aggressive in research and teaching at the fuzzy boundaries of applications with shared responsibilities.
3. Add real value to students in IS courses, particularly for nonmajors.
4. Be proactive as IS faculty members in keeping current on relevant technology and practice.
5. Be aggressive in adding value to IS practice and producing graduates prepared for a productive career.

#### ***Recommendation 1: Be Proactive in Defining Our Domain and Articulating the Importance of its Parts***

In the field, we tend to define the domain for IS as an organization function and academic discipline broadly rather than narrowly. The IS discipline has defined its scope broadly even though a common trend among organization disciplines has been to narrow their definitions of domain and research scope. A broad scope is appropriate for IS because its activities cross organization

boundaries; it partners with every organization function in providing systems and systems support. Breadth is required to understand the range of systems, system environments, and behaviors associated with systems. The design and operation of technology-enabled work systems is complex because of the combination of social and technical considerations. Systems exhibit significant variety and provide support for individuals, groups, and functions. Analysis of systems requires more than modeling requirements and quantitative analysis of data; it includes analysis and interpretation of a broad range of behaviors.

The IS domain encompasses technology-enabled systems employed in performing organization activities. The domain can be categorized into core knowledge, functional knowledge, and systems and applications knowledge.

1. Core knowledge relates to use of system concepts and systems thinking for organization systems, modeling behaviors in organizations relevant to collection and use of information, and modeling organization data.
2. Functional knowledge consists of knowledge to perform the four responsibilities of the IS function: information and communications technology infrastructure (hardware, software, and communications), management of the IS function (strategy, planning, personnel, and evaluation), IT-enabled systems (acquisition, implementation, operation, and maintenance), and databases (internal and external).
3. Systems and applications knowledge addresses responsibility for three types of technology-enabled systems: enterprise systems serving many functions, systems for common organization activities, and systems designed for a specific organization function (these are shared-responsibility systems).

Defining and articulating the IS domain is essential to overcoming resistance to required IS courses or course work, as well as any resistance to inclusion of IS as an academic unit within business schools. It will also alleviate confusion among students, advisers, faculty, and recruiters when faced with an array of business and nonbusiness related schools and degree programs. With a deeper understanding, students and advisers can make informed decisions regarding course work and majors. Moreover, this should facilitate partnering with non-IS faculty who often influence students' choices and career directions.

### ***Recommendation 2: Be Aggressive in Research and Teaching at the Fuzzy Boundaries of Applications with Shared Responsibilities***

In the IS portfolio of applications, the majority are systems for which there is shared responsibility between IS and users. The shared responsibility is with one function, several functions, groups of users, or single users of applications. This shared responsibility means that the IS personnel must learn much about the application domain. They must map requirements into IS system capabilities and suggest new alternatives that may provide new or improved capabilities. They must understand the user domain well enough to be able to understand and participate in discussions about the use of the system and the value from optional features. There is an intersection between the domain competence of the user group and the system competence and domain competence of IS developers. Examples of the shared responsibility and intersection of domain knowledge are the following:

- In acquisition of new or revised applications, the user groups are responsible for defining what the systems are to accomplish. IS personnel are responsible for aiding users to describe complete and correct requirements and assisting in the resolution of requirements conflicts and selecting among alternative designs. Ultimately, the IS personnel have responsibility for explaining the affordances from information and communications technology and proposing technology solutions and system innovations.
- In the case of enterprise systems with many users from across the different functions and activities of the organization, the intersecting domain knowledge of the IS group assists in resolving conflicts, ensuring integration of applications, negotiating limits for the enterprise systems, etc.

Every new IT-enabled organization work system is an opportunity for research. Although there are similarities among systems, there are unique conditions that can be described and explained. The similarities with other systems can be used in formulating principles and defining conditions under which they have been found to apply. The systems can be evaluated for effectiveness in achieving objectives, cost/value performance, reactions by internal personnel and customers and other outside users, risks and errors, etc. Each one is an example of an IT-enabled work system and can therefore be used to illustrate principles of organization systems.



The shared domain should be an opportunity to bring diverse academic research skills to problems in order to do better research. The market for ideas and research results may encourage this type of research. Since shared responsibility applications involve other functions, what research alliances might be formed? Alliances may be made for non-research reasons such as developing a long-term relationship, supporting teaching collaboration, being a good colleague, etc. An approach based only on research is to create alliances if there will be mutual advantages, but those alliances should not obscure the IS questions that come from researching many applications. The research alliance should result in synergy with new insights from the collaboration. There are many examples of researchers from different disciplines bringing different skills and ideas to shared systems and applications.

- Marketing researchers are interested in the uses of databases for data mining for marketing purposes; IS researchers are interested in the system characteristics that enable effective data mining.
- E-commerce research provides many opportunities for different disciplines. The same e-commerce systems may be profitably researched by marketing, operations management, consumer behavior, and systems (a variety of issues such as screen designs, dialog interfaces, error rates, erratic behaviors, etc.).
- Organization researchers are interested in socio-technical system design and methods for participation in system design. The IS discipline has many opportunities to encourage such methods and to research their effectiveness.

There are unusual opportunities for innovative ideas and research at the intersection of IS and some other part of the organization. Some of these ideas may not have a natural sponsor in the organization and IS can sponsor innovations. When technology innovations suggest new systems or new organization forms, IS research can add value by research on changes as they happen or by examining possible unexpected consequences before or after the changes are made. A few examples of past and current innovations illustrate the ideas and how IS has done well or not so well.

- Business process reengineering (BPR) is interesting because consultants packaged basic system concepts and system thinking into a compelling story about getting significant gains from creating new systems rather than repairing old ones. IS personnel could have made the same case in systems terms: *Systems decay (systems entropy) and some of our major systems are 20 years old. Merely fixing the decay gives little benefit. With new technology, it is more profitable to do a new design that will reduce delays, increase productivity, and reduce errors while providing better information and better decision making.* This is the same message, but the consultants made it more compelling.
- Knowledge management is an example of an idea that requires the use of IS to be feasible. The problem has been to create knowledge management systems that are accepted, used, and give real value. IS has been involved in knowledge management, but perhaps not enough. This is an area that may respond to more research.
- The Internet and the World Wide Web as technologies must depend to a great extent on Computer Science for extensions and improvements of the technologies. Some IS researchers suggested innovative uses of the Internet, but the field mainly has waited to study what organizations have done. There is perhaps a lesson here. With some innovative thinking about the affordances of the Internet and Web, the IS field might have provided organizations with actionable ideas. There are still opportunities.
- E-commerce (and more recently mobile, or m-commerce) has evoked significant amounts of theoretical, analytical, and interpretive IS research. This is one area for which IS seemed to respond quickly with research.
- Group decision support was given significant help from academic research. Subsequent research that removed the boundaries imposed by decision rooms can be viewed as extensions of this stream of research.
- Virtual organizations are feasible because of information technology and information systems. IS researchers have provided a body of research for organizations that wish to move in this direction. Such organization innovations happen slowly, so the major impact has been in partial use of the concepts, sometimes with unintended consequences. Research opportunities continue.
- Globalization has been made feasible by information and communications technologies. Distance and time zones are insignificant. The systems and organization designs to achieve globalization are within the IS research agenda. Some research has been done and there appear to be more opportunities.

- Open systems are IS research issues. Open systems affect hardware and software decisions; blogs and wikis have the potential for affecting organizations. Examples of research are the characteristics and economics of open systems, the motivations of contributors, and the risks from open contributions. This area appears to offer many good opportunities.

### ***Recommendation 3: Add Real Value to Students in IS Courses for Nonmajors***

This recommendation focuses on the IS course for everyone rather than the specialized courses for majors. Some of the comments apply to courses for majors where the topics are taught in more depth, but the important issue here is making the first general course in IS of high value.

Nonmajors do not anticipate working in the IS function. They expect to work in one of the other organization functions such as accounting, marketing, etc. The courses taken by these undergraduates include some foundational courses that provide an orientation to and general knowledge of most organization functions plus courses in general analytical techniques and methods employed in analysis and decision making. The argument for functional area survey courses is the need for graduates to understand the entire organization and to have an appreciation for what each function performs, the way it operates, and the value it adds to the organization. Some topics in these introductory courses have general utility. For example, students may be taught about “rate of return” in a finance course; it will be useful in all other courses when dealing with investment of capital.

Both undergraduates not majoring in IS and MBA students need the information they obtain in the introductory IS courses. MBA students may be able to receive and absorb more information about management implications and management-level issues, both because of their maturity and through case method teaching.

What would we like a nonmajor to remember from the IS courses after a few months or perhaps after a few years? In our courses, we describe the IS function and its activities very well, but we have often stopped with description and have not achieved understanding. Real value comes from imparting understanding in such a way that it persists into the future as the basis for understanding new technologies and new applications. Following are some possibilities (some we do better than others, but we can still improve):

1. How to understand information and communications technologies. How to think about the affordances provided by new technologies. How to link affordances of new technologies to problems or opportunities.

Some students may develop this level of understanding by reading about old and new applications and technologies, but most will not. It will require a rethinking of how technology knowledge can be transferred in order to make it transferable to new situations and new problems. It requires practical exercises that encourage students to think about affordances rather than features.

2. How to understand system concepts, so that they are meaningful and actionable in work situations. How to think about organization processes and procedures as open, socio-technical systems and apply system concepts to understand issues and behaviors. How to think about technology-enabled systems as human-machine systems and apply system concepts to design, operation, and management of the systems.

Students learn analytical methods, decision making, strategic thinking, etc. for use in identifying problems, formulating alternatives, doing analysis, and making recommendations that fit organization strategy. However, decisions are frequently implemented with systems, and typically these systems depend on and employ information technology. In other words, knowledge of systems in organizations (how they function, how they are built, how they can fail, how they are controlled, the effect of incentives, and how they are renewed) is vital. Interfaces between humans and the system are particularly important. A badly designed interface (for example, in an order entry form or a report) will result in errors, confusion, frustration, misuse, or nonuse. A well designed interface will result in willingness to use a system.

Without this system knowledge, people in organizations will strategize, analyze, and decide, but will implement badly if at all. The IS course can add significant value by introducing system concepts and show how they apply when decisions are made and must be implemented. Students can begin to understand the consequences of poor systems with poor interfaces, dysfunctional incentives, poor feedback, and inadequate control features. Some examples illustrate the importance of this topic.

- A young executive was placed on a large number of implementation teams to integrate companies that had been acquired. When asked why she was doing so many of these, she replied that the bright managers did not understand systems and could not design systems nor specify requirements for them.
- The Enron Company failure was in many respects due to the lack of adequate systems and system knowledge. For example, the Enron finance function did not have a report of expected cash flow showing commitments for cash and sources of cash.
- The Enron audit was inadequate and audit quality control procedures were not enforced because the Arthur Andersen audit firm had partner and staff incentives that conflicted with quality audit objectives.
- Almost everyone has experienced interfaces with one or more poor, error-prone, time-wasting feature. This means that a well done teaching unit on interfaces will be instructive and helpful in future positions.

System concepts are usually very difficult to teach. On the surface, they seem simple and obvious. In practice, they tend to be overlooked and not applied carefully or productively. One of the very important IS contributions to the education in administration can be to teach system concepts so that they are memorable, meaningful, and long-lasting. Can system concepts be taught so that graduates will apply them productively and with insight when evaluating, modifying, or administering an existing system? Can they be taught so that they will apply them with insight in the specifications for new systems and in the system construction process? If we can do this well, the course will be one of the very high value-added courses in the curriculum.

3. How to understand behavior modeling so that years after the course a non-IS person can apply a few of its most important ideas in simple modeling of systems and to comprehend what expert modelers are doing.

Graduates will experience situations in which they will need to understand and describe a system. There will also be times when they need to interact with system development projects. They will need to be able to work with IS developers to model what is happening or what is being proposed to happen in a system. They will need to identify and explain what happens through processes and events (including triggers). Behavior modeling is a key for describing and understanding how and why organizations behave as they do. A student may develop some elementary skill in behavior modeling in a survey course, but it is not likely to be remembered or be useful. Can behavior modeling be simplified to be useful to a nonexpert? Can the problems provide motivation to learn the basic concepts and basic elements of the methods?

4. How to understand the importance of data modeling and be able to apply a few of its most important ideas in data modeling simple requirements and to understand issues relative to the corporate data models.

When processes and events occur, there is data. Data modeling is modeling what exists in data. Understanding the structure, objects, and relationships of data supports the system building process. Understanding the data that exists is important to all organization participants who use data in systems or in analytical and decision processes. A student may be taught simple data modeling in a survey course, but will it be interesting and have long-term value? Can data modeling be simplified to be useful to a nonexpert? Can the concepts and problems provide insight that will allow a non-IS person to appreciate the value of data modeling and work with an expert to build data models and to understand the corporate data models in order to specify data to be obtained?

5. How to evaluate new applications. How to learn meaningful lessons from examining technology-enabled systems in organization. How to extract important principles when there are differences in the way each system applies technology affordances, different value propositions, different implementation problems, different risks, and different problems in acceptance and use by internal and external users.

Applications of IS are vital in teaching students about the importance and value of IS. The application descriptions explain how IS can affect their work. The applications can be described as examples of the way in which value and comparative advantage are achieved through information and communication technology. The applications can be used to motivate students to be proactive in identifying organization systems that can benefit from new technologies and new methods. The problems of introducing new systems can be illustrated. Some of the applications examined will be enterprise-wide systems; others will be examples that affect only one activity or one organization function.

A student may be presented with descriptions of new and interesting applications, but what are the lessons (conceptual and practical) from each of them? Can applications be described and discussed in ways that will help students to develop insight about systems and meaningful lessons to apply to systems in the future? Can students develop a mental model of system and data risks, error and loss prevention, and capabilities of security processes and recovery procedures?

6. How to work effectively with the IS function. How to understand a reasonable set of expectations about the systems and services of the IS function. How to understand and appreciate the value of organization-wide enterprise systems, standards, and practices. How to work with the IS function in exploring strategic, operational, management, and control issues and problems involving systems and technologies.

If the course explains what the IS function does, this may be useful to students, but it may be more useful to couple the description with lessons about working with the function to achieve the goals of an organization unit, the goals of a group, or even the goals of an individual knowledge worker. Can the students develop useful expectations that will help them in asking for systems and services and negotiating service agreements (formal or informal)? Can the students develop a useful understanding of the importance of the IS function relative to enterprise IS? Do they get an appreciation of the value obtained from integrating many organization processes and employing a comprehensive database for all of the applications in the enterprise system? Do they understand the tradeoffs with standard systems such as benefits of reduced costs and high integration but with disadvantages of reduced flexibility and limitations on innovation?

***Recommendation 4: Be Proactive as IS Faculty Members in Keeping Current on Relevant Technology and Practice***

This point is obvious for a field that must deal with rapidly changing technology, but we must keep the issue before us and work on solutions. Some systems remain about the same when new technologies are introduced, but most systems change. The new technology removes technology constraints, adds capabilities with improved access, and encourages innovations in applications. There are changes in every academic field, but in IS the rate and scope of change is perhaps the largest in the university. The question is how to deal with the rate of change. Some IS faculty members keep current; others fall steadily behind.

This section will not deal in detail with ways of solving the problem; if there is agreement that it is important to be more aggressive in keeping faculty members current, there are a number of solutions that can be implemented. For example,

- Technology updating leaves
- Summer updating programs
- Regular updating seminars in each department
- Regular updating seminars in companies that are willing to have faculty members attend
- Online updating seminars
- Updating workshops at professional meetings

***Recommendation 5: Be Aggressive in Adding Value to IS Practice and Producing Graduates Prepared for a Productive Career***

It is clear that IS practitioners devote much attention to the role of the function and how to add value to the organization. Most of us know that thoughtful practitioners are interested in academic research findings if the findings can be related to problems they face or are likely to face. However, it is difficult for practitioners to find the “practice pearls” in the research articles. Since asking practitioners to read research articles is not likely to work, how can there be knowledge transfer with practitioners transferring practical knowledge to academics and academics interpreting research in terms of problems being faced by practitioners? The objectives are clear; methods may differ for different situations. Some academics do academic knowledge transfer to practitioners very well; others not at all. Some examples illustrate things that have been done; innovative academics will find more opportunities.

- Write a practitioner-oriented article as part of the articles reporting results of a research project. Try a practitioner journal such as *MISQ Executive*.
- Partner with a practitioner in writing about a problem in practice.

- Do a consulting project (and with agreement from the organization but without extra compensation extend your analysis to incorporate sufficient analysis to report as research that has implications for practice).

Producing graduates prepared for a productive career means balancing between the short-term and long-term objectives of the employee and employer. There is an inherent conflict between the needs of practice for graduates who can be productive as soon as they start work and the long-term needs of the organization for employees who are lifetime learners. This is not just a curriculum problem. Some IS academics deal with the problem by working cooperatively with practitioners to have them participate in such a way that students understand the needs of practice. Examples are participation in some class sessions, talks, discussion of student papers and presentations, site visits, technology discussions, and demonstrations.

## Summary Thoughts

The paper is organized to present arguments on securing the future of IS as an academic discipline. It is designed to help readers formulate their own arguments when faced with many of the issues dealt with in the paper. In the face of criticism or a downturn in enrollment, it is easy to overlook the significant strength of IS as an academic discipline. The alternative to IS as an academic field is to not have any teaching or research related to the design, development, or use of technology-enabled systems in organizations.

The conclusion of the review of pessimistic views was that those pessimistic views that may be true can be solved by our own actions. The brief review of the comparative advantages of the field suggests we basically have a strong position; it is up to us to make it stronger and better.

The five recommendations are not startling, but they do help us to focus on what we can do to improve the position of the IS discipline in the university and provide compelling evidence of the value of IS teaching to students. They can motivate us to do research that creates knowledge for the academic field and can be translated into advice for practitioners. Some things in the paper that have had relatively little discussion in the field are the emphasis on research on shared responsibility systems with a recommendation that IS researchers initiate research projects in the early stages of new technologies. There is also a recommendation that IS researchers cultivate cooperative research relationships with researchers in other organization functions.

Did the paper tell you something you did not know? Probably not, but we hope it has framed the arguments a little more clearly and presented the need for action in a more compelling way. Many of our colleagues have been making similar arguments. The paper synthesizes and summarizes many of these.

## References

We have not created an extensive bibliography partly because it doesn't suit the paper and partly because we would certainly have omitted some worthy citations. The ideas expressed in this paper reflect the thinking of the authors, but the ideas are not original. They are the result of numerous articles, discussions, presentations, and papers. It is impossible to identify all of the contributors and all of the sources of thoughts. The references, therefore, are only the two specific citations.

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