

Global Information Technology Education

Issues and Trends

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5 Globalization of Information Technology: Here to Stay or a Passing Fad?

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At the Norwegian School of Management, near Oslo, we are rethinking the scope of our undergraduate and graduate programs for 1992. Internationalization of business has been singled out as a critical element to be incorporated into every relevant course. The chosen philosophy is to integrate internationalization into traditional courses.

The introduction of the issue of globalization of information technology invited us to rethink not only course content, but also the basic premises of our Management Information Systems (MIS) education program. We began by examining who we were educating and for what purpose. Were we educating application specialists, system development specialists, or line managers (as users and custodians of information systems)? We concluded that the mission of a business school is to educate (future) managers.

Information technology represents a formal means of communication, which is a major part of a manager's work. The concept of formal communication is complex, since it requires the integration of organizational, group, and individual systems that also span organizational boundaries. External (to the organization) communication may introduce the need for global systems. Managers need to understand what may be communicated for-

mally and the innovative processes that may need to be created to meet information needs.

MIS programs on the undergraduate level should address the needs within the organization and expand to the international scene. The graduate level should introduce more flexibility. The globalization of information technology must be integrated with other MIS issues.

The use of information technology has increased sharply over the last decade. Information technology is now regarded as a necessity for conducting business and as a vehicle for creating strategic business advantage (Keen, 1991; Keen, 1988). A natural consequence of this development is the need to update our education of future managers to increase their ability to effectively and efficiently create and use information technology in the global business setting.

Throughout the forty-year evolution of information technology, we have seen a plethora of concepts hit the headlines only to be returned to the grab bag of concepts and issues: in the 60s hardware, software, and programming were important topics; in the 70s systems development, user participation, and decision support systems drew our attention; and in the 80s we struggled with end-user computing, strategic use of information systems, telecommunications, and expert systems.

We may wonder whether the concept of globalization will suffer the same fate. That is, in the long run, will globalization require special attention in its own right within our Management Information Systems (MIS) educational programs? To answer this question, we at the Norwegian School of Management looked at the globalization of information technology in conjunction with other critical issues of MIS. This required a basic analysis of what is needed within our curricula and how that material could be delivered. The following material highlights the principal issues that were considered in the fundamental reorganization of the MIS education at the Norwegian School of Management.

BACKGROUND

Norway is a country with a population of a little more than four million people. We export approximately 50% of our gross national product. Therefore, we are highly dependent upon

international trade. In many ways, knowledge is a critical factor for maintaining our competitive stand in international markets. Business education in Norway is responsible for educating future managers to assist us in this process.

Public and private institutions offer MIS education on the university level. In Norway, there is no accrediting organization with the mandate of securing a minimum common platform. The institutions are free to choose their own focus. Consequently, there is no systematic curriculum development trend among them.

The Norwegian School of Management, situated near Oslo, is a private business school. Approximately 85 percent of our gross income comes from student fees and research funds. Fifteen percent is governmental support. At present, the Norwegian School of Management is undertaking a major revision of its educational programs. Two events initiated the drive for change. First, business is becoming increasingly internationalized. The implementation of the common market of the European Economic Community in 1993 has highlighted the need for synchronization and adaptation. Second, a new dean took office at the Norwegian School of Management in 1989. He was elected on a program highlighting internationalization and strategy as two critical elements in all future research and educational efforts.

Therefore, internationalization is at the forefront of all our efforts. Globalization will be integrated into every relevant aspect of business education. Not only has this dimension become the responsibility of every faculty member, the dean's office has taken on a particular responsibility in acting as a discussion partner with faculty members to ensure quality implementation of subject matter and pedagogical form. The new strategy has so far lead to the introduction of an executive Master of Business Administration and a Master of Science program in which students may specialize in European Management, International Shipping, and Energy Management. In the Fall of 1992, a revised four-year, full-time, undergraduate and graduate program will be implemented.

To carry through these changes, the business school has a staff of approximately 70 academicians. Faculty members received their degrees from many countries, with the largest number holding degrees from Norway, the United States of America, and Great Britain. Faculty participate regularly in international conferences, publish in leading international jour-

nals, and work in other countries as visiting professors.

Regarding Management Information Systems, we have, over the last five years, experienced waning interest among students, faculty, and the administration for the traditional undergraduate course work emphasis on computer use and systems development. On the graduate level, the number of students attending specialized courses dropped catastrophically, down to the level where the future need for indepth studies was being seriously questioned.

Some MIS faculty sought comfort in the view that the decrease in interest is an international trend and, therefore, unavoidable. This might be true. The consequence of this view might easily be demise of separate MIS courses. For us, the moment of truth was the revision of our undergraduate program. We had to convince our dean, administration, and colleagues that there will be a continuing business need for MIS. We understood the role of information technology in the internationalization of business to be part of the answer. However, we soon came to realize that we needed to address other fundamental issues, such as: What is the focus of MIS education, and, How can information technology be used to integrate organizational and individual roles.

The remainder of the chapter explains our basic thinking and our solutions. The new form and content of our MIS undergraduate and graduate program has been accepted and is under implementation.

BASIC PREMISES, SOLUTIONS, AND RECOMMENDATIONS

The section contains two parts. The first subsection presents the basic issues, controversies, and problems we evaluated to determine our MIS curriculum. In the second subsection, we present our solution for the undergraduate program and our recommendations for graduate education.

Issues, Controversies, and Problems

Knowing where to start often puts you halfway to success. We began by considering three basic dimensions. First, we needed to clarify the market for our educational efforts. Second,

we needed to answer the question: what are the theoretical foundations of MIS. Third, we needed to clarify whether what we claimed to be our field within business administration was really a uniform phenomenon within organizational settings.

When we returned to the foundations of what we thought we should be doing in our educational efforts, we kept in mind John Naisbitt's words on the evolution of information technology (1984, p. 11):

New information technologies will at first be applied to old industrial tasks, then, gradually, give birth to new activities, processes, and products.

This principle also applies to education.

When we began considering how to add the aspect of the globalization of information technology to our existing educational programs we had the opportunity to critically evaluate our platforms. There are two compelling reasons for this. First, the introduction of globalization gave us the opportunity to innovate; we could avoid using old solutions for new challenges. And second, it is our opinion that the globalization of information technology, in most cases, is not a stand-alone issue. Global uses of computer systems will coexist with other information systems used for internal organizational needs or domestic markets. Therefore, we saw the need to evaluate existing internal and domestic usage to get the global picture right and to evaluate the impact on the two because of globalization. For these reasons we took some time to reconsider the fundamentals.

The Market - For Whom Do We Educate

It would seem obvious that the mission of a business schools is to prepare people for careers in business. When we consider what we do in reality, perhaps that statement is no longer so obvious. There is a difference between public and private organizations. The two may not benefit equally from one common program, since they may differ on issues such as:

(1) The way in which income is generated and used:

Private organizations earn their money in the market from customers and are relatively free to spend their resources according to their own considerations. Public organizations

are in many cases allocated resources through a political budget and planning process.

(2) The decision process within the organization:

Private organizations are oriented toward hierarchical decision making. Public organizations may have to include committees composed of representatives from groupings within as well as outside the organization in their decision making processes .

(3) The professional structure:

Private organizations often have a clear division of responsibility between managers and specialists. In public organizations one profession may dominate (for example, medical doctors in public hospitals).

The differences between public and private organizations warrant considerable thought, but it is not the emphasis of our discussion. The following material is related to organizations in the private domain. This does not mean that the arguments forwarded here have no bearing on public sector organizations, but rather that we will not attempt to evaluate what the differences and similarities may be here.

In principle, we may choose between three distinct foci for information technology education. First, we may elect to educate specialists in functional areas, such as marketing, finance, accounting, or production. This alternative would call for indepth studies within one or more of these fields. The objective would be to ensure that students would be competent users and, possibly, creators of data and software. They would also learn about expert systems and decision support systems within their chosen specialization.

The second choice is to design a general program for people who will participate in the process of creating information systems. Programs of this nature will include the elements of computer hardware and software, data structures, electronic communication, programming, systems analysis, and the management of MISs. The focus of this type of program is information rather than technology (as is the case in computer science). It mixes the business view with technological considerations. That is, the program spans the systems life cycle from eliciting information requirements from users to methods and techniques of information analysis and programming. This approach to MIS has dominated the basic education on information technology in

undergraduate as well as graduate programs. Also, many specialization programs within Master of Business Administration (MBA) or Master of Science (MSc) studies have adapted this profile and it may be said to color the recommendations of the American Association of Collegiate Schools of Business (AACSB).

Our third choice is to focus on the manager in the line organization (the line is defined as the hierarchy of managers from the Company Executive Officer to the level of manager above the foremen on the jobfloor). Regarding information technology, managers carry a dual role. They are responsible for the processes needed to develop and run information systems in the organization. In this regard, managers should be knowledgeable about business needs and ways in which information technology may support the business. They must plan for and control the projects and computer usage of their subordinates. The second role managers have is that of the user. Managers may use computers to support their own jobs (for example, determining requirements for the user interface to increase the likelihood of use, deciding what applications may be of help, and deciding how data will be used). Managers also allocate execution of computer tasks among staff, and act as discussion partners in computer-related matters.

Theoretical Foundations

We debated the theoretical foundations of MIS as a stand-alone program within business schools. In research, the often expressed view is that MIS has become a field in its own right because publications build on previous research within MIS rather than on the disciplines of organizational theory, behavioral theory, sociology, or psychology - some of its supporting fields (Culnan & Swanson, 1986; Orlikowski and Baroudi, 1991). Yet even in cases where researchers build on research within MIS, there is no common theme among the multitude of research findings published in the journals. At best, they deal with some dimension of information systems and organizations, groups, individuals, or technology. However, we are hard pressed to identify a common denominator.

The proposition put forward and accepted at the Norwegian School of Management is that what we are dealing with is communication. Communication has been called the glue that holds organizations together (Zmud, Lind, and Young, 1990).

Porter (1990) claimed that communications infrastructure is one of the critical advanced factors that will determine international comparative business advantage in the future. When we take information technology into account, we are talking about formal communication. Fundamentally, computer systems accept, store, manipulate, refine, transmit, and present data. We select data to input and store because we think that they may be of use for somebody at some point in time. We manipulate, refine, and transmit data in an effort to communicate.

The communications paradigm does not impose a straight-jacket on the field. It would allow for a multitude of views, just as we find within other academic areas, for example organizational theory (Morgan, 1986; Van de Ven & Joyce, 1981). The communications paradigm allows for all types of communication: oral, pictorial, or traditional written data. The added dimension of information technology is that the communication occurs through an electronic channel with certain functional capabilities and that the communication may be delayed.

Organizations consist of the five interrelated components

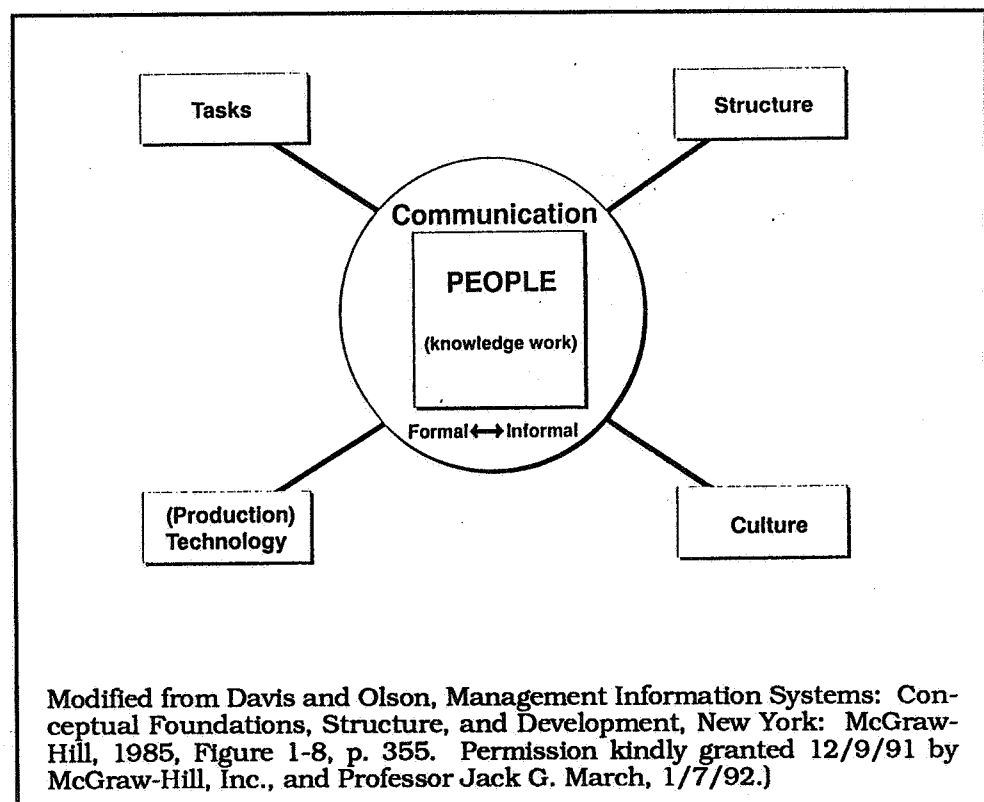


Figure 1: Organizational Subsystems

of people, tasks, technology, structure, and culture (Leavitt, 1965; Davis & Olson, 1985). We believe that communication is an additional component necessary for making organizations work. In principle, organizations function through people. Therefore, the model Leavitt forwarded needs elaboration, as shown in Figure 1.

The position taken here is that communication is a phenomenon that occurs among people and that organizational behavior cannot be explained without knowledge of communication patterns. We choose to believe that organizational structure, partitioning of tasks, technological arrangements, and culture are results of how human action or inaction is communicated. Therefore, we disagree with Leavitt's view that, for example, technology and structure directly influence each other. The fundamental difference is the one that academics in the field of systems thinking make between purposeful and purposive systems (Checkland, 1981). Purposeful systems are formed according to the free human will. Purposive systems develop according to nature, or unintentionally. That is why, for example, technology and structure should only be related through people. If the two evolve because of some purposive force, they are beyond human intervention and the need for management is nullified. Of course, it may be that phenomena are purposively related. However, the best way to think about them is to adapt the view that people organize with a purpose in mind, since we then create the basis for shaping our environment according to need.

There are two principal questions we have to ask regarding communication: What is it we want to communicate? and, How should we proceed to ensure that we create the communication systems we need? A long standing slogan within the MIS field says that information systems should deliver the right information to the right person in the right format at the right time at the right cost. Traditionally, we have tried to achieve this through the elicitation of user requirements (Wetherbe, 1991; Olle et al., 1988). The danger of this approach is that we easily get lost in technical issues related to methods and programming. To counteract the technical dimension, we need to adapt concepts that tie us more strongly to the ultimate function of information systems, that is, that the system delivers data that the receiver understands. An example of an approach of this nature is the concept of service management in marketing. Service manage-

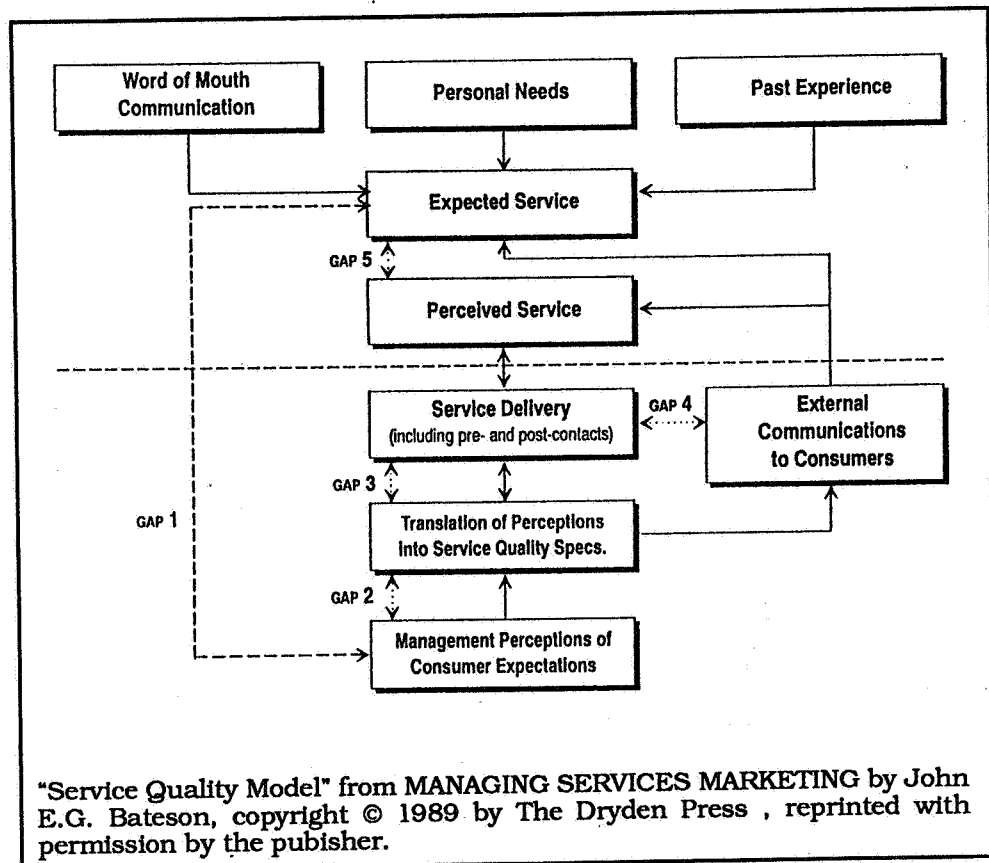


Figure 2: Service Quality Model

ment has risen to the forefront among marketers as a way in which a firm may tie its sales function more strongly to the requirements of its consumers. A typical model within this school of thought is shown in Figure 2.

The benefits of models of this nature are their emphasis on differences in perceptions between those responsible for creating products and the users; gaps that may explain the existence of inferior delivery.

The process of creating the information systems we need is intrinsically a question of innovation. Innovation encompasses the issues of creativity and implementation (Couger, 1990; Schultz & Ginzberg, 1984). Innovation theory also includes the organizational and individual level (Kanter, 1983; Van de Ven, 1986). Regarding information systems, the organizational level includes all activities where the end result is an information system that is used by many (for example, the creation of transaction systems through systems development). The individual level includes issues such as idea generation

through change champions (Beath & Ives, 1988) and individual use and development of information support in the context of end-user computing (Nelson, 1988). The organizational and individual level systems are developed and controlled as a totality by means of strategic planning and control (Keen, 1991).

A Taxonomy of Information Systems

The view developed here is that formal communication in organizations occurs through information systems in unique ways. Two dimensions need to be considered to understand how communication works in organizational settings. First, there is an interaction between informal and formal communication. Formal communication does not happen in isolation but in interaction with informal communication. Second, communication occurs on different levels within the organization (levels are defined by the constellation of people). Consequently, we have three levels, that is, the individual, the group, and the organization. Each of the three levels benefit from the specific theories that help us understand the interaction between formal and informal communication.

The foundation of this model requires understanding the relationships on the two dimensions of information and level within the boundaries of a specific organization. Building on that, the concept of interaction among organizations within a relative homogeneous area, such as a nation, are introduced. Finally, the phenomenon of collaboration among organizations on the global scale is added. Surrounding these notions is the concept of management of information systems. And the total formal communication system is based on information technology. Figure 3 summarizes these dimensions.

Simply put, the baseline for our educational efforts is what happens within an organization. When we add the domestic and global aspect, we should at each step look for genuine differences that need to be addressed. This is a totally different approach from starting at the global level and looking backward toward the organization. The main arguments for the inside-out approach are integration and knowledge. Information systems function as a whole. We may say that the quality of information systems is no better than its weakest link. Therefore, if the internal systems do not work, there is little hope that external applications will function in a satisfactory manner. Knowledge

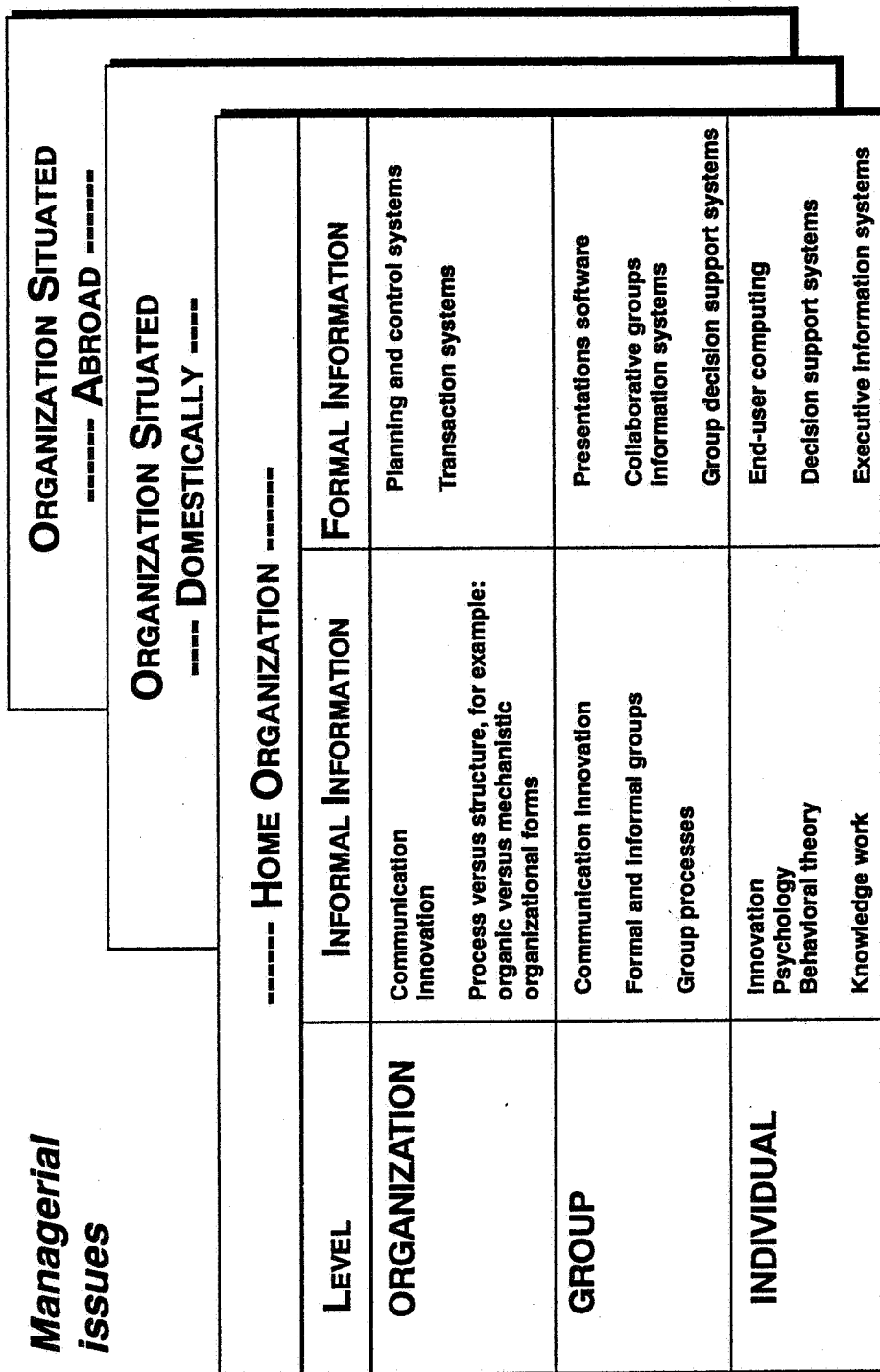


Figure 3: The Taxonomy of Information Systems

about the effective use of information technology must be based on the appropriate application of information technology within the organization. Of course, this does not mean that we may remain ignorant of the additional challenges of moving computer power into the larger environment. Understanding opportunities and possible stumbling blocks have always been prerequisites for successful use of information technology. The conclusion is, simply, that in educational terms it seems more appropriate to start with the internal view. The globalization issue is an important dimension that should be integrated into other elements of information systems. Finally, and most basically, it will be the integrated knowledge about formal communication that constitutes the basis for success. Our thinking has also been influenced by Porter's (1990) view that a strong international stand is based on excellent business performance in the domestic market. Therefore, we argued that the appropriate use of information technology on the global scene builds on the quality of internal information systems.

The Issues of Globalization of Information Technology

The use of information systems on an international scale has resulted in the need to introduce additional themes into our educational programs. The themes range from technical issues (standardization of hardware, software, data, telecommunication equipment, and applications) to people problems (differences in culture, education, religion, and languages). Also, national governments impose challenges through differences in regulations and mandates of legislation to protect their own industries.

The way in which we may systematize the various aspects of globalization is to use the framework in Figure 3 as the baseline. An additional worry in education is the availability of literature about the globalization of information technology. Fortunately, textbooks are forthcoming (for example; Palvia, Palvia, and Zigli (Eds), *Global Issues of Information Technology Management*, Harrisburg: Idea Group Publishing, 1992), as are publications in popular and academic journals, and articles in proceedings from major conferences. Figure 4 shows examples of global use of information technology and illustrations of literature that may be of use.

Managerial issues		Literature reference
LEVEL	FORMAL INFORMATION	
ORGANIZATION	Transaction systems: <ul style="list-style-type: none"> - Electronic document interchange - International banking and financial systems Planning and control: <ul style="list-style-type: none"> - Financial planning and control - Product development and manufacturing 	Ives & Jarvenpaa, 1991 Keen, 1991 Keen, 1990 Lee, et al., 1991 Mareschal, et. al., 1991
GROUP	Tele-conferencing	Kraut, et al. 1990 Fulk, et al., 1990
INDIVIDUAL	Electronic mail International negotiations preparations	Zmud, et al., 1990 Rangaswamy et al., 1989
Technical issues		Numerous articles in: <ul style="list-style-type: none"> - Business Week - Datamation - Computer World

Figure 4: Examples of Global Use of Information Technology on the Organization, Group, and Individual Level.

The information technology theme has two dimensions. First, we need to understand the prerequisites for communication. Students should know who the major producers of hardware, software, and telecommunication equipment are and what efforts they have made and are making to standardize their products. It is equally important to examine why they do not standardize; that is, the issue of proprietary solutions. We must also spend time on the role of protocols (for example, ISO, X.25, EDIFACT, or X.400), who the major international standardization organizations are, and what they are trying to achieve. The standards the computer manufacturers develop (for example, IBM's SNA under SAA or DEC's NAS) and how these relate to the work of standardization institutions should be an integral part of the curriculum. Legislative efforts, such as the standardization efforts of the European Economical Community for Europe of 1992 (Cecchini, Catinat, & Jacquemin, 1988), need to be included into curriculum material.

The managerial challenge is one of integrating ever more diverse views, participants, and technological considerations into the decision processes. At present, the four most critical issues in regard to globalization of information technology are thought to be (Ives & Jarvenpaa, 1991):

- (1) Linking IT and business strategy.
- (2) Development of information technology platforms.
- (3) International data sharing.
- (4) Cultural environment.

We conclude that the globalization of information technology is an area that contains multiple genuine issues, ranging from technological issues to managerial considerations. However, globalization is to a large extent integrated into the information processing that occurs within the firm. In reality, global use of information systems may, in some instances, be developed as an extension of the information systems for the domestic market. We most probably have reciprocal relationships where the nature of the business will decide the relative impact of these areas of use of information technology. What is certain is that the appropriateness of the system will depend upon the degree to which the global, domestic, and internal information systems are integrated.

SOLUTIONS AND RECOMMENDATIONS

Success depends on the quality of the implementation. First, we considered the requirements for the bachelor and graduate level. Second, we determined who should be responsible for the training. Third, we evaluated the life-cycle of knowledge; that is, whether to adopt a pedagogical model that encouraged "learning how to learn for life" or gave immediate technical competence. These considerations formed the background for evaluating how the issue of globalization of information technology was to be introduced into our curricula.

Requirements at the Undergraduate and Graduate Level

Regardless of level, education within MIS is a balancing act among theory instruction, case illustration, student work, and evaluation. In principle, the four elements should develop in parallel to ensure a natural progress. The main differences between undergraduate and graduate programs are the extent of specialization and the degree to which students are responsible for their own education.

The undergraduate program. The objective of an undergraduate program is to ensure that students get a basic education in the central issues of MIS. In this context we have to ensure that future managers understand the issue of formal communication since we cannot guarantee that students will continue to the graduate programs or choose MIS as a part of their portfolio at that level.

A natural sequence in learning is to start with the concrete and use references to the "natural world" as a baseline for abstraction. Although guidelines of this nature cannot be taken literally, it indicates what the chain of MIS issues should be. We start with practical examples of what formal communication means and why it is of importance to us. Next follows instruction of the basic elements of information technology. Students learn about the principal elements of computer hardware, operating systems, data organization, and telecommunications. The next thing to do is to illustrate applications in more depth. In this regard, the most critical element is to help students understand how these various elements are interrelated.

Many MIS programs at the undergraduate level include computer literacy training. The Norwegian School of Management is of the opinion that this is a totally inappropriate use of our resources. Learning how to use word processing programs, spreadsheet packages, and the like, is a vocational skill. This type of training is best undertaken in short intensive courses administered prior to or in the first few weeks of the undergraduate program. The existence of this type of training as part of our regular education is a waste of time, at best, and a red herring, at worst. The more vocational training is included into our curriculum, the less the communication imperative is understood among our own staff, our colleagues in other faculties, and university administrators. In addition, an increasing number of students are computer literate when they enter the undergraduate program. For this reason alone it would make more sense to require completion of computer literacy crash courses only for those who lack the experience.

Following the material on communication and information technology, we introduce the issues of what information systems are supposed to deliver and how to create them. The focus here is on service management, information requirements elicitation, and innovation.

The third and final theme consists of managerial considerations. We end on this note because managerial issues cannot be meaningfully discussed until students have a working knowledge of the information technology issues and are able to generate workable ideas. Students become aware of the challenges to management of the line organization, to computer experts, and the nature of interactions between the two.

The undergraduate program needs a very strict structure. It may be well served by traditional mass lectures to present theories and examples, but the critical element is the volume and quality of student assignments. Assignments should be an integral part of the entire program. The nature of the assignments should be twofold: they should act as vehicles to ensure that students understand basic theoretical issues; and equally important, some assignments should be of the nature of cases where the students analyze practical business questions. The cases must not be overly simplistic. That is, they should not focus on problems that require limited analyses based on computer tools. For example, in parallel to lectures on communication and information technology, a case study might require the

student to evaluate a complex business situation and develop a framework for a computer infrastructure.

The graduate program. In many business schools the program of MIS at the graduate level is a replication of the course in the undergraduate program. Often, the major difference is only that the readings package used for the graduate students is three times as thick as the one used for undergraduates.

The typical reason for this state of affairs is that the students have bachelor degrees in areas other than business. Evidently, there is little we can do about this; however, it is problematic. A graduate program should provide students with the opportunity to take more responsibility for their own education. The best way to achieve this objective, we believe, is to run graduate courses as seminars. A seminar is a pedagogical form where the instructor determines the basic literature but students do the work. Consequently, there is very little traditional lecture. The classroom should be a place for interaction, where students present the result of their work and where critical issues are debated. In fact, turning the graduate level education around to this form may well be a critical success factor in the process of creating knowledge workers rather than copy-cats out of our student body.

Apart from the pedagogical structure, basic knowledge is a prerequisite for success in adapting the seminar form. The class cannot have meaningful discussions if the instructor regularly has to get to the blackboard to explain basic information.

The Placement of the MIS Education

Computers are used everywhere for all sorts of purposes. The question is whether MIS should include education on how computers should be used in finance, marketing, or the other disciplines within business schools. We think that the issue may be settled by thinking of information technology as business support.

Most organizations are in the business of producing and selling products other than computers. In this context, computers are regarded as a support tools, albeit critical ones. If we believe this - and make ourselves consciously aware of the criticism that information systems professionals have exhibited a technical rather than business orientation - it would follow that

other disciplines should be made responsible for determining how computers are used within their field. This is nothing more than capitalizing on a well established view that as much as possible of the ingredients needed to conduct business should be integrated into the line organization rather than be put in staff units.

For this reason financial applications are best taught in finance, marketing applications in marketing, etc. If this is not the case, MIS faculty should initiate the transfer of responsibility for these application-oriented uses of computers from MIS to their logical department. Many MIS faculty feel threatened by this prospect, fearing that nothing will be left for MIS. We would suggest that if all there is to MIS is the use of computer technology in other areas, then business schools might just as well do without us. If this were the case, the best contribution we could give our business schools would be our own demise. It would, in any case, just be a matter of time.

However, it is precisely the adoption of the communications paradigm (of which MIS is the natural custodian for the common interest of all) that justifies our existence. The adoption of this umbrella rids MIS of computer applications training, and the removal of this type of training from MIS courses frees time that may be used for issues that are critical to the organizations we serve. In conclusion, the strategy of funding MIS on the basis of computer application use in other fields is not proper. The focus for this part of MIS is distribution rather than centralization.

Lifelong Learning

One thing is certain: any specific computer technique we teach to students becomes obsolete within a few years. Consequently, if an educational program consists largely of tool training, its value is a short term one. Yet, businesses very often require that prospective employees have a working knowledge that can be utilized immediately upon employment.

We put forward the argument that requirements of this nature are short-sighted. First, focusing on techniques causes the overall picture to suffer. Second, businesses will have to provide tool training sooner or later in any case. In principle, we think that the objective of business schools is to educate managers (though of course, we may give our students the

opportunity of specializing within areas).

However, educating systems analysts - or even more problematic, programmers - can hardly be said to represent training of managers. The dilemma for MIS is that while training students in specialization programs as systems analysts has a clear career identification, the education of managers that understand integrated information technology has not. Although this type of competence is highly appropriate and asked for, students and business are very slow to accept it.

Today's emphasis on the education of systems analysts within MIS was, from a historical perspective, a natural evolution from the focus of programming in the early days of our field, and it was a career for which nobody else had educational programs. However, the time has come to realize that we need to educate line managers to understand the opportunities and requirements of integrated information technology. This may create an extended platform for people who earlier saw a career in organizational development or similar positions. Understanding how to develop and use information technology is very much a question of organizational and individual development. The marriage between information technology and organizational development should make for an interesting and highly desirable mix of knowledge.

Making the education of managers our goal may save us from the limitations of vocational training, however, this shift of focus does not guarantee lifelong learning if the new program becomes a stew of relevant but loosely connected elements. In our opinion, the basis for lifelong learning, in addition to relevant knowledge, is problem solving. The way in which this element is integrated into our MIS curricula may vary between undergraduate and graduate programs.

In the undergraduate program students should have training in solving practical problems in context. One way in which this may be done is to ensure that students can use a method that integrates business needs with technological possibilities. A method of this nature may contain elements such as:

- (1) business situation analysis
- (2) critical success factors for the market and organizational planning and control
- (3) description of applications that will support (2)

- (4) technological scenarios for (2) and (3)
- (5) evaluation of the quality of present applications and hardware/software in light of (2), (3), and (4)
- (6) identification of projects that must be initiated to develop new applications or substitute old ones
- (7) a budget for an investment period of the next five years where economical constraints are taken into consideration

Some would argue that this is too much for undergraduates. In our experience it is not. The key to success is that the faculty believe it is doable, that we take the time and effort to develop good cases, and that we require students to work on problems like these.

In addition we must ensure that undergraduates have an appreciation for the literature. It does not suffice to run courses based on a single textbook. Readings packages must also be put together for areas missing in the textbook or for areas in which an indepth knowledge is necessary. Examples of the latter would be the issue of globalization, managerial use of information technology, or the centralization versus decentralization of EDP departments. The effective way to ensure that students acquire this knowledge is to have them write a paper on the subject matter using the literature.

On the graduate level we think that the scientific approach to problem solving is the appropriate method. That is, graduate students should be well acquainted with central theories of MIS, the concept of hypotheses, and how to operationalize variables, collect, and analyze data. It is disconcerting to see how afraid many business schools are of science. However, we can see no conflict between science and practical life. We would strongly advocate that there is nothing as practical as applied research.

We must hasten to say that MIS programs at the graduate level may also contain technological matter and other material. We simply underpin the need for the strong presence of the elements that foster lifelong learning. And of course the material whether of a scientific or practical nature, should have a managerial orientation.

Globalization in Our Curricula

MIS is not the only area where academicians turn to the issue of globalization. For example, the *Strategic Management Journal* as recently as the Summer of 1991 ran a special issue on global strategy (Bartlett and Ghoshal, 1991).

The inclusion of the globalization angle may vary at the undergraduate and graduate level. At the undergraduate level, we think that the principle of integration should be followed throughout. This is another example of integrating into the line organization as much as possible, rather than creating staff units.

The issues of globalization should be integrated into their natural frame of reference. This means that when we, at the initiation of our courses, present examples of the use of formal communication, global applications are one ingredient. We cannot avoid talking about international issues when we discuss who the vendors of computer equipment are, or for that matter, telecommunications. Consequently, most issues within our undergraduate curriculum will have a natural sequence of development from definition of basic terminology, organizational use, the domestic scene, and globalization.

The place where the undergraduate program should capitalize on globalization as a specific issue is under the heading of management. The objective would be to understand the threads that may impact the global issue. Internationalization of information technology is a good opportunity to illustrate the need for a business-to-technology coupling and the demand for an integrated approach to MIS.

The degree of freedom is greater at the graduate level. In cases where the business school runs one course on MIS or implements a general managerial oriented specialization, we think that the integrative approach should be applied. The graduate level also invites the opportunity for the implementation of specialization. MIS may be invited to offer courses under specializations in other topic areas, either as an obligatory or as an elective course. Obviously, the permutations here are numerous. Courses offered may be technical (examples of expert systems or decision support systems) managerial, or a mix of these.

Specialization within MIS at the graduate level again

contains possible numerous variations. If we keep our focus on educating managers, examples of courses for the globalization of information technology include:

- (1) The alignment of global business with information technology
- (2) Information resources management from the global perspective
- (3) Network organizations and service management
- (4) The impact of legislation, culture, and education on the global use of information technology

A means for increased student awareness of differences among nations is to require that students spend some time studying abroad or do their thesis in firms operating internationally. Collaboration with universities abroad requires, in most cases, that the business school see internationalization as important enough to establish contacts and implement rules for the transfer of credits for courses taken. Most probably, such arrangements would apply to the business school in general and not to MIS specifically. These concerns would also apply to the thesis.

Naturally, it would be just as appropriate to send faculty abroad to other universities or have them conduct research in multinational or international firms. There is a vast difference between doing it yourself and reading about it. Anyone who has tried to learn another language or adapt to another culture has gained a much richer insight into the kinds of problems internationalization imposes on us. Globalization is a cultural phenomenon.

The Structure of Our Educational Programs

Programs that are run at the Norwegian School of Management main campus will, from the Fall of 1992 follow a three quarters per year model. Students who have little or no experience with computers are required to take a crash course before the start of the first quarter in the first year of study. Additionally, computers are used extensively in other disciplines and students are required to purchase their own PC at the start of the program.

The undergraduate level course structure. Our four year program, leading to the degree of Master of Management, is

divided into two parts: the undergraduate program (three years) and the graduate program (one year). Students do not earn a degree on completion of the first three years but must finish four years of study. MIS at the undergraduate level is offered at the second year of the program and consists of three consecutive courses. The reason for the placement of MIS in the second year is that students have been exposed to basic issues in mathematics, statistics, accounting, and organizational and behavioral theory in their first year of study. The details of the curriculum are still under development. The overall model for the MIS courses is shown in Figure 5.

The structure of the graduate program. We offer a specialization at the graduate level of the four-year program. The approach taken here is to combine the two discipline areas of information technology and logistics. The principal reason for the combination of the two areas is that information and logistics are two of the main elements that bind the organization together internally and externally. We have suggested three obligatory and a set of elective courses. Their principal focus and content are shown in Figure 6. In some courses the issue of globalization is integrated into the material. In other instances, such as network organizations, globalization is the core element.

Finally, we also offer two elective MIS seminars as part of our executive MBA program. The first seminar is on the issue of service management and information technology. The focus of the second seminar is information resource management. Since a Master of Business Administration is an international degree, the instruction takes place in English. We have used the integrated approach to the globalization of information technology here also.

We are currently in the initial stages of discussing the need for a specialization in Strategic Management and Formal Communications for our MSc program. Globalization will be one of the major themes here. Apart from the fact that the language of the specialization will be English, it is too early to say exactly what the structure will be like.

We are of the opinion that the basic principles we have discussed for the development of undergraduate as well as graduate programs are of a general nature and not specific to Norwegian needs or the special interests of the faculty at the Norwegian School of Management. The line management focus and the integration of globalization issues into formal communi-

COURSE 1: BASIC FOUNDATIONS

- Communication:**
- Why is formal communications important?
 - Definitions of communication, information, and data.
 - Theories of formal communication on the:
 - Organizational level
 - Group level
 - Individual level

- Technology:**
- Hardware
 - Operational software
 - Data and data storage
 - Electronic communication

- Applications:**
- Organizational level
 - Group level
 - Individual level

COURSE 2: INNOVATION AND IT

- Theoretical Foundations:**
- Service management
 - Innovation

- Innovation on the Individual Level:**
- End-user computing
 - Individual needs and collective requirements

- Innovation on the Organizational Level:**
- Systems development
 - Project administration

- Strategic Planning and Control:**
- A phase model of strategic planning
 - Strategic planning of IT and strategic planning in other business areas
 - Building platforms to support organizational and individual innovation

COURSE 3: INFORMATION RESOURCE MANAGEMENT

- Management, Planning, and Control:**
- Managing the individual level in the line-organization
 - The management of the EDP-department
 - Strategic management

- Globalization of IT:**
- The use of IT in a global context on the levels of:
 - Organization
 - Group
 - Individual
 - Managerial issues regarding the globalization of IT

- Future Trends:**
- Expected technological development
 - The strategic possibilities, where are they?
 - The future challenge facing managers

Figure 5: The MIS Curriculum at the Undergraduate Level.

OBLIGATORY COURSES:

Strategic logistics:

- Customer service and logistics strategies
- Partnerships with vendors and distributors
- Production and logistics
- Organization of logistics

Networks as organizational design:

- Principles of network organizations
- Network organization analysis
- Task differentiation and coordination of networks
- The management of network organizations

Service management and quality control:

- Service and total quality
- Information technology and quality control
- Market segmentation
- Internal and external communication
- Cultural aspects and innovation management

ELECTIVE COURSES:

Information systems innovation and organizational entrepreneurship:

- The individual's role in innovative processes
- Organizational evaluation of new innovations
- Implementation considerations
- The management of innovations

Business development and strategic information system:

- Information technology development trends
- Inter-organizational systems and competition
- Information technology strategy development
- Integration of information technology
- Governmental regulations

Companies unlimited - business telematics:

- Electronic communications technology
- Electronic data interchange, theories and practice
- Governmental policies regarding electronic communications

Executive information system (EIS):

- Executive communication and decision behavior
- Informal versus formal communication and decision making
- Implementation and continuous development of EIS

Purchasing management:

- Objectives and management of purchasing
- Collaboration with vendors
- Purchasing negotiations and strategies for contract development

Transport and physical distribution:

- Transports and governmental regulation and deregulation
- Carriers
- Distribution systems
- Strategic alliances and third party contracts
- International distribution

Figure 6: The MIS Curriculum at the Graduate Level

cation, service management, innovation, and management of information technology is a platform that would benefit innovation of the MIS curriculum in most business schools.

On the undergraduate level, the underlying structure shown in Figures 3 and 4 and the principal topics exhibited in Figure 5 are generally valid. Implementation may vary among business schools. Programs may emphasize some aspects more than others. Often, MIS has only one course on the undergraduate level. Also, the level of information technology diffusion and expertise may be quite different from nation to nation. The recommendations put forward in this chapter mirror the needs of a highly industrialized nation. We are of the opinion that our principles apply to most cases where a managerial focus is adopted. Consequently, if fragmented, the vision may be lost. But we hasten to add that the details regarding basic foundations, innovation, and management must take into account specific interests of the faculty, the general level of managerial experience, the use of technology in the local society, and the need for globalization. History has taught us that we cannot transplant a complex structure from one place to another. Local reformulation and ownership are required to achieve success.

We are of the opinion that a common graduate course for students who do not have a MIS background may benefit from adapting the principles put forward for undergraduate education. We are much more uncertain about the general applicability of our solutions for specialization. Business schools develop focus to position themselves in the educational market and programs may mirror the research interest of their faculty. At present, logistics and information technology are two areas in which Norwegian industry needs to perform better. However, we could think of many other marriages (for example; marketing and information technology, strategy and information technology, or global use of information technology). Our solution is as much a result of organizational facts and politics as rational selection.

FUTURE CONSIDERATIONS

One thing is certain: the use of information technology will continue to increase in all areas of business. In our opinion, the most important consequence of this is an increased need for integration. Our challenge is to educate line managers who understand the coupling between business and information

technology support that will determine the structure of the technical integration. The fundamental problem we have is that many managers still have a lukewarm attitude toward MIS. We believe the main reasons for this is that we have oversold information technology capabilities. In the 60s we advocated that the capabilities of computers were almost limitless. Since then we have tried to save the business world by virtue of decision support systems, office automation, end-user computing, and strategic use of information technology. The relationship between the true capabilities of computers and managers' interpretations of its relevance is illustrated in Figure 7.

Line management initially overestimated what computers could do. As a consequence, line management perceptions became pessimistic. Although the line management has become increasingly aware of what computers can do, their perceptions have never quite caught up with actual potential. One reason is that we have oversold computer functionality. Another reason is that the field has been moving so fast that line management cannot keep abreast of the development.

We would argue that it is the combined effect of computer use in all its facets that, finally, will bring line management into synchronization with the actual potential of information technology. In this regard, the globalization of information technology can be used as one vehicle for convincing line management of the importance of information technology. What we, in the capacity as experts, need to do is to sell our field by sober example of the benefits and loss-of-opportunity that may occur because of information technology.

However, information technology is not only an issue of isolated gains and losses. Information technology will be a prerequisite for planning and control of markets, production, finance, and human resources. Organizations cannot hope to handle the complexity and diversity of information needed to run businesses in the time available for decision making unless line management proactively engages themselves as custodians of idea generation and the use of information technology. Most line managers will, in the process, find that they also have to become users of computers.

It is the responsibility of the MIS profession to lay the foundation for line managers who exhibit this orientation. We do this by presenting a managerial education that incorporates the major elements of MIS, with globalization as an integral part.

Notes:
 Thick line indicates the evolution of computer capabilities.
 Dotted line indicates the perception line management has
 of the capabilities of computers.

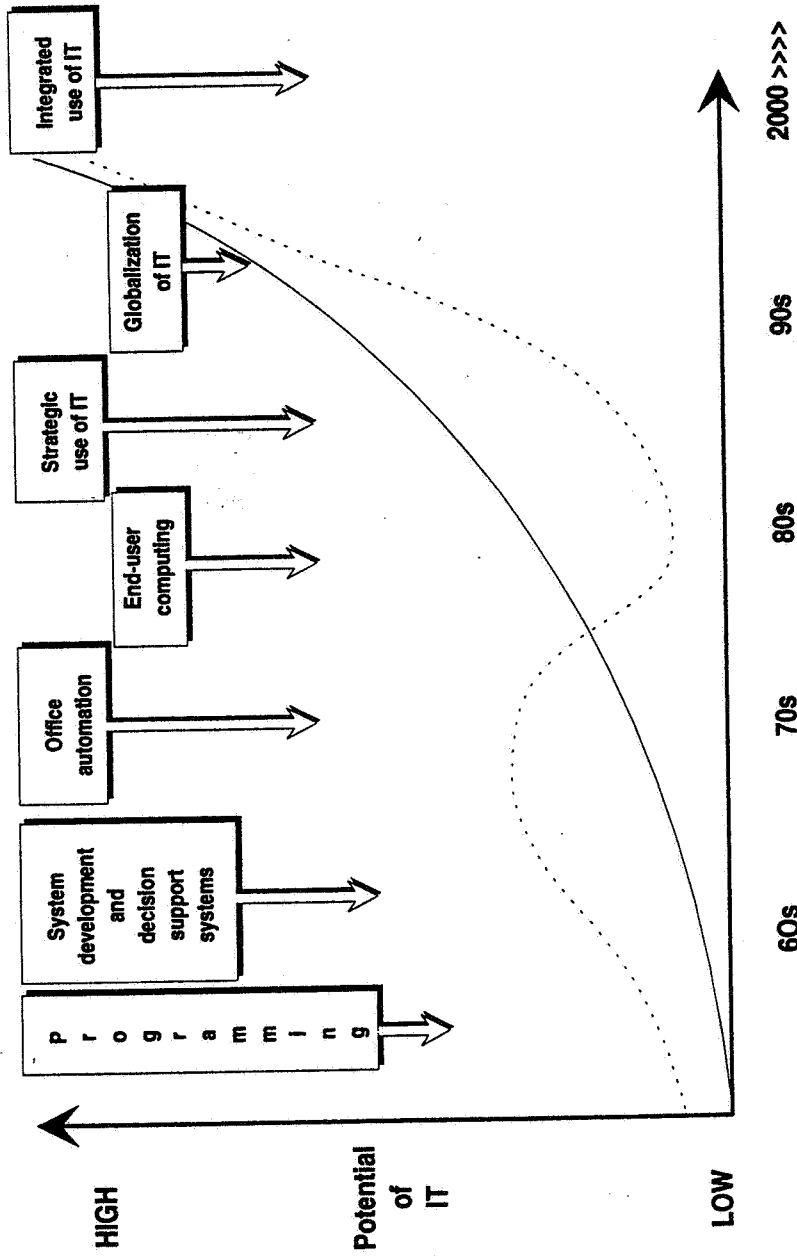


Figure 7: The Relationship Between the Capabilities of Computers and Line-Management Perceptions

CONCLUSION

The introduction of globalization into our MIS programs is a good example of the increasing complexity of our field. We cannot simply expand our present curricula. We need to make some tough and hard choices to bring curriculum development into sharper focus. Otherwise, we risk the demise of MIS as a self-defined unit within our business schools and we will see our colleagues in other areas grab the leftovers.

At the Norwegian School of Management, the challenge has been to rethink the basic premises for MIS. The new base for MIS has two major components. First, we have defined the line manager as our customer. Line management has, traditionally, carried the responsibility for innovation, planning, and control regarding product, production processes, money, and people. In many cases, the active managerial responsibility for the development and use of information technology has been the missing ingredient. We need to convince line managers of the need to incorporate formal communication as a critical factor. This may be achieved by indicating the benefits to be derived from integrating information technology into their areas of responsibility. Simultaneously, we need to help line managers see the negative effects of avoiding information technology.

Second, we have developed an integrated approach to help line management see the interaction among the organizational, group, and individual levels within as well as among organizations. Integration, with information becoming available to organizational members, is a prerequisite for harvesting the true benefits of information technology. Perhaps most important of all, the integrated approach enables effective time management. Time from opportunity or problem definition to implemented solution becomes increasingly shorter. Information technology may support managers in every step of this problem-solving process. We also know that timely supplies and delivery of finished goods cannot occur without efficient use of information technology.

We need to redefine our MIS education to ensure that future, and present, managers understand these interrelated aspects of information technology. At the closure of our courses we may ask students the simple question of the degree to which they think the development and use of information technology is

part of their responsibility. A low rating would imply that we, as academicians, still have much work to do.

APPENDIX

Currently Used Undergraduate and Graduate Programs

Four year, full-time program in business administration:

Undergraduate program, obligatory courses:

(1) Basic Foundations:

Definitions of formal communication, information, and data. Hardware, operating systems, data and data storage, electronic communication. Examples of applications on the organization, group, and individual level.

(2) Innovation and Information Technology:

Theories of service management and innovation. Innovation on the individual and organizational level. Strategic planning and control.

(3) Information Resource Management:

Line management planning and control. Management and the globalization of information technology. Future trends.

Graduate program, title: Quality and productivity in management processes

Obligatory Courses:

(4) Strategic logistics:

Customer service and logistics strategies. Partnerships with vendors and distributors. Production and logistics. Organization of logistics.

(5) Networks as organizational design:

Principles of network organizations. Network organization analysis. Task differentiation and coordination of networks. The management of network organizations

(6) Service management and quality control:

Service and total quality. Information technology and quality control. Market segmentation. Internal and external communication. Cultural aspects and innovation management.

ELECTIVE COURSES

(7) Information systems innovation and organizational entrepreneurship: The individual's role in innovative processes. Organizational evaluation of new

innovations. Implementation considerations.
The management of innovations.

(8) Business development and strategic information systems:

Information technology development trends.
Interorganizational systems and competition. Information technology strategy development. Integration of information technology. Governmental regulations.

(9) Companies unlimited - business telematics:

Electronic communications technology.
Electronic data interchange, theories and practice.
Governmental policies regarding electronic communications.

(10) Executive information systems (EIS):

Executive communication and decision behaviors. Informal versus formal communication and decision making.
Information technology support of managers.
Implementation and continuous development of EIS

(11) Purchasing management:

Objectives and management of purchasing. Collaboration with vendors. Purchasing negotiations and strategies for contract development.

(12) Transport and physical distribution:

Transports and governmental regulation and deregulation.
Carriers. Distribution systems. Strategic alliances and third party contracts. International distribution.

Executive Master of Business Administration:

Elective courses (based on other courses, but with more emphasis on case studies):

(13) Information Resource Management

(14) Service Management in the Field of Information Technology

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