

The IRM Curriculum Model: An International Curriculum Model for a 4-Year Undergraduate Program

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In modern organizations, information resources are now recognized as the single most important asset of the organization and requires effective management that is highly trained and educated in information resources management. An international state-of-the-art information resources management curriculum for a four-year undergraduate level program is detailed in this document. The intention of this curriculum is to prepare students to understand the concepts of information resources management and technologies, methods, and management procedures to collect, analyze and disseminate information throughout organizations in order to remain competitive in the global business world. Core course descriptions, rationales, and objectives are outlined. Specific course topics and the percentage of emphasis are also included. The proposed IRM Curriculum Model should be considered as a general generic framework for customizing a specific curriculum in light of local needs and requirements.

During the past few decades, management literature has witnessed a tremendous increase in the volume of writings about Management Information Systems (MIS). Concepts, applications, problems, and future potentials have been discussed and assessed both by researchers and practitioners. Each group has recognized the value and importance of MIS in the achievement of success in this very competitive business world. At no time has the need for effective management of information resources been so important as in recent years. Particularly since an increasing number of firms are realizing the true power of information technology systems in providing information and assistance to decision-makers at all levels of national and international organizations. However, the need for proper management to utilize these resources has not been considered important until very recently. This is mainly due to the fact that more and more firms have realized the significance of computer-based information systems in providing information and assistance to decision-makers at all levels of

an organization.

In response to the aggressive growth in information requirements, companies have been searching for more effective ways of managing their information resources. At the same time, many top executives have come to believe that the traditional management team of the computer center has failed to satisfy the information needs of decision-makers because of a basic lack of business sense. Top management preferred IS personnel with strong basic managerial skills along with technical skills. Insufficient orientation toward business and management information concepts and theories was considered one of the major deficiencies in the education of current IS managers. Top managers' perceptions regarding the present skill profile of IS managers and the importance of information as a major corporate resource has not been reflected in the current IS curricula used to train the future IS managers of the corporate world.

Information Systems Evolution

During the 1960s, most companies employed a staff with a strong technical background to manage their computer centers. The major requirement for the manager of a computer center was technical competence, particularly the ability to cope with hardware maintenance and operations. Further, the DP management position was viewed as purely technical, not managerial. In this era of computer systems operations, technical feasibility was a primary concern while economic feasibility was a secondary concern for most companies.

As the use of computer systems leveled off, many firms began to apply newly introduced MIS concepts and applications to various business functions by developing computer-based information systems. Consequently, the former data processing center manager became the new MIS manager. Unfortunately, this change of status did not reflect additional skills, nor did it indicate a change in the organizational structure of the computer center. Knowledge of the use of hardware and software, rather than the acquisition and application of information, is insufficient for an effective MIS professional (Porter, 1983; Davis, 1986). Over a decade ago, leaders in the field of MIS education recognized the need for MIS professionals to acquire skills, independent of technology, in a wide range of areas including effective verbal and written communication, time management, leadership, and delegation of authority (Metz, Greenhill, Smith, 1983).

As information systems technology matures by providing more advanced equipment for information processing and facilitating the operation of computer-based information systems, more attention is given to the managerial aspects of MIS personnel. The orientation of MIS management in many organizations is changing in the direction of greater user involvement. Consequently, MIS managers, rather than serving as the technical custodians of computer hardware entities, now function more as agents between MIS resources and end-users. Additionally, the trend toward decentralization of IS duties and downsizing of hardware from mainframe processing to networked end-user PCs, has further led to the fundamental change in the traditional role of IS managers and the function of IS within many organizations (Lee, D.M., et al., 1995; Bulkeley, 1990; Goldberg, 1986; Guimaraes, 1986; Maglitta, 1993; Rockart and Flannery, 1983).

Issues of Information Resources Management

Information resources management (IRM) is a general theory advocating a method for organizations to comprehensively utilize their information resources. A primary function of IRM is to promote information as a major resource, with information processing technology as the ultimate tool for the processing, distribution, and integration of information and its use in various organizational functions (Khosrowpour, 1989). Figure 1 highlights some of the components of infor-

mation resources in modern organizations.

In general, many information processing professionals perceive that resources of computer-based information systems are limited only to hardware and software components. This perception has been partially promoted by restricted views given by information systems education of the past. Today, information resources consists of many more resources than the computer hardware and software used to manage information within organizations. This requires an increased understanding of these resources and their applications (Liscouski, 1991).

Information Resource Value and Concepts

The rapid integration of IRM into all aspects of business and the great advancement of information technology during the past few decades have created a demand for MIS professionals who are not limited to knowledge of the technical side of information systems, but who possess a broad understanding of these systems, organizational behavior, and management (Yaffe, 1989; Spruell, 1989). Increased use of technology in all areas of business has caused a shift in the occupational skills required in many areas. Specifically, as typewriters were replaced with computers, a secretary who typed correspondence became an "information manager" required to use greater cognitive skills to manipulate and interpret information using word processing, database, desktop, and graphics applications.

As information systems technology matures, providing advanced equipment for processing information and facilitating the operation of computer-based information systems, more attention is being given to the managerial aspects of IRM. Many MIS managers have already found themselves to be incapable of coping with the behavioral issues which arise in MIS management.

Organizational and Behavioral Issues

Effective management of rapidly expanding information resources has become a focal point of the corporate world. The fears of top management that traditional MIS teams lack the ability to produce adequate information for strategic decision-making are based upon the belief that these teams lack sufficient business sense. The role of these teams was viewed as purely technical, not managerial and was conceived as a strictly "line" position job, concerned with the supervision and operations of computer systems, and the preparation of computer-generated outputs to be used predominantly by accountants, controllers, and inventory managers.

While the new concept of MIS was intended to be utilized by management at all levels, the custodian of the MIS remained a totally technically oriented person (Alavi, Wheeler and Valacich, 1995). This resulted in a general suspicion about the value of MIS within the organization (Khosrowpour, 1988). Additionally, many MIS managers have already found themselves to be unqualified for coping with the behavioral

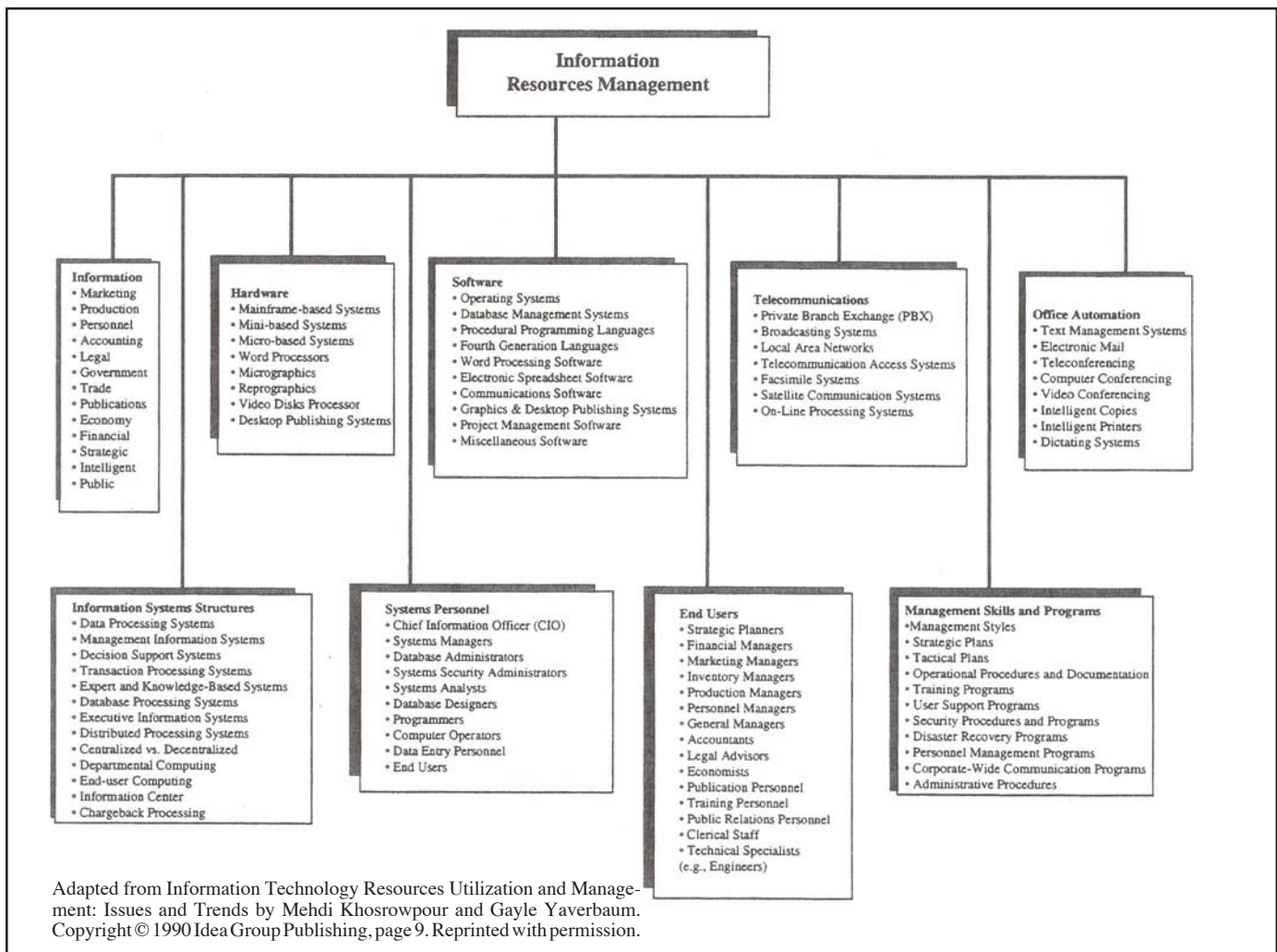


Figure 1: Components of Information Resources in Modern Organizations

issues which arise in MIS management. As far back as 1974, Gupta noted that information managers do not have adequate training in managerial jobs and thus lack those skills that are so essential for developing a successful MIS (Gupta, 1974).

More recently, Kanter and Kresner (1992) noted that the MIS manager of the 1990s (sometimes referred to as a Global Information Officer) must understand the global issues of the business and its customers, as well as have a comprehensive knowledge of information technology in order to operate effectively (Kirkham, 1991; Dibblee, 1992). Perhaps a lack of expertise on the part of MIS managers in any of these areas can be at least partially blamed on the MIS curricula adopted by colleges and universities around the country (Haworth and VanWetering, 1994). These programs were designed to satisfy the previous needs of the industry, but have not kept pace with changing personnel requirements, particularly in a global marketplace. Business schools have continued to graduate students who lack basic knowledge in the management of information technology — knowledge that is crucial in today's competitive, global marketplace (Westland, 1993;

Thamhain, 1990).

Global Issues

Over the past several decades, the advancement of information technology (IT) has created many new challenges and opportunities in the international business community. During this period, the focus of relevant issues in information technology has shifted to include globalization. Thirty years ago, programming and hardware were the main topics in the industry; twenty years ago, systems development and support became critical issues; and within the past ten years, end-user computing and telecommunications were the focal points (Larsen, 1993). Today, the widespread use and availability of technology has resulted in a widening of the scope of information technology issues. Specifically, information technology has expanded on an international level and, as such, the present focus is now on matters that are more global in nature (Laribee, 1992).

Information technology has, to varying degrees, reached nearly all countries. According to Palvia, Palvia and Zigli

(1992), countries now can be categorized by the sophistication of their current technology. According to the United Nations' Computer Industry Development Potential (CIDP), countries can be advanced (e.g. United States and Japan), operational (e.g. Argentina and Mexico), basic (e.g. Albania and Chile), or initial (e.g. Zimbabwe). As noted by Palvia, Palvia, and Zigli (1992), the CIDP standing of a country is directly related to its state of development. Under-developed countries such as Nigeria and Pakistan are less technologically advanced than developed nations like the United States. Regardless of the state of a nation, the influx of technology into nearly every country has opened a window into other cultures that, to this point, was unavailable.

While the government of a particular country can greatly restrict access, growth, and use of technology, the increasing economic dependance upon information in the business community ensures that nations wishing to compete successfully must be willing to grow technologically and provide job-oriented education in the field of MIS (Litecky, Arnett, 1993; Hedrick, 1991).

Equally important as the global perspective of IT, is the affect that this transformation has had on domestic business operations. In a given organization, the IS Department is no longer strictly a separate function, rather, it is an integrated function of all departments. The effective MIS manager must have the knowledge to further integrate separate technologies (data processing, telecommunications, etc.) within the organization and also to support end-users during this integration.

Additionally, the almost complete integration of technology in the workplace has greatly increased security risks in the form of theft, data integrity, record alterations, and fraud. MIS managers must be knowledgeable enough to effectively deal with these risks (Applegate, Cash, Mills, and Quinn 1988). By utilization of the technology available today, business communications both within and outside the organization will permit almost instantaneous feedback and will provide ample opportunities for global business transactions at all levels of the organization. The education and training of future MIS managers must ensure that these information experts are capable of developing and implementing effective corporate strategic plans that will succeed in both a national and global business environment.

Research has proven that "there seems to be an overwhelming consensus reflecting a perspective that (1) the United States must be prepared to compete in the fast-changing international arena and (2) education with an international component is a necessary part of the solution" (Loch and Khosrowpour, 1993). Some model business schools, including the European Institute of Business Administration (INSEAD) and the International Institute of Management Development (IMD), have already integrated almost twice as much international material into the program as the average business school. Among other innovative ideas, these schools offer programs using overseas training and use international

business consultants as classroom instructors (Loch and Khosrowpour, 1993).

There are, however, barriers to developing globalized IS courses. Preparing relevant course materials, training and/or acquiring faculty, obtaining resources, and eliciting organizational support can all prove difficult (Conger, 1993). To some extent, the development of an internationalized IS curricula has been hampered by the unwillingness of the administration to commit enough funds to deploy a program that includes business alliances, international faculty, and overseas experience for students.

Considering all the issues of information resources management, the following concepts have been identified as critical issues in the management of information resources:

- The traditional centralized IS department has shifted in recent years towards a decentralized, end-user-focused environment
- The current IS manager, instead of serving as the technical custodian of computer hardware entities, now functions more like an agent between IS resources and end-users
- The IS manager must understand the global issues of the business and its customers, as well as have a comprehensive knowledge of global information resources management
- Information technology has expanded on an international level and, as such, the present focus is now on matters that are more global in nature
- The influx of technology into nearly every country has opened a cross-cultural window into other nations that, to this point, was unavailable
- Business schools have continued to graduate students who lack basic knowledge in information resources management
- In a given organization, the IS department is no longer strictly a separate function, rather, it is an integrated function of all departments
- IS managers must be knowledgeable enough to effectively deal with greatly increased security risks brought about by the integration of technology

Information Resources Management Education

During the early 1960s, while many businesses were in the process of organizing their electronic data processing centers, academia likewise began to develop programs in data

processing (DP). Soon standard curricula courses for DP programs were initiated by professional groups such as Data Processing Management Association (DPMA), and the America Computing Machinery (ACM). The main emphasis of these curricula was on the computing aspects of computer-based systems. These programs trained many early DP personnel who became glorified programmers and technicians. Although the programming and technical know-how of these individuals was what industry demanded during that stage of the information processing technology evolution, the needs of the industry have changed significantly in the past 30 years.

By the late 1960s, many colleges had begun to form new programs in Management Information Systems (MIS) as industry moved toward a more managerial use of computer-based information systems. These systems were viewed as tools in support of information requirements of managerial functions. The primary objective of these newly formed MIS programs was to train specialists in skills beyond that of the use of programming languages, compilers, and operating systems. Instead, they would assist decision-makers in determining both their information needs and the services that they could obtain from information systems.

A quick review of the recommended MIS curricula utilized in MIS programs during the 1970s and early 1980s clearly indicates that students were still encouraged to take as many programming and analytical courses as possible. Furthermore, the main emphasis was on hardware and software components of computer-based systems, rather than on information and information users (Mandt, 1982). Even then, proponents of MIS education were recommending the inclusion of courses in oral and written skills, problem-solving, and leadership (Metz, Greenhill and Smith, 1983).

During the past decade, a new focus on the management of information resources--domestically and globally—and how organizations can benefit from these vital resources has evolved. Unfortunately, MIS programs have failed to keep pace with this new trend toward information resources management as opposed to information systems management (Danos and Measelle, 1990). As far back as 1983, prolific growth in technology and information exceeded the accompanying education, thereby forcing a greater gap between the need to understand and apply information and the ability of the MIS professional to accomplish this task (Porter, 1983). Additionally, the fact that the majority of MIS programs, curricula, and courses are still based upon the sheer love of computing and hardware and software know-how is not encouraging in this age of information, particularly at a time when organizations are in search of more effective ways of managing their information resources (Spruell, 1989). Perhaps MIS education is due for a major overhaul in order to catch up with current trends and demands of the information management age (Ahern, 1992; Larabee, 1992).

Some industry leaders believe that the failure of educa-

tion to respond to the challenges of information resource management will directly affect the competitiveness of the American workforce in the world market (Loch and Khosrowpour, 1993). According to John Patten, publisher of *Business Week*, "American business will compete successfully throughout the world only as long as American education produces a workforce that can prevail in a global economy driven by knowledge and skill" (Patten, 1990). However, input from national and international organizations would greatly enhance IS curriculum. Organization concerns involving the inadequate preparation of many IS personnel has increased as the workplace has become more information and global oriented. Some of the responsibility for this lack of preparedness may be attributed to low level of participation by businesses in the review of IS curricula. As early as 1981, professors such as Randy Hand, Ed.D., were urging organizations to take an active role in the development of IS curriculum (Hand, 1981). Clearly, whether viewed as an educational or business failing, IS curriculum is long overdue for restructuring to meet the changing needs in our increasingly technological workplace (Lee, et al., 1995; Nelson, 1991; Niederman, et al., 1991; Weis, 1987; Yaffee, 1989).

Introduction of IRM Concepts to Business Students

Business curricula and courses are primarily designed around the five traditionally recognized organizational resources: personnel, financial, material, equipment, and management. Most business students have never heard of an information resource and have no understanding of the existence and importance of this resource. Information acquired from the California Postsecondary Education Report (86-24 91987) clearly illustrates the failure of many universities to even acknowledge the viability of MIS as an important instructional area. Those universities that were pursuing MIS-related curriculum still failed to recognize the need for multidisciplinary courses crucial to the success of MIS personnel in the workplace (Thamhain, 1990; Haworth and Wetering, 1994).

Currently, information is not recognized as a major organizational resource by many business faculty; instead it is viewed as a support tool for other mainstream resources. With the relatively recent recognition of information as one of the major organizational resources, IRM concepts should be incorporated into all levels of the business curricula.

Future managers must recognize information as an important organizational resource which should be managed like other major assets. The seeds of information resource recognition should be sown in college business courses where future managers are trained (Dede, 1989; Jackson, 1992).

The task of educating future managers about IRM concepts can be accomplished by introducing these students to the idea of information as a major resource. There should be a foundations course in information resources like other funda-

mental courses about other major organizational resources. This course would be similar to principles of marketing, principles of management, or principles of accounting, in which students would learn about the information resource, its characteristics, utilization, and management. In most current business curricula, students are usually introduced to computers and their glories during their freshman year. A course in MIS concepts generally follows in a later year. The message conveyed by this type of curriculum is that MIS concepts are somehow an "extra" which one may choose to study as an elective rather than as fundamental theories of business organizations. Many of these students leave business programs without having any appreciation of information management, and some think that the whole process of information processing, utilization, and management is done by computers. We should train these students to understand and appreciate information resources first, and then teach how this important resource can be utilized and managed.

Incorporation of IRM Concepts in All Business Courses

The concept of information as a major organizational asset and the greater utilization and management of it should be incorporated in all business courses (Laribee, 1992). In the same fashion that business students are constantly reminded about the value of financial, human, and other major organizational resources in various business functions, they should also be taught about the value of information resources. The fact that business students have been taught that information systems are support tools for other organizational resources ignores the overall value and recognition of information resources, and can be considered a major shortcoming of business education. It would be very difficult for anyone to argue that one organizational resource should be considered to be a support resource for other organizational ones. Instead, an organization's resources are utilized collectively to achieve the organization's goals and objectives. The argument here is not to prioritize an organization's resources, but rather to suggest that business courses have not given enough, if any, coverage to the concept of the information resource and its management and utilization. Business students must be guided in the development of a mentality that allows them to appreciate the value and importance of information resources in all functional areas of a business.

Achieving the goal of educating business students about the information resource should begin with our college business textbooks. The current ones do not view information as a major resource and, therefore, do not give adequate coverage to this major organizational asset. Although some business textbooks offer limited consideration of the use of information systems in a very irrelevant manner, the value of information is de-emphasized and the computer system is glorified. For example, in a typical business strategy course, students focus

on all five traditional major organizational resources and attempt to learn how these can be utilized in the most effective method. In some cases they make use of computerized games for testing various strategies without the basic appreciation that computer systems are components of information resources and that their main role is one of a tool in the processing and managing of information. Students instead view the computer system as a number crunching tool used to facilitate arithmetic operations. This lack of understanding of the value and components of the information resource creates a misconception regarding information systems and their intrinsic worth. It is now time to teach our business students about information resources and their significant benefits to the organization.

These recommended changes in MIS and business curricula and their role in IRM education must be constantly assessed in terms of their effectiveness in preparing students to function competently within an organization. The primary objective of this educational process must be to provide our MIS and business students with a greater awareness of information as a resource and, eventually, the effective management and utilization of this resource.

IRM as the First Course in MIS Curriculum

MIS students should be introduced to the concepts of IRM as their first course in the MIS curriculum. Traditionally, the first course is an introductory one in MIS which normally consists of various concepts of information processing systems. Students should be introduced to information resource concepts before the tools for processing are emphasized. In other academic disciplines, students are usually introduced to the basic concepts of the field; the tools of the discipline are learned later. For example, in the field of finance, students are not introduced to all the benefits of calculators and other tools to manage financial resources before they learn about the importance of financial management. Instead, they are taught the basic concepts of financial resources and are later introduced to the available analytical and electronic tools. What use would calculators and computer systems have to a financial manager if the individual is not familiar with different types of financial resources such as bonds, stocks, cash, and the methods used in measuring financial growth and stability, such as the use of ratios and models?

MIS students must be familiarized with the value and types of information, characteristics of effective information, users, and sources of information, economy of information, use of it and managerial functions, information and decision-making, information resource management and managers, and the relationship between information resources and other organizational resources.

The majority of MIS books do not cover the concepts of information as a resource. If they do, it is done in a few pages or, at the most, in a brief chapter. The rest of the book is

- Information management concepts
- Data vs. information
- Information origins
- Types of information
- Value of information
- Decision making and information
- Economy of information
- Information processing methods
- Information systems structures
- Information processing personnel
- Information users
- Information processing tools
- Information processing technology
- Information resource managers

Table 1 : The primary components of IRM concepts

generally devoted to computer-based information processing systems. It is no surprise that MIS students are the least familiar with the concepts of information resource management. What we are preaching to our students is the 1960s and 1970s technology of data processing and number crunching. An overemphasis on the hardware and software of computer systems and various methods of generating reports is not the best way to prepare our students for the challenges of corporate America and the global marketplace.

The concepts of IRM and their importance should be embedded in the MIS student's mind prior to the introduction of information processing systems, and particularly prior to the introduction of computer-based information systems. Perhaps MIS students can become familiar with various information systems and their characteristics and components in a separate course entitled "Information Systems Technology" after their first course in Information Resource Management. Table 1 provides a summary of the contents of a principle course in IRM.

Students should be given the opportunity to incorporate information management into every course that is taken in the MIS curriculum, and to develop skills that will eventually allow them to assist organizations in utilizing their information resources more effectively. MIS courses should be developed around IRM concepts, rather than information processing systems. This change of emphasis in information management in MIS courses calls for fundamental advances in the existing textbooks utilized in MIS courses. The overwhelming majority of these books never considered information management as part of their theme. The new generation of textbooks used in MIS courses should be based on the concepts of information resources management.

Proposed IRM Curriculum

Traditionally, the components of a computer information system have been identified as hardware and software, and systems staff have been mainly oriented toward these two

components, ignoring humanistic concerns. The heavy emphasis given to hardware and software, without consideration of the human components of the systems, led to serious management problems, and led many companies to conclude that their information systems efforts had failed. It should be mentioned that the human component of these systems is not limited to people within the systems, but extends to all end-users and anyone within the organization who is affected by the information system. One must consider the organizational impact of information systems, how these systems fit into the organizational structure of the firm, and how the products of information systems can be utilized by managers across the company. Unfortunately, most systems staff are strangers to the organizational concerns that cannot be classified as either hardware or software.

A more accurate, contemporary definition of a computer-based information system is that it is a collection of hardware, software, peopleware, and procedures/techniques surrounded by end-users from all other functional units. Further, there are external factors which have a direct effect on the system as a whole, such as technology, governmental regulations, the economy, other information systems, and available education.

Generally, the model IS curricula of the past has been based on the narrow definition of the computer-based information system as a collection of hardware and software. Now it is time to include other relevant training in the IRM curriculum and offer students a broader definition of these systems. The critical concepts of IRM outlined previously are the foundation of the first two courses in the curriculum; Information Resources Management Principles and Information Systems Technology. The concepts of IRM are further related to all courses with the IS program. Other courses offered in this curriculum focus on specific IS topics but are supplemented with information resources management concepts and how various applications of information processing technology can contribute to more effective management of resources in organizations.

The foundation of any IRM curriculum must begin with an introduction of IRM concepts to all business students, with all subsequent courses incorporating these concepts into the curriculum. Critical IRM concepts include:

- The recognition of information as the major organizational asset
- An understanding of the principles of the characteristics, utilization and management of information
- An appreciation of the value and importance of information resources in all functional areas of a business
- A familiarization with the value and types of information, characteristics of effective information, users and sources

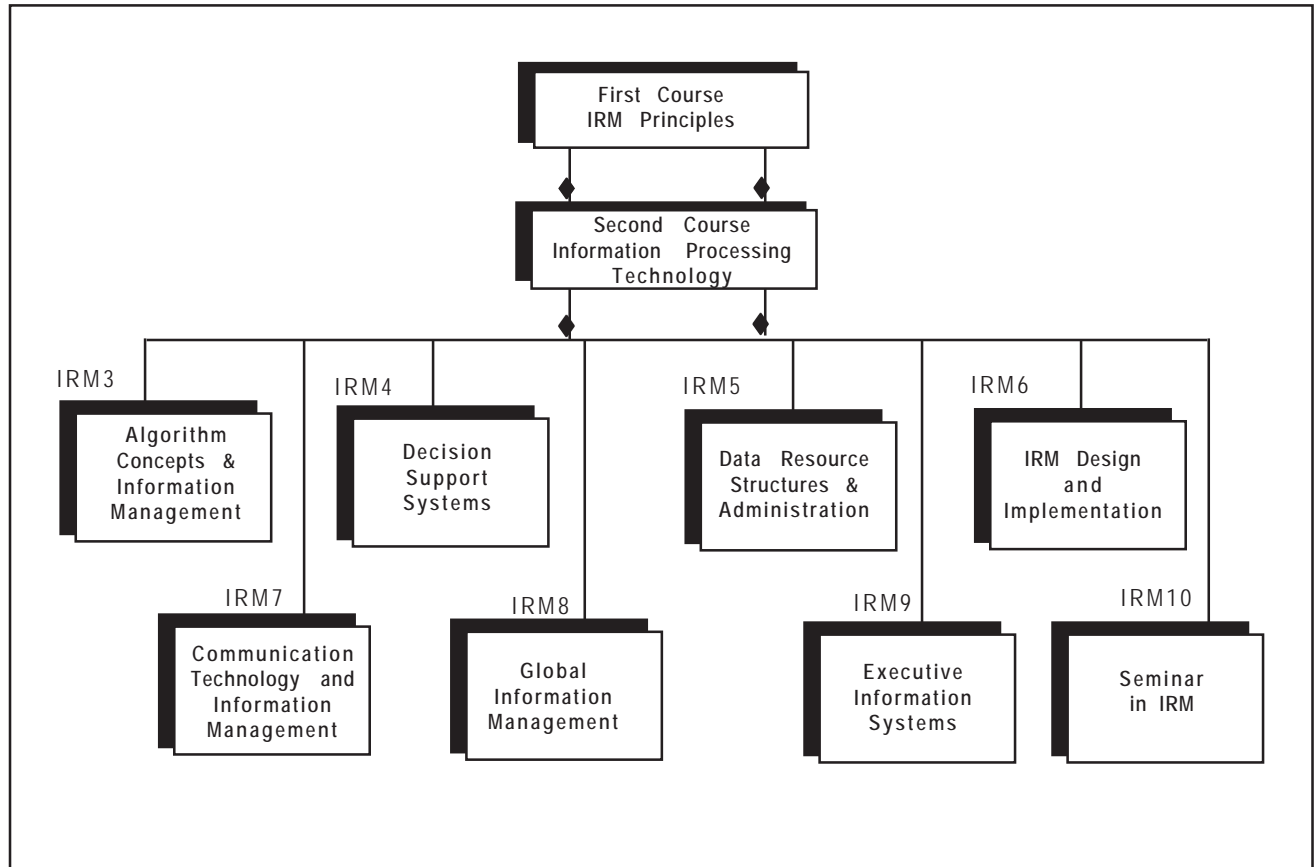


Figure 2: An IRM curriculum model for undergraduate programs in IS

of information, economy of information, managerial functions in information-oriented decision-making, and the relationship between information resources and other organizational resources

Figure 2 illustrates a framework for the previously described IRM course, the information processing technology course, and other courses in the information systems program.

The IRM course is appropriate for juniors in college, provided those students have already taken a course in organizational behavior or principles of management course which allows them to understand the organizational and managerial implications of information resource management. The following pages list all of the proposed courses for the IRM curriculum along with course rationale, objectives and assorted topics. It should be emphasized again that the proposed IRM Curriculum Model should be considered as a generic framework where certain changes can be implemented to its

courses and contents, to satisfy the needs of the local clientele.

IRM1 - INFORMATION RESOURCES MANAGEMENT PRINCIPLES

Description:

This course is designed to prepare students to understand the principles of information resources management and the role that these principles play in the overall management of organizations.

Objectives of the course:

- (1) To introduce information concepts.
- (2) To introduce the types and the value of information.
- (3) To introduce the relevance of information in decision-making.
- (4) To introduce the role of information resources on organizational strategy.

Topics:

1. Information Management (20%)
 - data types
 - data sources
 - data vs. information
 - data manipulation techniques
 - data security and control
 - data processing in business/

education/government

2. Types of Information (15%)

- marketing information
- production information
- personnel information
- accounting information
- financial information
- strategic information

3. Value of Information (15%)

- information economy
- expected information value
- estimating information value
- different types of information and their value
- information security and control
- information quality and control

4. Information Processing Techniques (10%)

- history of information resource management
- manual information processing techniques
- semi-manual information processing techniques
- automated information processing techniques
- information processing structures

5. Information Processing Personnel and Users (10%)

- computer information officers
- information managers
- information analysts
- information users

6. Information Users and Types of Information (10%)

- strategic information and managers
- financial information and managers
- marketing information and managers
- accounting information and managers
- production information and managers
- personnel information and managers

7. Information System Structures (10%)

- information and competitive advantage
- management information systems
- decision support systems
- transaction processing systems
- database processing systems
- meta data management tools

8. Information Delivery Technologies (10%)

- multimedia computing
- expert systems
- imaging systems
- client/server technology
- other delivery technologies

IRM2 - INFORMATION SYSTEMS TECHNOLOGY

Definition:

This course is designed to reinforce and broaden the first foundation course by focusing on learning about information technology components and their applications in the management of resources in

organizations.

Objectives of the Course:

- (1) To provide a broad understanding of modern information technology components.
- (2) To introduce the various structures of information systems within the organization.
- (3) To introduce various applications of information systems.
- (4) To introduce ethical issues in the use of information technology.

Topics:

1. Components of Information Systems Technology (15%)
 - hardware technologies
 - software technologies
 - telecommunications technologies
2. Role of Information Systems in Organizations (20%)
 - collection and processing of information
 - elements of information systems in organizations
 - tactical planning and information
 - strategic planning and information
 - quality control and information
 - training and information
3. Systems Professionals and Information in Organizations (20%)
 - systems analysts and information management
 - database designers and information management
 - programmers and information management
 - computer operators/data entry personnel and information management
 - end-users and information management
4. Information Systems Processing Methods in Organizations (15%)
 - mainframe processing methods
 - minicomputer processing methods
 - microcomputer processing methods
 - word processor processing methods
 - communication and processing methods
 - spreadsheet processing methods
5. Structure of Information Systems in Organizations (15%)
 - distributed information systems
 - centralized information systems
 - decentralized information systems
 - departmental information systems
 - end-user information systems
6. Organizational Ethics in Information Systems Management (15%)
 - copyright and permission
 - access control and information
 - piracy and information
 - privacy and information
 - theft of information
 - government regulations and information

IRM3 - ALGORITHM CONCEPTS AND INFORMATION MANAGEMENT

Definition:

This course provides students with hands-on experience in the

development of information systems applications by utilizing a state-of-the-art programming language (e.g., C++), algorithms and concepts.

Objectives of the Course:

- (1) To provide a broad understanding of programming concepts.
- (2) To teach the value of programming concepts in information systems.
- (3) To provide applications of programming concepts in information systems.
- (4) To develop project management skills critical to programming and deploying systems.

Topics:

1. Algorithm Planning and Information Systems (25%)
 - flowcharting concepts
 - hierarchical charting concepts
 - decision-looping concepts
 - mathematical concepts
 - programming style concepts
2. Algorithm Processing and Information Systems (25%)
 - file processing concepts
 - table processing concepts
 - sorting and searching concepts
 - input and output integrity concepts
3. Algorithm Validation Concepts (25%)
 - detection of input and output errors
 - presence testing
 - range/limit testing
 - error flag concepts
 - documentation concepts
4. Algorithm Technology and Database Management (25%)
 - methodology for database management
 - end-user computing and database management
 - problems and successes in database management
 - solving data-related problems

IRM4 - DECISION SUPPORT SYSTEMS

Definition:

This course enables students to acquire a broad understanding of business management information systems and their components while incorporating the use of data and analysis models.

Objectives of the course:

- (1) To introduce students to the real value of decision support systems.
- (2) To introduce students to the organizational structure of business management information systems.
- (3) To introduce students to the suitability of decision support systems for various types of businesses.

Topics:

1. Roles of Decision Support Systems (30%)
 - warehousing development
 - decision support systems and information management
 - decision support systems and management and organizational

theories

- decision support systems and users

2. Approaches to Decision Support Systems (25%)
 - evolution of decision support systems
 - value analysis of DSS
 - developmental approach
 - application of resources
3. Decision Support Systems Development (25%)
 - existing DSS prototypes and information management
 - DDS development stages and information management
 - decision support systems and software
 - office automation and DSS
 - expert systems and DSS
 - database management and DSS
4. Evaluation of Decision Support Systems (20%)
 - model validation and information
 - DSS information analysis
 - information management and DSS
 - systems support and maintenance of DSS
 - system security and control of DSS

**IRM5 - DATA RESOURCE STRUCTURES
AND ADMINISTRATION**

Definition:

This course is designed to provide students with a basic knowledge of various concepts of data resources administration and database management and their applications in organizations by utilizing a state-of-the-art database management system (DBMS).

Objectives of the Course:

- (1) To teach students the value and importance of data resources in information systems.
- (2) To provide students with a broad understanding of data structures and data administration.
- (3) To introduce students to concepts and a variety of applications of database design and management.
- (4) To introduce students to the concepts and applications of data administration in organizations.

Topics:

1. Data Resources and Information (20%)
 - data definition and standardization
 - data resources concepts
 - data administration concepts
 - data security practice
 - controlling the data resource
2. Database Concepts and Applications (30%)
 - database design concepts
 - database usage and applications
 - database administration and security
 - database management and strategic planning
3. Applications of Data Administration (30%)

- operations and applications of trees
- multiway trees concepts and processing
- database and tree structures
- random files processing techniques
- hash files concepts and processing

4. Strategic Information System Planning (20%)
 - strategic modeling and metadata
 - mathematical concepts and information systems
 - methodology for data administration
 - end-user computing and data resources
 - solving data-related problems
 - problems and successes in data administration
 - future of data administration

IRM6 - IRM DESIGN AND IMPLEMENTATION

Definition:

This course is designed to provide students with hands-on applications of the design and implementation of information systems in organizations.

Objectives of the course:

- (1) To introduce students to the development process and methodology of information systems.
- (2) To introduce students to the management techniques in the control and development of information systems.
- (3) To give students practical experience in the development of a computer-based information system.

Topics:

1. Information Management and Information Systems (20%)
 - capturing data
 - organizational history and information systems
 - organizational information requirements and information systems
 - recommended solutions and information systems
 - Total Quality Management (TQM)
 - Business Process Reengineering
2. Systems Analysis of Information Systems (15%)
 - system analysis and information management
 - systems analysts and information managers
 - phases of systems analysis and information management
 - differences between systems analysis and information management
 - software review and selection analysis
3. Systems Definition of Information Systems (15%)
 - systems scope and business requirements
 - alternative solutions
 - evaluation of alternative solutions
 - cost of alternative solutions
 - recommended solutions
4. Systems Design of Information Systems (20%)
 - logical and physical modeling
 - input and output design

- files and database design
- systems and subsystems
- systems hierarchy chart
- input and output format
- system phases and time table

5. Systems Implementation of Information Systems (15%)
 - systems installation and testing
 - applications development
 - conversion plans and implementation
 - developing and conducting training programs
 - testing and quality assurance
6. Systems Maintenance and Management of Information Systems (15%)
 - developing systems maintenance programs
 - developing systems security programs
 - conducting post-implementation review
 - adjusting systems errors and needs

IRM7 - COMMUNICATION TECHNOLOGY AND INFORMATION MANAGEMENT

Definition:

This course is designed to help students understand the components of communication technologies and their importance in information management and dissemination within the organization and among other organizations.

Objectives of the course:

- (1) To introduce students to various types of communications technologies.
- (2) To introduce students to technologies resulting from the convergence of existing technology and telecommunications.
- (3) To introduce students to the application of telecommunications.
- (4) To introduce students to the strategic impact of communication technology on information management.

Topics:

1. Telecommunications and Information (25%)
 - private branch exchanges and information
 - broadcasting systems and information
 - local area networks and information
 - telecommunication access systems and information
 - facsimile systems and information
 - satellite communication systems and information
 - on-line processing systems and information
2. Communication Technology (25%)
 - business telecommunications
 - voice communication concepts
 - common carrier services
 - fundamental communication concepts
3. Communication Design (15%)
 - data communications hardware
 - network configurations
 - microcomputers communications
 - communication software

4. Communication Controls (15%)

- protocols and software
- network design concepts
- network security and controls
- Internet data security

5. Communication Systems Planning and Development (20%)

- systems needs investigation and analysis
- systems selection and design
- systems implementation
- systems maintenance

IRM8 - GLOBAL INFORMATION MANAGEMENT

Definition:

This course is designed to provide students with the understanding of the importance of globalization in respect to functional areas of the organization and the role of information resources management in support of organizational globalization goals and objectives.

Objectives of the course:

- (1) To provide a broad understanding of global information technology resources utilization and management.
- (2) To provide a comprehensive coverage of issues surrounding the applications of information technology in organizations.
- (3) To introduce the use of global information technology in managing various functional areas of the organization.

Topics:

1. Global Information Resources Management (20%)
 - global information types
 - global information processing techniques
 - global information management
 - global information systems structures
 - global information users
 - national vs. international information resources management
2. Information Technology and Global Marketing (15%)
 - global perspectives of marketing information systems
 - decision support systems and marketing executives
 - role of information technology in the global marketplace
3. Information Technology and International Financial Services (15%)
 - financial telecommunications
 - information technology and financial markets
 - information technology and trading and treasury operations
 - information technology and risk management systems
4. Information Technology and International Accounting (10%)
 - information technology and global accounting
 - assessment of international accounting systems
 - integration of international accounting systems
5. Information Technology and Global Operations (15%)
 - international manufacturing operations
 - electronic data interchange systems

- security in global management of manufacturing

6. Information Technology and Research & Development (10%)

- international management operations
- research and development in a global environment
- opportunities for research and development in developing countries

7. Information Technology and Global Human Resources (15%)

- management of global human resources
- human resource systems in global organizations
- strategic response to international human resources

IRM9 - EXECUTIVE INFORMATION SYSTEMS MANAGEMENT

Definition:

This course is designed to provide students with a basic understanding of key concepts in executive information systems and how the design and use of these systems impacts the organization and its strategic decisions.

Objectives of the Course:

- (1) To introduce various types of executive planning.
- (2) To introduce the methods and structure of information systems with the organization.
- (3) To introduce the ramifications of the misuse of technology.

Topics:

1. Executive Decision-Making (30%)
 - delegation of responsibility and information systems
 - project planning and information systems
 - project control and information systems
 - project management and information systems
2. Executive Direction of Information Systems (25%)
 - organizational goals and information
 - control and security of information
 - availability of executive information
 - access to executive information
3. Strategic Application of Information Systems (25%)
 - value of executive information
 - organizational communication of executive information
 - application of executive information
 - impact of information on executive decision-making
 - group decision support
4. Executive Information Systems and Control of Information (20%)
 - mission statement and executive information systems
 - government regulations and executive information systems
 - trade regulations and executive information systems
 - legal issues and executive information systems

IRM10 - SEMINAR COURSE IN INFORMATION RESOURCES MANAGEMENT

Definition:

This course provides students with the opportunity to understand current innovations in technology and to study and evaluate current

applications of these systems.

Objectives of the Course:

- (1) To introduce students to organizational case studies involving information systems technology.
- (2) To introduce students to the application of new technologies.
- (3) To allow students the opportunity to research and present new trends in technology.

Topics:

1. Issues in Information Resources Management (35%)
 - national and international standards and information management
 - multinational corporations and information management
 - personnel issues and information management
 - information flow processes and information management
 - competitive advantage and information management
2. New Trends in Information Resources Management (35%)
 - interactive technology and information management
 - current telecommunication options and information management
 - innovative hardware/software and information management
 - artificial intelligence and information management
 - networking and information management
 - prototyping and information management
 - Total Quality Management (TQM)
3. Application of Information Resources Management (30%)
 - organizational case studies
 - group research into new trends in technology
 - future of information resources technology

Required and Elective Courses

The issue of what should be considered as required courses and elective courses should be dealt with very carefully in light of many factors, such as immediate job skills requirements, future growth potential, possibility of future graduate work, and also local, national and international employment needs and trends. It is our hope that the recommendations made here are carefully assessed against all factors discussed above before the final curriculum model is implemented.

Out of ten courses proposed within the contents of this curriculum model, we recommend a total of seven courses be taken by the student, with five courses being required and two taken as electives. Table 2 illustrates the overall recommended and elective courses and their possible prerequisites.

Conclusions

The need for broad management of information resources now challenges business schools to provide more training and focus upon the managerial aspects of information resources. Information systems graduates should have a command of more than a few computer programming lan-

guages and different concepts and procedures for data manipulation. They should also understand the role of information resources in organizations and how these resources can be managed more effectively. Consequently, IRM students should be required to take managerial and organizational courses as a foundation for integrating IRM concepts and use with managerial skills and for using information technologies in providing information to information users.

IRM students should continue to receive adequate training on a wide base of software programs such as DBMS, expert systems, spreadsheet, and presentation software. Additionally, courses should be offered that deal with emerging technologies, applications, and programs using graphics, database strategies, and decision support systems rather than strictly programming languages. (Nixon, 1987; Fisher, Hayen, 1990; Jackson, 1992).

The fact that many systems staff lack a solid educational background in humanistic and organizational concerns points to one of the major reasons for the past and present deficiencies in the management of information resources. This inadequate education can be blamed, in large part, on universities and colleges and their MIS curricula. Most of these curricula are exclusively comprised of courses in quantitative analysis and hardware/software-oriented courses, and offer nothing on the organizational implications of information systems. This is, perhaps, a result of the way in which MIS educators have viewed information systems, with an overemphasis on the computer's role in general, and a downplaying of other elements of information resources.

Educating both future business managers and information processing professionals about information resource management is a major task facing both MIS and business instructors. In the past few decades, overemphasis on automation and the technical aspects of information processing systems has resulted in many graduates who were nothing more than glorified computer systems professionals who lacked the understanding and appreciation of the basic commodity of any information system—the information resource. Their solutions for organizations seeking an effective utilization of information resources were to acquire bigger and more sophisticated computer systems.

Information resources are now viewed by corporations as one of their major resources to be managed and utilized effectively. MIS educators are long overdue in putting more emphasis on information resources management, including information technology management as a part of its domain, and de-emphasizing computer systems as the only important component of information resources. Additionally, organizations will experience difficulty coping with the complexity of technology in an international marketplace without IS managers who are competent in globalized issues in business and technology (Larsen, 1993). An IS curriculum that incorporates cutting-edge technological education with related international materials and experiences is necessary to enable the

Course Description	Required	Elective	Prerequisite
IRM1 -Information Resources Management Principles	x		Basic management course (e.g. organizational behavior)
IRM2 -Information Systems Technology	x		IRM1
IRM3 -Algorithm Concepts and Information Management	x		IRM2
IRM4 -Decision Support Systems		x	IRM2
IRM5 -Data Resource Structures and Administration	x		IRM3
IRM6 -IRM Design and Implementation	x		IRM5
IRM7 -Communication Technology and Information Management		x	IRM2
IRM8 -Global Information Management		x	IRM2
IRM9 -Executive Information Systems Management		x	IRM2
IRM10 -Seminar Course in Information Resources Management		x	IRM5

Table 2: Recommended Required and Elective Courses and Their Prerequisites

country to maintain a competitive advantage in the worldwide marketplace.

MIS curricula are now due for a major overhaul that will incorporate the concepts of IRM into MIS courses. MIS teachers must keep pace with the demands of corporate America and begin to train information resources managers to understand the value and role of information and to assist organizations in the greater utilization and management of this resource.

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Acknowledgments

This Curriculum Model was developed with two primary objectives: 1) to prepare students for the current job market needs; and, 2) to embed the overall concepts of IRM where they can be taken to organizations for more effective use of information resources management in modern organi-

zations. The latter objective has a long-term implication and prepares future IRM leaders who can help organizations in learning new concepts in information resources management. The IRM Curriculum Model presented here is the result of two years of extensive research and efforts of the joint IRMA and DAMA International Task Force on IRM Curriculum. Development of the IRM Curriculum Model began in October 1994, with an invitation extended to numerous experts in the field of information resources management to serve on a curriculum task force whose purpose would be to review and develop an IRMA curriculum model and offer suggestions, revisions, and comments based upon their expertise. The Curriculum Task Force members were sent copies of a position paper and asked to analyze the document and offer guidance in the development of the actual curriculum model. The input offered by these task force members was used to develop the first draft of the presented IRMA Curriculum Model.

In May 1995, the developed curriculum model was presented at the annual Information Resources Management Association's International Conference held in Atlanta, Georgia. At this conference, several more experts were added to the task force and additional revisions were made to the model. The curriculum development continued and, in October 1995, the task force was approached by the leadership of DAMA International with a request to participate in this venture and subsequently four members of DAMA were added to the task force. The proposed IRM Curriculum Model was revised in January 1996 and again in July 1996. Through the extensive efforts of both IRMA and DAMA members, the final draft of the curriculum model presented here was developed.

The development of this state-of-the-art Information Resources Management Curriculum was possible through the valuable input and support of many experts in the field of information resources management. The curriculum task force consisted of members of IRMA (Information Resources Management Association) as well as DAMA (Data Administration Management Association) members. We would like to thank the task force members for their suggestions and enhancements to this project.

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Comments and Feedback

Despite all the effort put into this project, we firmly believe this proposed IRM Curriculum Model can greatly benefit from constructive comments of all individuals involved in teaching, researching, and practicing various concepts covered in this document. Please forward your comments to Mehdi Khosrowpour, Information Systems Program, Penn State Harrisburg, 777 West Harrisburg Pike, Middletown, PA 17057 or Fax 717/948-6456 or e-mail M1K@psu.edu.

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