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ABSTRACT

This course is the sixth of seven in the Information Systems curriculum. The purpose of the course is to build on skills acquired in the earlier courses and to provide the student with skills that enable him/her to function as a resource person. Its focus is on concepts, applications, and skills as well as on equipment familiarity needed to integrate financial, database, telecommunications/networking, records management, inventory, managerial, and administrative support systems within an organization. These components are provided for each task area: behavioral objective, suggested teaching strategies, content, and summary. Topics covered include principles of integration of various business systems with automated equipment; principles, concepts, and theories of sociotechnical analysis applied to the integrated office; data flow analysis and database review to make recommendations for selection, configuration, and installation of hardware components and applications software; evaluation of the need for, setting up of, and maintenance of a records management program; and ability to analyze, upgrade, troubleshoot, and respond to needs of end-users. Appendixes include visuals (transparencies and other teacher materials), student materials (student handouts, work sheets, and exercise materials), evaluation (end-of-task and end-of-unit questions, test items, etc.), and an eight-page list of references. (YLB)

Integrated Information Systems

course six

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In Cooperation with
ASSOCIATION OF INFORMATION SYSTEMS PROFESSIONALS (AISP)

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INTEGRATED INFORMATION SYSTEMS

This course relies on knowledges, skills, and attitudes acquired in three courses: Applied Information Systems, Telecommunications/Networking, and Database Systems. The focus of this course is on concepts, applications, and skills, as well as on equipment familiarity which integrates financial, database, telecommunications/networking, records management, inventory, managerial, and administrative support systems within an organization.

The end result of this course is to provide the student with skills which enable him/her to function as a **resource person** in order to analyze and maintain systems in terms of interfacing equipment and people, utilize flowcharting techniques to analyze work flow, evaluate equipment and networking needs at the end-user level, design a simple floor plan to accommodate routine information needs, make decisions about and arrange for demonstrations and trial usage of equipment, anticipate upgrading of hardware and software, develop a records management program, promote the information systems function to all levels of the organization, and demonstrate good working relationships within and outside the organization. Again, group projects serve to accomplish the objectives of this course.

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INTEGRATED INFORMATION SYSTEMS

CONDITION	PERFORMANCE/STANDARD
TASK AREA 1: Given the knowledge of problem solving and decision making skills related to database systems, telecommunications/ networking, and operational knowledge of a variety of business applications software,	the student will be able to review the principles related to the integration of three resources in the automated office: business and organizational systems, people, and electronic systems to the satisfaction of the instructor.
TASK AREA 2: Given specific knowledge of integration principles in the automated office,	the student will be able to review the principles, concepts, and theories of sociotechnical analysis and apply them to the integrated office to the satisfaction of the instructor.
TASK AREA 3: Given the specific knowledge of database systems,	the student will be able to analyze data flow and review database systems within business systems in order to make recommendations for selection, configuration, and installation of hardware components and software applications to the satisfaction of the instructor.
TASK AREA 4: Given a records management project,	the student will be able to evaluate the need for, set up, and maintain a records inventory program which might include records transfer, records retention, and records destruction to the satisfaction of the instructor.

CONDITION	PERFORMANCE/STANDARD
TASK AREA 5: Given a variety of information systems media, software, hardware, peripherals, telecommunications, networking, and other resources,	the student will be able to demonstrate through application, integration, and up-to-date knowledge of information systems that decisions can be made to analyze, upgrade, update, troubleshoot, and respond to the needs of end-users and management regarding planning and organizing for change in media, software, hardware, peripherals, telecommunications, networking, and other resource planning to the satisfaction of the instructor.

INTEGRATED INFORMATION SYSTEMS

Task Area 1

Given the knowledge of problem solving and decision making skills, hands-skills related to database systems and telecommunications/networking, and operational knowledge of a variety of business applications software, **the student will review the principles related to the integration of three resources in the automated office: business and organizational systems, human, and electronic systems to the satisfaction of the instructor.**

Suggested teaching strategies: Lecture/discussion, guest speakers, field trips, and outside readings would enhance students' understanding of the scope of information systems integration.

(Note to instructor: Use the two scenarios in the "Visuals" section to stimulate discussion of the distinct differences between the equipment and the roles of the support professional in each of the scenarios. Handouts may be made of the visuals for students.)

These scenarios are not nearly so out-of-date and far-fetched as they would appear. In fact, the trends woven into both are at work in today's business scene. In Scenario #1, the traditional office is very nicely illustrated. The only thing that is not apparent is whether the support professional has a microcomputer or a stand-alone system. The beginnings of this office system took root in the fifties, following World War II and the advent of big business. Changes in the traditional office in the sixties and seventies focused on data processing, word processing, and distributed processing equipment which promised to increase the productivity of clerical personnel by alleviating boring, repetitive tasks. However, new equipment and new expectations often left clerical employees confused, frustrated, and resistant to change.

Scenario #2 illustrates the potential and promise of the integrated information system in this and the next decade. Productivity is still the byword but it applies to all levels of the organization--executive, managerial, professional, technical, and administrative. Many elements of an integrated office system are included in this scenario--portability, compatibility, time-sharing access, integration of several information media (voice, text, and graphics), and the recognition of the value of the resource person in the organization with the information, technical expertise, and

the organizational brightness to increase efficiency, effectiveness, and productivity.

A significant difference between these two scenarios is the approach that is taken toward automated equipment in the office environment. In the first scenario, employees often are left out of decisions regarding the purchase and use of automated equipment. Fear of machines and fear of being replaced by machines cause high anxiety among employees. Automated equipment is viewed as a tool to produce and revise more documents, not as a means to becoming more effective and involved. The second scenario begins to focus on the information worker who is a source for effective ideas and information.

Current trends of combining human resource considerations along with automated equipment considerations have greatly increased the chances for acceptance of change. Scenario #2 beautifully points out the role of the support professional as a value resource for making and implementing recommendations for integrating automated information systems.

THE EMERGENCE OF INTEGRATED INFORMATION SYSTEMS

Computerization of most office work will characterize the emergence of integrated information systems in this decade and the next. Integration is the method by which technology will combine business systems (organizational and administrative), information systems support tools (hardware, software, and telecommunications), and people for the purpose of making changes in job functions to ultimately process, communicate, and utilize information efficiently for effective decision making. If successfully implemented, the integration will result in an all-encompassing focus called information systems. The end result of integrated information systems will be to enhance the effectiveness of each office worker to accomplish the purpose of the office--the manipulation of data into usable information.

Why is all of this occurring at this point in time? What are the major factors which are "driving" the change? Two factors seem to be having a tremendous push/pull impact on the office: the rate at which technology is changing (push) and the demand for increased productivity (pull). The office is entering a period in which most white-collar workers will be supported directly by a microcomputer in a workstation with access to integrated information systems tools. The need to decrease the amount of data and increase the amount of usable information is having a great impact.

Each of the three resources of an information system (human, organizational and procedural, and electronic) plays an important part in disseminating information to the right person at the right time for effective decision making. Each of these three resources is discussed in the sections below.

HUMAN RESOURCES

Many times, the historical approach to automating the office has focused on the introduction of technological innovations, often overlooking user and organizational needs and constraints. When this has occurred, the result has been inappropriate expectations, inadequate procedures and guidelines, and worker hostility and resentment. One expert has put this dilemma into perspective: "Too many computer-based systems have been designed on technological breakthroughs...which are insensitive to the limit of man's rationality and the social needs which must be met within organizational structures." **(Note to instructor: Ask students to discuss this statement as to the social needs which may be overlooked by concentrating solely on technological implementation.)**

When information technology reorganizes work and procedures, new patterns of communication and interaction are set up. In a dynamic work environment, the social network is an important buffer between the worker and other elements in the work place, namely the computer terminal. In this kind of environment, there is a tendency for the workers to spend greater portions of the day interacting with a computer. A report from the Office of Technology Assessment (1985) states:

> There will be more need for lounges and discussion rooms and the like, to break the routine of stress from the machines. As tasks become more mechanical and isolating, more group activities and worker clubs and incentive systems need to be developed to keep up team spirit and morale.

Decades of research have established the importance of social communities in the work place and the lengths to which people will go to establish and maintain them. The human resource in an organization is the pivotal ingredient on which the success of the automated office hinges.

Naisbitt (Megatrends, 1980) has called this concept "high tech,/high touch". That is, whenever new technology is introduced into the environment there must be a counterbalancing human response of high touch. Without the high touch, the concept is rejected, and the more high tech, the more high touch.

Human concerns. The recent history of integrated information systems has shown that the urgency to increase efficiency and productivity has resulted in the lack of appreciation for the "people issues" related to acceptance of new technology. This emphasis focuses on "technology-driven" concerns--the rush to provide the newest, best, and fastest equipment. When people in the organization have arrived to find microcomputers at their desks, the natural inclination has been to resist. A very well-thought-out office automation strategy which takes into account the benefits to the people, as well as to the work and to the organization, will go a long way toward enhancing the sociotechnical environment. Human concerns also must center on specific issues relating to ergonomics, health and safety, and training. These issues are discussed below.

Ergonomics. Increased concern must be given to the planning of the physical environment. The configuration of the workstation offers the opportunity to examine many of the environmental issues such as color, space, lighting, temperature, privacy, and sound. Research has shown that these issues are of prime importance in planning for the introduction of office automation equipment and for the continued upgrading and expansion brought about by the need for access to information.

The physical capacities of the workstation itself should take into consideration the anthropometric measures such as standing heights, reaches, arm angles in keying and eye viewing angles, and source document surfaces. The objective is to maximize comfort and to minimize effort. Requirements for the sensory measures should focus on light, sound, and climate control. Industry standards exist regarding various measures in this domains; however, many of these standards may not taken into account the advent of microcomputer systems in the office. Noisy printers, glare on screens from overhead lights or windows, inadequate task lighting, improper ventilation, and intolerable levels of background noise due to inadequate sound absorbent materials are sensory measures which may have been overlooked in the haste to provide professional workstations.

Privacy needs refer to confidentiality, avoidance of interruptions, and the personal space a worker requires to maintain control over his/her work environment. Voice messaging systems may introduce new requirements for privacy. Also, as machines take over more of the routine, non-thinking tasks in an office, a critical need will exist for workers to have more privacy and quiet to plan and organize the nonroutine elements of their jobs.

Workstation design also should take into consideration the psychological factors such as aesthetics, design, individuality, face-to-face communications, and a sense of belonging. Maslow's hierarchy of needs should provide a checklist of factors to be considered in bonding the individual to his/her work area. The workstation design can be sensitive to the flow of work, the communication process, the movement of people, and to outside distractions. Therefore, the arrangement of the workstations is a prime consideration. Space planning and office systems planning must be converged to underscore the importance of each in the design of new offices and new buildings and in the redesign of existing facilities.

Health and safety. One of the most controversial issues in the automated office is the concern about the safety of video display terminals (VDTs). Many workers' groups assert that radiation from monitors may threaten the fertility of men and women and pose a danger to unborn fetuses. Additionally, prolonged use of microcomputer keyboards are purported to cause damage to wrist tendons. Height and position of VDTs also may lead to neck pains, backaches, and fatigue. Manufacturers of automated equipment have responded to these concerns by providing monitors which emit lower levels of radiation than the ordinary TV set. Many organizations are providing for breaks at predetermined times for end-users whose work requires them to sit for long periods of time at their computers. Conflicting studies are being released which call attention to the hazards of VDTs at the same time that research findings by scientists indicate that the monitor itself is not a hazard to workers. These are important issues that bear watching over time.

Other health issues concern posture, vision, and hearing. The need for (a) furniture designs which reduce backaches and neck pains; (b) sound absorbent materials which reduce noise emitted by printers, copiers, and voice messaging systems; (c) 'white' noise or music in appropriate locations; and (d) attention to complaints about headaches and eyestrain from screen glare and color must receive serious consideration by office designers and ergonometric engineers and employers. Many articles have been written regarding the advantages of the green screens vs the amber screens vs the multi-color screens utilized by some software. Many of these reports are inconclusive as to the long-term effects of screen glare and color.

Training and continuing education become imperative for employees who are displaced by technology, for employees who are expected to use equipment effectively, and for employees who may have assumed additional duties and have not been trained for the responsibilities. The nature of this issue

falls in the category of social responsibility of the organization. Providing the necessary training and continuing education for employees can go a long way toward overcoming resistance to change and for ensuring that employees remain viable, productive workers.

Due to office automation, new career paths have opened up to the support professional. These careers fall into the following categories: administrative services, training, marketing and sales of equipment and services, technical writing, equipment operation, consulting, supervision, coordination, quality control, and others. Knowledges and skills related to integrated information systems also are changing. Individuals who hope to compete for and maintain positions in the automated office will need skills related to human relations, communications (presentational and written), problem solving, decision making, planning and organizing, and organizational savvy as well as technology.

ORGANIZATIONAL RESOURCES

Business functions within the automated office and the information systems support tools which may be integrated into an effective information system include the following:

a. Accounting: word processing, information retrieval

b. Administrative or support (document production, mail services, duplicating centers, records centers): word processing, information retrieval, communication, data manipulation

c. Auditing: word processing, information retrieval

d. Billing: word processing, information retrieval, data manipulation

e. Financial: word processing, information retrieval, communication, decision support for forecasting, data manipulation

f. Human Resources such as personnel, benefits, salary administration, retirement, training: word processing, information retrieval, communication, graphics

g. Legal: word processing, information retrieval, communication

h. Managerial: word processing, information retrieval, communication, forecasting and decision support (ideally all in one executive workstation)

i. Order Handling: information retrieval, communication, data manipulation.

j. Purchasing: information retrieval, word processing

k. Production/Inventory: information retrieval, communication, data manipulation

l. Research: word processing, information retrieval, communication

m. Sales: word processing, information retrieval, communication, decision support for forecasting

n. Transportation/Delivery/Warehousing: information retrieval, communication

(Note to instructor: Students could be asked to name specific hardware or software or other information systems support tools which might be used in these business functions.)

Within the integrated information systems office, certain organizational patterns may emerge to facilitate the flow of information. Traditionally, information in the office flows between and among office components along formal and informal channels. The flow of information disseminates organizational goals and missions, forges the linkages between organizational units, and assists in the coordination and integration of the complicated interactions between specialized tasks. To enhance the flow of information, organizational staffing patterns and procedures are developed to accommodate the various business functions and the social system and to control the quality and quantity of information.

The traditional organization basically rests on command authority, That is, the flow is from the top down. The scalar military structure provides the example which many organizations have adopted as their own. Businesses have lived with the hierarchical structure and accommodated the people to it.

However, success of an information-based system may depend on asking new kinds of questions arising from the ability to access and "control" information at all levels of the organization, as pointed out by Peter Drucker:

> What should the company expect of me and hold me accountable for in terms of performance and contribution? Who in the organization has to know and understand what I am trying to do so that both they and I can do the work? On whom in the

> organization do I depend for what information, knowledge, specialized skill? And who in turn depends on me for what information, knowledge, specialized skill? Whom do I have to support and to whom, in turn, do I look for support?

Access to information by all levels of employees is creating a flatter organization with fewer levels of management. If this trend toward a flatter organization continues, two possible forms of organization may evolve. A matrix form (Figure 1) whereby an individual reports to a number of people depending on the ability to access and communicate information or a reticular organization (Figure 2) where the distribution of information and authority is fluid and shifts as required are probable patterns. In an information-based organization, the flow of authority is circular from the bottom up and then down again.

Peter Drucker describes the flatter organization as making irrelevant the principle of "span of control" and replaces it with a new principle he calls "span of communications". That is, the number of people reporting to one person is limited only by the willingness of the workers to take responsibility for their own communications and relationships, upward, sideways, and downward. The kinds of questions mentioned above relate directly to this span of communication and to the importance to the organization of the person who can access and manipulate the information.

These forms of organizations within a company may not alter the appearance of the organizational chart to the outside world. However, there will be profound effects on the people, role relationships, and job skills inside the organization.

Telecommuting. One additional organizational pattern which has developed with office automation is telecommuting. Telecommuting allows employees to work at geographically-independent locations, such as home, offshore, or in centrally located work centers. This also has been referred to as "cottage labor", the working home, or the "electronic cottage". John Diebold, an office automation consultant, has written this about telecommuting:

> ...this could lead to widespread decentralization of many office functions. People previously unable to travel--the handicapped or parents with

A MATRIX ORGANIZATION

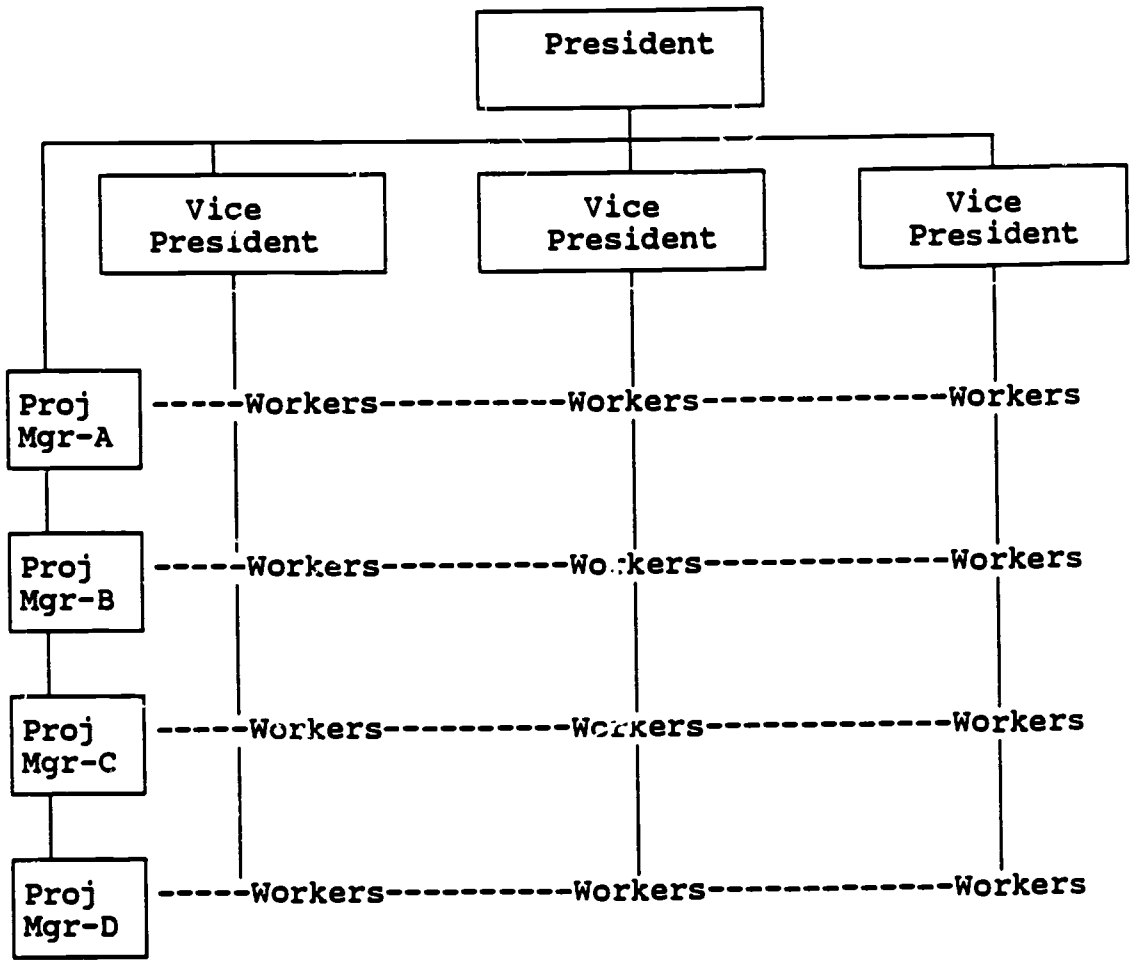

Figure 1.

(In a matrix organization, workers come together from different functional or line organizations, retaining formal relationships with their own departments and establishing dotted relationships with the newly created department. It combines centralized and decentralized characteristics.)

A RETICULAR ORGANIZATION

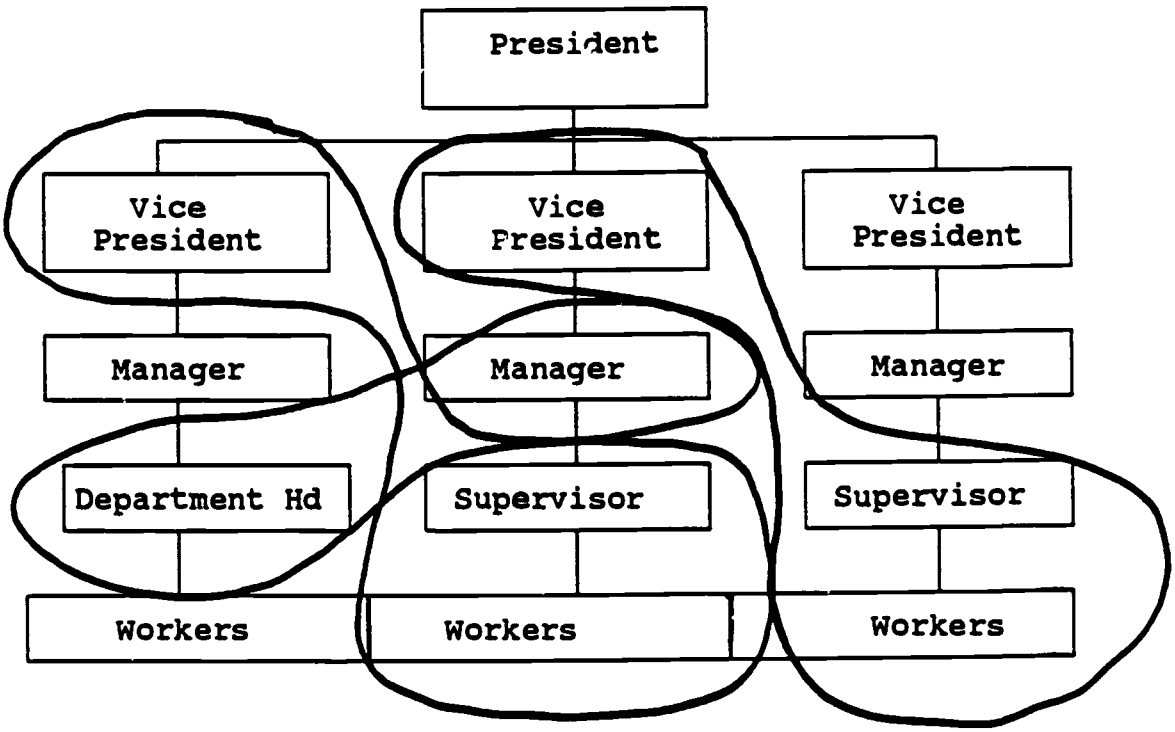

Figure 2.

(The reticular organization may not look different from outside of the organization. However, inside the organization, the many newly formed coalitions are based on trade-offs and collaborations brought about by technological changes or the nonroutine tasks of the office.)

> small children--represent an enormous untapped human resource that might easily "telecommute" to become part of an office work force. For others, the home office will be a matter of deliberate choice.

Walter Kleinschrod (1987) has pointed out that workers seem to know about telecommuting and consider it feasible for a while but they say "you better soon get back into the communicational swing of things at the office or quickly lose touch with what is going on." He suggests that one compromise between home and the office is the satellite work center which can be described as "an intelligent facility perhaps shared with other companies."

Jarrett says that the economies of scale currently applies to offices. The contemporary idea of business administration necessarily involves putting groups of people together in the same place because that is the only way the information will flow from one function to another. He goes on to say, however, technological capabilities will change the office of tomorrow:

> ...you don't need to devote space and resources to ranks of filing cabinets; you don't need armies of filing clerks; you don't need job structures;...a company will be able to distribute its offices away from high rents...the staff will be able to avoid the discomfort of commuting...people will choose "telecommuting" to work from home with their workstation terminal...and the company might link together several small offices.

An Office of Technology Assessment report (1985) cautions that there are legal questions to be resolved regarding "farming" out office work to homes as well as wage and salary questions. The whole aspect of telecommuting, however, sheds a different light on organizational staffing and procedural patterns in the electronic office.

Other organizational changes may occur as a result of integrating information systems such as (1) discovering that regional offices are not necessary when communication systems enable the headquarters to communicate directly with branch offices; (2) discovering that there is no "one best organizational pattern" because things are constantly changing and because different groups within an organization have different needs; (3) recognizing that communication patterns often dictate the type and kind of organizational structure; (4) recognizing that the office system is the "organization within an organization" that takes the inputs (raw materials, words, data, and functions) of the business and processes them into outputs (products, documents, information, and

procedures) which support the mission and goals of the overall organization; and (5) realizing that job duties and responsibilities, access to information, and opportunities for problem solving and decision making at all levels of the organization will be affected by automated equipment.

TECHNOLOGICAL RESOURCES

The information systems support tools which are available to end-users in the automated office include but are not limited to the following:

a. Workstations consist of a personal computer that may be connected to a centralized host computer or it may stand alone. It usually has access to a printer and may be able to communicate with other computers in other offices as well as other locations. A variety of software may be utilized so that it is possible to process text, data, and graphics; to communicate; to manage desktop tasks such as creating and accessing calendars, setting up tickler files, and sending and receiving mail; to access large databases which provide access to company-wide information; and to access outside database time-sharing services.

b. Word processing allows documents to be created, edited, stored, retrieved, processed, and communicated.

c. Communication provides capability to send information through Telex/TWX, facsimile, communicating information processors, computer-based message systems, computer-based voice systems (voice store and forward message systems), and receive and send mail and messages electronically.

d. Information retrieval provides easy access to databases within the company as well as to databases provided through outside services. The transmission media may be provided through telephone lines, cables, fiber optics, microwave stations, satellites, or a combination of several of these media.

e. Forecasting and decision support systems allow the creation of models and forms, statistical analyses, completion of forms, creation of graphics, and other support using "what if" situations. The software which allows these opportunities includes database management, spreadsheet, graphics, desktop management, and communication.

The use of automated support tools raises issues relating to technological considerations such as those discussed below.

Flexibility and expandability. To take into account the changing needs of the organization and demands of end-users and the changing demands from outside agencies and employees, hardware and software must be purchased with flexibility and expandability in mind. The need to change formats created by new regulations or tax laws or to reflect company growth speak directly to the issue of flexibility. The growth of the company and employee demands points to the issue of expandability. Should a company have to buy a whole new system when it outgrows its old one? Can the present system be upgraded to accommodate faster hardware and software? How easily can new users be added? These are questions which must be considered when purchasing information systems support tools.

Compatibility. There is a critical need in the field of information management to achieve compatibility between systems. Compatibility is an issue in connectivity and communication which affects efficiency and cost effectiveness. The ability of two systems to transfer documents retaining format codes and which do not require rekeying can only be achieved when two software applications packages are compatible and connectible.

Convenience. Is the system convenient or easy to use? Is it easy to learn? These are two different issues but both relate to convenience. A word processing package may offer the right prompts at the right time making it easy to learn and use. These same features also may slow down the user who can keyboard at a high rate of speed, thus hampering the convenience (of the prompts) provided by the software.

Speed. Computers are valued because they are fast in what they do. However, speed is more important in some applications than others. An order handling system that takes longer than five minutes to confirm a telephone order is not going to help business. A mailing list that is cumbersome and awkward to update is not going to help a company which relies on current mailing lists for its catalog mailings. On the other hand, speed may not be a factor in many applications.

Cost effectiveness. A system must also be evaluated by the bottom line: Is it worth the cost? To keep costs down, an organization may have to trade off certain optional features to be able to afford the features that are critical. These critical features are determined during the project planning stages as the features that the system must have--the functions that an organization is willing to pay for. Optional features are the features that would be nice to have-

-the functions that the organization might like to have but is not willing to pay for. When judging a system, it must be viewed in light of these two criteria: function and cost.

Debugging. After testing and retesting a system, bugs will often show up after weeks, months, or years of use. Fixing them may take time and be frustrating and extremely difficult, especially if the persons working on the debugging are not the ones who wrote the program. This points up the need for thorough documentation for the hardware and/or software.

Viruses. Computer virus programs can attack any type of computer system. They are passed from one disk to another through contaminated software. These viruses can be programmed to destroy hard disks or floppy ones; they can damage specific data, cause wholesale destructions, or fall somewhere in between. Most viruses are programmed to copy themselves to other disks, thereby spreading the contamination.

In addition to viruses, three other programs damage computer data. A Trojan horse--generally disguised as an interesting type of software such as games or graphics or which promises confidential data--will steal data from a computer or a disk while the software is being executed. Trojan horses can be used to change password combinations or to alter computer accounts. Time bombs wait for a specific time to perform a task, such as sending the user a message or damaging data. A worm, on the other hand, will attach itself to a specific utility and gradually gnaw at files whenever the utility is used.

To avoid possible damage, users should exercise caution. First of all, be wary of software that has been downloaded from a bulletin board. Bulletin board system operators (sysops) try to eradicate all contaminated software, but it doesn't hurt to double-check. Use a duplicate of your system as a start-up disk to load unknown software. Have all data backed up and removed from the computer system. Further, do not have the backed-up data on the same disk that contains copies of the operating system. If the system is infected, the contamination could spread to the rest of the data on the disk.

Data ownership. Who "owns" the data in the organization is becoming a critical issue because of the amount of available information. "Data ownership" is a common source of political strife within the organization. This issue strikes at the heart of ethics, values, and standards within the corporation. Some of the questions which arise include:

> Does corporate data "belong" to the organization as a whole OR to the user area that updates the database? Should there be a single database administrator to play traffic cop for all corporate data? Which elements are really sensitive and which are sensitive only in the eyes of the self proclaimed "owner"? All users want access. But often what data sharing means to users is that they want access to someone else's data, not that they want someone else to access theirs.

These questions and issues will continue to confront us as the amount of and availability to information continues to grow.

Security and integrity. Numerous newspaper reports have been written regarding the ability of "hackers" to access sensitive and private data banks. (Has everyone seen "War Games"? Is it fiction or fact?) With the proliferation of personal computers, access to sensitive information is more convenient. In fact, it can be "filed" on a diskette and transported out of the organization in coat pockets, briefcases, newspapers, etc. Mainframe processing is more likely to control the access to information. The use of passwords, back-door passwords, encryption, dumb terminals, audit trails, and security systems are becoming more and more prevalent as management begins to grope with the issues of information management and access.

If data stored on mainframes are going to be stored also on microcomputer media, integrity issues are raised. Why is there a need for duplication of data? Are the data that is stored accurate? What are the guidelines for downloading (transferring from mainframe to user workstation) and uploading (transferring from workstation to minicomputer and mainframe computers) data to preserve security and integrity?

If microcomputers and mainframes are going to be connected (and to achieve full integration, they must be), guidelines should be established which provide for security of data, integrity of data, and guidelines for access to data: how, what, who, when, where, why, and how much.

An effective policy which describes for what purposes computers (especially microcomputers) will be used and how they will be used may be necessary to control the access to, processing of, and manipulation of information. In addition, a policy also may cover purchase and maintenance criteria, related software, and end-users'responsibilities. Specifically, elements of an effective policy may speak directly to:

a. The construction of large databases. Microcomputers in general should not be used to construct large databases. This is generally the domain of the mainframe computer.
b. The degree of compatibility, especially if the microcomputer is going to be used as a terminal to the mainframe.
c. The type of hardware and software to purchase and vendors from which to purchase. This cuts down on duplication of effort, ensures smooth flow of information processing, and assures the buyer that the equipment and software have been tested and properly documented for internal use.
d. The role of the user. Guidelines must be established defining the proper methods to be used in extracting and interpreting data.
e. The integrity of data. A policy must describe what types of information should be gathered, maintained, updated, and reported; and what controls should be developed to assure that data are correctly treated so that when decisions are made, they are based on valid and sufficient data.
f. The type of preventive and emergency maintenance. Directions should be provided to the user which describe the proper channels of contact for malfunctioning equipment, what kinds of malfunctions may be encountered, and to what extent the user may be responsible for troubleshooting before making the request for maintenance. In addition, vendors who have been approved to make repairs or provide maintenance should be issued in this policy.

Without published, well-thought-out policies regarding use of computer equipment and software, the confidence in the information generated may be a bottleneck to sound information management decisions.

INFORMATION SYSTEMS APPROACHES

Several different approaches may be taken to integrate information systems in the automated office. Some of these approaches are discussed below.

Separate systems are maintained in the office when word processing, data processing, electronic mail, and reprographic services have been automated but are not linked together in a specific location or through telecommunications. Historically, this was the approach taken by the office when information systems support tools first became available. Each of the business systems listed above maintained hardware and software for its separate applications. In fact, many times different brands of hardware and software were used in

each separate system. There was no planned, concentrated approach to integration of these tools.

Integrated systems became available when (1) the ability to network the information processing technologies became possible through local area networks; (2) telecommunications and intelligent printers and copiers became interconnected; and (3) when word and data processing could be performed on one piece of equipment--the microcomputer.

An important link in the automation process is the ability to communicate information from one area, one person, or one machine to other information processors, facsimiles, copiers, and/or phototypesetters, or through teleconferencing.

The truly integrated system of the future will permit access to hardware and software with a common set of commands, will permit end-users to switch easily from application to application with the same software applications packages accessible to all end-users with compatible equipment, and will permit hardware and software that is incompatible to work together through integrated networks using gateways and bridges and communication protocols.

In the meantime, integration of information systems support tools is made possible with networked intelligent workstations, local area networks, or work area networks (usually found in departmental work groups or small businesses).

The tools of the network include workstations with personal computers, networked software, printers, copiers, telephones, facsimiles, modems, black boxes, network servers, printer servers, utility servers, gateways and/or bridges, mainframes, minicomputers, a specific network topology, and appropriate protocols.

Information Resource Management (IRM) is another approach which has concentrated on the integration of information systems support tools. Information Resource Management is a term coined in 1974 by Booz, Allen & Hamilton, a management consulting firm. With IRM, responsibility for integration of all information rests with one department, usually the Management Information Systems (MIS) or Computer Information Systems (CIS). However, the resources themselves are distributed throughout the organization. Information management resources include telecommunications systems, records management systems, reprographics systems, graphics and publishing systems, and all computer systems. The purpose of IRM is to ensure the most effective utilization of resources by all employees, to develop standards for compatibility of software and hardware, to research and make

recommendations for purchases of equipment, to train end-users, to establish accountability, and for general systems analysis and development.

Being able to see the connection between the goals of the organization and the environment in which work is carried out to meet those goals will provide an insight into the role of the individual and technology in meeting the needs of the organization. This is a prime consideration of IRM. Through this management approach, integration of information systems support tools takes into consideration the needs of the individuals, departments, and organization as a whole in an effort to provide the right tools to the right place at the right time to enhance effective decision making for meeting the goals and objectives of the organization.

An information center is an important part of an IRM approach, although its use is not limited to organizations that adopt IRM. Some organizations feel that providing an information center confirms management's support of office automation and provides the organization with qualified people and appropriate resources for training and research. The information center becomes the training center, testing center, as well as providing the organization with the experts who are concerned with the important information systems integration issues. Illustrated below are a few of the typical functions of an information center:

a. To provide training facilities for the entire organization.
b. To design new systems for departments and divisions of the organization.
c. To hire consultants when needed to aid in training and design work.
d. To test new software to replace or upgrade existing software.
e. To research new kinds of software which can be added on to existing software. For example, add-ons for Lotus 1-2-3.
f. To evaluate new workstations which are advertised as compatible with existing equipment.
g. To read and research constantly to stay up-to-date.
h. To attend and report back on computer conferences and expositions.

Sociotechnical analysis is another approach which could be taken by an organization to ensure that human resources and technological needs are considered simultaneously when purchasing, upgrading, and/or implementing an integrated information system. Task Area 2 focuses on the salient points of this approach.

STRATEGIC PLANNING

Any approach for implementing an integrated information system must rely on elements of strategic planning. The human, organizational, and technological resources set the stage for the development of an overall strategic plan for integrating information systems tools at all levels of an organization. The elements of the strategic planning process are described and discussed below.

The strategic plan to integrate information systems must include the first four items before the plan can go forward:

a. Knowledge of the functions of the organization's business systems and how they interrelate.

b. Support for the overall organization's goals and objectives with provisions for improved productivity, improved decision making, improved profitability and competitive position, enhanced job enrichment and satisfaction, improved work environment, and consideration of the impact of change on individual employees.

c. Response to management concerns and outside forces which make it imperative that flexibility and sensitivity to change be included in the plan.

d. Support of top management. It goes without saying that integration will not take place at the bottom of the organization if there is no commitment to the plan at the top of the organization.

The next three items in the strategic plan are aimed specifically at the process for implementation of the strategic plan:

e. Selection of the team to develop the plan. The team should include a diagonal cross-section of all levels of employees, from top management to end-user. If the IRM approach is utilized, information specialists will be included. One of the most important steps taken by this team is to establish time lines and target dates.

f. Implementation of a feasibility study or problem analysis. The need for strategic planning includes phasing in information systems support tools as well as responding to a given problem which has arisen due to the need for expansion or upgrading of a present system, lack of compatibility, bugs in a system, or other situations. At this point, the team looks closely at the

problem or situation to get an idea of its scope; conducts interviews with key employees; and looks at memos, reports, or other documentation related to the problem or situation. Some organizations may want a written report at this point to evaluate the scope of the problem or project before proceeding.

g. Analysis of many forms of data. Once the go-ahead has been given to search for a solution, analysis of many forms of data related specifically to the problem will occur. These may include organizational charts, programmers' notes, end-users' notes, data flow diagrams, and files. It also includes observations of the system or jobs that will be affected to give the team members an additional source of information.

h. Evaluation of alternatives to solve problem or complete project. The next step in the process is to be able to evaluate alternatives to solve the problem or to set up an integrated system. Defining the alternatives for an integrated office system may include looking at the following factors:

(1) Output: Will data be presented and saved on paper, microfilm, magnetic tape, monitor, optical disk, or other media?
(2) Input: Will data be entered orally, through the keyboard, electronically from another system, or from magnetic tape? or combinations of the above?
(3) User interface: What level of interaction is needed for communication: two-way, one-way only, or both? Will the system be menu driven? command driven? Both? Is a help feature needed?
(4) Processing: At this point, the programmer on the planning team will need to determine the algorithmic features of the program and to determine what operations are needed to convert the input into the output. Can new inputs be added?
(5) Security: What are the safeguards that will be installed? Who needs what information from the system? What back-up procedures will be installed? What kind of error recovery procedures will be installed? Are audit trails needed? What are the authorization procedures to be followed for individuals to access the data?

i. Choose the best alternative. The next step is to choose the best alternative from several choices. Can the present system be adapted to accommodate the new requirements? Can a commercial system be purchased? What is required to customize a ready-made system or package? Does a whole new system need to be designed?

What are the costs involved for each alternative?

Here, top management again is brought in to make the final decision from the alternatives and recommendations presented by the team. At management's direction, the team will start negotiating with vendors/manufacturers before making a final selection based on price, capabilities, and service.

j. The negotiation process. The negotiation process begins with the preparation of a request for proposal (RFP). This is the organization's formal document which outlines the requirements which are needed and which is sent to the selected list of vendors. In addition, a vendors' conference may be initiated by the team to give the vendors the opportunity to ask questions, to clear up misunderstandings on the part of the vendors, and to give vendors an idea of what other vendors are offering.

The next step in the negotiating process is to evaluate the vendors' proposals to see if they match the criteria which were specified. To do this, some sort of evaluation document may be helpful to compare each proposal. The ability to get hands-on evaluation of equipment before making a final decision is helpful. Does the proposal offer a demonstration? a period of trial usage? Involving end-users, technicians, and analysts in this hands-on evaluation affords invaluable input into the final decision.

The final step in the negotiating process is to make the decision regarding a vendor, a system, a piece of software or hardware, etc.

k. Installation of the system, software, or hardware. Installing the system, software, or hardware begins with testing it, analyzing documentation, providing training, and converting to the new system. Conversion can be done several ways:

(1) On a crash basis--completely leaving the old system and turning to the new one;
(2) On a parallel basis--running both systems at once until the new one is completely debugged;
(3) On a pilot basis--one group uses the old system while another group uses the new one and as the new one runs smoothly, the others convert to it; or
(4) On a phased-in basis--the new system is adopted one step at a time.

There are obvious pros and cons of each way.

1. Maintenance of the system. The last step entails maintaining the system by debugging, modifying it as needed by vendors' technicians or by programmers in the organization, and by constantly evaluating the system. The planners in the organization then begin again to study, plan, design, and implement a new system.

TRENDS IN INFORMATION SYSTEMS

What are the trends for the automated office? Many experts feel that integration of the information systems support tools will provide a way for the office to solve high costs and low productivity concerns. However, there is much concern about making a large financial investment in an information system that rapidly becomes obsolete. Computer systems are changing more rapidly than software; but software is becoming increasingly more sophisticated and costly due to the demands from end-users. The proliferation of hardware and software is illustrated by these figures:

> Approximately 200 personal computer manufacturers exist, 800 models of personal computers, and 30,000 applications software packages continue to invade the marketplace and move into organizations. It is predicted that by 1990, the ratio of workstations to information workers will be one to one.

Is it any wonder that managers and others are overwhelmed and concerned about their decisions regarding information systems? It behooves those who are associated with and responsible for selecting information systems to match their needs with current trends and future needs with existing products and be aware of trends and technical issues.

(Note to instructor: Ask students to read articles pertaining to the topics listed below and have them report their findings to the class.)

There are some very definite questions that are being raised about the work place of tomorrow:

> How will information be safeguarded that is being transmitted over telephone, cable, microwave, and satellite systems?
>
> Will there still be central computing facilities and what will be the role of these facilities?
>
> What are some of the changes in hardware that are foreseen? Specifically, how will voice input affect the

traditional keyboard/printer operation?

What are some of the changes in software that are foreseen?

What changes are occurring in microchip technology?

What will the job requirements be for managers in the integrated office?

How will the fifth generation of computers affect all of us? How will artificial intelligence affect the work place? How about expert systems in the automated office?

What will be done to offset the recurring fears of working with and around video display terminals?

How prevalent are viruses? What will be done to avoid this potentially dangerous problem from invading and destroying the data in the work place?

(Note to instructor: A student study guide is included in the "Student Materials" section as Exercise 1-1. Suggested solutions for the case studies in Exercise 1-1 are presented in the "Evaluation" section. Test #1 also is included in the "Evaluation" section.)

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INTEGRATED INFORMATION SYSTEMS

Task Area 2

Given specific knowledge of integration principles in the automated office, **the student will be able to review the principles, concepts, and theories of sociotechnical analysis and apply them to the integrated office to the satisfaction of the instructor.**

Suggested teaching strategies: Lecture/discussion, outside readings.

The purpose of this task area is to provide the principles for the successful implementation of integrated information systems support tools utilizing the sociotechnical approach. The framework which will be presented considers the end-user environment and the technical environment as equally important when installing automated products and new work procedures into the office.

Typically, the traditional approach taken by individuals within an organization to install and/or introduce new equipment or procedures has not been sensitive to the reactions and feelings of the end-user. The large body of "failure literature" indicates that this approach has not enabled the successful implementation of new products or new systems. As noted in Task Area 1, when employees have arrived at work to find new equipment at their desks, the first inclination was to resist change. An approach such as sociotechnical analysis focuses attention on the dual nature of the automated office. **(Note to instructor: Ask students to read and share their findings from two articles related to the importance of the sociotechnical environment in the office. These articles could include topics such as Quality of Work Life movement, job enrichment related to office automation, sociotechnical aspects of office automation, human concerns in the automated office, planning and implementation strategies for integrated office systems, etc.)**

Office automation influences all aspects of office life--ways of doing work, avenues of work flow, distribution of work and work responsibilities, lines of communication between and among workers, and the reporting relationships of workers and supervisors. Change must be carefully thought out and managed. Historically, word processing was introduced into the office at the support professional level to accomplish two things: (1) to automate manual processes and (2) to provide management information. New integrated office systems are focusing on providing a whole range of tools which will enable all levels of employees to work more efficiently and

effectively. It is this fact--that all levels of employees will be affected by integrated information systems--that is changing the way that work is being done by people and organizations.

Integrated information systems include two components: (1) the "social" (people and their job responsibilities, patterns of communication, attitudes, and feelings) and (2) the "technical" (tools, techniques, and methods of doing office work) The social system (people) seeks to join together the tools, techniques, and methods of doing work in an effort to coordinate and adapt the technical system to end-user environmental needs. In other words, the social system seeks to adapt the system to the people rather than the people to the system. Changes in either of these two domains affect the other. To successfully plan and manage the changes, there is information needed about each component.

END-USER ENVIRONMENT

Placing people needs ahead of technological needs in an organization emphasizes the importance of expanding the knowledge of the office worker rather than the need to increase typing and filing efficiency. End-users' needs for information and communication drives the integration of information systems. When the people perspective precedes the technological perspective, the results are:

a. Involvement of the end-user from the outset.
b. Participation in the decisions affecting the work environment.
c. Incorporation of human factors into the designs and implementation of the new information system and new work procedures.
d. Provision for education and training of end-users along with their continuing review and refinement of the system.
e. Increased employee satisfaction with the work and the organization.

To achieve the desired results of focusing on end-user involvement, several conceptual approaches can be taken by the planners. Each of these approaches is discussed below.

a. Organizational communication. In this approach, the organization is seen as a communication system. The premise is that if organizational communication is poor, an organization is likely to have problems; if it is good, an organization's performance and overall effectiveness are likely to be good. It should follow that if a computer system can improve organizational

communication, it can improve the effectiveness of workers and organizations. Therefore, any changes should improve communication between and among end-users. Improved communication should save time, provide better access to information, improve working relationships, provide more control, etc.

The information systems technologies which involve the organizational communication perspective include voice messaging systems, E-Mail, teleconferencing (video and audio), and computer conferencing.

The main criticism of this approach is that it focuses on means (processes) rather than ends (functions, products). It is viewed sometimes as superficial and limited in its scope of office functions.

b. Functional approach. In this view, the impact of information systems is on the functions which the office fulfills. The functional approach would seek to improve the office procedures using new technology--almost the opposite of the organizational communication approach which is seen as a means--to do the real work of the office which is scheduling production, paying accounts, and negotiating contracts. Office work is not seen as "communication", "using information", or "pushing paper". From the functional perspective, office automation is using technology to perform office functions. Office procedures clearly are delineated, identified, and determined.

If this approach is used to determine new office technology, organizations must distinguish between tasks and functions. Tasks can be performed by one person in narrowly focused, routine activities. Put enough of the tasks together and a function is realized. Tasks (general office tasks and highly structured tasks) lend themselves to automation as a substitution for human labor utilizing various software applications programs, FAX, E-Mail, calculators, storage and retrieval systems, etc.--all of which can be found in the professional workstation.

The major shortcoming of this approach may rest on the fact that, while it does lend itself to identifying highly proceduralized work, it often overlooks work that falls outside of this category. Much of the nonroutine work of clerical, professional, or managerial employees cannot be proceduralized. Another criticism is its lack of methodology to examine the impact of office systems on functions. Also, failure to consider communication patterns, attitudes, job structures, and decision making

can be ignored if only this approach is taken.

c. Information Resource Management (IRM) approach. IRM has concentrated its approach on the integration of information systems support tools and the value of information to an organization. With IRM, responsibility for integration of all information rests in one department, usually the Management Information Systems (MIS) or Computer Information Systems (CIS). However, the resources themselves are distributed throughout the organization. Information management resources include telecommunications systems, records management systems (manual and electronic), reprographics systems, graphics and publishing systems, all computer systems, and the automated systems which support these resources. The purpose of IRM is to ensure the most effective utilization of resources by all employees, to develop standards for compatibility of software and hardware, to research and make recommendations for purchases of equipment, to train end-users, to establish accountability, and for general systems analysis and development.

Being able to see the connection between the goals of the organization and the environment in which work is carried out to meet those goals will provide an insight into the role of the individual and technology in meeting the needs of the organization. This is a prime consideration of IRM. Through this management approach, integration of information systems support tools takes into consideration the needs of the individuals, departments, and organization as a whole in an effort to provide the right tools to the right place at the right time to enhance effective decision making for meeting the goals and objectives of the organization.

Criticisms of this approach include the inability of being able to put a dollar figure on the value of information to the user and to the organization, inability to manage information, and the inability to deal with complex human organizational, and measurement issues of implementing an information system. This approach is seen by some as focusing on the "soft" benefits of managing information which is like trying to manage air.

d. Decision Support Systems (DSS) approach. Another approach to information systems implementation situates office systems and measurement in the context of supporting the decisions and judgments of managers and other workers. In this framework, information systems research is aimed at studying the effects of systems and

human decision making skills on the performance of complex, semistructured, or unstructured work. Automated tools which support DSS include software applications such as project planning and forecasting, database management, spreadsheet, and graphics; time-sharing services; and telecommunications. These systems also are available in the professional workstation.

Critics of this approach say that its focus on the narrow view of data (numerical) analysis makes it an inadequate framework for a total information systems design and implementation strategy. Other routine, highly proceduralized work is ignored and often overlooked in the DSS approach.

e. Quality of Work Life (QWL) approach. QWL emphasizes the impact of information systems on the nature of work, the motivation of the workers, and the design of jobs and organizations. The QWL strategy uses research, design, and implementation to optimize the effectiveness of the social and technical components of any work system.

QWL is an approach designed to encourage greater worker involvement and a more democratic atmosphere in which workers are encouraged to have a voice in the structure of their jobs. Research has shown that what turns workers on to their jobs is experiencing meaningfulness in their work, experiencing responsibility for their efforts, and having immediate knowledge of the results of their efforts. Many facets of QWL can be seen in job enrichment programs, job enlargement activities, flexitime, compressed work weeks, and job sharing. All of these facets focus on individuals having more control of and concern for the job, for their job responsibilities, and for the organization. Don Tapscott (Office Automation: A User-Driven Method) feels that QWL offers the greatest hope for the implementation of office systems because of its focus on people and the sociotechnical aspects of information systems designs. The cost of worker alienation, badly designed jobs, declining job satisfaction, and underutilized skills are difficult to quantify. Yet, employers are aware of the poor quality of work which results from these feelings. Persons skilled in QWL techniques may have a better perspective on the issues of integrated information systems design, implementation, and measurement.

Critics of QWL point out that there is no coherent theory of QWL or of QWL and integrated information systems. Research into its effectiveness has been limited only to the upper levels of the organization. Its effectiveness with the lower levels of the organization remains to be

seen. Another obvious criticism is its lack of concern for, knowledge of, and focus on integrated information systems technology.

Each of the approaches discussed above is a valid method of assessing the social aspects of the automated environment. Taken alone, however, they only provide one aspect of the sociotechnical environmental system.

TECHNICAL ENVIRONMENT

Along with the people needs related to introducing and installing new information systems, the sociotechnical perspective takes into account factors related to:

a. Computer and information sciences.
b. Industrial relations.
c. Management sciences.
d. Educational and training theories.
e. Interior design and environmental factors.
f. Ongoing evaluation of the growing number of available office systems and local area network vendors so that adequate information can be maintained and accessible for future decisions.
g. Economics, sociology, and psychology.

To provide a thorough technical analysis of an integrated information system, it is necessary to have a conceptual model of the office and the organization as a whole. This model will enable the organization to develop a rational strategy for its automation needs and implementation. Having a better understanding of the functions and relationships in an office will provide a better view of the office and its benefits to the organization. Too often, the office is separated from the organization and changes are made which are not beneficial to the organization as a whole. Therefore, this conceptual model of the office must include:

a. An understanding of the mission (goals) of the organization--a global view.

b. An identification of the key result areas which comprise the objectives of the organization. Key result areas may include higher productivity, organizational growth, organizational stability, employee satisfaction, and stockholder approval.

c. A discrete number of functions or independent operating areas with specified inputs and outputs. These areas include purchasing, marketing, billing, research and development, personnel, accounting, finance, production,

etc. These functions are broken down into subfunctions. For example, the accounting function would include accounts payable and accounts receivable which are subfunctions for sending and receiving payments.

d. A number of processes for executing the specified functions. A process shows the relationship between a series of work activities which are undertaken to perform a given function. For example, managerial, work flow, supervisory, communication, performance appraisals, information processing, and decision making are processes.

e. An understanding of the procedures which are grouped together for specific purposes. These procedures may be structured, routine, semistructured, or relatively unstructured or nonroutine. They may be performed by clerical workers, professionals, and/or managers.

f. A description of jobs in the office and their constituent activities. Jobs include the aggregate of the activities and are assigned to support professionals, accountants, research chemists, engineers, salespersons, etc.

g. An understanding of the relationship of work activities in the performance of office functions and of a given process. Activities include keyboarding, filing, communicating, reading, opening mail, dictating and transcribing, scheduling, selling, meeting, traveling, etc.

How do these concepts relate to the five approaches suggested in the End-User Environment outlined above? The model depicted in Figure 1 may help answer this question.

Office Model

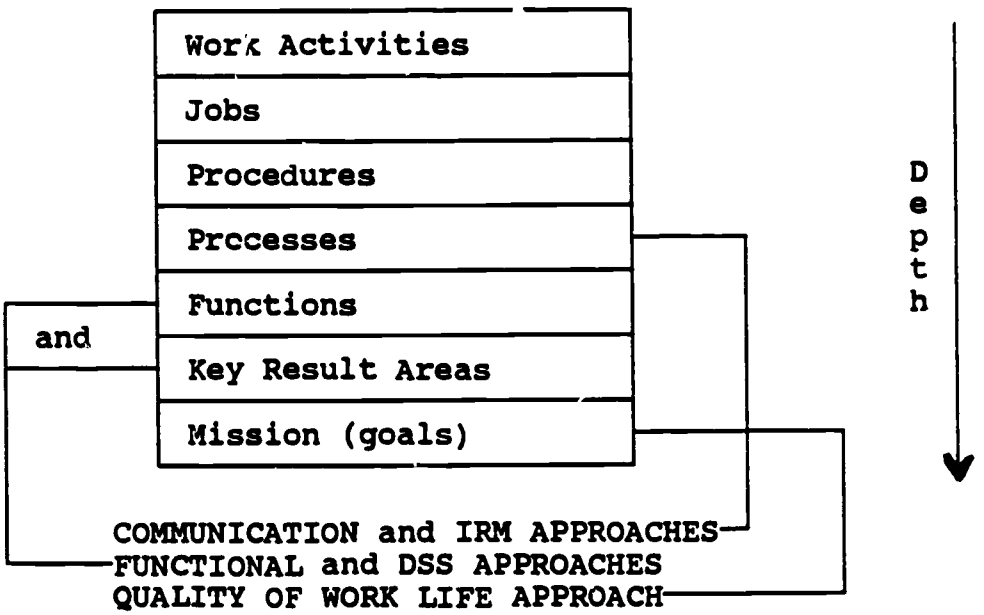

Figure 1.

In the model in Figure 1, the Mission of the organization is seen as the deepest part of the model (as depicted by the arrow). The six other levels--Key Result Areas, Functions, Processes, Procedures, Jobs, and Work Activities--show less depth as one moves up from the Mission level. The relationship of the approaches to the hierarchy of office concepts shows the penetration into the organization by each approach. This model serves to show that the Quality of Work Life approach reaches <u>all</u> levels of the office.

Caution should be taken to remember that there is value in each of the approaches and that while the QWL approach may focus on the individual in the office it may lack focus on the technology of information systems. **(Note to instructor: Discuss the implications of each of these approaches from the discussion in the End-User Environment section as it relates to the office concepts. Ask why each approach relates to its corresponding level(s).)**

Each of the five approaches is not mutually exclusive. Some theorists would conclude that QWL methods are applicable to integrated office systems design and evaluation. Some DSS theorists argue that QWL is an essential aspect of DSS. To

QWL leaders, organizational communication would fall under QWL. For IRM managers, procedures and functions should be a part of the objectives of any office system design.

END-USER ENVIRONMENT + TECHNICAL ENVIRONMENT = SOCIOTECHNICAL ANALYSIS

Emphasis on the end-user environment draws upon theories of organizational development, industrial psychology, strategic planning, operational research, and systems analysis. It also uses experimental procedures, statistical analyses, modeling, and simulation techniques. Sociotechnical analysis is evolutionary in its approach to implementing systems which combine the value of strategic planning and practical experience to ensure continued success in the evolution of integrated information systems.

Whichever approach is used to accomplish the balance between the social and technical aspects of the office, it is imperative that the approach has a positive impact on efficiency, effectiveness, and productivity in the office. Efficiency relates to reducing inputs which are external to the office (costs of labor, materials, services, etc.) and which are internal to an office (waiting time, filing, looking for information, filling out forms, etc.) to promoting greater outputs (sales, contracts, accounts processed, etc.). The effectiveness of a system is measured in the quality of products from the office, such as better management reports, more revenue, improved service to customers, quicker retrieval of documents, etc., not just greater quantities of goods or services. The ratio between input and output in the office is referred to as productivity: improving quantity or quality of products using the same or less input resources.

An anonymous writer offers the following synopsis of the lack of attention to efficiency and effectiveness:

> The vendor tells us that we've doubled our productivity because we doubled the number of memos and reports we can generate in a week. Somehow it just doesn't feel right...

Perhaps more than any other factor, vendors have promised greater productivity but have sacrificed organizational and personal efficiency and effectiveness. The urgency to automate--installing word processing systems and telecommunications capabilities and connecting micros to mainframes--has caused other problems of incompatibility, insufficient policies and procedures, lack of security and integrity of data, and uncooperative and uncommitted workers.

An approach which measures both internal and external office activities, processes, and procedures with organizational performance and office products, and technology along with the social concerns related to work flow, communication patterns, decision making structures and processes, job responsibilities and functions, and information access focuses on the strength of a sociotechnical analysis. Project teams, design specialists, information resource managers, or whatever kind of configuration appointed by management to implement an integrated information system in an office can ensure greater success by working with end-users to determine the character, size, location, and overall implementation strategy.

An effective sociotechnical analysis to implement an integrated information system may use several methods:

a. A pretest-posttest pilot system,
b. A phased-in approach,
c. A crash approach, or
d. A parallel approach to install or convert to a new or upgraded system.

Whatever the approach, involving the people who will be affected by the plan will go a long way toward ensuring the successful implementation of any integrated information systems plan.

SUMMARY: The principles, theories, and concepts of sociotechnical analysis applied to integrated information systems should provide insight into the value of combining people and systems to effect successful implementation.

Exercise 2-1 in the "Student Materials" section is included to give students the opportunity to apply the sociotechnical approach to one of the scenarios provided in Task Area 1. Suggested solutions are included in the "Evaluation" section.

INTEGRATED INFORMATION SYSTEMS

Task Area 3

Given the specific knowledge of database systems, the student will be able to analyze data flow and review database systems within business systems in order to make recommendations for selection, configuration, and installation of hardware components and software applications to the satisfaction of the instructor.

Suggested teaching strategies: A case study which utilizes decision making, problem solving, project planning, and research skills.

(Note to instructor: Review and discuss the following to sufficient depth of understanding which will lead into the case study.)

Space management and office design have a direct effect on the quality and quantity of work which is performed in the office. Factors which affect quality and quantity of work include sufficient space in which to work; effective work flows; professional workstations that permit and encourage good working methods and habits and effective communication channels; coordination of the use of space and ergonomic factors which include lighting, color, noise control, and ventilation; provision for comfort and convenience; and support for management's philosophy of effective and efficient space utilization with flexibility in layout for expansion or contraction of space needs.

1. Define work flow. Work flow is the movement of information (in raw and manipulated formats) vertically between superiors and subordinates or horizontally among workers on the same level. Why is it important to know about work flow?

2. Discuss and list the human needs to be considered in an effective space management program and office design layout.

   Personal space needs: Personal space is the privacy "bubble" surrounding the worker. This space may be broken down into four distances:

   a. Intimate space: skin contact to 18" (usually limited to persons who are invited into this space)
   b. Personal space: 18" to 4' (usually the space which one can comfortably control at work)

c. Social distance: 4' to 12' (usually the space in which one can comfortably hold a conversation)
d. Public distance: 12' and outward (usually "waving" distance and outward)

Territoriality needs: Territoriality is the office area which is under control of each worker. This space is generally the personal space around the office worker. Each worker in the automated office seeks to establish his or her "territory" in the automated office to fulfill psychological needs related to belonging and feeling in control of his/her work.

Functional office space needs: Regardless of the use of automated equipment, it makes organizational sense to continue to group people together who are performing tasks related to specialized functions to enhance work flow and to minimize movement and noise that are caused by people as tasks are performed.

3. Discuss office layout designs.

Conventional plan: The conventional office layout design (also known as the traditional plan) is characterized by wall barriers to isolate work areas. Usually, in the conventional plan, private offices denote status. Specialized work functions are grouped together in departments with workers in private offices or in large offices which are in larger walled offices. Critics of this office layout believe that it prevents communication and human interaction, hinders effective work flow, and slows down the production process. It is seen as an inflexible arrangement which requires added costs of moving walls when redesigning work areas.

There are benefits in this plan, however. Territoriality issues are not a problem in this plan, as each worker can identify and control his/her work area. Privacy is an integral part of this office layout and is not an issue.

Careful consideration should be given in this plan to the placement of departments so that those with the most contact with the public will be placed near the entrance; aisles and doorways are convenient and unobtrusive for workers in all departments to minimize traffic; and departments which need the most contact with each other or need to have access to information or equipment will be placed as close to each other as possible. Will the value of the conventional plan be enhanced as all levels of workers in the automated office need privacy and quiet to plan and execute their work responsibilities as machines take over more of the routine, non-thinking

tasks?

Open office plan (sometimes called office landscape) is characterized by open space. There are no permanent walls and corridors. It has movable/portable partitions which make up a workstation with its own lighting. Plants, bookshelves, and filing cabinets can be moved and arranged in groups to form work area dividers and to facilitate access to information and equipment. Private offices are kept to a minimum. Privacy is provided by using plants and sound-absorbing screens or partitions which are usually wired with electrical outlets. Status of workers is determined by work assignments rather than private offices or locations. The effect of the open plan is a feeling of openness and airiness with enhancing colors and lighting.

In some open office arrangements, executives and managers may use private offices for isolation and privacy. Other supervisors, however, are located near their staffs. Private conference rooms or meeting rooms also may be provided for customers, clients, or other in-house meetings which require a certain degree of privacy. When the open office layout and the conventional plan are combined, it sometimes is referred to as the American Plan.

Advantages to the open layout design include lowered construction and energy costs, more usable floor space, flexibility in rearrangement and/or redesign of the work place, and lack of barriers to communication and work flow among and between workers. Disadvantages to the open layout design focus on lack of privacy, noise factors, and designs which lack consideration of factors which would enhance work flow, communication, and productivity. Research continues to survey the impact of automated equipment and the use of the open layout design on the automated office environment.

4. Discuss the work center concept.

One additional office space plan is the work center or individual or professional workstation. When automated equipment is added to the individual workstation, it is called an automated work center. The work center concept assigns basic furniture and equipment to each station--desk, chair, table, counters, shelves, files, machines, computers (usually personal computers), disk drives, software, modems, FAX, interfaces, printers, storage media, telephone, and other equipment as needed. When two or more of these workstations are put together, they are referred to as group workstations. When a similar

facility is provided for executives, it is called an executive workstation and provides automated equipment which enable the executive to communicate, access data, and, in some instances, input text.

Attention to factors such as task lighting, sound-absorbing materials and printer shields, and ergonomic furniture designs are critical in the design of the professional workstation.

5. Define and discuss ergonomics.

Ergonomics is the science that explains the relationship of workers to the physiological and psychological factors in the work environment. These factors include the effective use of color, quantity and quality of lighting, floor coverings, noise reduction techniques, and the air environment (temperature, humidity, circulation, and cleanliness), and personal and data safety and security considerations. Attention to these factors can have an impact on individual productivity, efficiency and effectiveness; operating costs; and work satisfaction. Ergonomics integrates the use of space, furniture and equipment, and other physiological factors to meet the psychological needs of workers on the job.

6. Additional factors related to work flow, space management, and ergonomics are included in Task Area 1.

7. Students, individually or in groups, should use the discussion of these factors and the factors from Task Areas 1 and 2 to complete the assignment in the case study included in the **"Student Materials"** section as Exercise 3-1. Suggested solutions are included in the **"Evaluation"** section.

At least four class periods will provide students with the opportunity for experience in analyzing an actual case study.

Selected References

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Keeling, Norman F. and B. Lewis Kallaus. (1987) Administrative Office Management. Dallas: South-Western Publishing Company.

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INTEGRATED INFORMATION SYSTEMS

Task Area 4

Given a records management project, the student will be able to evaluate the need for, set up, and maintain a records inventory program which might include records transfer, records retention, and records destruction to the satisfaction of the instructor.

Suggested teaching strategies: This project lends itself easily to project work, with oral and written reports submitted to the instructor. Field trips to off-site storage centers, a commercial records center, or to an organization which has an established records management program; guest speakers which represent the Association of Records Managers and Administrators (ARMA) and/or the above-mentioned organizations; and a field trip to a collegiate records center will provide "real" world examples.

Once information arrives at its final destination, a major set of problems arises. How will it be stored and easily retrieved or accessed? On what media will it be stored? Who has access to it and why? If paper is the medium for storage, what are the problems associated with its storage and retrieval?

(Note to instructor: Review and discuss the following to sufficient depth of understanding which will lead to the completion of a records management project.)

1. Define record. A record is written, oral, photographed, printed, or graphed evidence that information has been collected and kept for decision making purposes.

2. Define records management. Records management is a process or providing the right information to the right person at the right time at the least possible cost; or it is the process of controlling records from origination to final destination. An effective records management program includes a company-wide procedure for records creation, records storage, records retrieval, records maintenance, and records disposition. Figure 1 illustrates the objectives of a company-wide records management program.

RECORDS MANAGEMENT PROGRAM OVERVIEW

RECORDS CREATION	RECORDS STORAGE	RECORDS RETRIEVAL	RECORDS RETENTION	RECORDS DISPOSAL
Determine need of record	Set up storage coding	Set up access to records	Set up retention system	Set up inactive storage
Control creation of record	Identify equipment and supplies for storage	Set up charge-out system	Survey records currently stored	Use micro-forms as practical
Design needed forms	Set up storage and protection process	Control return of charged-out records	Develop retention schedule	Set up transfer of records from active to inactive status
Set up cost standards to control creation of records	Select and train personnel	Audit and trail use of records	Set up records protection and safeguards	Set up schedule to destruct all records

Figure 1.

(Adapted from: Administrative Office Management, 9th ed.)

A records management program is only possible with the support of top management.

3. Define records management system. A records management system manages records by planning, organizing, staffing, and controlling functions.

4. Define records cycle. The records cycle has many of the same elements as the information processing cycle. Each of these elements is discussed below.

   Inputting. Origination of records occurs in the automated office through dictating, handwriting, word processing, communicating word processors, and receiving electronic mail or other forms of telecommunications. All levels of workers in the office originate records.

   Processing. A record is processed in the organization from creation to final disposition through various elements:

   (a) Distribution which may be intracompany, intercompany, or outside of the organization. This is the element of the records cycle which allows the appropriate persons to have access to needed information on a timely basis.
   (b) Being able to provide the right information for effective decision making, for answers to questions, for reference or legal requirements, or for necessary documentation is part of the production cycle of processing.
   (c) Maintenance is a general term for the element of the records cycle which concerns factors in maintaining records filing, storage, and retrieval.
   (d) A file is an entire collection of records. Filing/Storing is the preparation and placement of files according to a predetermined plan.
   (e) Retrieval is the physical or electronic act of finding a requested file or information from within a specific file.
   (f) Disposition is the final phase in the processing element. This is the actual removal of a record from the system for destruction or archiving. This is usually done according to a records retention schedule which provides a timetable of records storage or disposal. The retention schedule is influenced by requirements from outside regulatory agencies and established company policies. Records may be purged from a system by shredding, incinerating, pulping, or disintegrating chemically. Records may be archived in off-site records storage centers, underground mines prepared for records storage, or a combination of these two methods.

Outputting. This element pertains to information which has been moved through the record cycle at the least possible cost in a timely manner and is available in some medium (paper, film, magnetic disk, optical disk, or magnetic tape) for the person needing it. The output may be available on-site or off-site.

5. Discuss the following outputting methods which are available to persons wanting to store and retrieve information.

   (a) Micrographics. Micrographics is a method of filing information on film (microfilm) in miniaturized images. Micrographics eliminates the need for paper records and can save approximately 95 to 98 percent of the space needed for storing records in the office. Using micrographics can reduce letter-size documents to a ratio of 10 to 1. Consider this example:

   One shoebox-size microfilm file cabinet can hold the equivalent of the contents of about 160 four-drawer, letter-size files. A 100' roll of 16mm film will store 3,000 photographed letters, 5,800 6"x4" cards, or 13,000 bank checks.

   (b) Microforms. After an organization has decided to use micrographics, a suitable format and related materials may be selected from one or more of the following:

   Roll film is a microform that may be stored on an open reel of film and housed in cartridges or in cases. It is useful for paper work that can be numbered and stored in sequence. Three sizes are available: 16mm used for correspondence, checks, and invoices, and 35mm and 105mm used for engineering drawings and maps.

   Aperture card is an 80-column keypunch card 7-3/8"x3-1/4" that has an opening in which a strip or frame of microfilm is mounted.

   Microfilm jacket is a folder consisting of clear material sealed together on two or more sides which has channels into which microfilm can be slipped from one open end. One sheet of microfilm jacket can store approximately 60 to 70 documents.

   Microfiche is a sheet of film that may contain 100 to 200 miniature images in a grid pattern and is available in several sizes. The most common size

is 4"x6" which holds 98 documents per fiche (the general term used to include all film that falls into this category). A type of microfiche developed by the National Cash Register Company is called ultrafiche. Ultrafiche permits tremendous reduction rates to be used when filming material. For example, over 1,200 printed pages of the Bible can be reproduced on approximately two inches of this film.

Holofiche is a sheet of film that can contain up to 20,000 pages in a 4"x6" ultrafiche. The cost of storing material on holofiche is approximately one percent as much as storing information on magnetic tape or disk ($10 to store on disk vs 10 cents to store on holofiche). To be read in its original form, the holofiche must be decoded by the computer.

Considerations before microfilming include condition of records, accessibility to files, use of files, when to film, who will film, kind of records wanted, purchase of equipment, and type of available storage facilities.

6. One of the most promising storage media is the optical disk. An optical disk is a small, mirror-like disk on which large amounts of information (text, data, visual, and sound) may be stored in high density formats. Optical disk storage has an advantage over most forms of records storage. A single 12" optical disk can hold 100 billion bits of data, a storage density approximately 25 times greater than on magnetic disks. A single optical disk can hold all of the information found in an entire set of encyclopedias. Sound tracks also can be added. Optical disks could replace 35 reels of magnetic tape, 20 rolls of microfilm, or 1,500 fiche that have been output from a computer.

   Indexing capabilities with optical disks are improved as they can be searched randomly and accessed by chapter, section, page, or topic. The optical disk can be stopped at any point so that more time can be spent examining the contents of a single page. A hard copy can be obtained by connecting printing equipment such as an ink jet or laser printer to the optical disk player. Presently, production costs are still high, files cannot be easily updated once they are created, and equipment has to be purchased to view the optical disk file. Erasable optical disk storage is under development.

7. Discuss computer output microfilm (COM). COM is microfilm used in the place of paper as the computer

output. Instead of producing paper copies, the COM machines are capable of producing microscopic microfilm images from computer databases onto a roll or sheet of film.

To use COM, the information stored in a computer database is accessed by keyword(s) or word(s) in the document's profile and stored on magnetic tape or moved to a microfilm recorder. The microfilm recorder accepts data directly from either the computer or from the magnetic tape on which the output is stored. The film is developed by the recorder or removed and sent to some other equipment for development. Duplicators can make as many copies of the developed microfilm as needed. After the film is developed, it can be viewed on a viewer station. A paper copy can be produced from the microfilm.

The advantages of using COM include speed, costs, and space. COM is one aspect of networking that allows film to become the medium for recording information that has been communicated from an information processor. It provides the ability to record computer output directly onto microforms rather than to print it onto paper.

8. Discuss computer-assisted retrieval (CAR). When an attached computer is used to assist retrieval of data from a piece of film, the process is called computer-assisted retrieval. Computer-assisted retrieval can provide users with either partial or total retrieval assistance. In one type of CAR, a computer can search the information base and generate lists that help direct users to the location of specific micrographic images. Still another CAR system allows the computer to search and identify the location of each desired micrographic image, move to the correct frame, and display the image to the user. **(Note to instructor: Ask students to read articles related to CAR and report their findings to the class.)**

9. Discuss computer-input microfilm (CIM). CIM is a process that is the reverse of COM. When using COM, information is stored on microfilm as output. When using CIM, microfilm is used as input to the computer. A frame containing information is scanned by the computer and converted from printed words on film into electronic signals that the computer understands for storage onto magnetic tape. Once this information is digitized onto magnetic tape, it then can be used by the computer once again to read, manipulate, or revise previously processed information. CIM cannot be physically changed or updated. New updated files on microfilm can be created

using COM. Generally, the CIM process is utilized to retrieve and use infrequently needed information.

10. Discuss access to information through databases. The purpose of an effective information system is to provide the right information to the right person for effective and timely decision making. Access to and retrieval of the right information is a key to successful business operations. A database in an organization is capable of containing large amounts of data produced by a computer. It is similar to a file drawer filled with records which are cross-referenced.

    Once data have been stored and cross-referenced in a structured database format in a computer for easy, rapid retrieval by management, managers have an effective way to control the available data in their companies. Database management systems (DBMS) eliminate duplication of paper files and information and prevent data redundancy--the existence of the same information in different forms in different offices. Establishing a database eliminates data redundancy because information that appears repeatedly throughout all records (such as customer's name, address, social security number, credit limit, etc.) is filed only once in a database. Important issues which confront the automated office relate to data ownership, data access, and data integrity.

    Over 50 manufacturers currently offer DBMS software or hardware or both. Some of these include IBM, Cincom, Intel, Software AG, Ashton-Tate, Infodata, Claris, and Cullinane. This kind of software may be the ultimate tool of the 1990's as the amount of information continues to proliferate the work place and as software costs become a greater part of computer costs.

    Organizations today must take a structured approach to organize and cross reference data for ease of access. CAR and COM are two effective approaches being used to access large databases. Storage media, such as microfilm, hard copy, and optical disks also provide access to large amounts of data. However, few standards exist for indexing, storing, or cross-referencing data stored in this way.

11. Access to information external to the organization is becoming more and more available through the use of database time-sharing services. Some of these services are discussed below.

    Teletext and videotex are types of electronic publishing services that make text and graphics information stored

in a computer available through a television or a video display terminal. To use these services requires the addition of a small computer memory and control pad or keyboard to a TV or VDT. Services supplied by teletext services include news headlines, entertainment lists, captions for the hearing impaired, airline schedules, classified ads, and other easily condensed material.

Videotex (spelled "videotext" in England) provides access to large, centralized databases by the home user. Most videotex services have 5,000 or more pages of accessible information such as electronic mail, personal computer functions, and in-home banking and shopping.

Time-sharing databases provide a variety of services which give users access to vast amounts of information that have been indexed and stored in a database computer. The information can be accessed by communicating from any information processing terminal to the database service computer, using modems and communication software over telephone lines. Some are available through cable television systems. A few of these services are discussed below.

Dow Jones News/Retrieval Services is a 90-day inventory of news from Dow Jones, The Wall Street Journal, and Barron's National Business and Financial Weekly, and includes price quotations of securities listed on the four major U.S. stock exchanges. Available from Dow Jones Information Services.

The Source is a compilation of 1,200 services including UP/news wires, investment marketing information, and programs that perform business calculations. The parent company is Reader's Digest Association, Inc.

Westlaw provides computer-assisted legal research with case summaries and classifications of headnotes by digest topic and key number. This service includes information such as State Case Law, Federal Case Law, Federal Statutes, Code of Federal Regulations, Federal Tax Library, Shephard's Citations, and Forensic Service Directory. Put out by Westlaw Publishing Company.

Dialog Information Retrieval includes indexes of articles related to chemistry, education, business/ economics, science and technology, law and government, energy and environment, social sciences and humanities, and medicine and biosciences cited in 400 business-related publications. Private File Services are available for users who wish to store their own private databases. Available from Lockheed Missile and Space Company, Inc.

Other services of this type include Compu-Serve, Official Airline Guide (OAG), UPI, Tymnet, Telenet, and others.

12. Discuss the purposes of an information/data policy. An effective policy which describes the purposes of information, how it will be accessed, processed, and manipulated aids in assuring that decisions are made on valid, up-to-date, correct, and sufficient data. In addition, a policy also may cover the purchase and maintenance criteria for records management equipment--filing equipment, media, labels, folders, etc.--and users' responsibilities. Specifically, elements of an effective policy may speak directly to the following questions.

What the value of information to the organization?

What types of equipment and media may be purchased and from whom?

What is the role of the user of information?

What types of preventive and emergency maintenance measures are available?

What vendors have been approved to make repairs or provide maintenance?

Who in the organization is the information "guru"?

What is management's ethical position toward data?

13. Discuss the following questions related to data ownership, data access, and policies regarding digitized files.

How is ownership of data determined in an organization?

What do ethics, values, and standards have to do with data ownership?

Why is a policy needed regarding data ownership in an organization? What is the value of the policy relating to data?

14. Discuss the following questions related to data security and integrity issues.

What are some of the more common methods of protecting data in an organization's database? Discuss each.

What is data redundancy? Why is it an issue in the automated office?

What is data integrity? What are the ramifications of ignoring data integrity?

Why is a policy needed regarding data integrity and security?

What kinds of guidelines should be established in a policy which provides for security of data and integrity of data?

SUMMARY: Records include all information on any medium. A system to manage the creation, storage, retrieval, maintenance, and disposition of records is called records management. The purpose of a records management program is to provide the right information to the right person at the right time at the least possible cost. Storage media for information may include microfilm, hard copy (paper), roll film, computer output microfilm, magnetic tape or disk, and optical disk. This latter medium holds the greatest promise for the future for the capture and retrieval of large amounts of information.

An organization must maintain a firm, well-thought-out policy regarding access to and use of digitized information. A management policy statement will establish guidelines and protection of one of the organization's most valuable assets--information.

To understand the value of records and organizational information, students will complete a records management project. Many of these projects are available from textbook publishers. Some of these are listed below.

Records Management: Integrated Information Systems, 2nd ed. Patricia Wallace. Applications manual includes decision making exercises and mini-simulations to provide practice in applying the concepts of efficient records management (as opposed to merely records handling). New York: John Wiley & Sons.

Microfile: A Database Filing Program. (1987) Dallas: South-Western Publishing Company.

Alphabetic Indexing Rules: Application by Computer. (1984) Dallas: South-Western Publishing Company.

Records Management. (1987) Mina M. Johnson and Norman F. Kallaus. Includes Records Management Projects, a filing practice set containing 13 realistic assignments. The text and projects together allow students to practice storage and retrieval under conditions similar to those in a business office. Dallas: South-Western Publishing Company.

Multimedia Learning System Records Management. (1984) Includes an optional records management practice set. Dallas: South-Western Publishing Company.

Records Management Projects. (1982) Dennis Bauer. Reston, VA: Reston Publishing Company, Inc.

101 Database Exercises. (1987) Jeffrey R. Stewart, Jr., Sandra R. McMinnis, and Nancy M. Melesco. New York: Gregg/McGraw-Hill Book Company. A text-workbook.

Records and Database Management, 4th ed. (1988) Jeffrey R. Stewart, Jr. and Judy Greene. Has a correlated simulation entitled Records and Database Simulations. New York: Gregg/McGraw-Hill Book Company.

...Others.

Selected References

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Ricks, Betty R. (1988) Information Resource Management: A Records Systems Approach. Dallas: South-Western Publishing Company.

Thomas, Violet S., Dexter R. Schubert, and Jo Ann Lee. (1983) Records Management: Systems and Administration. New York: John Wiley & Sons.

Wagoner, Kathleen P. and Mary M. Ruprecht. (1984) Office Automation: A Management Approach. New York: John Wiley & Sons.

INTEGRATED INFORMATION SYSTEMS

Task Area 5

Given a variety of information systems, media, software, hardware, peripherals, telecommunications, networking, and other resources, the student will be able to demonstrate through integration of up-to-date knowledge of information systems that decisions can be made to analyze, upgrade, update, and respond to the needs of end-users and management regarding planning and organizing for change in media, software, hardware, peripherals, telecommunications, networking, and other information resource planning to the satisfaction of the instructor.

Emphasis in this section is placed on skills related to research; knowledge of hardware and software; ability to troubleshoot equipment and problems; written and oral communication; and interpersonal skills related to negotiations, teamwork, follow up and follow through, and knowledge of the organization.

Suggested teaching strategies: Case study, using project teams. The emphasis is on problem solving, decision making, project planning, and communication.

Students should work in project teams to complete the following requirements of the case study included in the "Student Materials" section as Exercise 5-1.

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The case study in Exercise 5-1 was written in 1983 by Steelcase Inc., Grand Rapids, Michigan, and the American Productivity Center, Houston, Texas. It is based on office automation decisions that were made by Digital Equipment Corporation (DEC) in the early 1980's. Departments and job procedures remain the same at this time. However, it will become evident as you and your students read through the case that changes should take place to bring the company's automated system up-to-date. In addition, a thorough analysis of the approach taken by DEC to install office systems is undertaken.

To complete the objectives of this task area, analyze the situation presented for the purposes of making suggestions for upgrading and/or updating equipment (hardware), software, media, telecommunications, networking, and other peripherals at DEC. Use the questions which appear throughout the case study as the basis for class discussions and as the basis for project work and oral and written reports.

A written report will be presented to the instructor.

(Note to instructor: A format for the oral and written reports is included in the "Student Materials" section. Suggested solutions to the case study are included in the "Evaluation" section.)

Integrated Information Systems

course six

Visuals

SCENARIO #1

YOU COME INTO YOUR OFFICE MONDAY MORNING TO FIND YOUR DESK PILED HIGH WITH PAPER FROM BOB JOHNSON, YOUR SUPERVISOR. HE HAS WORKED OVER THE WEEKEND AND IS ON A BUSINESS TRIP UNTIL THURSDAY. ON TOP OF THE STACK OF PAPERS IS A NOTE WITH THIS INFORMATION:

1. I HAVE LEFT DICTATION FOR YOU ON THE DICTATION MACHINE. THE LETTER TO SAM NEEDS TO GO OUT RIGHT AWAY. THE OTHERS ARE ROUTINE. PRINT AN EXTRA COPY OF THE LETTERS FOR MY READING FILE.

2. I HAVE LEFT A ROUGH DRAFT OF A CHART I WOULD LIKE TO HAVE SENT TO ME AS SOON AS YOU CAN GET RONNIE TO MAKE IT. I NEED IT FOR TUESDAY'S MEETING. CALL JOAN TO SEE IF YOU CAN USE THEIR FAX.

3. I DIDN'T HAVE TIME TO WRITE A MESSAGE TO THE STAFF ABOUT A MEETING ON FRIDAY. CALL THEM AND SET IT UP FOR 10 A.M. FRIDAY MORNING.

4. I WILL KEEP TRACK OF MY DAILY EXPENSES SO THAT WE CAN GET THE REPORT IN ON A TIMELY BASIS. CALL MY STOCKBROKER EACH DAY AND GET MY STOCK QUOTATIONS. LEAVE THE INFORMATION ON MY DESK.

5. I LIKE YOUR RECOMMENDATIONS FOR THE UPGRADED EQUIPMENT. CAN YOU GET CHARLIE ON THEM RIGHT AWAY?

6. BEFORE YOU LEAVE THE OFFICE THURSDAY, TYPE UP MY CALENDAR FOR NEXT WEEK. I'D LIKE TO HAVE IT THURSDAY NIGHT.

7. SEE YOU FRIDAY.

SCENARIO #2

YOU COME INTO YOUR OFFICE MONDAY MORNING TO FIND MESSAGES ON YOUR COMPUTER FROM BOB JOHNSON, YOUR SUPERVISOR. HE HAS WORKED AT HOME OVER THE WEEKEND AND IS ON A BUSINESS TRIP UNTIL THURSDAY. THE MESSAGES CONTAIN THE FOLLOWING INFORMATION:

1. I HAVE LEFT DICTATION FOR YOU ON THE COMPUTER. THE LETTER TO SAM NEEDS TO GO OUT RIGHT AWAY. THE OTHERS ARE ROUTINE.

2. I HAVE LEFT A ROUGH DRAFT OF A CHART I WOULD LIKE TO HAVE SENT TO MY COMPUTER IN MY HOTEL ROOM AS SOON AS YOU CAN GET AROUND TO IT. I NEED IT FOR TUESDAY'S MEETING.

3. I DIDN'T HAVE TIME TO DELIVER A MESSAGE TO THE STAFF ABOUT A MEETING ON FRIDAY. PLEASE DELIVER IT FOR ME. IT IS IN MY E-MAIL.

4. I WILL SEND MY EXPENSES TO THE MAILBOX, SO LEAVE MY COMPUTER ON. ALSO, I WANT TO ACCESS DOW JONES ON MY COMPUTER FROM THE HOTEL, SO LEAVE ANY MESSAGES YOU HAVE FOR ME.

5. I LIKE YOUR RECOMMENDATIONS FOR THE UPGRADED EQUIPMENT. LET'S DO IT. WHAT'S THE NEXT STEP? I'D LIKE TO DISCUSS YOUR TENTATIVE PLAN OF ACTION BY FRIDAY AFTER STAFF MEETING.

6. BEFORE YOU LEAVE THE OFFICE THURSDAY, UPDATE MY CALENDAR FOR NEXT WEEK. I'LL BE HOME LATE THURSDAY AND I'LL ACCESS IT FROM HOME.

7. SEE YOU FRIDAY AT THE STAFF MEETING.

8. AFTER REVIEWING BOB'S INFORMATION, YOU ACCESS YOUR SCREEN WHERE WITH A TOUCH OF YOUR FINER YOU ARE ABLE TO CALL UP YOUR CALENDAR, THE UPGRADED EQUIPMENT PROPOSAL, AND OTHER TASKS.

THE TRADITIONAL OFFICE

CHARACTERIZED BY ONE-ON-ONE RELATIONSHIP WITH ONE OR MORE "BOSSES"

WHAT ARE SOME OF THE OTHER CHARACTERISTICS OF THE TRADITIONAL OFFICE?

THE AUTOMATED OFFICE:

WHERE TECHNOLOGY OF COMMUNICATIONS
AND INFORMATION HANDLING
AND INTERACTIONS AMONG PEOPLE
ARE COMBINED TO MANIPULATE
INFORMATION FOR BUSINESS
DECISION MAKING.

CHARACTERISTICS OF THE AUTOMATED OFFICE:

BETTER WORK DISTRIBUTION
ACCESS TO INFORMATION
INCREASED PRODUCTIVITY
$
FREEDOM FROM BORING, REPETITIVE TASKS
INCREASED SKILL LEVELS
CAREER OPPORTUNITIES

THE PROFESSIONAL WORKSTATION
GROUPS TOGETHER
MANY INFORMATION SYSTEMS
COMPONENTS, SUCH AS

COMPUTERS
RECORDING MEDIA
PERIPHERALS
SCANNERS
IMAGE PROCESSORS
TELECOMMUNICATIONS
NETWORKS
NETWORK SERVERS
SOFTWARE

INFORMATION SYSTEMS

IS THE

INTEGRATION OF 3 RESOURCES:

HUMAN

ORGANIZATIONAL
(AND ADMINISTRATIVE PROCEDURES)

AND

TECHNOLOGICAL

WHICH MAKES IT POSSIBLE
TO ACCESS, PROCESS, AND DISSEMINATE
INFORMATION FOR
EFFECTIVE
DECISION MAKING

INTEGRATION

IS THE METHOD
BY WHICH TECHNOLOGY
WILL COMBINE
BUSINESS SYSTEMS
INFORMATION SYSTEMS SUPPORT TOOLS
AND
PEOPLE

FOR THE PURPOSE OF
MAKING CHANGES IN
JOB FUNCTIONS TO

PROCESS
COMMUNICATE
AND
UTILIZE

INFORMATION
EFFICIENTLY FOR
EFFECTIVE DECISION MAKING

THE PUSH/PULL ON THE OFFICE:

RAPID TECHNOLOGY CHANGE (PUSH)

DEMAND FOR INCREASED PRODUCTIVITY (PULL)

(AT ALL LEVELS)

HUMAN CONCERNS BROUGHT ABOUT BY NEW TECHNOLOGY

ORGANIZATION OF WORK
INTRODUCTION OF COMPUTERS
PATTERNS OF ORGANIZATION
SOCIALIZATION OF PEOPLE
ISOLATION BY COMPUTERS
RESISTANCE TO CHANGE
HEALTH AND SAFETY
ERGONOMICS

"THERE CAN BE NO HIGH TECH WITHOUT HIGH TOUCH."

--JOHN NAISBITT, MEGATRENDS

HUMAN RESOURCES CONSIDERATIONS

ERGONOMICS

PRIVACY NEEDS

HEALTH AND SAFETY

TRAINING AND CONTINUING EDUCATION

NEW CAREER PATHS

HUMAN RESOURCES

DISCUSS THE FOLLOWING COMMENT:

"TOO MANY COMPUTER-BASED SYSTEMS HAVE BEEN DESIGNED ON TECHNOLOGICAL BREAKTHROUGHS...WHICH ARE INSENSITIVE TO THE LIMIT OF MAN'S RATIONALITY AND THE SOCIAL NEEDS WHICH MUST BE MET WITHIN ORGANIZATIONAL STRUCTURES."

ERGONOMIC CONCERNS

ANTHROPOMETRIC
HEIGHTS
REACHES
ANGLES
SURFACES

SENSORY
LIGHT
SOUND
CLIMATE CONTROL

PRIVACY
PERSONAL SPACE
TERRITORIALITY

PSYCHOLOGICAL
AESTHETICS
DESIGN
INDIVIDUALITY
FACE-TO-FACE
SENSE OF BELONGING

ARRANGEMENT

HEALTH AND SAFETY FACTORS

VIDEO DISPLAY TERMINAL

WRIST

POSTURE

NECK PAINS

BACKACHES

FATIGUE

VISUAL

HEARING

SCREEN GLARE AND COLOR

ORGANIZATIONAL RESOURCES

BUSINESS FUNCTIONS

ORGANIZATIONAL PATTERNS

TELECOMMUTING

JOB RESPONSIBILITES

WORKING RELATIONSHIPS

REPORTING RELATIONSHIPS

MATRIX ORGANIZATION

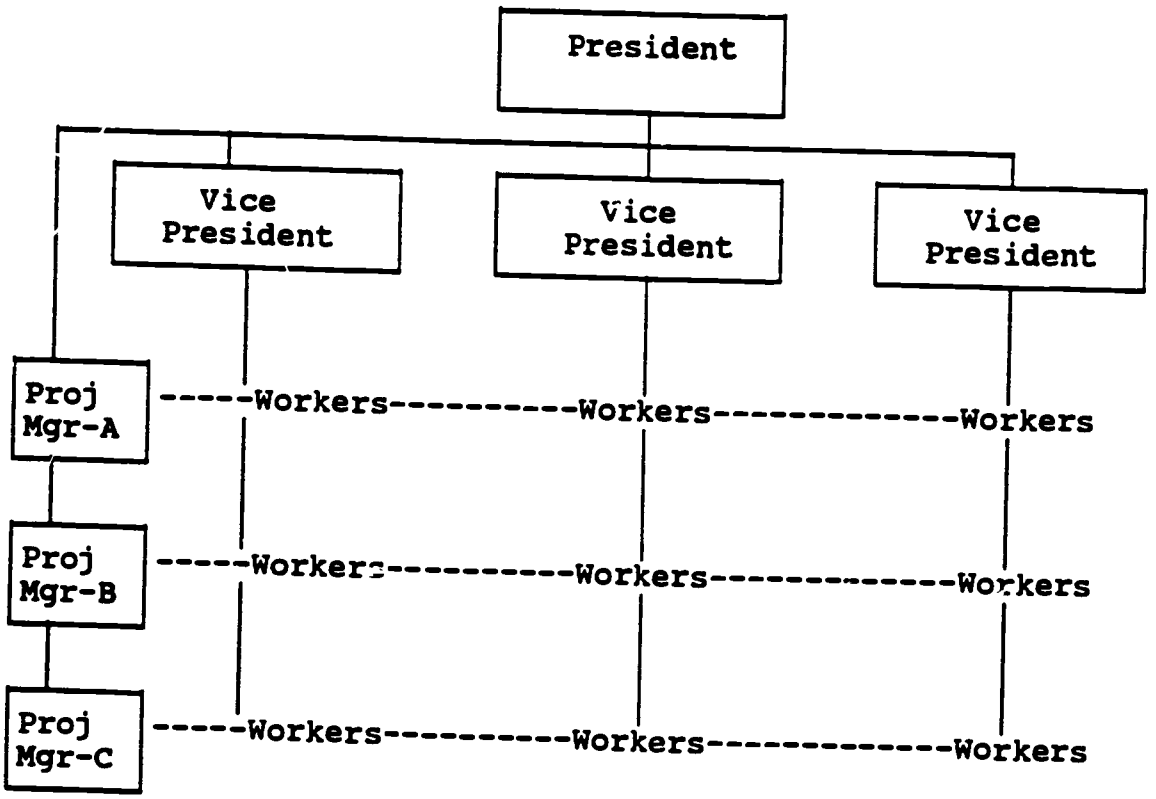


Figure 1.

(In a matrix organization, workers come together from different functional or line organizations, retaining formal relationships with their own departments, and establishing dotted line relationships with the newly created department. It combines centralized and decentralized characteristics.)

RETICULAR ORGANIZATION

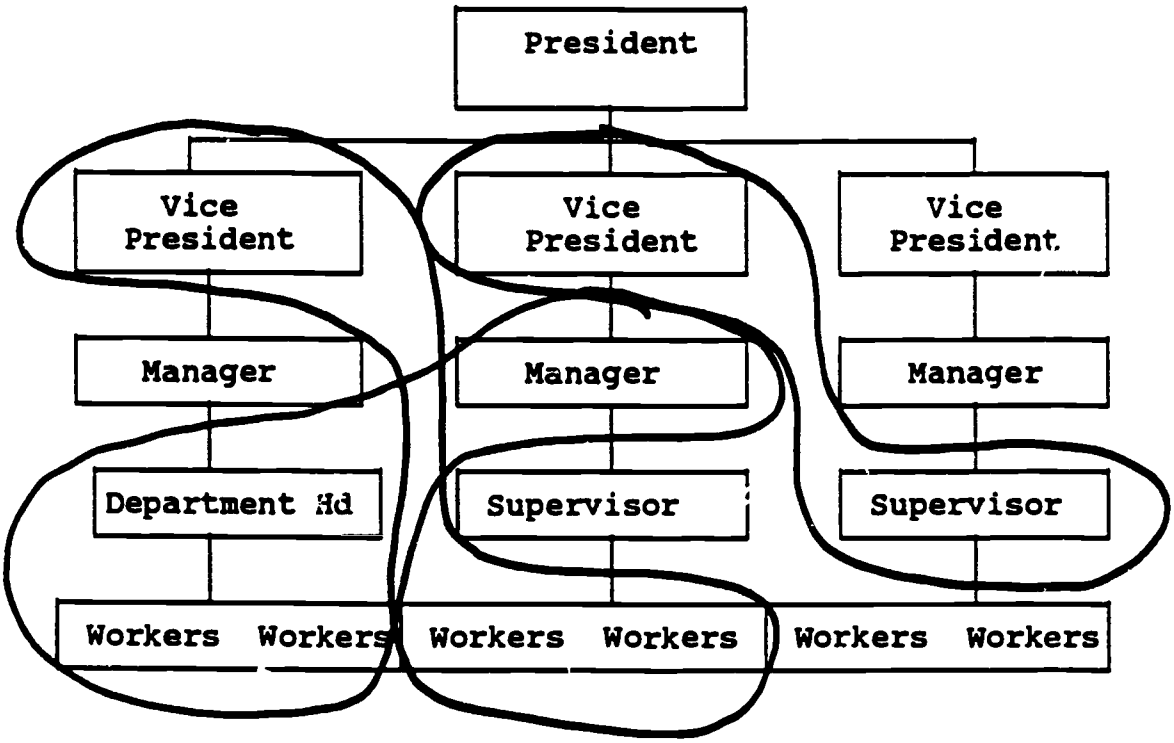


Figure 2.

(The reticular organization may not look different from outside of the organization. However, inside the organization, the many newly formed coalitions are based on trade-offs and collaborations brought about by technological changes or the nonroutine tasks of the office.)

TECHNOLOGICAL RESOURCES

WORKSTATIONS

WORD PROCESSING

COMMUNICATION

INFORMATION RETRIEVAL

FORECASTING AND DSS

FLEXIBILITY/EXPANDABILITY

COMPATIBILITY

CONVENIENCE

SPEED

COST EFFECTIVENESS

DEBUGGING

VIRUSES

DATA OWNERSHIP

SECURITY AND INTEGRITY

INFORMATION SYSTEMS APPROACHES

SEPARATE SYSTEMS

INTEGRATED SYSTEMS

NETWORKED INTELLIGENT WORKSTATIONS

LOCAL AREA NETWORKS

WORK AREA NETWORKS

INFORMATION RESOURCE MANAGEMENT

INFORMATION CENTER

SOCIOTECHNICAL ANALYSIS

STEPS IN STRATEGIC PLANNING

KNOW THE ORGANIZATION/GOALS
RESPOND TO MANAGEMENT CONCERNS
RESPOND TO OUTSIDE FORCES
SUPPORT TOP MANAGEMENT

SELECT PLANNING TEAM
IMPLEMENT FEASIBILITY STUDY
ANALYZE DATA

EVALUATE ALTERNATIVES
CHOOSE BEST ALTERNATIVE
PRESENT TO MANAGEMENT

PREPARE REQUEST FOR PROPOSAL

MEET WITH VENDORS
COMPARE VENDORS' PROPOSALS
SELECT VENDOR

INSTALL SYSTEM OR HARDWARE OR SOFTWARE

MAINTAIN SYSTEM

QUESTIONS/ISSUES IN TOMORROW'S WORK PLACE:

HOW WILL INFORMATION BE SAFEGUARDED THAT IS TRANSMITTED OVER TELEPHONE, CABLE, MICROWAVE, AND SATELLITE SYSTEMS?

WILL THERE BE CENTRAL COMPUTING FACILITIES? WHAT WILL BE THE ROLE OF THESE FACILITIES?

WHAT CHANGES ARE FORESEEN IN HARDWARE?

HOW WILL VOICE INPUT AFFECT THE TRADITIONAL KEYBOARD/ PRINTER OPERATION?

WHAT CHANGES ARE FORESEEN IN SOFTWARE?

QUESTIONS/ISSUES IN TOMORROW'S WORK PLACE:

WHAT CHANGES ARE OCCURRING IN MICROCHIP TECHNOLOGY?

WHAT WILL BE THE JOB REQUIREMENTS FOR MANAGERS?

HOW WILL FIFTH GENERATION COMPUTERS AFFECT THE WORK PLACE? HOW WILL EXPERT SYSTEMS AFFECT THE WORK PLACE?

WHAT WILL BE DONE TO OFFSET FEARS OF WORKING WITH AND AROUND VDT'S?

HOW PREVALENT ARE VIRUSES? HOW CAN THEY BE AVOIDED? PREVENTED?

SOCIOTECHNICAL ANALYSIS

AN APPROACH WHICH FOCUSES ATTENTION ON PEOPLE AND TECHNOLOGY AS EQUALLY IMPORTANT WHEN INSTALLING AUTOMATED PRODUCTS AND NEW WORK PROCEDURES

SOCIOTECHNICAL ANALYSIS

END-USER APPROACHES

ORGANIZATIONAL COMMUNICATION

FUNCTIONAL

INFORMATION RESOURCE MANAGEMENT

DECISION SUPPORT SYSTEMS

QUALITY OF WORK LIFE

SOCIOTECHNICAL ANALYSIS

TECHNICAL APPROACHES

MISSION

KEY RESULT AREAS

FUNCTIONS

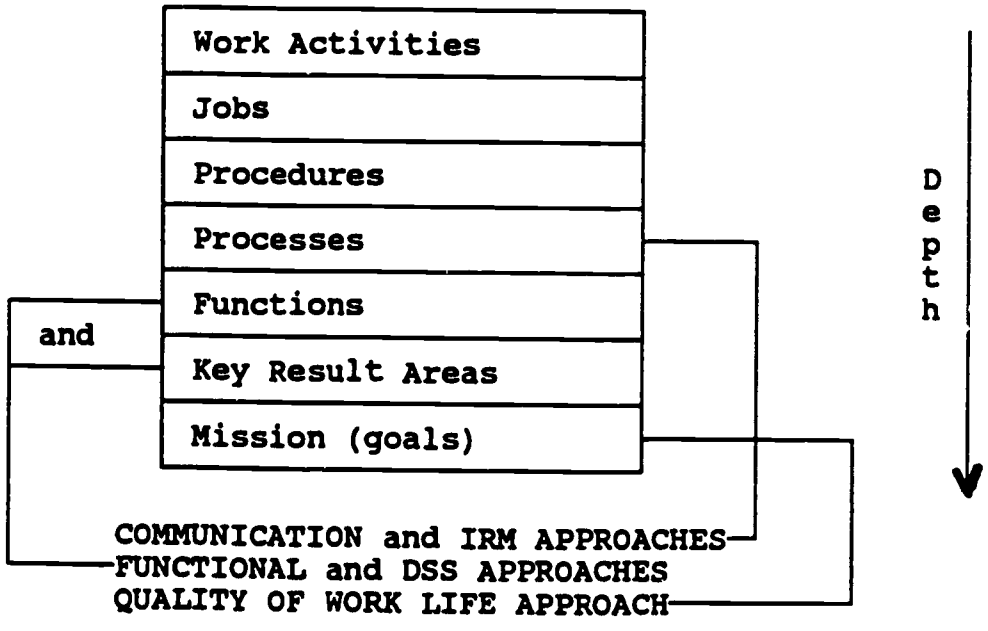
PROCESSES

PROCEDURES

JOBS

WORK ACTIVITIES

AN OFFICE MODEL COMBINING SOCIAL AND TECHNICAL CONSIDERATIONS



THE CHOSEN SOCIOTECHNICAL APPROACH MUST HAVE A POSITIVE IMPACT ON

EFFICIENCY

EFFECTIVENESS

PRODUCTIVITY

SPACE MANAGEMENT AND OFFICE DESIGN FACTORS

WORK FLOW

PERSONAL SPACE NEEDS

TERRITORIALITY

FUNCTIONAL OFFICE SPACE

ERGONOMICS

CONVENTIONAL
OFFICE LAYOUT PLAN
IS CHARACTERIZED
BY WALL BARRIERS
WHICH ISOLATE WORK AREAS.

DENOTES STATUS

SPECIALIZED WORK FUNCTIONS
ARE GROUPED TOGETHER

MAY HINDER COMMUNICATION
AND HUMAN INTERACTION, AND
SLOW DOWN WORK FLOW

PRIVACY AND TERRITORIALITY
ARE NOT ISSUES IN THIS PLAN

OPEN OFFICE LAYOUT PLAN IS CHARACTERIZED BY MOVABLE/PORTABLE PARTITIONS WHICH MAKE UP WORKSTATIONS.

PRIVATE OFFICES ARE KEPT TO MINIMUM

PRIVACY PROVIDED BY PLANTS, SCREENS, FILING OF WORKSTATIONS

STATUS DETERMINED BY WORK ASSIGNMENTS

LOWERED CONSTRUCTION AND ENERGY COSTS

MORE USABLE FLOOR SPACE

REARRANGEMENT FLEXIBILITY

ENCOURAGES COMMUNICATION, WORK FLOW, AND HUMAN INTERACTION

LACK OF PRIVACY MAY BE AN ISSUE

AN INFORMATION/DATA POLICY SHOULD ANSWER THE FOLLOWING QUESTIONS:

WHAT IS THE VALUE OF INFORMATION TO THE ORGANIZATION?

HOW IS OWNERSHIP OF DATA DETERMINED IN AN ORGANIZATION?

WHAT TYPES OF EQUIPMENT AND MEDIA MAY BE PURCHASED AND FROM WHOM?

WHAT IS THE ROLE OF THE USER OF INFORMATION?

WHAT TYPES OF PREVENTIVE AND EMERGENCY MAINTENANCE MEASURES ARE AVAILABLE?

WHAT VENDORS HAVE BEEN APPROVED TO MAKE REPAIRS OR PROVIDE MAINTENANCE?

WHO IS THE INFORMATION "GURU"?

WHAT IS MANAGEMENT'S ETHICAL POSITION TOWARD INFORMATION?

RECORDS MANAGEMENT PROGRAM OVERVIEW

RECORDS CREATION	RECORDS STORAGE	RECORDS RETRIEVAL	RECORDS RETENTION	RECORDS DISPOSAL
Determine need of record	Set up storage coding	Set up access to records	Set up retention system	Set up inactive storage
Control creation of record	Identify equipment and supplies for storage	Set up charge-out system	Survey records currently stored	Use micro-forms as practical
Design needed forms	Set up storage and protection process	Control return of charged-out records	Develop retention schedule	Set up transfer of records from active to inactive status
Set up cost standards to control creation of records	Select and train personnel	Audit and trail use of records	Set up records protection and safeguards	Set up schedule to destruct all records

Integrated Information Systems

course six

Student Materials

•INFORMATIONSYSTEMSCURRICULUM•INFORMATIONSYSTEMSCURRICULUM•INFORMATIONSYSTEMSCURRICULUM•

INTEGRATED INFORMATION SYSTEMS

Exercise 1-1

1. Define information systems.

2. Define integration.

3. Define office automation.

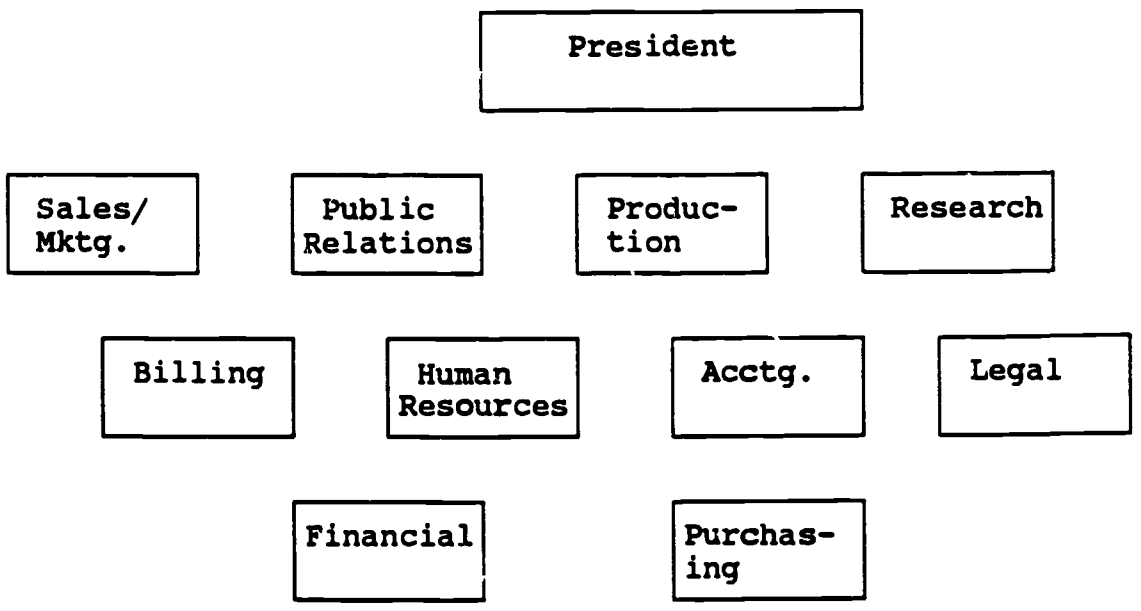
4. Define information resource management (IRM). List three purposes of IRM.

5. Define information systems support tools. What kinds of support tools are included in this category?

6. What is an information center or information resource center? List three purposes for an information center.

7. Define and list the kinds of functions in an automated office. What role do networks play in the integration of automated systems?

8. From the organizational chart presented below, identify the business systems and the types of functions in each that could be integrated with the use of information systems support tools.



9. Describe the purpose of a policy regarding computers, especially microcomputers, in an organization. Discuss the factors which a sound computer policy should include.

10. Discuss each of the three information resources (human, business and organizational, and electronic) as to their importance to the integrated office and their relationship to each other.

11. What is ergonomics? List and discuss the factors which pertain to ergonomics in an integrated information system.

12. Below are three case studies which require the use of strategic planning. First, identify the problem or project to be resolved or undertaken. Then, using the steps in the strategic planning process, define the system requirements, define the alternatives, select the alternative which you think management should choose, implement the system, and discuss the methods used to maintain it.

Case Study #1

A well-known service organization, headquartered in Chicago, with 2,000 field offices, counsels these offices on membership strategies, buildings and facilities, marketing, and public relations programs. It is an organization that depends heavily on the telephone. The headquarters office places an average of 300 long-distance calls per day. It has recognized the need to cut its escalating telephone costs.

What kind of organization is represented here? What is the problem to be solved? What is the project to be undertaken?

Case Study #2

A California-based testing laboratory performs over 40,000 diagnostic tests a month. This independent laboratory transmits test results in endocrinology, oncology, immunology, toxicology, microbiology, and genetics to its nationwide clients 24 hours a day. According to the vice-president of communication and administration, the laboratory's monthly test volume has increased as a result of new clients, more test requests, and new diagnostic procedures from the research community.

Using the old system, the laboratory transmitted test results twice a day from its Microdata 8000 mainframe via long-distanc telephone to dispersed client and institutional sites where teleprinters issued hard copies of the test results. This system has worked well for 13 years. However, long-distance calls have become expensive and the system "cumbersome and obsolete..." The vice-president has realized that the laboratory's old communication system could not cost-effectively handle the increasing volume and meet quick turnaround requirements. It is time for the laboratory to adopt a more versatile and efficient system.

What kind of organization is this laboratory? What are the problems? What is the project to be undertaken?

Case Study #3

Wafer Commercial Seating, Inc. is a national supplier of seating for the restaurant industry. Headquartered in the Midwest, it provides these establishments with an array of furnishings from chairs to booths. Founded in 1936, the company has been rapidly expanding over the past 12 years.

In order to support this and future growth, the company found it needed to implement an automated cost accounting system that would monitor and control a full range of applications. It had outgrown its system (the NEC ASTRA 250) and wanted to increase the company's capabilities to produce reports.

What kind of organization is represented here? What is the problem to be solved? What is the project to be undertaken?

INTEGRATED INFORMATION SYSTEMS

Exercise 2-1

The scenario below is expanded from Task Area 1. The purpose of this exercise is to apply sociotechnical analysis concepts to the scenario as the instructions dictate.

Instructions: Read the following case study.

You work for a large, well-known, and well-respected manufacturing company whose overall goals are to provide excellence in products and services to its customers. To meet these goals, this company is continuously seeking ways to improve its customer relations and its employees' participation. Your supervisor is the technical manager for one of the company's most important products. Other functions in this department include sales, technical expertise to customers, laboratory testing, research and development of new applications for old products and new research for new products, and administrative, supervisory, and managerial functions.

You come into your office on Monday morning and find messages on your computer from Bob Johnson, your supervisor. He has worked over the weekend and is on a business trip until Thursday. The messages contain the following information:

1. I have left dictation for you on the computer. The letter to Sam needs to go out right away. The others are routine. Access the dictation with my name.

2. I have left a rough draft of a chart I would like to have sent to my computer in my hotel room as soon as you can get around to it. I need it for Tuesday morning's meeting.

3. I didn't have time to deliver a message to the staff about a meeting on Friday. Please deliver it for me. It is in my E-Mail. One of the items on the agenda will be the recent employee survey results. Please prepare a short presentation, summarizing the results from our department and comparing them to the total company's results. Be sure that the staff will have handouts to pass on to their employees at their communications meetings.

4. I will send my expenses every day to the mailbox, so leave my computer on. Also, I want to access Dow Jones News/Retrieval on my computer from the hotel, so leave any messages you have for me.

5. I like your recommendations for the upgraded information systems equipment. Let's do it. What's the next step? I'd like to discuss your tentative plan of action by Friday after staff meeting.

6. Before you leave the office Thursday, update my calendar for next week. I'll be home late Thursday and I'll access it from home.

7. See you Friday morning.

8. After reviewing Bob's information, you access your screen where with a touch of your finger you are able to call up your calendar, the upgraded equipment proposal, and other tasks. You also access the database containing the employee survey results for the information for your department and download the information onto your microcomputer for later manipulation.

Instructions: All of the departments in the organization are not specifically named here. From the information presented, therefore, you will have to assume that the various functions exist in this organization. Then, using the Office Model from Figure 1 in Task Area 2, identify the following elements: Mission, Key Result Areas, Functions, Processes, Procedures, Jobs, and Work Activities. Which approach(es) (Organizational Communication, Functional, Decision Support Systems, Information Resource Management, and Quality of Work Life) do you think is(are) exhibited here? Be able to defend your choice(s) with specific reasons.

Final instructions for group work: Which of the five approaches (Organizational Communication, Functional, Decision Support System, Information Resource Management, and Quality of Work Life) does your group think is more effective in the automated office? Why? Share your group's reasons in a short oral presentation to the class.

INTEGRATED INFORMATION SYSTEMS

Exercise 3-1

The recent merger of two railroad lines into MSX Corporation has created a new administrative headquarters group consisting of 27 executives and 14 support professionals. The merger will create the need for an information system that would provide word processing, document formatting and distribution, spelling correction, electronic mail, and other management and office applications. The new headquarters group will be required to handle the communication of management reports and transmit information between the headquarters unit in Richmond, Virginia, and three regional locations in Baltimore, Maryland, Cleveland, Ohio, and Jacksonville, Florida.

Before the merger, both railroad companies ran their office management systems in the traditional way. Every senior executive had one or two secretaries. There were countless memos, reams of photocopied reports, steno pads for dictation, endless games of telephone tag, and, of course, the ever popular, time-consuming meetings. The conventional office plan is used to provide private offices for the executives; the support professionals sit outside their executives' offices in a "bullpen" type of arrangement. Some of the support staff have stand-alone word processors. There is no notion of integrated workstations, shared databases, or electronic mail. With the merger will come the opportunity to make dramatic changes in the way work has been handled in the past.

Two attachments at the end of this case illustrate the changes that are anticipated with the installation and use of the new electronic information system.

Figure 1 illustrates a breakdown of some of the specific office applications which will be required of the information system purchased and installed at MSX:

Executive Office	Finance
Detailed, daily morning reports	Daily cash management
Electronic mail with operating company executives	Tax planning and modeling
Confidential dictation	Securities tracking and trading
Scheduling of limousines	Spreadsheet analysis of budgets
Scheduling of key meetings	Annual and quarterly financial report analysis
Spreadsheet and graphic analysis, and E-Mail on grid portable computer	Lease-purchase analysis
General Office Services	**Corporate Services**
Document processing and generation of reports in standard formats	Editing and typesetting of annual and quarterly reports and board meeting minutes
Electronic indexing, filing and retrieval of documents	Press releases and public relations mailings
E-Mail within headquarters and with traveling managers	Electronic mail to congressmen
Document and financial report printing in draft, letter, or typeset quality	Legislative tracking
Facsimile transmission	Legal case search and retrieval
Document reproduction	Printing of executive speeches
Central corporate records management	Letters to shareholders and investment bankers
Desktop management such as calendars and tickler files	E-Mail to lobbyists

Figure 1.

Before completing the tasks in this case study, read Attachments 1 and 2. Then, proceed to complete the requirements of this exercise as enumerated below.

1. Graphically illustrate the work flow which takes place between the offices in the headquarters at MSX.

2. Define and list the preliminary steps that MSX must take prior to automating the functions listed above. Take into consideration the elements of a sociotechnical analysis and the importance of each element. What other specific needs were included in the two attachments?

3. What are the problems to be analyzed and solved? Who will be involved in the project? Is a feasibility study needed?

4. What are the alternatives: hardware, software, other peripherals? What are the outputs, inputs, interfaces, processing features, and security safeguards which must be considered? (Discuss systems which are available to handle the type of information which will be required at this new headquarters. Use your research skills to find information about specific systems.)

5. What are the negotiating points?

6. Which system was selected and why? Justify your choice. What kind of training and documentation should be available to the people affected by the changes?

7. What office layout would be appropriate for the information system you propose? Why? Graphically illustrate the work flow in the proposed new office layout.

8. Design the floor plan for the information system you choose.

9. Present the information system plan to your class in an oral report with visual aids. A written report should be given to your instructor.

ATTACHMENT 1 - Exercise 3-1

As CEO of the MSX Corporation, Harry Williams wants to be able to receive his "morning reports" on his computer with just a minimum of keystrokes at his terminal (or with a mouse, light pen, or touch). The morning reports consist of the previous day's car loadings, daily revenues, and any unusual events. He wants to have access to a summary balance sheet, profit and loss statement, and variance from plan and budget reports. These morning reports also should be available and accessible to any senior executive or support person who may need data from the reports, whether they are in the office, at home, or traveling. Presently, only a few cumbersome copies on sheafs of computer printout paper are available. The office support professionals and other executives now have to wait for the information until the computer reports are distributed. They are expensive and the data are not timely.

In addition, Mr. Williams is anticipating that the computer will allow him to work with more of the corporate information that is available but not accessible to him. Also, he thinks that a portable computer may be just what he needs when he wants to work away from the office.

ATTACHMENT 2 - Exercise 3-1

With the advent of the electronic information system at MSX, the traditional roles of clerk-steno and secretary may become obsolete. Persons in roles of administrative assistants (which is the anticipated role of the support professionals) will be expected to fulfill more demanding, multi-faceted roles. In fact, there will be no personal assistants assigned to any executives other than to the CEO and the president. Each corporate department will have one or more support professionals assigned to it. Here is a typical job description:

The support professional at MSX is expected to handle word processing required by his/her department, answer phones, keep appointment calendars, and transcribe any dictation that is routed through the new system to the workstation. He/She also will perform management-type tasks such as logging in accounting vouchers, updating cash management records, preparing market analysis data by monitoring MSX and other stock trading and preparing and disseminating operational data and reports. The support professional also will handle travel arrangements for her/his corporate department. Being able to access and manipulate information means that the support professional is a mini-office manager running a departmental staff function.

INTEGRATED INFORMATION SYSTEMS

Exercise 5-1

This case study is one of a series related to the publication of "White Collar Productivity: The National Challenge"--a study written in 1983 by The American Productivity Center, Houston, Texas, and sponsored by Steelcase Inc. Data in this study may be quoted and/or reproduced without specific permission, provided that Steelcase and The American Productivity Center are acknowledged as the sources.

As you read through this case study which includes many of the principles, concepts, and theories relevant to integrated information systems, there will be "Questions to Consider and Answer" to focus attention on the knowledges you have obtained in this course up to this point. You as an individual or in a project group will use these questions as the basis for oral and written reports.

****

DIGITAL EQUIPMENT CORPORATION: A New Approach to Office Automation and Productivity Improvement

The Organization

Digital Equipment Corporation (DEC), founded in 1957, is today the second largest manufacturer of interactive computers in the world. With 7,000 sites and 67,700 employees, it generates $3.9 billion in revenues annually.

A supplier of "state-of-the-art" computers to the scientific community throughout the 1960's, DEC extended its product line to include the business market in the next decade. During this latter time period, DEC's annual growth rate averaged over 35 percent. To support this rapid growth, it has evolved to a matrix organization, with a management style reflecting a high degree of autonomy and individual responsibility.

Although office automation products and vendors have proliferated, all too often these systems have failed to achieve the expected gains in increased productivity. Recognizing the educational process required to implement these tools effectively, DEC's own automated office systems have been designed to meet the following goals:

1. To develop an implementation method which increases productivity dramatically;
2. To develop a perspective for expressing/measuring productivity which improves efficiency within an effectiveness context; and
3. To provide research and development support for new product development and marketing.

Questions to consider and answer:

1. What is a matrix organization? Why do you think DEC chose to use the matrix organization?

2. Why has DEC focused on efficiency and effectiveness for their automated office systems?

3. At this point in reading the case study, what do you know about DEC?

Digital Information Services: Office Automation and Productivity Improvement within DEC

Digital Information Services (DIS) was chartered in 1978 to bring new information and communication technologies to the company's office operations. This brought local office functions together into a central corporate function to act in a consulting manner to DEC business units. It was hoped this consolidation would minimize error and duplication, facilitate integration, and increase the visibility and leverage of the office system function. The overall objective was to provide better support for end-users.

At its inception, DIS was made up of information system and telecommunication professionals. They saw their role as evaluation and implementing tools. They were mainly concerned with quantitative measures to describe this impact on the organization.

After 18 months, human resource personnel from the Organization Development Department were added to DIS to work on "human factors". This resulted in a much broader view of impacts and opportunities presented by technology, not only for work groups and the corporation, but also at the societal level. However, a significant gap in planning for these broader considerations was recognized.

As DIS has evolved, so has its goals. From "to implement office automation through introduction of modern office technology," it is working currently "to improve office effectiveness and job satisfaction, drawing on new technology as needed." Down the road it hopes "to achieve business and social goals through organizational and technological innovation." The shift in goals parallels a growing market maturity. With informed consumers seeking specific answers to their own needs, a priority arises for organizational analysis and design.

Questions to consider and answer:

4. Which approach did DIS use in the beginning?

5. What indications might the DIS group have had that the Organization Development Department people might be needed?

6. To what approach might DIS (and DEC) be evolving at this point in time as it relates to information systems integration?

7. How will DEC's change in approach to office systems implementation aid in its acceptance by the end-users?

DEC Teams: Efficiency and Effectiveness

This shift of emphasis within DIS required an approach to productivity measurement which would include qualitative as well as quantitative measures. Existing measuring tools were narrowly concerned with text output, filing time, and keystrokes per minute. More global measures were required.

One promising approach to productivity improvement within the context of improved effectiveness involved the establishment of end-user "teams"--the managerial, professional, clerical and administrative personnel who work together to produce combined outputs.

By examining the outputs in the context of specific business functions, the team supports corporate objectives and productivity are defined in terms of the functions' services. Rather than looking for incremental increases in efficiency in routine activities, substantial increases are sought by focusing on the extent to which people are doing the right thing and doing it well. It also recognizes a broad range of organizational impacts associated with new technology. These are described below in Figure 1.

Finally, it was recognized that prospective end-users need to become more involved in the system design. To effect substantial productivity improvement from the new technology, it is these prospective end-users who can best match business, personal, and social needs to the available options.

Questions to consider and answer:

8. DIS has spelled out the principles and theories it plans to use to implement new office systems. What advantages do you see in its approach?

9. In Figure 1, how does new technology affect employment?

10. What other impacts can you think of that are not listed in Figure 1?

11. Which of the ten impacts do you (or your team) consider to be the most important from the end-user's standpoint? from management's viewpoint? from the organization's standpoint?

ORGANIZATIONAL IMPACTS OF NEW TECHNOLOGY

- Increase or decrease in employment
- Technical obsolescence or new career options
- Improved or worsened manager-employee relationships
- Redistribution of information--change in power structures
- Increased or decreased interdependence of organizational units
- Trends toward decentralization or centralization
- Constructive or destructive measurement systems
- Increased or decreased work schedule flexibility
- Increased or lessened social isolation
- Increased remoteness or closer touch with end result of labor

Figure 1.

Office Systems: Developing a Planning Methodology

The Office Systems Group (OSG) is responsible for the development of applications software, long-term planning of technical systems, and the development/implementation of what is called "Office Systems Planning Methodology."

Their mission is to support DIS's long-term objective "to achieve business and social goals by integrating organizational and technical innovation." To this end, a three-part strategy was developed in late 1981.

Part 1. This strategy targeted productivity improvement of DEC line functions.

Part 2. This strategy sought to develop a set of situational measures useful to line managers in assessing productivity improvement.

Part 3. This strategy freed the managers to use any automated system best suited to their needs.

Productivity was the core of the strategy while interactive systems and employee involvement were its features.

Traditional approaches, frequently based on product design and engineering models, often overlooked human and organizational needs. A change of role was desired--one which moved the system design from "expert"--delivering finished products--to "consultant"--helping clients to achieve their own plans.

Questions to consider and answer:

12. Which of the three strategies listed above will have a long-term effect on DIS's objective "to achieve business and social goals by integrating organizational and technical innovation"?

13. What kinds of job functions make up the OSG group? (It says they are responsible for the development of applications software, long-term planning of technical systems, and the development/implementation of the planning methodology.)

14. Who are the clients of the OSG group?

Office Systems Planning Methodology: Helping Work Groups Help Themselves

The Office Systems consulting team designed Office Systems Planning Methodology to provide a way for work units to improve their productivity. It is intended to aid a work system's productivity improvement effort, via organizational changes, chosen by the work units themselves. The ten-step process, described in Attachment 1, yields an action plan. To implement the process, a series of five workshops has been designed. Called "The Productivity Improvement Series", the series of workshops covers tools and techniques required to manage office productivity efforts. It breaks down the planning methodology into five general procedures: data collection; data analysis; future systems design; organizational and technological alternatives; and implementation and evaluation.

When a work unit decides to purchase the series, it is requested to select a planning team to administer the ten steps. This "design" or "planning" team consists of up to six persons from a "diagonal slice" of the work unit.

A steering committee of senior managers associated with the work unit is then established. The committee has the responsibility of supporting the design team, approving proposals of the team, and playing a key role in diffusing the method to other work units.

Questions to consider and answer:

Answer the following questions which focus on the five general procedures (data collection, data analysis, future systems design, organizational and technological alternatives, and implementation and evaluation) that have been identified in DEC's planning methodology:

15. What kind of data might be collected prior to planning a new system? What might be the ways that data could be collected?

16. After data are collected, how could they be analyzed? What might the data tell the planning team?

17. Based on the data collection and analysis steps, might it be possible for the planning team to identify the differences between what is and what a future information system might be? How is this possible?

18. After the planning team has considered what is and what might be and has given this information back to the end-users, how do they go about finding out what options are available to redesign the present system?
What criteria might be used as the basis for a decision?

19. How might the planning team implement the new system? How might it measure its efforts?

20. What is the role of the planning or design team?

21. What is the role of the steering team?

A Pilot Group in Purchasing

The Administrative Purchasing Department was selected as a pilot because of its proximity to Corporate Purchasing and its reputation for being a healthy organization, amenable to change.

The Administrative Purchasing Department supports 24 facilities and 11,000 people. It purchases about $50 million worth of supplies annually for administrative support and building construction and facilities renovation. The staff processes 30,000 outgoing documents a year (purchase orders, debit memos, shipping, billing, etc.). The operations are supported by 20 terminals linked via modems to an offsite mainframe computer system and three word processing work stations.

Members of the design team were selected by management: two people from Corporate Purchasing were chosen, one for technical expertise and the other from personnel for group relations and organizational behavior expertise. They also were expected to play a key role in diffusing the methodology to other purchasing departments. Three more people were selected by the department manager: a line manager, a buyer, and a secretary.

A steering committee was selected in the first workshop by determining who were the "key influencers" inside and outside the department. Five managers were identified: the corporate purchasing manager, the department head, a line manager, a manager outside the department in charge of receiving and stocking supplies, and one within the accounting department.

Although the process is not complete, representative issues under consideration by the design team are:

Job Satisfaction: A survey was taken to assess employee attitudes toward their work. Many believed they were able to

do more. This called attention to the need to examine the relationship between people's abilities and their responsibilities as well as the amount of discretion each had to complete his/her work.

Work Systems: Analysis of work boundaries and key players in the external environment revealed that any given transaction had implications beyond the immediate exchange. Therefore, any reorganization within purchasing would affect working relationships with those outside which, in turn, would affect internal productivity. Thus, incentives for suppliers (to maintain quality and support for requisitioners in planning to reduce the number of purchase orders to be processed) are likely outcomes.

The Buyer Role: One implication of the open system analysis was the role buyers could play in supplier performance. Ways to shift buyers from routine transaction processing to more proactive work are being investigated. For example, developing greater product expertise, eliminating back orders, and identifying goods related to R&D tax credits.

Measurement: Prior to the design effort, management asked department employees what productivity measures of their work they considered appropriate. A task force of employees not on the design team is currently working with the list. Several measurement areas are under consideration: quality of procurement, prices, delivery time, bottom line impact, among others.

Technological Change: People in the purchasing department have been using computer-based tools for some time. Several changes in and additions to the tools are under consideration. These include a minicomputer-based system to increase capability while decreasing response time and a more advanced telephone system.

Although the department recently adopted a modified open-office plan, the new design of the organization will require further rearrangements. Workstations with ergonomically designed furniture are being considered. The systems will serve as prototypes for field testing.

Questions to consider and answer:

22. What is the specific role of the planning team in this situation? of the steering committee in this situation?

23. Can you determine what are some of the job functions in a purchasing department from this explanation? List them.

24. Where does a purchasing department get its information (inputs)? What are some of the outputs (documents) of a purchasing department?

25. How could a purchasing department benefit by an integrated information system?

26. Are there other issues which should be considered by the project team other than those listed (Job Satisfaction, Work Systems, The Buyer Role, Measurement, and Technological Change)?

27. Identify the kinds of hardware and software the purchasing group had at the time of this study.

28. Based on research by you or your project group, suggest specific hardware, applications software, telecommunications/networking, and other peripherals which could be utilized in DEC's Purchasing Department. Be prepared to justify your recommendations.

29. What might be the impacts on people and jobs in this department as the result of a new integrated information system? For example, new and more responsible job duties, new job descriptions, more enthusiasm from employees, new and improved work procedures, etc.

30. What is your overall evaluation of the process designed and implemented at DEC?

Conclusions

Implementing office automation systems effectively is viewed by DEC as more complex than commonly understood. DEC's innovative approach--internal groups seeking their own productivity improvement and job satisfaction by work redesign supported appropriately by technology--is intended to be a means for end-users to inform themselves about the new technology and its potential.

Closing the existing information gap between vendors and end-users and harnessing the coherent energy within organizations by designing their own work systems is DEC's focus in this productivity improvement effort: turning what is known into what can be.

Attachment 1

OFFICE SYSTEMS PLANNING METHODOLOGY

1. Answer Questions:

   - Why are we changing?
   - What is the problem or opportunity?
   - How will we measure success?

2. Identify System Boundaries:

   - What are the groups with which we are directly concerned?
   - What are the groups which depend on us for resources or information?

3. Present System Analysis:

   - Key demands
   - Current work procedures
   - Job needs of people
   - Major problem areas

4. Future System Model:

   - Critical success factors
   - Given these, what are the key assumptions/demands?
   - Identify related key processes
   - Identify key information needs

5. Identify Work Content Needs:

   - Target description of new system
   - Constraints
   - Resources
   - Technology

6. Identify Job Success Needs of People:

   - Resources
   - Constraints

7. Set and Prioritize Objectives for the New System:

   - Work content needs
   - Job success needs

8. Develop Alternative Strategies:

- o Organizational
- o Technological

9. Present Proposal to Management/Steering Committee:

- o Approval/Support
- o Commit resources

10. Implementation and Evaluation:

- o Develop action plan
- o Agree on measurement criteria

INTEGRATED INFORMATION SYSTEMS

Oral and Written Report Format
(To Be Utilized with Exercise 5-1)

The Organization

1. What is a matrix organization? Why did DEC choose to use the matrix organization?

2. Why has DEC focused on efficiency and effectiveness for their automated office systems?

3. At this point in reading the case study, what do you know about DEC?

The Approach

4. Which approach did DIS use in the beginning?

5. What indications might the DIS group have had that the Organization Development Department people might be needed?

6. To what approach might DIS (and DEC) be evolving at this point in time as it relates to information systems integration?

7. How will DEC's change in approach to office systems implementation aid in its acceptance by the end-users?

Efficiency and Effectiveness

8. DIS has spelled out the principles and theories it plans to use to implement new office systems. What advantages do you see in its approach?

9. In Figure 1, how does new technology affect employment?

10. What other impacts can you think of that are not listed in Figure 1?

11. Which of the ten impacts do you (or your team) consider to be the most important from the end-user's standpoint? from management's viewpoint? from the organization's standpoint?

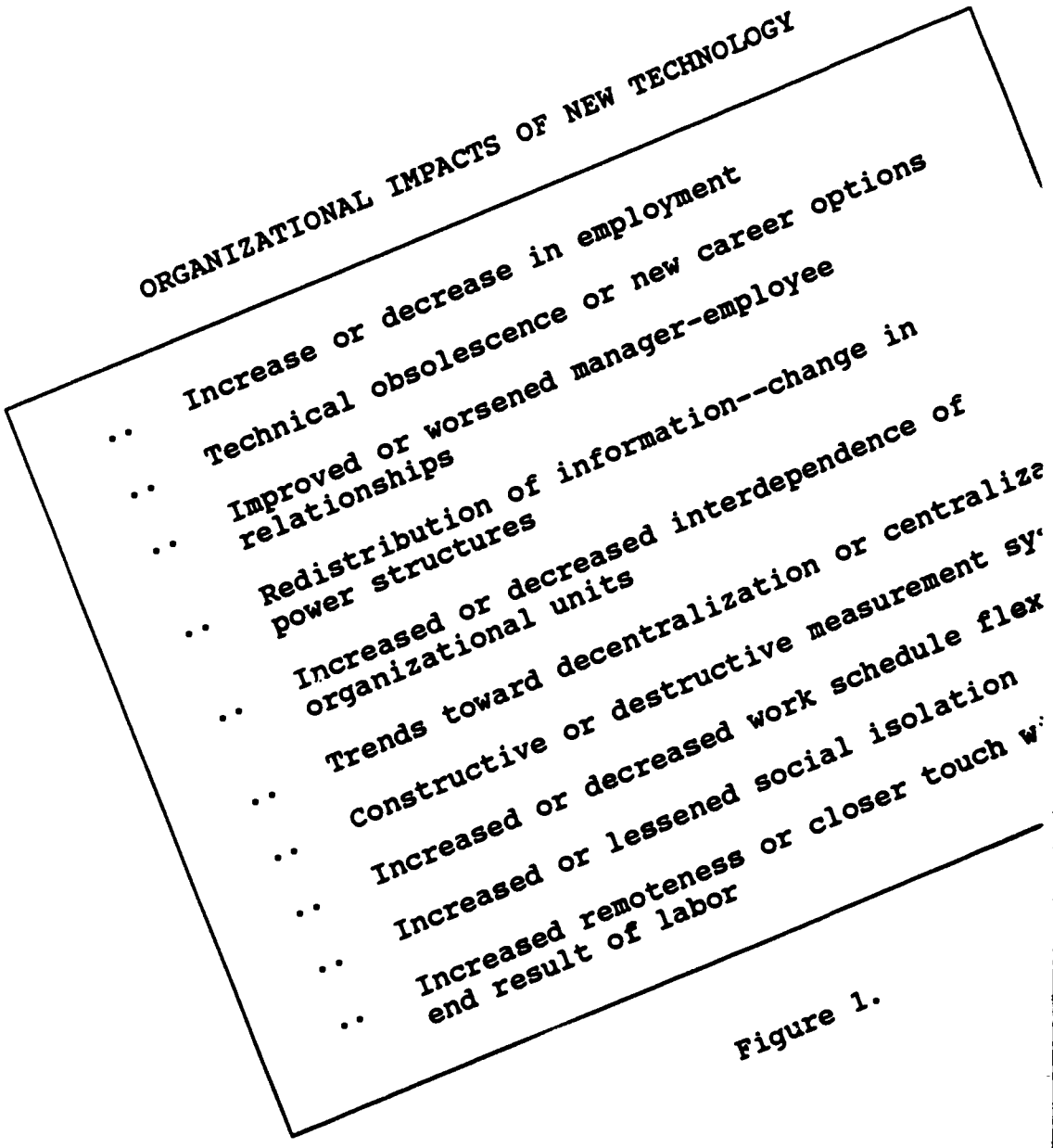

ORGANIZATIONAL IMPACTS OF NEW TECHNOLOGY
Increase or decrease in employment
Technical obsolescence or new career options
Improved or worsened manager-employee relationships
Redistribution of information--change in power structures
Increased or decreased interdependence of organizational units
Trends toward decentralization or centraliza
Constructive or destructive measurement sy
Increased or decreased work schedule flex
Increased or lessened social isolation
Increased remoteness or closer touch w
end result of labor

Figure 1.

Planning Methodology

12. Which of the three strategies will have a long-term effect on DIS's objective "to achieve business and social goals by integrating organizational and technical innovation"?

13. What kinds of job functions make up the OSG group? (It says they are responsible for the development of applications software, long-term planning of technical systems, and the development/implementation of the planning methodology.)

14. Who are the clients of the OSG group?

Answer the following questions which focus on the five general procedures (data collection, data analysis, future systems design, organizational and technological alternatives, and implementation and evaluation) that have been identified in DEC's planning methodology:

15. What kind of data might be collected prior to planning a new system? What might be the ways that data could be collected?

16. After data are collected, how could they be analyzed? What might the data tell the planning team?

17. Based on the data collection and analysis steps, might it be possible for the planning team to identify the differences between what is and what a future information system might be? How is this possible?

18. After the planning team has considered what is and what might be and has given this information back to the end-users, how do they go about finding out what options are available to redesign the present system?
What criteria might be used as the basis for a decision?

19. How might the planning team implement the new system? How might it measure its efforts?

20. What is the role of the planning or design team?

21. What is the role of the steering team?

The Pilot Study

22. What is the specific role of the planning team in this situation? of the steering committee in this situation?

23. Can you determine what some of the job functions in a purchasing department are from this explanation? List them.

24. Where does a purchasing department get its information (inputs)? What are some of the outputs (documents) of a purchasing department?

25. How could a purchasing department benefit by an integrated information system?

26. Are there other issues which should be considered by the project team other than those listed (Job Satisfaction, Work Systems, The Buyer Role, Measurement, and Technological Change)?

27. Identify the kinds of hardware and software the purchasing group had at the time of this study.

28. Based on research by you or your project group, suggest specific hardware, applications software, telecommunications/networking capabilities, and other peripherals which could be utilized in DEC's Purchasing Department. Be prepared to justify your recommendations.

29. What might be the impacts on people and jobs in this department as the result of a new integrated information system? For example, new and more responsible job duties, new job descriptions, more enthusiasm from employees, new and improved work procedures, etc.

30. What is your overall evaluation of the process designed and implemented at DEC?

Your oral and written report should cover these factors.

Integrated Information Systems

course six

Evaluation

INTEGRATED INFORMATION SYSTEMS

Suggested Solutions for Case Studies
in Exercise 1-1

Note to instructor: Use the solutions to these case studies to discuss and research the specific systems selected as solutions. What others could have been implemented instead of the ones selected here?

Case Study #1

A well-known service organization, headquartered in Chicago, with 2,000 field offices, counsels these offices on membership strategies, buildings and facilities, marketing, and public relations programs. It is an organization that depends heavily on the telephone. The headquarters office places an average of 300 long-distance calls per day. It has recognized the need to cut its escalating telephone costs.

What kind of organization is represented here? What is the problem to be solved? What is the project to be undertaken?

Suggested solution: This service organization (non-profit organization) has to solve its high long-distance costs with a low-cost telephone system. A possible solution is to install ITT USA service. ITT's service provides nationwide calling to any telephone in the continental United States, Puerto Rico, U.S. Virgin Islands, and Hawaii. This service organization currently plans to install five ITT USA 300 lines. This service is geared to organizations such as this one looking for volume-discount long-distance calling. The monthly statements are itemized allowing the organization to have better accounting control over its phone costs.

The organization's headquarters anticipates that it will save 12 to 14 percent on its long-distance telephone charges during the first year. More importantly, the administration of this organization believes the dollar savings will allow the organization to enhance its communication system and keep up with the latest technology.

Case Study #2

A California-based testing laboratory performs over 40,000 diagnostic tests a month. This independent laboratory transmits test results in endocrinology, oncology, immunology, toxicology, microbiology, and genetics to its nationwide clients 24 hours a day. According to the vice- president of communication and administration, the laboratory's monthly test volume has increased as a result of new clients, more test requests, and new diagnostic procedures from the research community.

Using the old system, the laboratory transmitted test results twice a day from its Microdata 8000 mainframe via long-distance telephone to dispersed client and institutional sites where teleprinters issued hard copies of the test results. This system has worked well for 13 years. However, long-distance calls have become expensive and the system "cumbersome and obsolete..." The vice-president has realized that the laboratory's old communication system could not cost-effectively handle the increasing volume and meet quick turnaround requirements. It is time for the laboratory to adopt a more versatile and efficient system.

What kind of organization is this laboratory? What are the problems? What is the project to be undertaken?

Suggested solution: The laboratory (profit-making, research-based, medical with high standards and accountability for results) chose a customized, integrated system from McDonnell Douglas Applied Communications Systems (ACS) to support its test results transmission. The laboratory named the system LABCOMM. McDonnell Douglas' ACS installed OnTyme® to meet the laboratory's E-Mail needs. The laboratory currently enters test results into its Microdata 9100 mainframe. A Microdata 3355 microprocessor is used to transmit the results via TYMNET® to a McDonnell Douglas computer. Clients simply dial the local TYMNET® access numbers to log onto the host computer to obtain LABCOMM reports.

Currently, the laboratory has over 2,700 clients and more than 150 of its own personnel linked by OnTyme®. The laboratory has seen a significant reduction in turnaround time with the use of LABCOMM. For employees, OnTyme® has cut down the number of meetings they have to attend. The sales people also are able to use the system to qualify prospective clients and to take supply orders. The versatile ACS system has allowed the laboratory to be more efficient and cost effective in the way it communicates information.

Case Study #3

Wafer Commercial Seating, Inc. is a national supplier of seating for the restaurant industry. Headquartered in the Midwest, it provides these establishments with an array of furnishings from chairs to booths. Founded in 1936, the company has been rapidly expanding over the past 12 years.

In order to support this and future growth, the company found it needed to implement an automated cost accounting system that would monitor and control a full range of applications. It had outgrown its system (the NEC ASTRA 250) and wanted to increase the company's capabilities to produce reports.

What kind of organization is represented here? What is the problem to be solved? What is the project to be undertaken?

Suggested solution: Wafer is a profit-making organization which is seeking to improve its automated accounting capabilities. Wafer decided on NEC Information System's ASTRA 370, a top-of-the-line system which offers up to 6 megabytes (Mb) of internal memory and supports up to 32 workstations, 35 printers, and 16 communications lines. Wafer currently has 20 people who access the ASTRA 370 which leaves it room to grow with the system.

Wafer found the NEC system to be the best for its business in terms of cost and reliability. It is flexible enough to handle a wide range of accounting applications, including client billing, accounts receivable, credit and collection, and work in progress. Wafer's customer services people use VDTs that tie into the system and provide them with timely accounting information.

Wafer has found NEC's ASTRA 370 to be both reliable and flexible. It has allowed the company to manage its customer accounts more effectively and keep up with the growing demands of the business. It plans to implement several additional applications using the ASTRA system. Its credit and collection personnel soon will be using the ASTRA 370 to run on-line Dun & Bradstreet checks on client credit information. In the future it also plans to take advantage of the ASTRA's potential to lower the company's phone costs. When it comes to using technology to streamline its business and increase productivity, Wafer is not sitting down on the job. **Note to instructor: Ask students why it was practical for Wafer to stay with an NEC ASTRA system and upgrade existing equipment?**

INTEGRATED INFORMATION SYSTEMS

Test 1

1. Define information systems.

2. Define integration.

3. Define office automation.

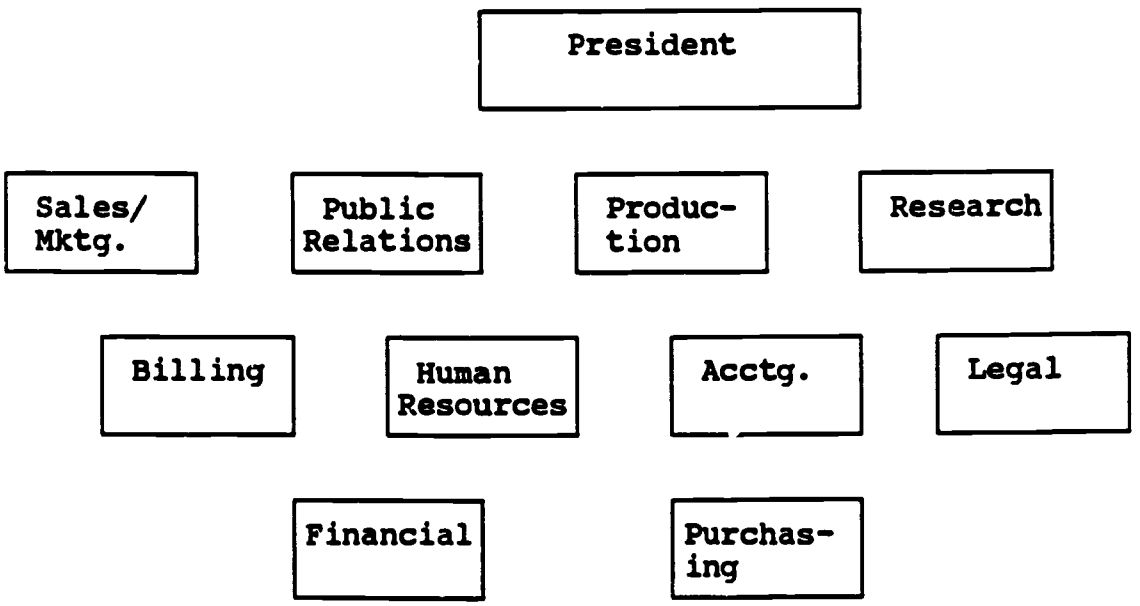
4. Define information resource management (IRM). List three purposes of IRM.

5. Define information systems support tools. What kinds of support tools are included in this category?

6. What is an information center or information resource center? List three purposes for an information center.

7. Define and list the kinds of functions in an automated office. What role do networks play in the integration of automated systems?

8. From the organizational chart presented below, identify the business systems and the types of functions in each that could be integrated with the use of information systems support tools.



9. Describe the purpose of a policy regarding computers, especially microcomputers, in an organization. Discuss the factors which a sound computer policy should include.

10. Discuss each of the three information resources (human, business and organizational, and electronic) as to their importance to the integrated office and their relationship to each other.

11. What is ergonomics? List and discuss the significance of the factors which pertain to ergonomics in an integrated information system.

INTEGRATED INFORMATION SYSTEMS

Exercise 2-1
(Suggested Solutions)

The scenario below is expanded from Task Area 1. The purpose of this exercise is to apply sociotechnical analysis concepts to the scenario as the instructions dictate.

Instructions: Read the following case study.

You work for a large, well-known, and well-respected manufacturing company whose overall goals are to provide excellence in products and services to its customers. To meet these goals, this company is continuously seeking ways to improve its customer relations and its employees' participation. Your supervisor is the technical manager for one of the company's most important products. Other functions in this department include sales, technical expertise to customers, laboratory testing, research and development of new applications for old products and new research for new products, as well as administrative, supervisory, and managerial functions.

You come into your office on Monday morning and find messages on your computer from Bob Johnson, your supervisor. He has worked over the weekend and is on a business trip until Thursday. The messages contain the following information:

1. I have left dictation for you on the computer. The letter to Sam needs to go out right away. The others are routine. Access the dictation with my name.

2. I have left a rough draft of a chart I would like to have sent to my computer in my hotel room as soon as you can get around to it. I need it for Tuesday morning's meeting.

3. I didn't have time to deliver a message to the staff about a meeting on Friday. Please deliver it for me. It is in my E-Mail. One of the items on the agenda will be the recent employee survey results. Please prepare a short presentation, summarizing the results from our department and comparing them to the total company's results. Be sure that the staff will have handouts to pass on to their employees at their communications meetings.

4. I will send my expenses every day to the mailbox, so leave my computer on. Also, I want to access Dow Jones News/Retrieval on my computer from the hotel, so leave any messages you have for me.

5. I like your recommendations for the upgraded information systems equipment. Let's do it. What's the next step? I'd like to discuss your tentative plan of action by Friday after staff meeting.

6. Before you leave the office Thursday, update my calendar for next week. I'll be home late Thursday and I'll access it from home.

7. See you Friday morning.

8. After reviewing Bob's information, you access your screen where with a touch of your finger you are able to call up your calendar, the upgraded equipment proposal, and other tasks. You also access the database containing the employee survey results for the information for your department and download the information onto your microcomputer for later manipulation.

Instructions: All of the departments in the organization are not specifically named here. From the information presented, therefore, you will have to assume that the various functions exist in this organization. Then, using the Office Model from Figure 1 in Task Area 2, identify the following elements: Mission, Key Result areas, Functions, Processes, Procedures, Jobs, and Work Activities. Which approach(es) (Organizational Communication, Functional, Decision Support System, Information Resource Management, and Quality of Work Life) do you think is(are) exhibited here? Be able to defend your choice(s) with specific reasons.

Final instructions for group work: Which of the five approaches (Organizational Communication, Functional, Decision Support System, Information Resource Management, and Quality of Work Life) does your group think is more effective in the automated office? Why? Share your group's reasons in a short oral presentation to the class.

****

Mission: You work for a large, well-known, and well-respected manufacturing company whose overall goals are to provide excellence in products and services to its customers.

Key Result areas: To meet these goals, this company is continuously seeking ways to improve its customer relations and its employees' participation. (Expanded growth, better customer relations, greater employee involvement)

Functions: Accounts payable (travel expenses), production, sales, marketing, research and development, computer services (databases in mainframe), purchasing, public relations, human resource planning, etc.

Processes: Managerial, supervisory, communication, decision making, information processing, etc.

Procedures: Expense reports, hiring, computer (downloading data from mainframe), E-Mail, laboratory procedures, etc.

Work activities: Storing, retrieving, accessing, traveling, keyboarding, communicating, reading, dictating, proofreading, editing, sending and receiving, sampling, selling, supervising, purchasing, etc.

Regarding approaches: Elements of all approaches are illustrated here. You will be the judge of the students' understanding based on their responses to the instructions in the case study.

Exercise 3-1
(Suggested Solution)

The recent merger of two railroad lines into MSX Corporation has created a new administrative headquarters group consisting of 27 executives and 14 support professionals. The merger will create the need for an information system that would provide word processing, document formatting and distribution, spelling correction, electronic mail, and other management and office applications. The new headquarters group will be required to handle the communication of management reports and transmit information between the headquarters unit in Richmond, Virginia, and three regional locations in Baltimore, Maryland, Cleveland, Ohio, and Jacksonville, Florida.

Before the merger, both railroad companies ran their office management systems in the traditional way. Every senior executive had one or two secretaries. There were countless memos, reams of photocopied reports, steno pads for dictation, endless games of telephone tag, and, of course, the ever popular, time-consuming meetings. The conventional office plan is used to provide private offices for the executives; the support professionals sit outside their executives' offices in a "bullpen" type of arrangement. Some of the support staff have stand-alone word processors. There is no notion of integrated workstations, shared databases, or electronic mail. With the merger will come the opportunity to make dramatic changes in the way work has been handled in the past.

The two attachments at the end of the case illustrate the changes that are anticipated with the installation and use of the new electronic information system.

Suggested answers to questions:

1. Graphics of the work flow will vary. You will be the judge of the students' work.

2. Sociotechnical analysis factors should provide the basis for the preliminary steps that MSX must take.

3. Problems and people should be enumerated from the case study. The need for a feasibility study may depend on whether individuals or groups feel that all of the problems have been delineated in the case study.

4. Research skills by individuals or groups will turn up different alternatives.

5. Negotiating points include cost, functions MSX is willing to pay for, time of installation, availability of the

system MSX wants, capability and reputation of consultants (if used) or in-house professionals, etc.

6. Suggested solution: MSX chose to work with an office system consultant, Office of the Future, Inc. At the suggestion of the consultant, MSX selected executive workstations equipped with a comprehensive integrated software package that provided word processing, document formatting and distribution, spelling correction, E-Mail, high-speed FAX, and desktop management capabilities; and communications links with time-sharing bureaus--Telenet and Tymnet which permit access to Dow Jones News/Retrieval, UPI, Official Airline Guide, and others through a mini-computer.

   Other equipment and capabilities include:

   .. laser printers;
   .. morning reports sent over computers at remote locations and made available to others in the headquarters;
   .. portable computers;
   .. a Rolm telephone system which includes least-cost call routine, do not disturb, call forwarding, conferencing, and automatic dialing;
   .. Dictaphone dictation, automatic transcription and distribution system; and
   .. an electronic paper file retrieval system.

   Everyone in the office is "connected" and "on line".

7,8. Office designs, layouts, and floor plans will vary. You will be the judge of the quality of the students' work. Ergonomic factors and human concerns, along with technological capabilities, must be evident in the office design and layout consideration.

INTEGRATED INFORMATION SYSTEMS

Exercise 5-1
(Suggested Solutions to Selected Questions)

Most of the answers to the questions in Exercise 5-1 will be self-evident. However, the answers below may help to stimulate discussion.

5. What indications might the DIS group have had that the Organization Development Department people might be needed?

.. Attitudes exhibiting resistance to change
.. Planning team may not have had insight into how to consider people along with technology
.. Questions from end-users about how their jobs may be affected by new technology
.. Rumors
.. Lack of knowledge of jobs and work procedures
.. Others...

9. In Figure 1, how does new technology affect employment?

.. Are there enough qualified people in the area who can be hired?
.. What kind(s) of training will be needed by those employees already employed?
.. Will any employees be displaced because of the new technology?
.. Does an organization have a responsibility to articulate its needs with high schools, community or four-year colleges, or business colleges?
.. Others...

10. What other impacts can you think of that are not listed in Figure 1?

.. Change in office design and furniture?
.. Change in organizational patterns?
.. Change in work responsibilities and job duties?
.. Others?

15 What kind of data might be collected prior to planning a new system? What might be ways that data could be collected?

.. Samples of memos, letters, reports, and other documents
.. Samples of job and work procedures
.. Lists of work activities that could be automated
.. Data could be collected by paper, observations, interviews

23. Can you determine what are some of the job functions in a purchasing department from this explanation? List them.

- Buyers (who are responsible for buying products, office supplies and equipment raw materials, etc.)
- Supervisors (who may negotiate contracts)
- Manager (who is responsible for purchasing function and ethical behavior of buyers and other employees)
- Support professionals: clerks, secretaries, and executive assistants (who may maintain files; key contracts, correspondence, and other documents; answer telephones; and other duties)

24. Where does a purchasing department get its information (inputs)? What are some of the outputs (documents) of a purchasing department?

Inputs: Requests from customers, price catalogs, vendors or salespersons, top management
Outputs: Contracts, correspondence, price quotations, historical information

29. What might be the impacts on people and jobs in this department as the result of a new integrated information system? For example,new and more responsible job duties, new job descriptions, more enthusiasm from employees, new and improved work procedures, etc.

Other than those listed above, other impacts might be:

- Monthly communications meetings between managers and buyers
- Redefinition of the roles of the individuals in the department to fit new capabilities
- Training of on-board employees (such as secretaries) to take on purchasing duties to leverage skills and introduce more variety into the secretary's job.
- Interest and input from other support professionals
- Testing site for new equipment for the organization, such as portable terminals and message units, new telephone system,
- Modification of operating procedures to reflect improved work flow and reduce operations costs
- Development of systems to handle high volume/low dollar procurements with minimal buyer involvement
- New career paths opened up and implemented

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