UNIT II

1. Computer based information system,
2. Information management,
3. Who are the users?
4. Manager and Systems,
5. Data versus information,
6. Evolution of computer based information system (CBIS),
7. Model of CBIS,
8. Information service organization,
9. Trend to End-User computing,
10. Justifying the CBIS,
11. Achieving the CBIS,
12. Managing the CBIS,
13. Putting the CBIS.

1. COMPUTER BASED INFORMATION SYSTEM

A computer-based information system (CBIS) is an information system that uses computer and often telecommunications technology to perform some or all of its intended tasks. The first major computer application was used to process accounting data. That application was followed by four others management information systems (MIS), decision support systems (DSS), the virtual office and knowledge based system.

2. INFORMATION MANAGEMENT

Information is one of the main resources available to the manager. Information can be managed just as any other resources.

Information management is characterized by the phrase of 'Getting the right information to the right person at the right place at the right time'. **Information management** (**IM**) is the collection and management of information from one or more sources and the distribution of that information to one or more audiences. This sometimes involves those who have a stake in, or a right to that information. Management means the organization of and control over the structure, processing and delivery of information. The manager uses many reports or information displays to reflect the physical condition of the firm.

Main types of resources managed by manager:

- Personnel
- Material
- Machines
- Money
- Information (and data)

The task of the manager is to manage these resources in order to use them in the most effective way. The first four resources types are tangible; they exist physically and can be touched, called as physical resources. Information is the conceptual resource. Managers use conceptual resources to manage physical resources.

How information is managed?

- Manager manages physical resource as well as conceptual.
- The manager ensures that the necessary raw data is gathered and then processed into usable information.
- The manager ensures that appropriate individual receive the information in the proper form at the proper time so that it can be used.
- Finally, the managers discard information that has outlined its usefulness and replace it with information that is current and accurate.
- All of this activity- acquiring information, using it in the most effective way, and discarding it at the proper time is called information management.

Factors Stimulating Interest in Information Management

1) Increasing complexity of business activity

   a) **International economy**: firms of all sizes are subject to economic influences. Such influences can be seen in the relative values of the currencies of each nation. Buyers make purchases in those countries where their currencies have the greatest value.
   b) **Worldwide competition:** firms no longer compete in only their own geographic area. Rather, competition exists on a world wide scale. The effects of the competition can be seen in the imports from foreign countries.
   c) Increasing complexity of technology: we see examples of technology in business every day- bar code scanners in supermarkets, computer based airline reservation, automated teller machine, closed-circuit television in parking garages. There is also much behind the scenes technology that we do not see factory robots and automated merchandise storages and handling equipment.
   d) Shrinking time frames: all phases of business operations are performed more rapidly than ever before. Sales representative engage in telemarketing to contact their customers within seconds by telephone, sales orders are transmitted electronically from one computer to another, and manufacturers schedule raw material deliveries to arrive "just-in-time".
   e) Social constraints: plant expansion, new products, new sales outlets and similar actions must all be weighted in terms of their environmental impact.

2) Improved computer capabilities

   a) Size: the large computers of the 1950 and 1960 were straight out of the scene. Users never came in direct contact with the hardware. In most cases, users did not know how to use the computers, and many were afraid to learn.

b) **Speed:** today's users, most likely have keyboard terminals or microcomputers in their offices to speed up. Today's user does not regard the computer as something special as a necessary piece of office equipment, just like a desk, a telephone or a copying machine.

3. WHO ARE THE USERS?

- Managers
- Non-managers
- Persons & organizations in the firm's environment

The first users of computer output were clerical employees in the accounting area, where the computer performed such application as payroll, inventory and billing. Users also existed outside the firm. Customers received invoices and statements, stock holders received dividend checks, and the federal government received tax reports.

Where Managers are found:

- Management levels

i. O**perational control level** –Lower level managers are responsible for the day-to-day operation, activities and transactions of an organization.
ii. **Management control level** – Middle managers, who co-ordinate, control and monitor various activities in an organization and act as liaison between operational managers and top managers.
iii. St**rategic planning level**– Top managers, establishes the vision and the long term goals of the organization.

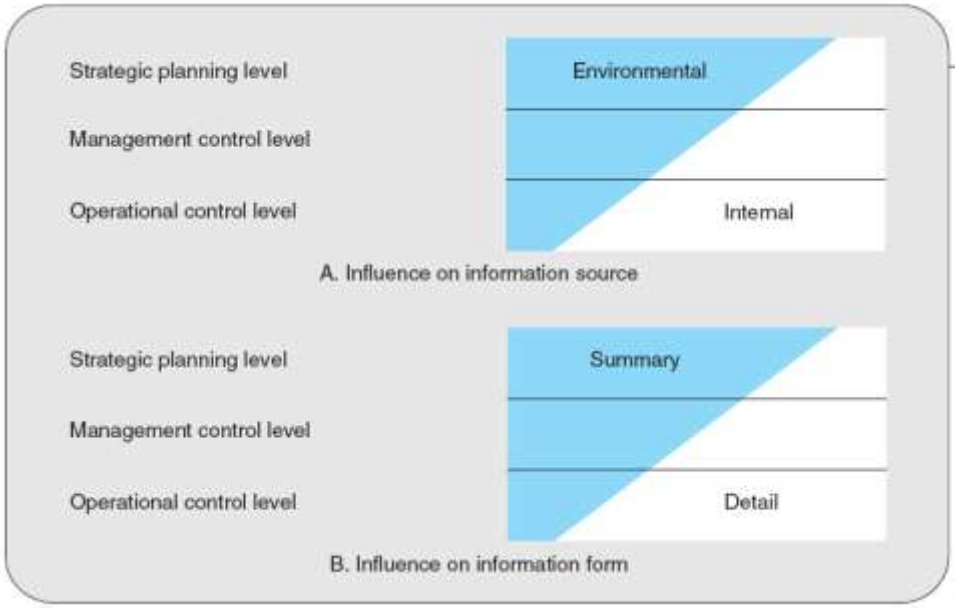

Fig.2.1 Management level can influence information

The figure 2.1 shows that managers on the strategic planning level place greater emphasis on environmental information than do managers on the lower levels, and those managers on the operational control level regard internal information as vital. The lower graph shows that strategic planning level managers prefer information in a summary format, where as operational control level managers prefer detail.

- Business areas: managers are in the business areas of the firm, where resources are segregated according to the work performed. Areas are

  i. Marketing
  ii. Manufacturing
  iii. Finance
  iv. Human resources
  v. Information services

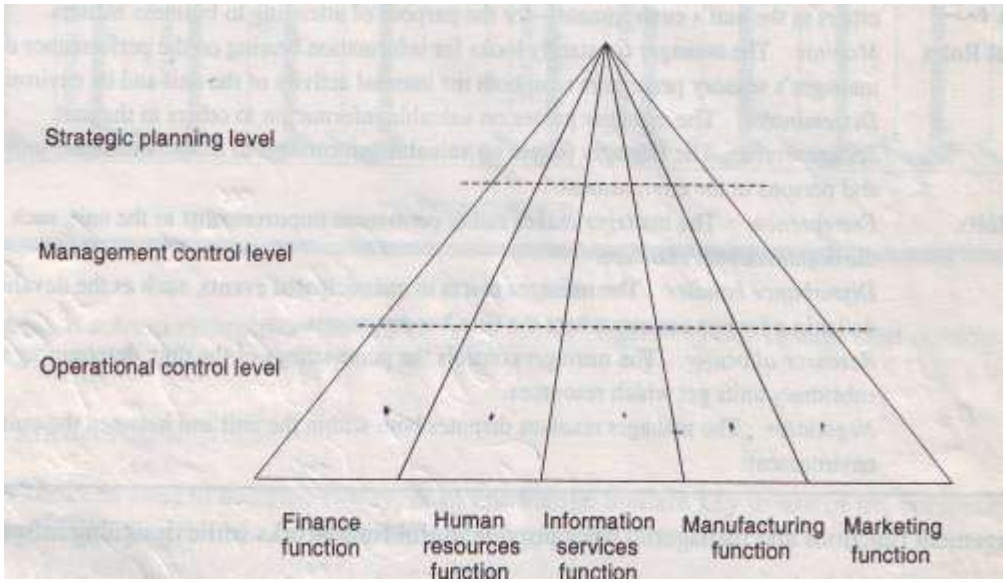

Fig.2.2 Managers Can Be Found on All Levels in the firm

What Managers do?

- **Management functions:** early in this century, around 1914, the French management theorist Henri Fayol recognized that managers perform five major management functions. Figure 2.3 shows the functions performed by managers at each level.

- **Managerial roles:** Henry Mintzberg decided that Fayol's functions did not tell the whole story. He developed a more detailed framework consisting of 10 managerial roles that managers play. Table 2.1 shows the roles of the managers.

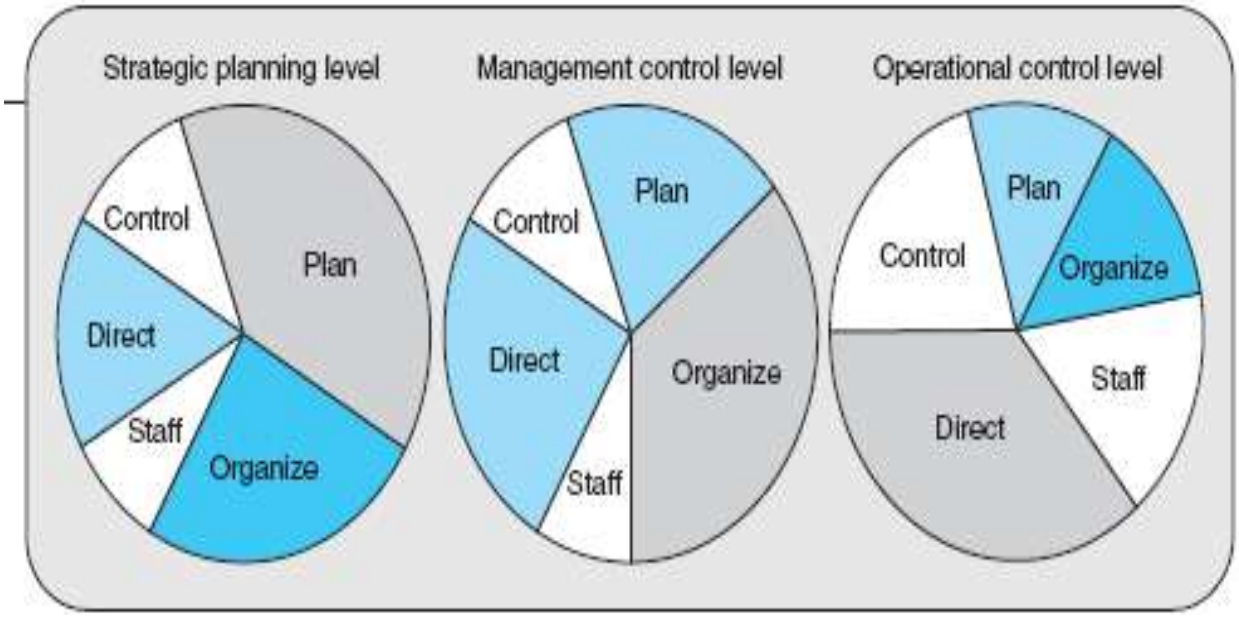

Fig.2.3 Management Functions

Mintzberg's Managerial Roles	
INTERPERSONAL ROLES	*Figurehead* The manager performs ceremonial duties, such as giving visiting dignitaries tours of the facilities. *Leader* The manager maintains the unit by hiring and training the staff and providing motivation and encouragement. *Liaison* The manager makes contacts with persons outside the manager's own unit—peers and others in the unit's environment—for the purpose of attending to business matters.
INFORMATIONAL ROLES	*Monitor* The manager constantly looks for information bearing on the performance of the unit. The manager's sensory perceptors scan both the internal activity of the unit and its environment. *Disseminator* The manager passes valuable information along to others in the unit. *Spokesperson* The manager passes valuable information along to those outside the unit—superiors and persons in the environment.
DECISIONAL ROLES	*Entrepreneur* The manager makes rather permanent improvements to the unit, such as changing the organizational structure. *Disturbance handler* The manager reacts to unanticipated events, such as the devaluation of the dollar in a foreign country where the firm has operations. *Resource allocator* The manager controls the purse strings of the unit, determining which subsidiary units get which resources. *Negotiator* The manager resolves disputes both within the unit and between the units and its environment

Table 2.1 management roles

Management Skills

- **Communications skills:** managers receive and transmit information in both written and oral forms. Figure shows how these media can originate either internally or in the environment, as well as how managers use the information in problem solving.

- **Problem solving kills:** we define problem solving as all activities that lead to the solution of a problem. During the process of problem solving, managers engage in decision making, which is the act of selecting from alternative courses of action.

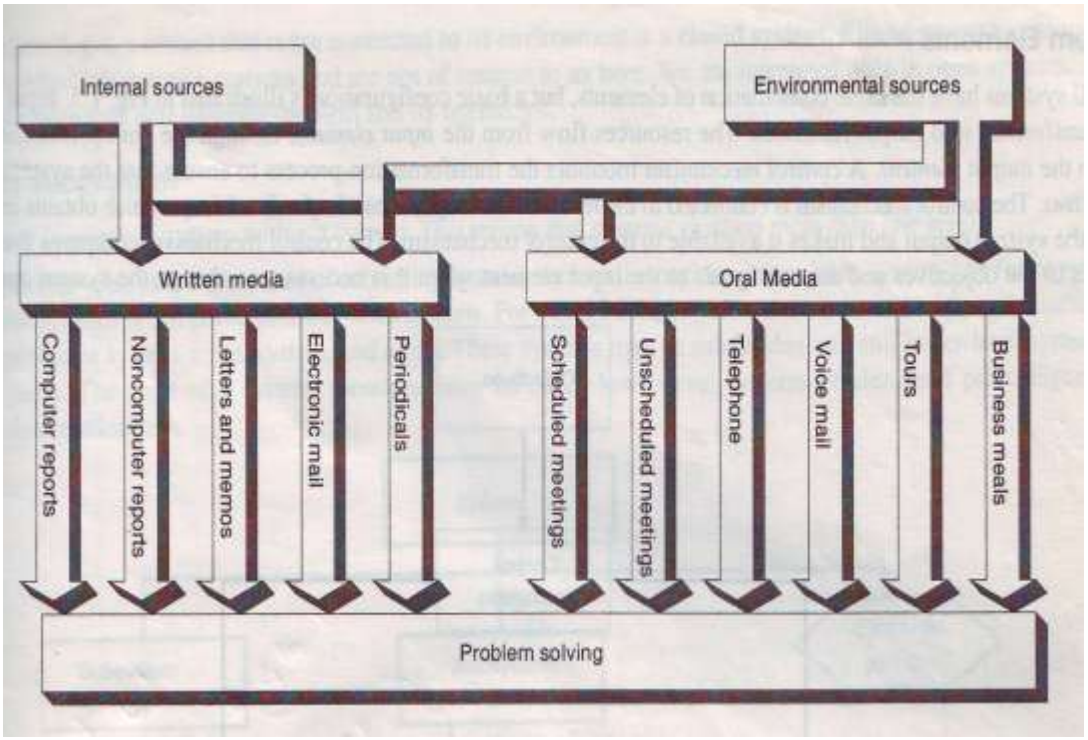

Fig.2.4 Problem-Solving Information

Management Knowledge

- **Computer literacy:** the basic working knowledge of the computer necessary to function in today's world is called computer literacy. This knowledge includes
    - an understanding of computer terminology
    - a recognition of the strengths and weaknesses of the computer
    - an ability to use the computer

- **Information literacy:** information literacy consists of understanding
    - how to use information at each step of the problem solving process
    - where that information can be obtained
    - how to share information with others

4. MANAGER AND SYSTEMS

What is a system?

System is a set of interacting or interdependent elements that are integrated with the common purpose of achieving an objective.

System elements

- Input element
- Output element
- Transformation element
- Control mechanism

The resources flow from the input element, through the transformation element, and to the output element. A control mechanism monitors the transformation process to ensure that the system meets its objectives. The control mechanism is connected to the resource flow by means of a feedback loop, which obtains information from the system output and makes it available to the control mechanism. The control mechanism compares the feedback signals to the objectives and directs signals to the input element when it is necessary to change the system operation.

Closed -Loop System

A system with the three control elements (control mechanism, feedback loop, and objective) is called a **Closed** -loop system.

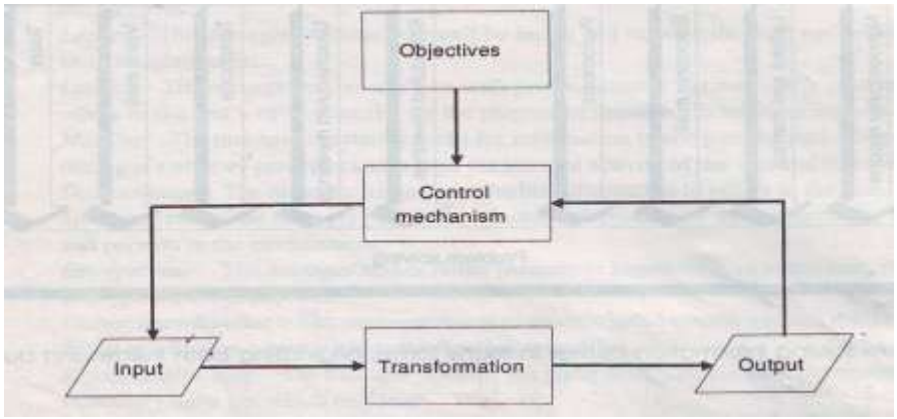

Fig.2.5 Closed -Loop System

Open-Loop System

A system without the control mechanism, feedback loop, and objective elements is called an open-loop system.

Fig.2.6 Open -Loop System

Open versus Closed Systems

Open system: An open system usually interacts with some entities in their environment.
Closed system: A closed system is isolated from its environment.

What is a subsystem?

A **subsystem** is a set of elements, which is a system itself, and a part of a larger system. An automobile is a system composed of subsidiary systems such as the engine system, body system and frame system.

What is a Supersystem?

When a system is a part of a larger system, the larger system is the Supersystem. For example, a town's government is a system, but it is also part of a larger system- the government of a state or province.

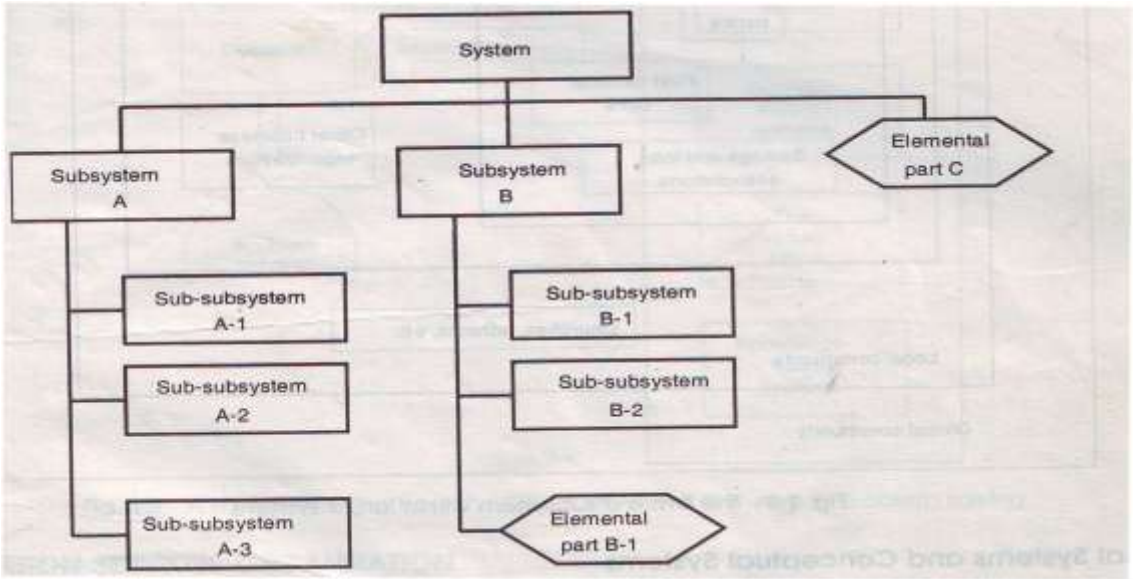

Fig.2.7 Systems can be composed of subsystems

The Business System

As with all systems, the system of the firm exists in one or more larger environmental systems or supersystems. If the firm is a bank, for example, it is part of the financial

community. It is also part of the business community, the local community, and the global community.

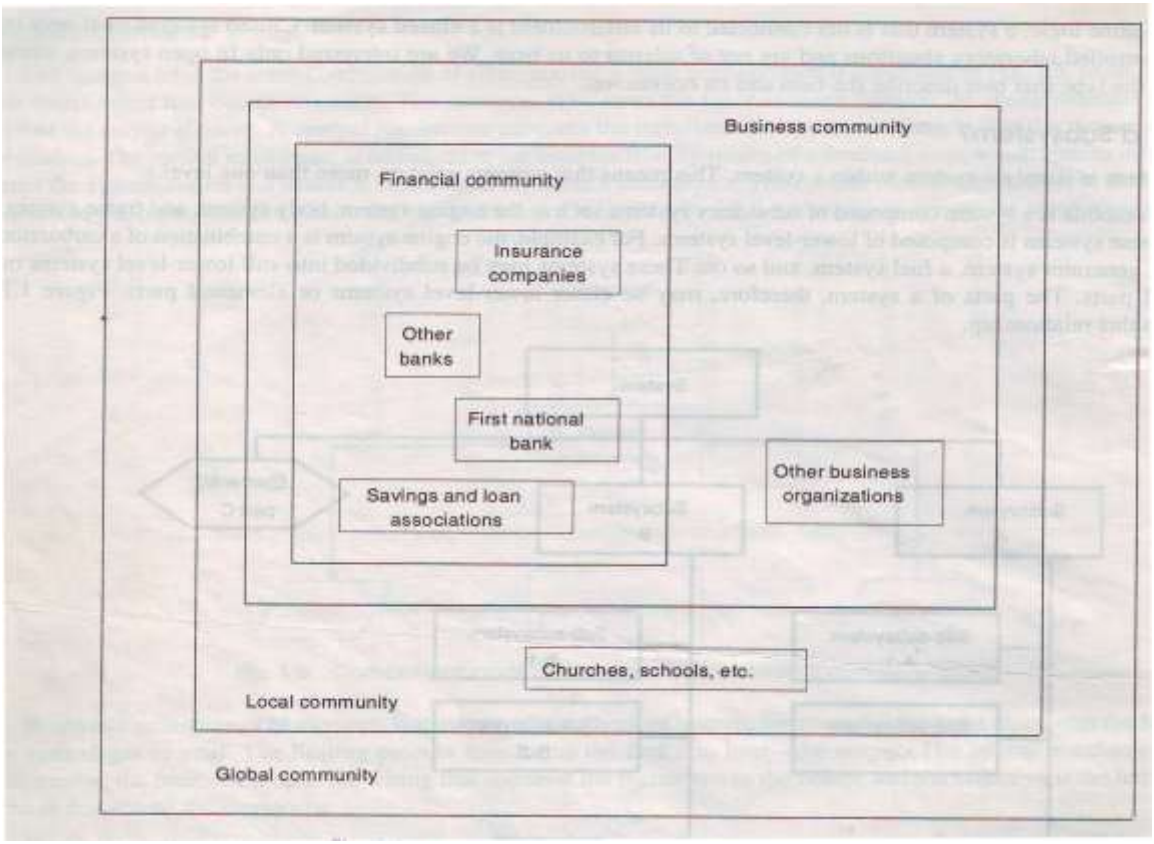

Fig.2.8 The business system

Physical and Conceptual Systems

- Physical system
  - The business firm
  - Composed of physical resources
- Conceptual system
  - It represents a physical system
  - Uses conceptual resources
    - Information
    - Data

A Systems View

Business operations are embedded within a larger environmental setting

- Reduces complexity
- Requires good objectives
- Emphasizes working together
- Acknowledges interconnections
- Values feedback

5. DATA VERSUS INFORMATION

- Data consists of facts and figures that are relatively meaningless to the user. For example, data may be the number of hours worked for each employee in the company. When this data is processed, it can be converted into information. When the hours worked by each employee are multiplied by the hourly rate, the product is the gross earnings. Information is the processed data.
- One person's data is other person's information. For example, the gross earnings figures for a firm's employees provide an illustration. The separate figures are information to each of the employees. But to the company's owner, these figures are data. The owner wants to know the total payroll for the firm, and the individual figures must be processed to produce this information.
- Data is the raw material transformed into information. This transformation is performed by an information processor. The information processor is one of the key elements in the conceptual system and can include computer components, non-computer components, or some combination of the two.

6. EVOLUTION OF COMPUTER BASED INFORMATION SYSTEM

The initial efforts to apply the computer in the business area focused on data. Then came an emphasis on information and decision support. Today, communication and consultation are receiving the most attention.

- **The initial focus on Data:** During the first half of the 20^{th} century, when punched card and key driven bookkeeping machines were used, firms generally ignored the information needs of managers. The name given to these early computer-based accounting applications was electronic data processing (EDP). Later, we use the term accounting information system (AIS) to describe the system that processes the firm's data.
- **The focus on information:** In 1964, a new generation of computing equipment was introduced. The new computers were the first to use silicon chip circuitry, and they offered opportunities for more processing power per dollar. The concept of using the computer as a MIS was promoted by the computer manufacturers. The MIS concept recognized that computer applications should be implemented for the primary purpose of producing management information.
- **The revised focus on Decision Support:** In 1971 information scientists formulated a different approach. Their concept was named the decision support system (DSS). A DSS is an information producing system aimed at a particular problem that a manager must solve and at decisions that the manager must take. The manager can be located any where in the organization on any level and in any business area.
- **The current focus on communication:** Office automation got its start in 1964. Office automation-which facilitates communication and increase productivity among managers and office workers through the use of electronic devices. Office automation grew to include a wide variety of applications such as video

conferencing, voice mail, electronic mail, electronic calendaring. We use the term virtual office to describe the modern setting for office work, made possible by the office automation and other electronic applications.

- **The potential focus on consultation**: Artificial intelligence got its start in 1990. The computer can be programmed to perform some of the logical reasoning tasks as a human, an application called artificial intelligence (AI), expert systems, is receiving much attention in business. An expert system (ES) is one that functions as specialists in an area. We can use the term knowledge-based systems that apply artificial intelligence to problem solving.

7. MODEL OF CBIS

- Managers make decisions to solve problems, and information is used in making the decisions.
- Information is presented in both oral and written forms by an information processor.
- The computer portion of the information processor contains each of the computer-based application areas- AIS, MIS, DSS, the virtual office and knowledge-based systems.
- We use the collective term CBIS to describe the five subsystems that utilize the computer.

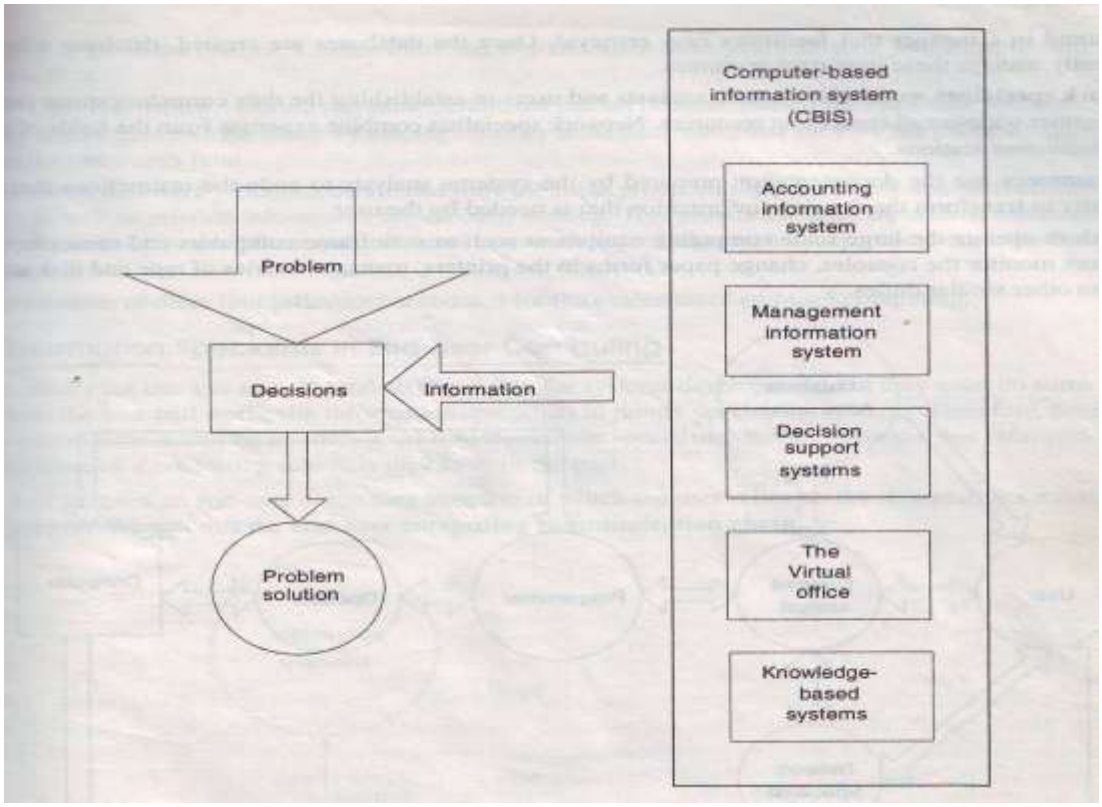

Fig.2.9 CBIS Model

8. INFORMATION SERVICE ORGANIZATION

The first computer-using firms recognized the necessity of establishing separate organizational units of specialists who would be responsible for implementing the systems.

Information Specialists:

Information specialists have full-time responsibility for developing and maintaining computer-based systems.
There are five main categories of information specialists-

- **System analyst:** work with the users in developing new systems and in improving existing systems. System analysts are expert at defining problems and at preparing written documentation on how the computer will assist in solving the problem.
- **Database administrators:** work with the users and systems analysts to create databases that contain the data needed to produce the user's information. A database is an integrated collection of computer data, organized and stored in a manner that facilitates easy retrieval. Once the databases are created, database administrators frequently manage these important resources.
- **Network specialists:** work with the systems analysts and users to establish the data communications networks that tie together widespread computing resources. Network specialists combine expertise from the fields of computing and telecommunications.
- **Programmers:** use the documentation prepared by the systems analysts to encode the instructions that cause the computer to transform the data into information needed by the user.
- **Operators:** handle the large-scale computing equipment such as mainframe computers and minicomputers. The operators monitor the consoles, change paper forms in the printers, manage libraries of tape and disk storage, and perform other similar duties.

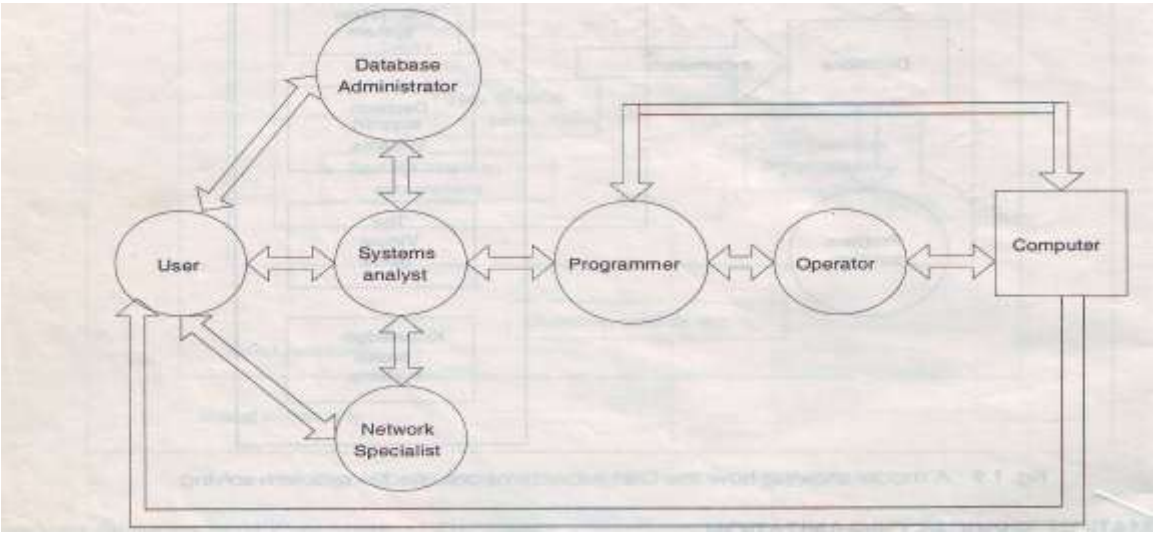

Fig.2.10 The Traditional Communication Chain

9. TREND TO END USER COMPUTING

- Information specialists do not always participate in the development of computer-based systems. That is the traditional approach, the way all systems were developed during the 1950, 1960 and early 1970.
- The late 1970 saw the beginning of a trend that had a big influence on computer use. The trend was a growing interest on the part of users in developing their own computer applications.
- This approach to system development was named end-user computing. End user is synonymous with user; he or she used the end product of a computer-based system.
- End-user computing (EUC) is the development by users of all or part of their computer-based systems.

What simulated the End-user Computing?

End-user computing evolved because of four main influences.

- **Increased computer literacy:** during the early 1980s, good computer education programs at both the college and pre-college level began to have an impact. Management ranks, especially on the lower levels, began to fill with computer literate people.

- **Information services backlog:** information specialists have always had more work than they can handle. The situation became critical during the early 1980s, when users began making demands on information services for additional systems support. Information services could not respond quickly enough, and backlogs built up. Some users had to wait two or three years for their jobs to work their way through the backlog.

- **Low-cost hardware (the PC):** during this period, the market became flooded with low-cost microcomputers. Users could obtain their own hardware by placing an order at the local computer store by telephone and making payment from the petty cash fund.

- **Prewritten software (electronic spreadsheets):** both hardware and software firms produced software that would perform basic accounting tasks as well as provide information for decision making. This prewritten software offered enhancer support and ease of use, and it enabled firms and individual users with little or no computer expertise to implement computer-based systems.

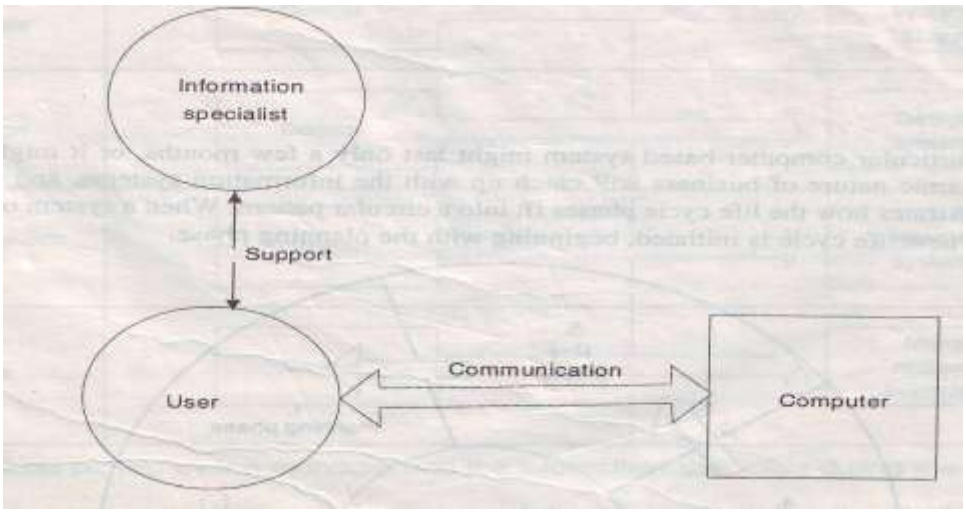

Fig.2.11 The End-User Computing Communication Chain

10. JUSTIFYING THE CBIS

The CBIS should be justified in the same manner as any other large investment of the firm.

- **Cost reduction**: During the electronic data processing (EDP) era, firms attempted to justify their computers on the basis of displaced clerical cost. As things worked out, few of the clerical workers lost their jobs. Although the computer did not cut clerical costs as planned, substantially more success was achieved through increased efficiency or increased return on investment.
- **Reduced inventory investment:** One of the first computer applications was inventory control, and firms often reduced their inventory investment by computerizing their inventory records.
- **Increased productivity (CAD/CAM):** Productivity is increased due to the use of advanced technology.
- Computer justification became more difficult with the emergence of information-oriented systems. An MIS or a DSS can produce a valuable report, but how valuable is it? The value of a piece of information is difficult to assess. Because of the difficulty of measuring CBIS value, firms approach the decision to implement such systems very cautiously. Much managerial and staff time is spent evaluating the impact that the system will have on the organization.

11. ACHIEVING THE CBIS

- Each subsystem of the CBIS is like a living organism: it is born, it grows and matures, it functions, and eventually it dies.
- This evolutionary process is called the system life cycle(SLC), and consists of the following phases:
    - Planning
    - Analysis
    - Design

- Implementation
- Use

- The life cycle of a particular computer based system might last only a few months, or it might last several years.
- When a system outlives its usefulness and must be replaced, a new life cycle is initiated, beginning with the planning phase.

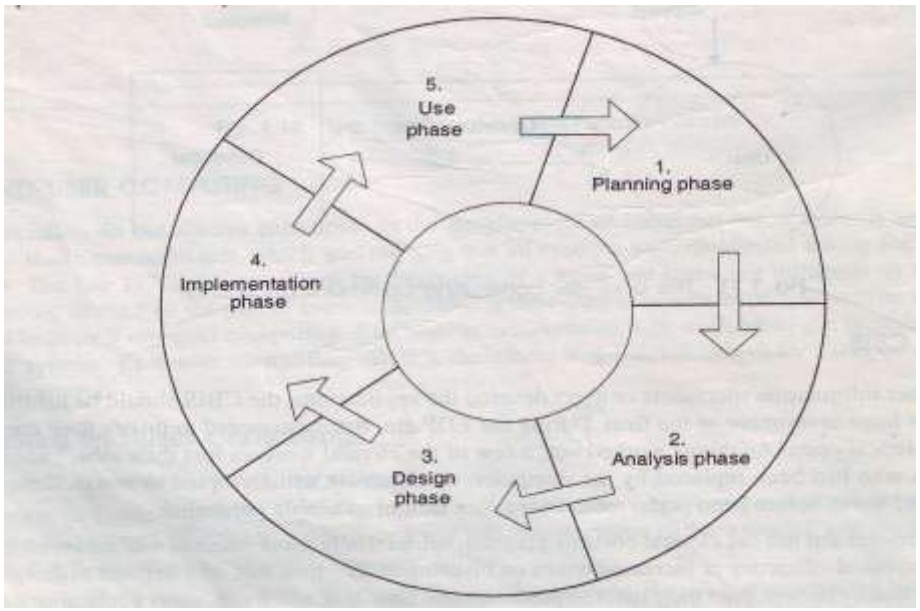

Fig.2.12 The Circular Pattern of the System Life Cycle

12. MANAGING THE CBIS

- User should be responsible for the system life cycle.
- If the user is the manager, it is the manager's responsibility to manage CBIS.
- As the CBIS evolves, the manager plans the life cycle and controls the information specialists who are involved.
- After implementation, the manager controls the CBIS to ensure that it continues to provide the desired support.
- When the manager enlists the support of the information specialists, both parties work together

  - To identify and define the problem
  - To identify and evaluate alternative solutions
  - Select the best solution
  - Assemble appropriate hardware and software
  - Create the database
  - Keep the system current

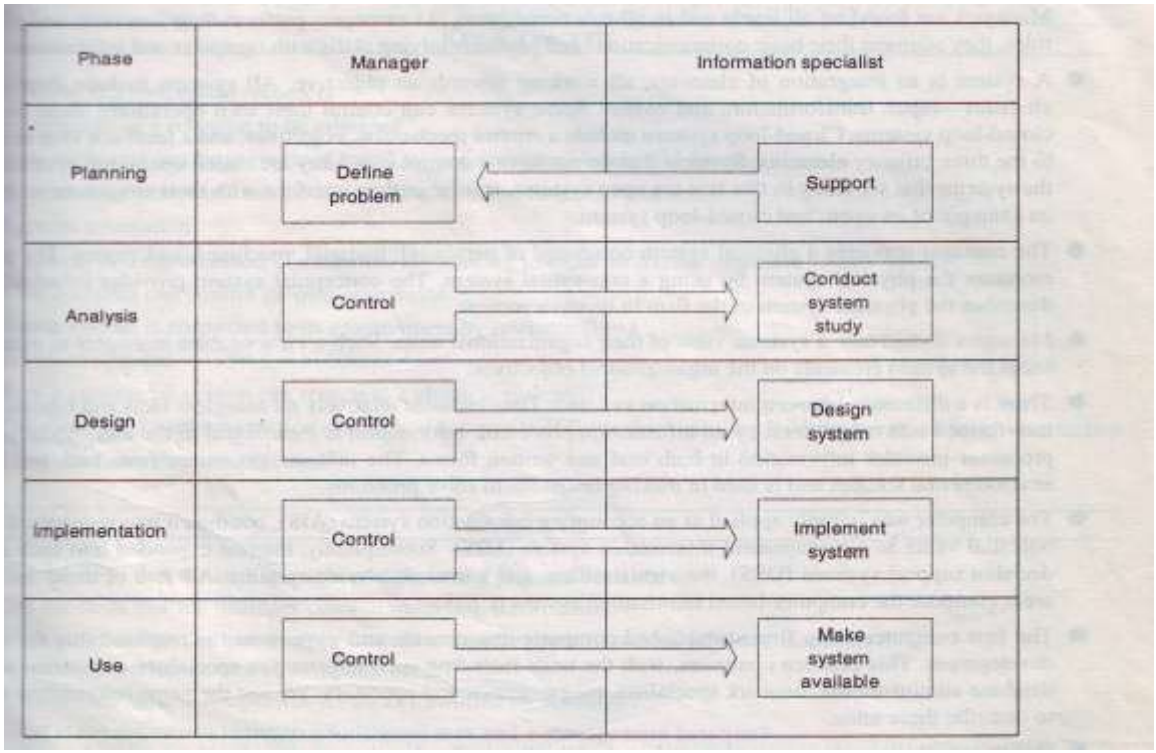

Fig.2.13 Roles Played by the Manager and the information specialists

13. THE CBIS PUTTING

- During the early years of the computer- firms had a choice as to whether they would use it.
- The managers of the early computer- using firms were visionaries; they recognized that the computer gave them some edge over their competitors.
- As the cost of computing hardware and software decreased, the applications used by the early firms became available to practically all firms.
- Today's manager really does not have much choice concerning computer use. The question is not whether to use it but how extensively to use it.
- Most firms have become completely dependent on their computer-based accounting information systems and could not handle a day's transactions without them.
- Some firms have also achieved systems that provide problem solving information, speed the flow of communications and make available expertise of the richest sort.

THE END