Management Information Systems Notes

Lecture 2

September 2005

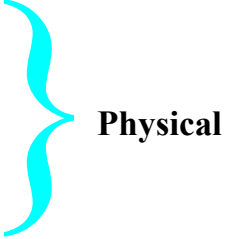# Introduction to the Computer-Based Information System

INFORMATION MANAGEMENT

Five Main Resources:

A manager is required to manage five main types of resources effectively:

- Personnel
- Material
- Machines (including facilities and energy)   **Physical**
- Money

- Information (including data)   **Conceptual**

INTEREST IN INFORMATION MANAGEMENT

1. **Increasing complexity of business activity**

   – **International economy**

   Firms of all sizes are subject to economic influences that can originate anywhere in the world. Such influences can be seen in the relative values of the currencies of each nation, where purchases are made in those countries with the highest currency value.

   – **Worldwide competition**

   Competition exists on a worldwide scale. Its effects can be seen in the imports from foreign countries.

   – **Increasing complexity of technology**

   Technology is used everywhere in business. Examples are bar code scanners, computer based airline reservation systems, automated teller machines, factory robots ..etc.

   – **Shrinking time frames**

   All phases of business operations are performed more rapidly than ever

before. (telemarketing, electronic sales orders, "just in time " delivery of raw materials ..etc)

– **Social constraints**

Some products and services are found undesirable by society. Therefore, business decisions must be based on economic factors, but social costs and payoffs must be considered as well. Plant expansion, new products, new sales outlets and similar actions must all be weighed in terms of their environmental impact.

2. **Improved computer capabilities**
   – **Size**
   – **Speed**

Today's users, have keyboard terminals or microcomputers in their offices. Many of the micros are connected to other computers in a network and users know how to use them.

WHO ARE THE INFORMATION USERS?

- **Managers**
  The idea of using the computer as a management information system was a breakthrough because it recognized managers' need for problem solving information. Embracing the MIS concept made several firms develop applications specifically aimed at management support.

- **Non-managers**
  Non-manages and staff specialists also use the MIS output.

- **Persons & organizations in the firm's environment**
  Users outside the company benefit from the MIS as well. They can be customers receiving invoices, stockholders getting dividend checks, and the federal government checking tax reports.

Management Levels

Strategic Planning Level

The strategic planning level involves mangers at the top of the organizational hierarchy. The term **strategic** indicates the long-term impact of top managers' decisions on the entire organization. The term **executive** is often used to describe a manager on the strategic planning level.

Management Control Level

Middle-level managers include regional managers, product directors, and division heads. Their level is called "management control level" due to their responsibility of putting plans into action and ensuring the accomplishment of goals.

Operational Control Level

Lower level managers are persons responsible for carrying out the plans specified by managers on upper levels. Their level is called the "operational control level" because this is where the firm's operations occur.

Influence of Management Level on Information Source and Form

When designing information systems, it is important to consider the manager's level. Such levels can influence both the source of information and how it is presented. Managers on the strategic level place greater emphasis on environmental information than do managers on the lower levels. Managers on the operational control level regard internal information as vital.

The second figure shows that strategic planning-level managers prefer information in a summary format, whereas operational control-level managers prefer detail.
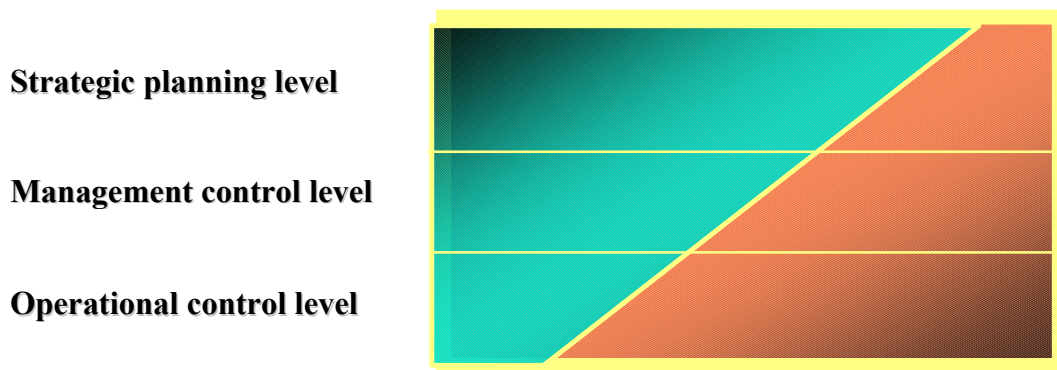
Strategic planning level

Management control level

Operational control level

Figure 2.1

Summary

Strategic planning level

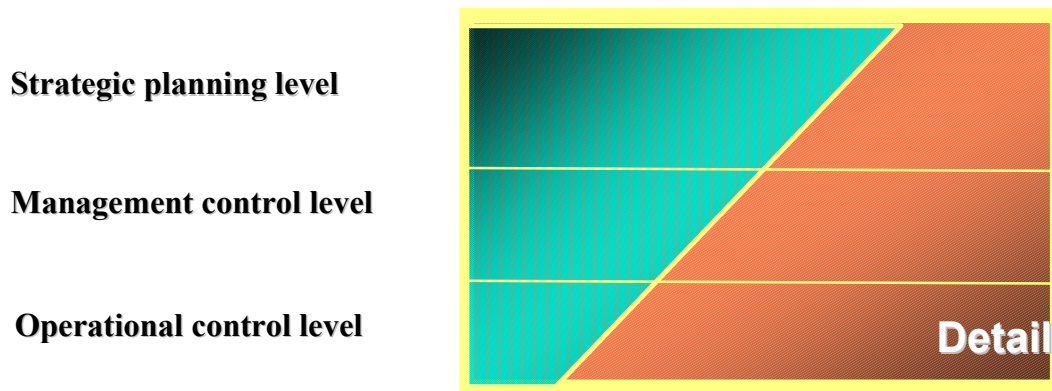**Management control level**

Operational control level

Figure 2.2

Business Areas

Managers are found in various business areas of the firm. The three traditional business areas are marketing, manufacturing, and finance in addition to other two areas that have gained major importance-human resources and information services.
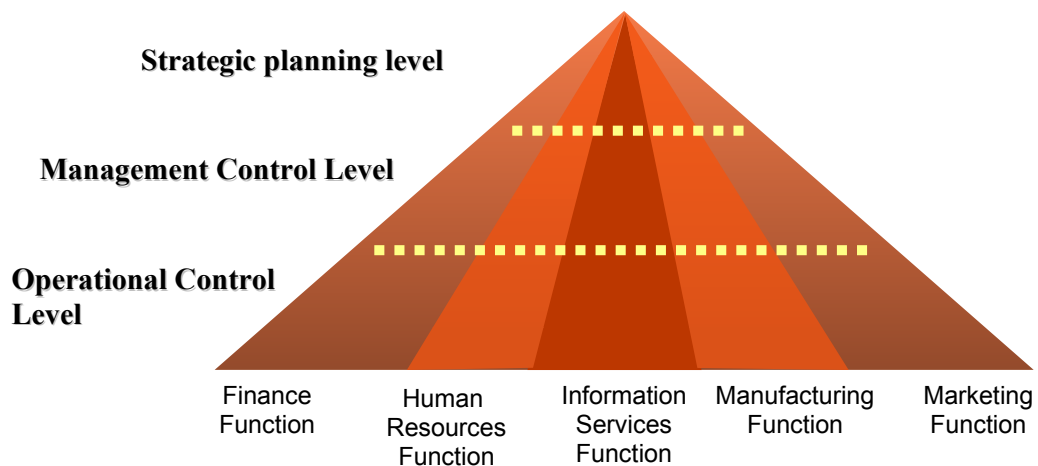
Strategic planning level

Management Control Level

Operational Control Level

| Finance Function | Human Resources Function | Information Services Function | Manufacturing Function | Marketing Function |

Figure 2.3

What managers do

According the French management theorist, Henri Fayol, managers perform five major functions.

- They **plan** what they are to do
- They **organize** to meet the plan.
- They **staff** their organization with the necessary resources.
- They **direct** the available resources to execute the plan.
- Finally, they **control** the resources, keeping them on course.

All managers perform these functions, however with varying emphasis as shown below.
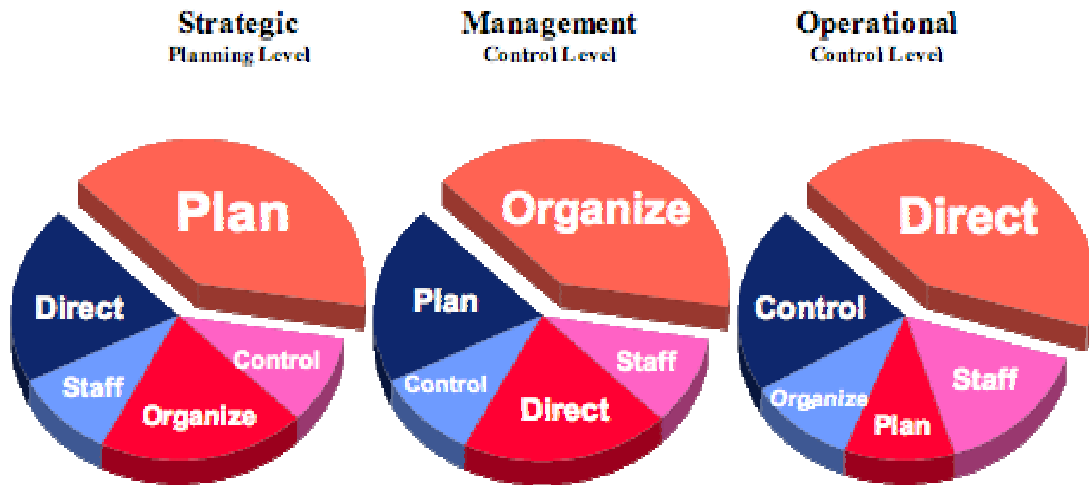

Figure 2.4

Management Knowledge

- **Computer literacy**
  This knowledge includes an understanding of computer terminology, a recognition of its strengths and weaknesses, an ability to use the computer ..etc

- **Information literacy**
  A manager should also have information literacy which consists of understanding how to use information at each step of the problem solving process, where this information can be obtained from, and how to share information with others.

Information literacy is not dependent on computer literacy. A manager can be information literate but computer illiterate.

THE MANAGER AND SYSTEMS

System Components

A system is a group of elements that are integrated with the common purpose of achieving an objective.

Not all systems have the same combination of elements, but a basic configuration is illustrated in the figure below:
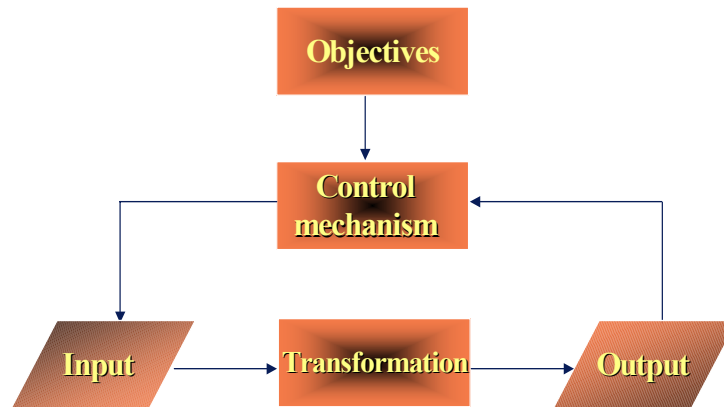
Figure 2.5

Input resources are transformed into output resources. 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.

Open Loop and Closed Loop Systems

Figure 2.6

Not all systems are able to control their own operations. A system without the control mechanism, feedback loop, and objective elements is called **an open loop system.** A system with the three control elements is called a closed loop system.

Open and Closed Systems

- **Open system:** Connected to its environment by means of resource flows (e.g., heating system)
- **Closed system:** Not connected to its environment. They usually exist in tightly

controlled laboratory systems.

What is a subsystem?

A subsystem is simply a system within a system. This means that systems exist on more than one level and can be composed of subsystems or elemental parts.
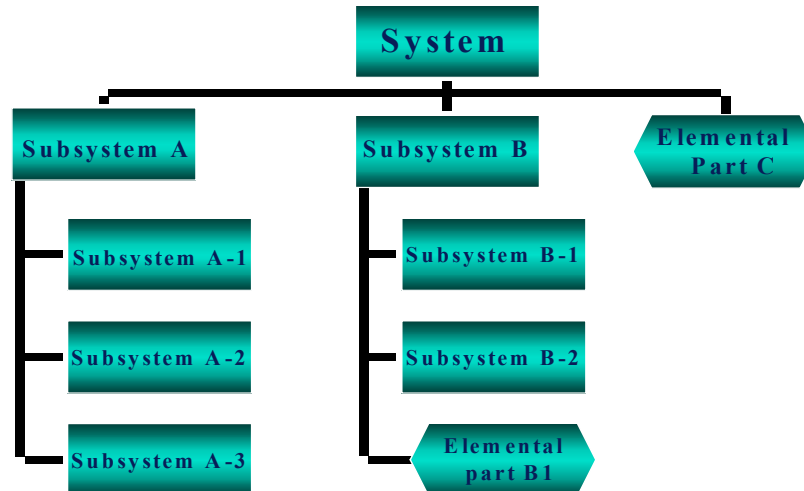

Figure 2.7

What is a Super System? (not frequently used)

When a system is part of a larger system, the larger system is the super system.

Physical and Conceptual Systems

Physical system

The business firm is a physical system, composed of physical resources

Conceptual system

It's a system that uses conceptual resources-information and data- to represent a physical system.

Eg. : The Computer is a physical system, but the data and information stored in it can be viewed as a conceptual system.

The Importance of a System View

A systems view regards business operations as systems embedded within a larger environmental setting. It's an abstract way of thinking, but it has potential value to the manager. The systems view:

- reduces complexity
- requires good objectives
- emphasizes working together
- acknowledges interconnections
- values feedback

DATA VERSUS INFORMATION

o Data consists of facts and figures that are relatively meaningless to the user. (e.g., number of hours worked by an employee)

o Information is processed data or meaningful data. (e.g., multiplying the hours worked by the hourly rate to get each employee's gross earnings).

The transformation of data into information 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
- Combination of the two

THE EVOLUTION OF COMPUTER BASED INFORMATION SYSTEMS

- Data Processing (DP) during the first half the twentieth century
- Management Information Systems (MIS) 1964
  - o IBM promoted the concept as a means of selling disk files and terminals
  - o The MIS concept recognized that computer applications should be implemented for the primary purpose of producing management information.
- Decision Support Systems (DSS) 1971
  - o A DSS is an information-producing system aimed at a particular problem that a manager must solve and at decisions that the manager must make.
  - o Notes distinction: MIS: Organizational/group - general

    DSS: Individual - specific
- Office Automation (OA) 1964
  - o Facilitates communication

- o Increases productivity among managers and office workers through the use of electronic devices.
- o Includes a variety of applications such as video conferencing, voice mail, electronic mail, desktop publishing...etc.
- Artificial Intelligence (AI)/ Expert Systems (ES) - 1990s
  - o AI is an application that enables the computer system to perform some of the same logical reasoning tasks as humans.
  - o An expert system is a special subclass of AI that functions as a specialist in a certain field. For example, it can provide management consultancy.
  - o Limitation of ES: It doesn't improve its intelligence over time. One way to overcome this limitation is to use neural networks, electronic and mathematical analogs of the human brain.
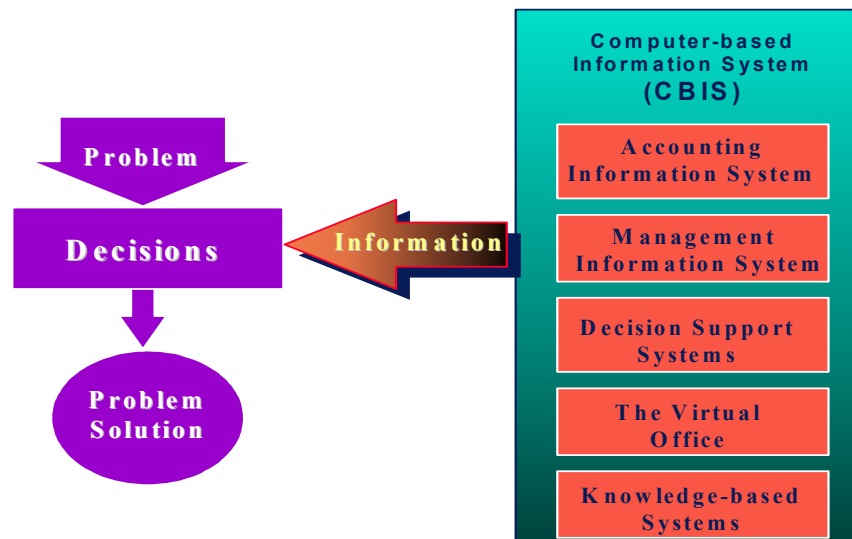
THE CBIS MODEL

Figure 2.8

Managers make decisions to solve problems, and information is used in making these 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.

THE INFORMATION SERVICES ORGANIZATION

Information Specialists

Those are the ones who have full-time responsibility for developing and maintaining computer based systems. There are five categories of information specialists:

- **System analysts** work with users to define the requirements for developing new systems and improving existing ones.
- **Database administrators** work with users and system analysts to create databases that contain the data needed to produce the user's information.
- **Network specialists** work with system analysts and users to establish the data communication networks that tie together widespread computing resources.
- **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 mini-computers.

THE TREND TO END USER COMPUTING

Information specialists do not always participate in the development of computer-based systems as shown in the figure below. That is the traditional approach, the way all systems were developed during the 1950s—1970s.

The trend towards **End user Computing** began by the late 1970s and then kept growing.

EUC is the development by user of all or part of their computer bases systems.
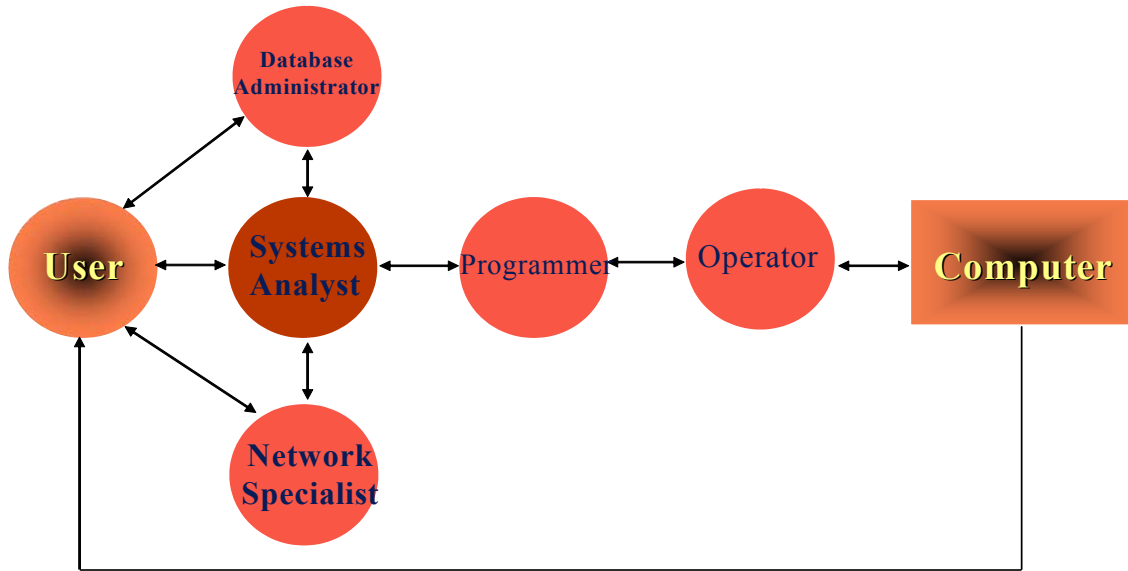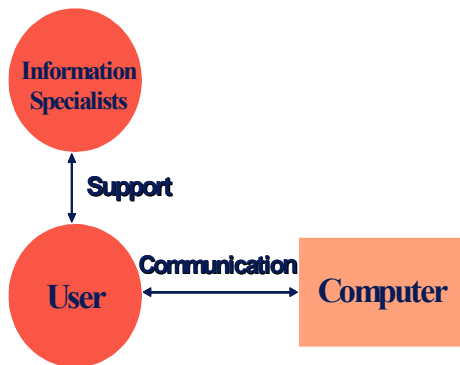
Figure 2.9

Stimulants to EUC

- **Increased computer literacy**
- **Information Services backlog,** Information specialists have always had more work than they can handle. Backlogs began to build up in the 1980s, when information specialists could not respond quickly to users' increasing demands.
- **Low-cost hardware (the PC)**
- **Prewritten software (electronic spreadsheets)**

The Role of Information Specialists in EUC

The EUC concept doesn't mean that there will be no more need for information specialists. Rather, it means that information specialists will assume more of a consulting role than they used to have in the past.

Figure 2.10

JUSTIFYING THE CBIS

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

- o **Economic**
  - – Cost reduction
  - – Reduced inventory investment
  - – Increased productivity (CAD/CAM)
- o **Non-economic**
  - – Perceived value

ACHIEVING THE CBIS

In some respects, 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).** It consists of the following phases:
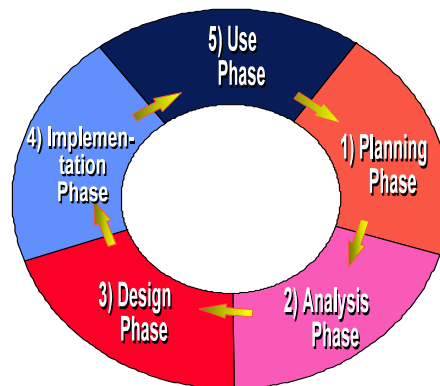

Figure 2.11

REENGINEERING THE CBIS

The process of reworking a system is called reengineering or business process redesign.

- o A reengineered system is not always a clean-slate approach
- o Good features of the system can be retained
- o BPR will be the development methodology of choice, rather than the SLC.

MANAGING THE CBIS

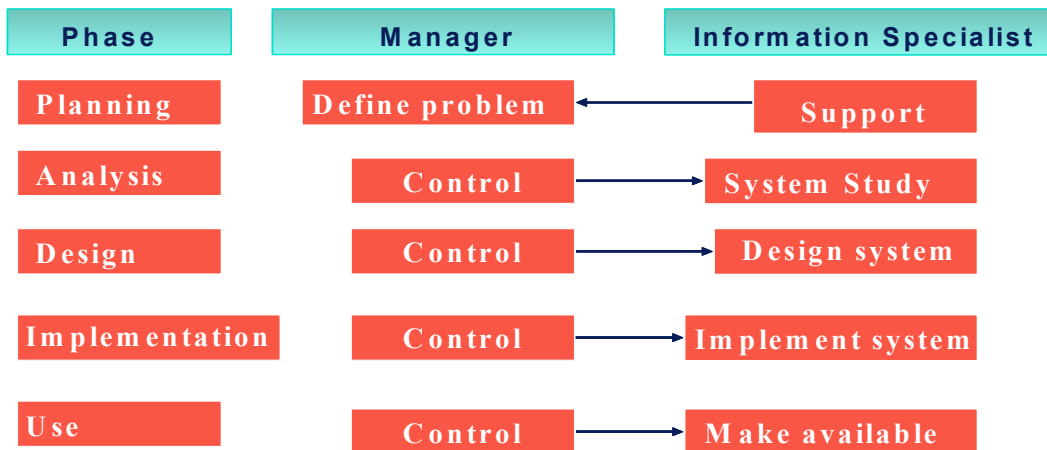| Phase	Manager	Information Specialist
Planning	Define problem	Support
Analysis	Control	System Study
Design	Control	Design system
Implementation	Control	Implement system
Use	Control	Make available

Figure 2.12

The manager is the one responsible for managing the CBIS. Among his responsibilities are:

- o Planning the life cycle
- o Controlling the information specialists involved.
- o Ensuring that the CBIS provides the desired support.