PGD in IT

Management Information Systems

Preface:

This courseware is prepared for the BCS CIIT – HEQ Professional Graduate Diploma in IT's Management Information Systems module. Many recommended texts were used in preparing this text book.

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Chapter 01 - Evolution of Management

What is Management?

Management is the practice of consciously and continually shaping organizations. This consists of the process of ***Planning***, ***Organizing***, ***Leading*** and ***Controlling*** the work of organization members as well as using all available organizational resources to reach stated organizational goals.Management in business and human organization activity is simply the act of getting people together to accomplish desired goals.

Management comprises planning, organizing, staffing, leading or directing, and controlling an organization (a group of one or more people or entities) or effort for the purpose of accomplishing a goal. Resourcing encompasses the deployment and manipulation of human resources, financial resources, technological resources, and natural resources.

Who is Manager?

A Manager is the person responsible for planning and directing the work of a group of individuals, monitoring their work, and taking corrective action when necessary. For many people, this is their first step into a management career.

Managers may direct workers directly or they may direct several supervisors who direct the workers. The manager must be familiar with the work of all the groups he/she supervises, but does not need to be the best in any or all of the areas. It is more important for the manager to know how to manage the workers than to know how to do their work well.

A manager may have the power to hire or fire employees or to promote them. In larger companies, a manager may only recommends such action to the next level of management. The manager has the authority to change the work assignments of team members.

Efficiency and Effectiveness of Management

Underlying many management discussions there are two concepts suggested by Peter Drucker, one of the most respected writers on management; that is "**Efficiency**" and "**Effectiveness**". Efficiency means "**doing things right**" and Effectiveness means "**doing right things**".

Efficiency is an **"input-output"** concept. An efficient manager is one who achieves outputs, or results, that measure up to the inputs (*labour, materials and time*) used to achieve them. Managers who are able to minimize the cost of resources needed to achieve goals are acting efficiently.

Effectiveness in contrast involves choosing right goals. A manager who selects an inappropriate goal, *For example: producing mainly large cars when demand is there for small cars is an ineffective manager, even if large cars are produced with maximum efficiency*. Managers at General Motors learned this lesson the hard way. When the demand for fuel-efficient, smaller cars increased in the 1970s, General Motors ignored the competition created by the Japanese and Germans believing that the trends were an aberration and that Americans loyal to American products would not continue to buy foreign cars. As a consequence they continued to produce large fuel-inefficient cars and in so doing lost enormous competitive ground to these new rivals.

No amount of efficiency can make up for a lack of effectiveness. In fact Drucker says, effectiveness is the key to an organization's success, before we can focus on doing things efficiently, we need to be sure we have found the right things to do.

Evolution of Management Theories

Theories are perspectives with which people make sense of their world experiences. Formally a theory is a coherent group of assumptions put forward to explain the relationship between two or more observable facts.

1. First, a theory provides a stable focus for understanding what we experience. A theory provides criteria for determining what is relevant.
2. Second, theories enable us to communicate efficiently and thus move into more complex relationships with other people.
3. Third, theories make it possible-indeed; challenge us to keep learning about our world.

By definition theories have boundaries, there is only so much that can be covered by any one theory. Once we are aware of this we are better able to ask ourselves if there are alternative ways of looking at the world (especially when our theories no longer "fit" our experience) and to consider the consequences of adopting alternative beliefs.

Management Activities, Roles and Levels

Management Activities

Work is of two kinds; first, altering the position of matter at or near the earth's surface; second, telling other people to do so. The first kind is unpleasant and ill paid; the second is pleasant and highly paid. Bertrand Russell

Management bear the responsibility for ensuring that the organization operates to meet its objectives, taking into account the various participants, regulatory authorities and laws. Management activities include setting objectives, controlling work, reviewing results, applying corrective action and providing an environment. That stimulates and motivates.
Are the right things being done? Often, the time consumed by management activities is in inverse proportion to the importance of them, for example, when an inordinate amount of time is spent approving trifling expenses as compared to the time given to defining where the organization sees itself in ten years time. Managers often do the easy things to appear busy, rather than contemplate difficult issues. Management should evaluate its activities to see which are really required. The question should be asked: 'Is the time and effort we spend on a particular issue worth more than the results obtained?' If not - why do it? For example, if people were allowed to spend money on expenses without prior authorization and only spot checks were made, how much money would the organization actually lose compared with the saving in management time?

Sundry activities: Management activities are not the same as the activities of a manager. The latter may include many other activities as well as managing work and people; indeed some 'managers' may not do any actual managing at all! These other activities could involve professional work, being a media spokesman or sitting on various external committees. They really come under the category of support or incidental activities.

Problems with appraising: An important management activity is appraisal and benchmarking, that is, comparing various aspects of the organization with internally imposed objectives, other similar organizations or government imposed standards. However, monitoring and appraisal can be overdone - continually asking someone how well they are coping, producing financial accounts more than necessary or continually assessing students, may make the manager look busy but is actually obstructive and counter,productive.

Managerial Levels

1. Strategic Management
2. Tactical Management
3. Operational Management

Strategic Management
Is the conduct of drafting, implementing and evaluating cross-functional decisions that will enable an organization to achieve its long-term objectives. It is the process of specifying the organization's mission, vision and objectives, developing policies and plans, often in terms of projects and programs, which are designed to achieve these objectives and then allocating resources to implement the policies, and plans, projects and programs. A balanced scorecard is often used to evaluate the overall performance of the business and its progress towards objectives.
Strategic management is a level of managerial activity under setting goals and over Tactics. Strategic management provides overall direction to the enterprise and is closely related to the field of Organization Studies. In the field of business administration it is useful to talk about "strategic alignment" between the organization and its environment or "strategic consistency".

Tactical Management

Operational Management
Is an area of business concerned with the production of quality goods and services, and involves the responsibility of ensuring that business operations are efficient and effective. It is the management of resources, the distribution of goods and services to customers.

Operations also refers to the production of goods and services, the set of value-added activities that transform inputs into many outputs.[1] Fundamentally, these value-adding creative activities should be aligned with market opportunity (see Marketing) for optimal enterprise performance.

Types of Managers

We have been using the term manager to mean anyone who is responsible for carrying out the four main activities of management that is Planning, Organizing, Leading and controlling in relationship over management. One way to grasp the complexity of management is to see that managers can practice at different levels in an organization and with different ranges of organizational activities. The following are different types and levels of managers that may exist in organizations:

1. First-Line-Managers
2. Middle Managers
3. Top Managers

First-Line-Managers
The lowest level in an organization at which individuals are responsible for the work of others is called First-Line or First-Level management. They direct non-management employees; they do not supervise other managers. Examples of first line managers are the foreman or production supervisor in a manufacturing plant, the technical supervisor in a research department, and the clerical supervisor in a large office. First-Level managers are often called as “Supervisors”.

Middle Managers
The term middle management can include more than one level in an organization. Middle managers direct the activities of lower-level managers and sometimes those of operating employees as well. Middle managers principal responsibilities are to direct the activities that implement their organization’s policies and to balance the demands of their managers with the capacities of their employers.

Top Managers
Composed of a comparatively small group of people, Top management is responsible for the overall management of an organization. These people are called executives. They establish operating policies and guide the organization’s interactions with its environment. Typical titles of top managers are “Chief Executive Officer”, “President”, and e.t.c.

Functional and General Managers

Another major classification of managers depends on the scope of activities they manage. Organizations are often described as a set of **“functions”.** A function, in this sense, is a collection of similar activities. The marketing function for example commonly consists of sales, promotion, distribution and market research activities.
The Functional manager is responsible for only one functional area such as production, marketing or finance.
General manager on the other hand oversees a complex unit such as a company, a subsidiary, or an independent operating division.

Management Skills
The following are the different types of skills that is required by managers at different levels.

1. Technical Skill
2. Human Skill
3. Conceptual Skill

Technical Skill
This is the ability to use the procedures, techniques and knowledge of a specialized field. Surgeons, engineers, musicians and accountants all have technical skills in their respective fields.

Human Skill
This is the ability to work with, understand and motivate other people as individuals or in groups.

Conceptual Skill
This is the ability to coordinate and integrate all of an organization’s interests and activities. It involves seeing the organization as a whole, understanding how its parts depend on one another and anticipating how a change in any parts will affect the whole.
Fayol and Katz suggest that although all three of these skills are essential to a manager, their relative importance depends mainly on the manager’s rank in the organization. Technical skill is most important in the lower levels. Human skill, although important for

managers at every level, is the primary skill needed by middle managers; their ability to tap the technical skills of their subordinates is more important than their own technical proficiency. Finally, the importance of conceptual skill increases as one rises through the ranks of a management system. At higher and higher organizational levels, the full range of relationships and the organization's place in time are important to understand. This is where a manager must have a clear grasp of the big picture.

Managerial Roles

Managerial roles can be described in four broad functions:

- ✓ Planning
- ✓ Organizing
- ✓ Leading
- ✓ Controlling

We can look beyond these functions to identify a number of specific roles that managers may fulfil at various times. You may be already familiar with some of the crucial roles required of managers because you are already a veteran of many different relationships that have evolved over your life thus far! In your ties with your family, friends, classmates and co-workers sometimes you *lead,* sometimes you act as a go-between or *liaison* and sometimes others look to you as a *symbol* of some worthwhile trait such as honesty or willingness to work hard. In these same relationships, you *monitor* what is going on outside the relationship, *share information* with your partners, and even act as a *spokesperson* for them. Furthermore you sometimes take the *initiative*, sometimes *handle disagreements,* and sometimes *allocate resources* such as money, and sometimes *negotiate* with your collaborators.

Increasingly, today's organizations are seeing that many managerial roles need not be confined to traditional managers. As the organizational environment becomes increasingly competitive, companies are looking for ways to improve quality. Often this means people who once had very narrow, non managerial roles are asked to expand their range of activities.

Planning, Organizing, Leading & Controlling

The Management Process

Since the late nineteenth century, it has been common practice to define management in terms of four specific functions of manager: Planning, Organizing, Leading and Controlling. Although this framework has come under some scrutiny it is still generally accepted. We can thus say that management is the process of the planning, organizing, leading and controlling the effort of organization members and of using all other organizational resources to achieve stated organizational goals.
A process is a systematic way of doing things. We refer to management as a process to emphasize that all managers, regardless of their particular aptitudes or skills, engage in certain interrelated activities in order to achieve their desired goals. In the rest of this section we will briefly describe these four main management activities and how they involve relationships and time.

1. Planning Process

Planning implies that managers think through their goals and actions in advance and that their actions are based on some method, plan or logic rather than on a hunch. Plans give

the organization its objectives and setup the best procedures for reaching them. In addition, plans are the guides by which;

- The organization obtains and commits the resources required to reach its objectives
- Members of the organization carry on activities consistent with the chosen objectives and procedures
- Progress towards the objectives is monitored and measured so that corrective action can be taken if progress is unsatisfactory.

The first step in planning is the selection of goals for the organization. Goals are then established for each of the organization's subunits – its divisions, departments and so on. Once these are determined, programs are established for achieving goals in a systematic manner. Of course in selecting objectives and developing programs, the top manager considers their feasibility and acceptability to the organizations managers and employees. Relationship and time are central to planning activities. Planning produces a picture of desirable future circumstances – given currently available resources, past experiences, etc.

Plans made by top management charged with responsibility for the organization as a whole may cover periods as long as five or ten years. In a large organization, such as multinational energy corporation like British Petroleum, those plans may involve commitments of billions of dollars. On the other hand, planning in particular parts of the organization spans much shorter periods. For example such a plan may be for the next days work, or for a two – hour meeting to take place in a week.

2. Organizing

- ✓ An organization is a pattern of relationships through which people under the direction of managers pursue their common goals.
- ✓ These goals are the products of decision – making a process that is known as planning.
- ✓ The goals that managers develop through planning are typically ambitions, far reaching and open ended.
- ✓ Managers need to ensure that their organizations can endure for a long time, and members of an organization need a stable, understandable framework within which they can work together towards organizational goals.
- ✓ The managerial process of organizing involves making decisions about creating this kind of framework so that organizations can past from the present well into the future.
- ✓ Managers must take into account two kinds of factors when they organize. First they must outline their goals for the organization, their strategic plans for pursuing those goals and the capabilities at their organizations for carrying out those strategic plans. Simultaneously, managers must consider what is going on now and what is likely to happen in the future in the organizational environment.
- ✓ At the intersection of these factors (plans and environments) managers make decisions that match goals, strategic plans and capabilities with environmental factors.
- ✓ This crucial first step in organizing which logically follows from planning is the process of organizational design.
- ✓ The specific pattern of relationships that managers create in this process is called the organizational structure.

Four Building Blocks

- ✓ Organizing is an ongoing managerial process. Strategies can change, organizational environments change, and the effectiveness and efficiency of organizational activity does not always measure up to what managers would like.
- ✓ Managers take four fundamental steps when they begin to make decisions about organizing.
    1. Divide the total workload into tasks that can logically and comfortably be performed by individuals or groups. This is referred to as the division of work.
    2. Combine tasks in a logical and efficient manner. The grouping of employees and tasks is generally referred to as departmentalization.
    3. Specify who reports to whom in the organization. This linking of departments results in an organizational hierarchy.
    4. Set up mechanisms for integrating departmental activities into a coherent whole and monitoring the effectiveness of that integration. This process is called as coordination.

Division of Work

- ✓ This is the breakdown of a complex task into components so that individuals are responsible for a limited set of activities instead of the task as a whole. This is sometimes referred to as division of labour.
- ✓ The advantage is that is total productivity was multiplied, because division of work creates simplified tasks that can be learned and completed relatively quickly.
- ✓ This also caters specification as each person becomes expert in a certain job.

Departmentalization

This is the process of grouping into departments of work activities that are similar and logically connected.
Eg: Finance, Marketing…etc.

Hierarchy

- ✓ This is a pattern of multiple levels of an organizational structure at the top of which is the senior-ranking manager(s) responsible for the operations of the entire organization. Other lower ranking managers are located down the various levels of the organization.
- ✓ When having a hierarchy span of management control or span of control is considered this refers to the member of people reporting directly to a manager.

3. Leading

A Definition of Leadership

A traditional definition of leadership is **Leadership** is an interpersonal influence directed towards the achievement of a goal or goals.
Three important parts of this definition are the terms *interpersonal*, *influence*, and *goal*.

- ***Interpersonal*** means between persons. Thus, a leader has more than one person (group) to lead.
- ***Influence*** is the power to affect others.
- ***Goal*** is the end one strives to attain.

Basically, this traditional definition of leadership says that a leader influences more than one person towards a goal.

Any organization should consist of leader in order to ensure work assigned to groups is carried out effectively. Leaders should be the initiative for all activities performed by group members. A leader can be a manager, but a manager is not necessarily a leader. The

leader of the work group may emerge informally as the choice of the group. If a manager is able to influence people to achieve the goals of the organization, without using his or her formal authority to do so, then the manager is demonstrating leadership.

4. Control Process & Types of Controls

Control Process

- ✓ Management control is the process of ensuring that actual activities conform to planned activities in fact control is more pervasive (spreading) than planning.
- ✓ Control helps managers monitor the effectiveness of their planning, and their leading activities.
- ✓ An essential part of control process is taking corrective activities as needed.

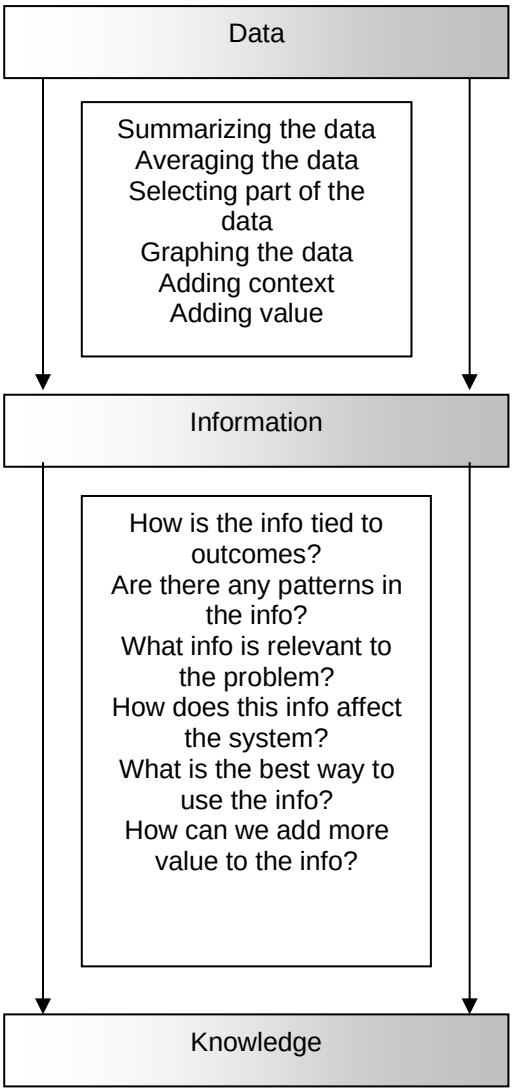
Chapter 02 - Information Systems and Technologies

Information Concepts

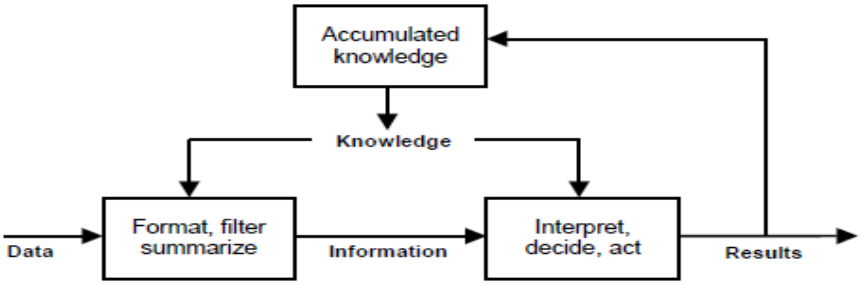
Data Vs Information

Data
_ raw facts
– Alphanumeric, image, audio, and video

Information
– Organized collection of facts
– Have value beyond the facts themselves



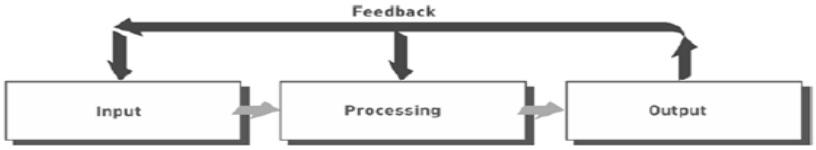
Relation between data, information and knowledge



Characteristics of Valuable Information

Characteristics	Definitions
Accurate	Accurate information is error free. In some cases, inaccurate information is generated because inaccurate data is fed into the transformation process (this is commonly called garbage in, garbage out [GIGO]).
Complete	Complete information contains all the important facts. For example, an investment report that does not include all important costs is not complete.
Economical	Information should also be relatively economical to produce. Decision makers must always balance the value of information with the cost of producing it.
Flexible	Flexible information can be used for a variety of purposes. For example, information on how much inventory is on hand for a particular part can be used by a sales representative in closing a sale, by a production manager to determine whether more inventory is needed, and by a financial executive to determine the total value the company has invested in inventory.
Reliable	Reliable information can be depended on. In many cases, the reliability of the information depends on the reliability of the data collection method. In other instances, reliability depends on the source of the information. A rumor from an unknown source that oil prices might go up may not be reliable.
Relevant	Relevant information is important to the decision maker. Information that lumber prices might drop may not be relevant to a computer chip manufacturer.
Simple	Information should also be simple, not overly complex. Sophisticated and detailed information may not be needed. In fact, too much information can cause information overload, whereby a decision maker has too much information and is unable to determine what is really important.
Timely	Timely information is delivered when it is needed. Knowing last week's weather conditions will not help when trying to decide what coat to wear today.
Verifiable	Information should be verifiable. This means that you can check it to make sure it is correct, perhaps by checking many sources for the same information.
Accessible	Information should be easily accessible by authorized users to be obtained in the right format and at the right time to meet their needs.
Secure	Information should be secure from access by unauthorized users.

The Components of an Information System



Computer-Based Information Systems

• Manual versus computerized information systems
• Computer-based information system (CBIS)
– Hardware, software, databases, telecommunications, people, and procedures
– Collect, manipulate, store, and process data into information

Business Information Systems

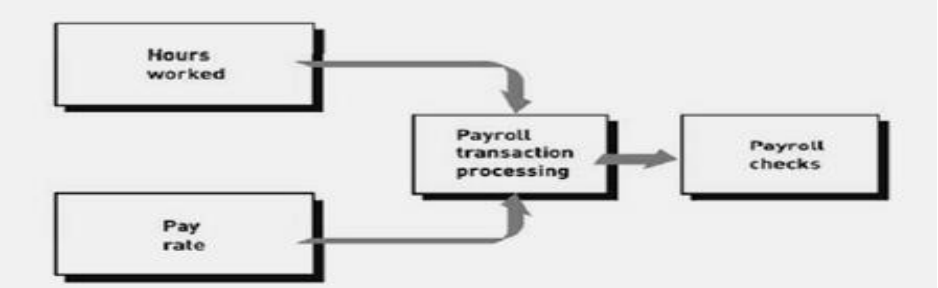
• Most common types of information systems used in business organizations:
– Electronic and mobile commerce systems
– Transaction processing systems
– Management information systems
– Decision support systems
– Specialized business information systems

Electronic and Mobile Commerce

• **E-commerce:** any business transaction executed electronically between parties such as:
– Companies (B2B)
– Companies and consumers (B2C)
– Consumers and other consumers (C2C)
– Business and the public sector
– Consumers and the public sector

Transaction Processing Systems and Enterprise Resource Planning

• **Transaction:** business-related exchange
– Payments to employees
– Sales to customers
– Payments to suppliers
• **Transaction processing system (TPS)**
– A collection of people, procedures, software, databases, devices
– Records completed business transactions



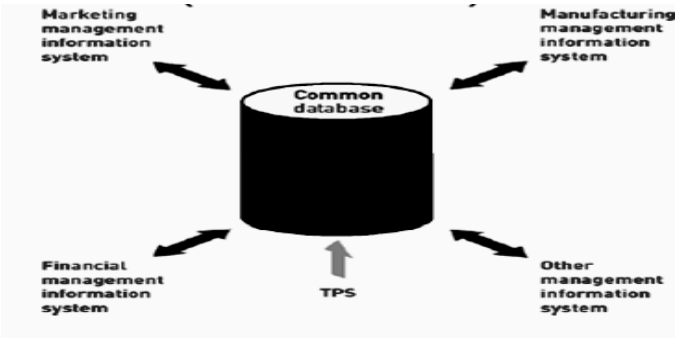
The inputs (numbers of employee hours worked and pay rates) gothrough a transformation process to produce outputs (paychecks)

Enterprise Resource Planning

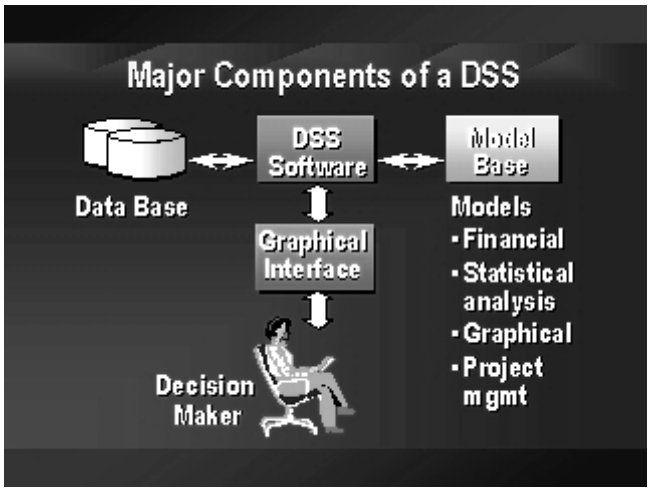
• Integrated programs that manage all business operations
• Coordinate planning, inventory control, production, and ordering

Information and Decision Support Systems Management Information Systems

• **Management information system (MIS)**
– A collection of people, procedures, software, databases, devices
– Provides information to managers/decision makers
• Primary focus is operational efficiency
• MIS outputs
– Scheduled reports
– Demand reports
– Exception reports



Decision support system (DSS)
– A collection of people, procedures, software, databases, devices
– Supports problem-specific decision making
• Focus is on decision-making effectiveness



The cost & value of Information

The value of information is directly linked to how it helps decision markers to achieve their organization goals. Cost of information calculated based on resources consumed to produce in and following are considered.

- Cost of acquiring data
- Cost of maintain data
- Cost of generating information
- Cost of communicating information

What is an Information System?

An information system can be any organized combination of people, hardware, software, communications networks and data resources tat collects, transforms and disseminates information in an organization.

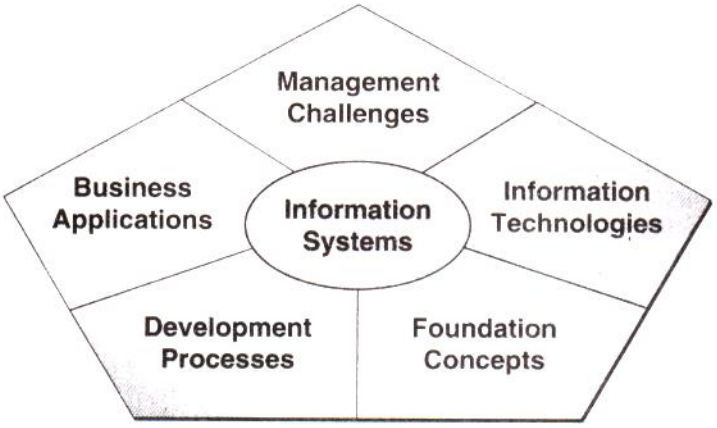
People have relied on information systems to communicate with each other using a variety of physical devices (*hardware*), information processing instructions and procedures (*software*), communications channels (*networks*) and stored data (*data resources*) since the dawn of civilization.

Why Information Systems are Important?

The blending of Internet technologies and traditional business concerns is impacting all industries and is really the latest phase in the ongoing evolution of business. All companies need to update their business infrastructures and change the way they work to respond more immediately to customer needs.

Information systems and technologies (including e-business and e-commerce technologies and applications) have become a vital component of successful businesses and organizations. They thus constitute an essential field of study in business administration and management.

An IS Framework for Business Professionals



The field of information systems encompasses many complex technologies, abstract behavioural concepts, specialized applications in countless business and non business areas. As a manager or business professional you do not have to absorb all of this knowledge. The diagram below illustrates a useful conceptual framework that organizes the knowledge presented in this text and outlines what you need to know about information systems. It emphasises that you should concentrate your efforts in five areas of knowledge as given below:

- ***Foundation Concepts:*** Fundamental behavioural, technical, business and managerial concepts about the components and roles of information systems. Examples include- Basic information system concepts derived from general systems theory, or competitive strategy concepts used to develop business applications of information technology for competitive advantage.

- ***Information Technologies:*** Major concepts, developments and management issues in information technology that is hardware, software, networks, data resource management and many Internet based technologies.

- ***Business Applications:*** The major use of information systems for the operations, management, and competitive advantage of a business, including electronic business, commerce, collaboration and decision making using the Internet, intranets and extranets.

- ***Development Processes:*** How business professionals and information specialists plan, develop, and implement information systems to meet business opportunities using several application development approaches.

- ***Management Challenges:*** The challenges of effectively and ethically managing information technologies, strategies, and security at the end user, enterprise, and global levels of the business.

Components of an Information System

What is a system?

A system can be most simply defined as a group of interrelated or interacting elements forming a unified whole. Many examples of systems can be found in the physical and biological sciences, in modern technology, and in human society. Thus we can talk of the physical system of the sun and its planets, the biological system of the human body, the

technological system of an oil refinery, and the socio-economic system of a business organization.
A more forma l definition of a system can be as follows:

"A system is a group of interrelated components working together towards a common goal by accepting inputs and producing outputs in an organized transformation process".

Such a system (sometimes called as *dynamic* system) has three basic interacting components or functions which are given below:

Input: involves capturing and assembling elements that enter the system to be processed. For example: Raw materials, energy, data, and human effort must be secured and organized for processing.

Processing: involves transformation process that converts input into output. Examples are a manufacturing process, the human breathing process, or mathematical calculations.

Output: involves transferring elements that have been produced by a transformation process to their ultimate destination. For example, finished products, human services, and management information must be transmitted to their human users.

Examples:

- A manufacturing system accepts raw materials as inputs and produces finished goods as output.
- An information system is a system that accepts resources (data) as input and processes them into products (information) as output.
- A business organization is a system where economic resources are transformed by various business processes into goods and services.

Feedback and Control

The system concept becomes even more useful by including two additional components, *Feedback and Control*. A system with feedback and control components is sometimes called as *cybernetic* system, that is self monitoring, self regulating system.

Feedback: is data about the performance of a system. For example, data about sales performance is feedback to sales manager.

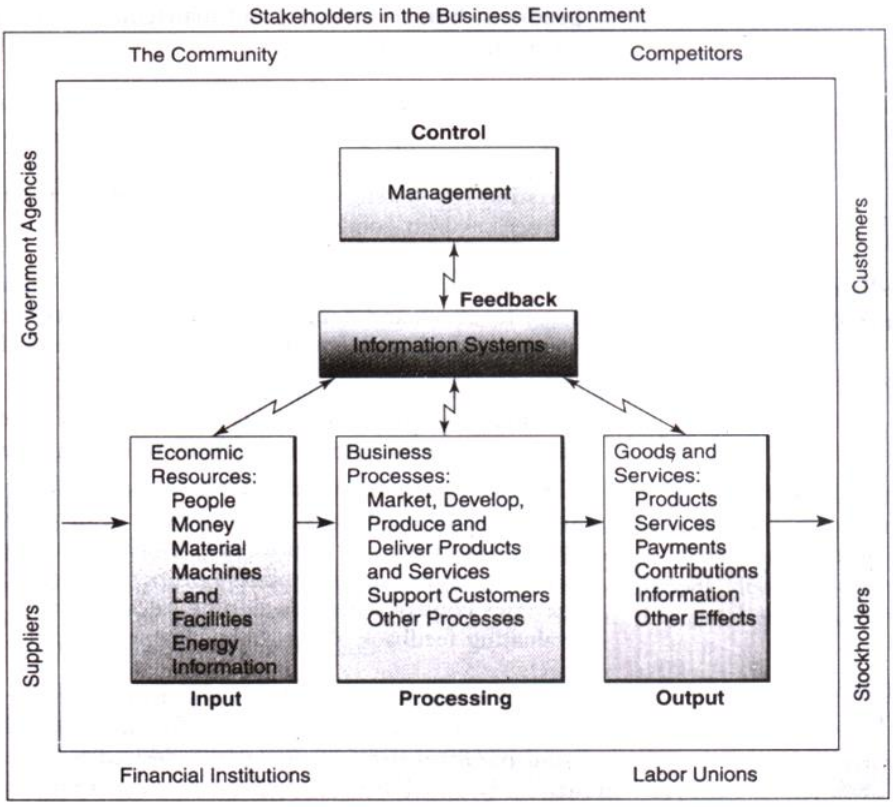
Control: involves monitoring and evaluating feedback to determine whether a system is moving towards the achievement of its goal. The control function then makes necessary adjustments to a system's input and processing components to ensure that it produces proper output. For example, a sales manager exercises control when reassigning sales persons to new sales territories after evaluating feedback about their sales performance.

Example:

A business has many control activities such as where computers may monitor and control manufacturing processes, accounting procedures help control financial systems, data entry displays provide control of data entry activities, and sales quotas and sales bonuses attempt to control sales performance.

Other system characteristics
[

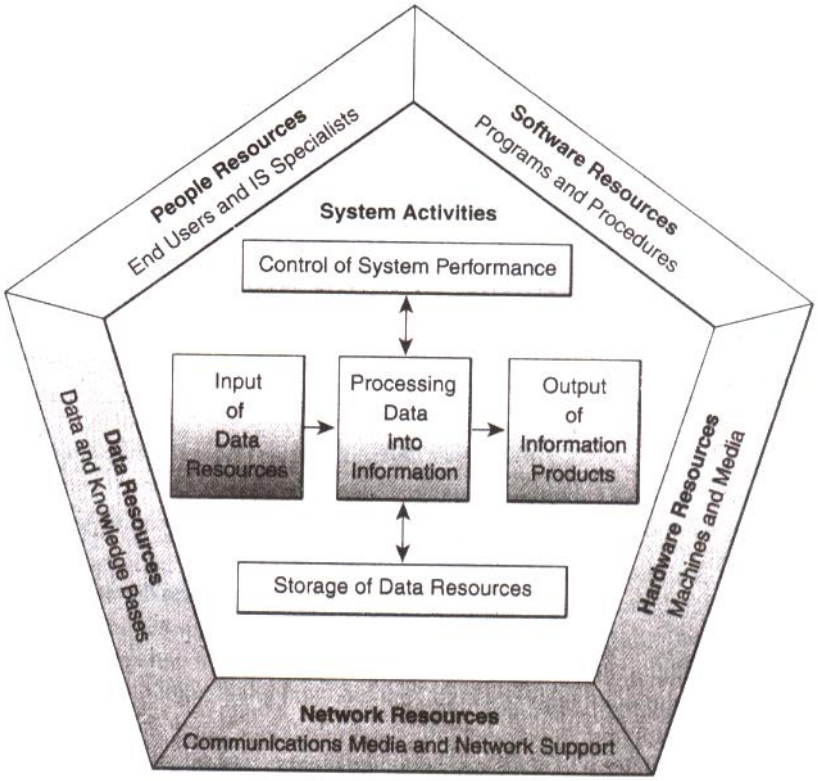
The following diagram uses a business organization to illustrate the fundamental components of a system, as well as several other system characteristics. Note that a system does not exist in a vacuum; rather, it exists and functions in an ***environment*** containing other system. If a system is one of the components of a larger system then it is said to be a ***subsystem***, and the larger system is the environment.
Several systems may share the same environment. Some of these systems may be connected to one other by means of a shared boundary, or interface. The following diagram also illustrates the concept of an open system that is a system that interacts with other systems in its environment. A system which has the ability to change itself or its environment in order to survive is an *adaptive system*.



Example:

Organizations such as business and government agencies are good examples of the systems in society, which is their environment. Society contains a multitude of such systems, including individuals and their social, political and economic institutions. Organizations themselves consist of many subsystems such as departments, divisions, process teams, and other workgroups. Organizations are examples of open systems because they interface and interact with other systems in their environment. Organizations are examples of adaptive systems, since they can modify themselves to meet the demands of changing environment.

The diagram below illustrates an **information system model** that expresses a fundamental conceptual framework for the major components and activities of information systems. An information system depends on the resources of people (end users and IS specialists), hardware (machines and media), software (programs and procedures), data (data and knowledge bases), and networks (communications media and network support) to perform input, processing, output, storage and control activities that convert data resources into information products.



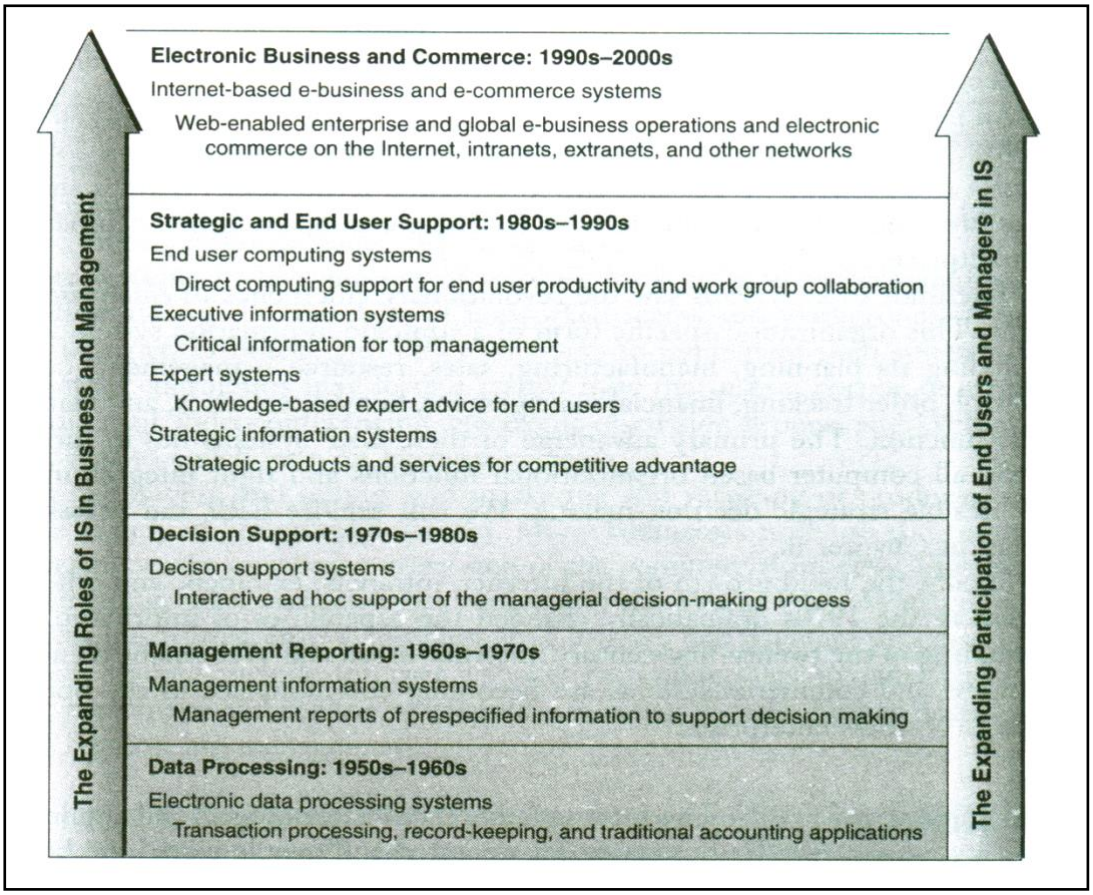
Information System Resources

The following diagram outlines several examples of all typical information system resources and products:

Information Systems Resources and Products
People Resources Specialists—systems analysts, software developers, system operators. End Users—anyone else who uses information systems.
Hardware Resources Machines—computers, video monitors, magnetic disk drives, printers, optical scanners. Media—floppy disks, magnetic tape, optical disks, plastic cards, paper forms.
Software Resources Programs—operating system programs, spreadsheet programs, word processing programs, payroll programs. Procedures—data entry procedures, error correction procedures, paycheck distribution procedures.
Data Resources Product descriptions, customer records, employee files, inventory databases.
Network Resources Communications media, communications processors, network access and control software.
Information Products Management reports and business documents using text and graphics displays, audio responses, and paper forms.

Evolution of MIS
Trends in Information systems

The business applications of information systems have expanded significantly over the years. The diagram below summarizes the changes:



Until 1960s, the role of most information systems was simply transaction processing, record-keeping, accounting, and other *electronic data processing* (EDP) applications. Then another role was added, as the concept of *management information systems* (MIS) was conceived. This new role focused on developing business applications that provided managerial end users with predefined management reports that would give managers the information they needed for decision- making purposes.

By the 1970s, it was evident that the pre-specified information products produced by such management information systems were not adequately meeting many of the decision making-needs of management. So the concept of *decision support systems* (DSS) was born. The new role for information systems was to provide managerial end users with ad hoc and interactive support of their decision-making process. This support would be tailored to the unique decision-making styles of managers as they confronted specific types of problems in the real world.

In the 1980s, several new roles for information systems appeared. First, the rapid development of micro computer processes power, application software packages and telecommunications networks gave birth to the phenomenon of *end user computing.* Now, end users could use their own computing resources to support their job requirements instead of waiting for the indirect support of corporate information services departments.

Second, it became evident that most top corporate executives did not directly use either the reports of management information systems or the analytical modelling of capabilities of decision support systems, so the concept of *executive information systems* (EIS) was developed. These information systems were created to give top executives an easy way to get the critical information they want, when they want it, tailored to the formats they prefer.

Third, breakthroughs occurred in the development and application of artificial intelligence (AI) techniques to business information systems. *Expert Systems* (ES) and other *knowledge-based systems* forged a new role for information systems. Today expert systems can serve as consultants to users by providing expert advice in limited subject areas.

An important new role for information systems appeared in the 1980s and continued through the 1990s.This is the concept of strategic role for information systems, sometimes called *strategic information systems* (SIS). In this concept, information technology becomes an integral component of business processes, products, and services that help a company gain a competitive advantage in the global market place.

Finally, the rapid growth of the Internet, intranets, extranets, and other interconnected global networks of the 1990s have dramatically changed the capabilities of information systems in business at the beginning of the twenty-first century. Inter- networked enterprise and global electronic business and commerce systems are revolutionizing the operations and management of today's business enterprise.

Chapter 03 - The Mission of Information Systems

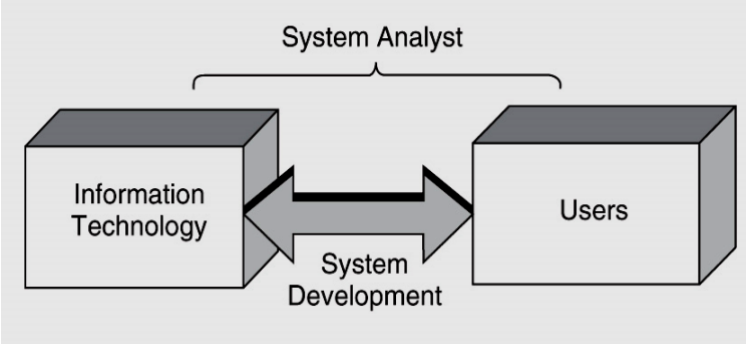
The mission of information systems have changed over the years as given below:

Initially the transaction processing system acted as "**Paperwork Factories**" handling payments to employees, customer billing, maintain stores e.t.c. That is objectives of information systems defined by productivity measures.

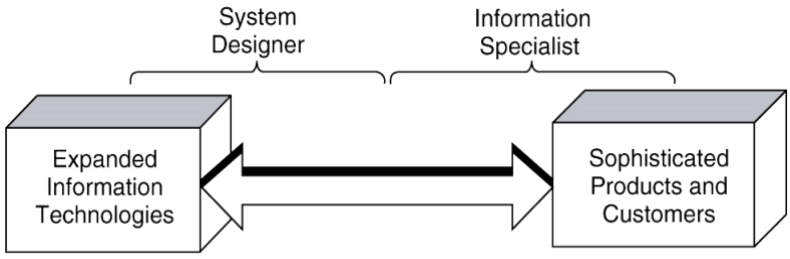
In the MIS the mission changed to "**Getting the right information to the right person at the right time**". This produced reports for "management by exception" for all levels of management.
For today's environment a broader focus would be **"To improve the performance of people in the organizations through the use of information technology".** Improving organizational performance is accomplished by the people and groups that comprise the organization. One resource for this improvement is IT.

A simple model

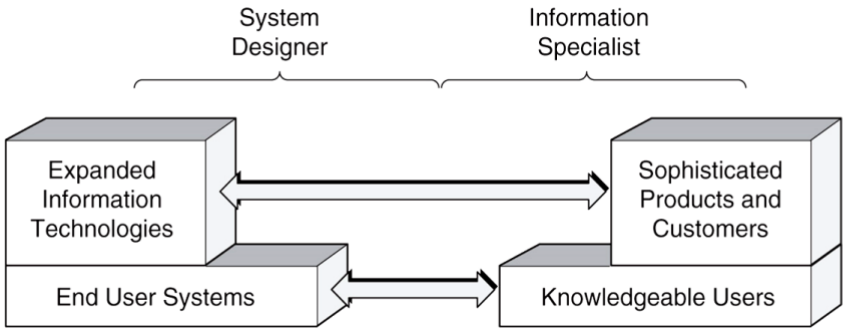
In the early days of Information Systems, the 'translation' between IT and users was performed almost entirely by systems analysts.



Over the last 50 years technology has become increasingly complex and powerful. Users have become increasingly sophisticated where Information systems are now viewed as 'products' and users have become 'customers'. Therefore more specialization is required of systems professionals to bridge this wider gap



Thereafter Technology has became sophisticated enough to be used by many employees and consumers which lead to the users to bridge the technology gap. Today, some of the technology is truly user-friendly, and some applications such as Web page development, database mining and spreadsheet manipulation, are handled by non-IT staff
Transaction systems, however, are still 'developed' by professional developers, either inside or outside the firm.



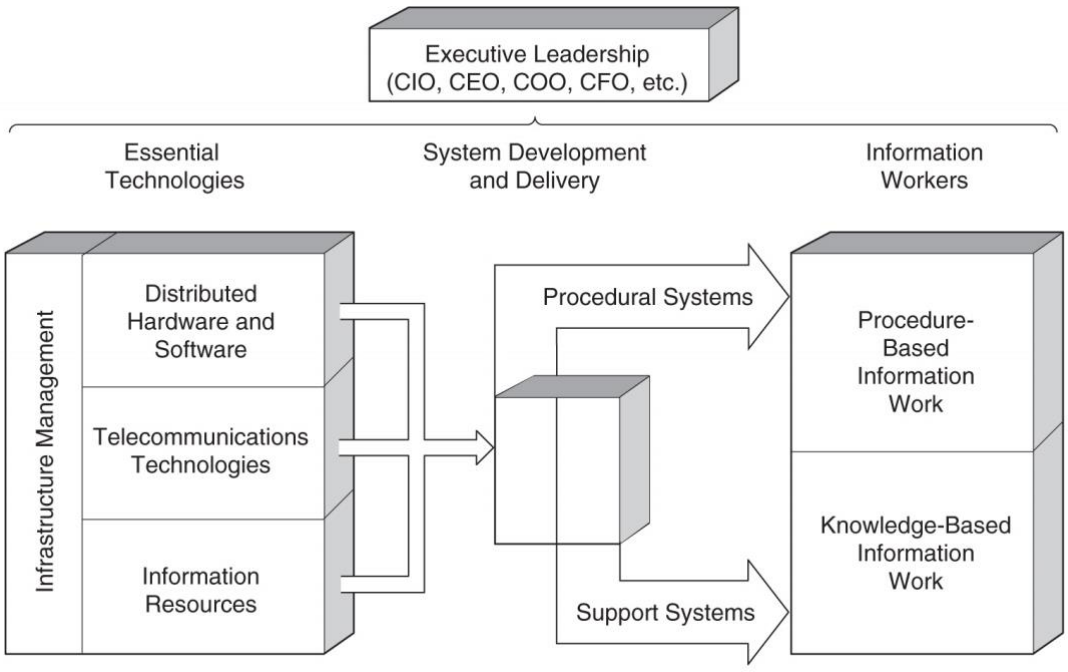
Why Talk about the "Technology Gap"?

The main point of this discussion is that technology is getting more complex, applications are becoming more sophisticated, and users are participating more heavily in the development of applications. The net result is that management of the process is becoming more complex and difficult as its importance increases. Therefore this lead to the following model.

A Better Model

Expanding the simple model gives us more guidance into managerial principles and tasks which suggest a model with four principal elements which are mentioned below:

1. A set of technologies that represent the IT infrastructure installed and managed by the IS department
2. A set of users who need to use IT to improve their job performance
3. A delivery mechanism for developing , delivering and installing applications
4. Executive leadership to manage the entire process of applying the technology to achieve organizational objectives and goals



1. Technologies

Several forces contribute to the increased importance and complexity of IT such as:

- Growth in capacity + reduction in cost & size
- Merging of previously separate technologies of computers, telephones/telecom/cable TV, office equipment and consumer electronics
- Ability to store and handle multiple forms of data

Information systems now fill major roles in management reporting, problem solving and analysis, office support, customer service and communications

2. The Users

Clerical?	**Managerial?**
Procedure Based	***Knowledge Based***
• High volume of transactions	• Low volume of transactions
• Low cost (value) per transaction	• High value (cost) per transaction
• Well-structured procedures	• Ill-structured procedures
• Output measures defined	• Output measures less defined
• Focus on process	• Focus on problems and goals
• Focus on efficiency	• Focus on effectiveness
• Handling of data	• Handling of concepts
• Predominantly clerical workers	• Managers and professionals
• Examples	• Examples
Back office	Loan department
Mortgage servicing	Asset/liability management
Payroll processing	Planning department
Check processing	Corporate banking

3. System Development and Delivery

Systems development and delivery bridge the gap between technology and users. Systems for procedure-based (clerical) activities differ from systems for knowledge based information work (managerial). Systems are built based on technology resources using the following three main categories (essential technologies):

- Hardware and software
- Telecommunications
- Information resources

Management of these is called infrastructure management.

4. Information System Management

- Chief Information Officer (CIO)
  - Must be high enough in the enterprise to influence organizational goals
  - Must have enough credibility to lead the harnessing of technology to pursue those goals

- Must work with all the other CXOs (Chief Executive Officers)
  - IT has become too important to be left to one individual

- Executive team must work together to govern it and leverage it well.

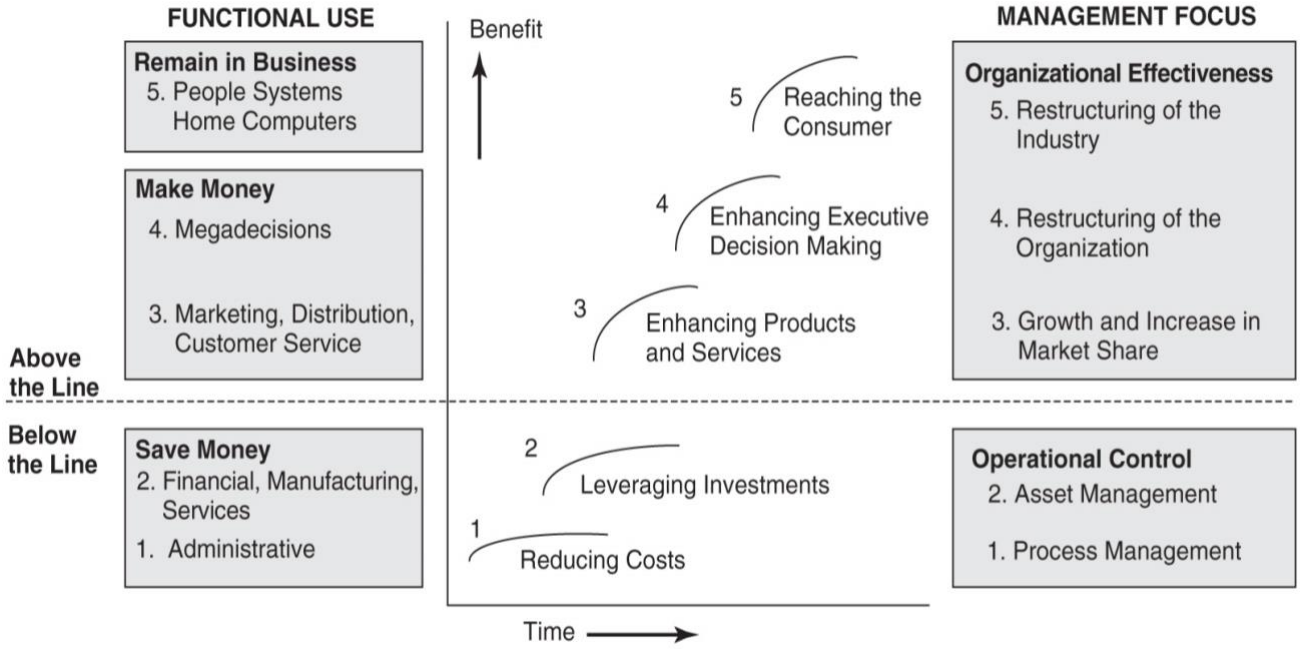
A Better Model - Summary

This model has four major components:

1. **The technology** – which provides the electronic and information infrastructure
2. **Information workers** - who use IT to accomplish their work goals
3. **System development and delivery** – which brings the technology and users together
4. **The management of the IS function** - Overall responsibility = to harness IT to improve the performance of the people and the organization

Where Is the IS Organization Headed?

Escalating Benefits of IT- Discussion



Chapter 04 - Types of Information System

4.1 Introduction

For most businesses, there are a variety of requirements for information. Senior managers need information to help with their business planning. Middle management need more detailed information to help them monitor and control business activities. Employees with operational roles need information to help them carry out their duties.

As a result, businesses tend to have several "information systems" operating at the same time. This revision note highlights the main categories of information system and provides some examples to help you distinguish between them.

4.2 Operations Support Systems

Operations Support Systems (also called **Operational Support Systems** or **OSS**) are computer systems used by telecommunications service providers. The term OSS most frequently describes "network systems" dealing with the telecom network itself, supporting processes such as maintaining network inventory, provisioning services, configuring network components, and managing faults. The complementary term Business Support Systems or **BSS** is a newer term and typically refers to "business systems" dealing with customers, supporting processes such as taking orders, processing bills, and collecting payments. The two systems together are often abbreviated **BSS/OSS** or simply **B/OSS**.

4.2.1 Transaction Processing Systems

A Transaction Processing System (TPS) is a type of information system that collects, stores, modifies and retrieves the data transactions of an enterprise. A transaction is any event that passes the ACID test in which data is generated or modified before storage in an information system.

Features of Transaction Processing Systems

The success of commercial enterprises depends on the reliable processing of transactions to ensure that customer orders are met on time, and that partners and suppliers are paid and can make payment. The field of transaction processing, therefore, has become a vital part of effective business management.

Transaction processing systems offer enterprises the means to rapidly process transactions to ensure the smooth flow of data and the progression of processes throughout the enterprise. Typically, a TPS will exhibit the following characteristics:

1 *Rapid Processing*

The rapid processing of transactions is vital to the success of any enterprise – now more than ever, in the face of advancing technology and customer demand for immediate action. TPS systems are designed to process transactions virtually instantly to ensure that customer data is available to the processes that require it.

2 *Reliability*

Similarly, customers will not tolerate mistakes. TPS systems must be designed to ensure that not only do transactions never slip past the net, but that the systems themselves remain operational permanently. TPS systems are therefore designed to incorporate comprehensive safeguards and disaster recovery systems. These measures keep the failure rate well within tolerance levels.

3 *Standardisation*

Transactions must be processed in the same way each time to maximise efficiency. To ensure this, TPS interfaces are designed to acquire identical data for each transaction, regardless of the customer.

4 *Controlled Access*

Since TPS systems can be such a powerful business tool, access must be restricted to only those employees who require their use. Restricted access to the system ensures that employees who lack the skills and ability to control it cannot influence the transaction process.

Transactions Processing Qualifiers

.

Types of Transactions

While the transaction process must be standardised to maximise efficiency, every enterprise requires a tailored transaction process that aligns with its business strategies and processes. For this reason, there are two broad types of transaction:

1 Batch Processing

Batch processing is a resource-saving transaction type that stores data for processing at pre-defined times. Batch processing is useful for enterprises that need to process large amounts of data using limited resources.

Examples of batch processing include credit card transactions, for which the transactions are processed monthly rather than in real time. Credit card transactions need only be processed once a month in order to produce a statement for the customer, so batch processing saves IT resources from having to process each transaction individually.

2 Real Time Processing

In many circumstances the primary factor is speed. For example, when a bank customer withdraws a sum of money from his or her account it is vital that the transaction be processed and the account balance updated as soon as possible, allowing both the bank and customer to keep track of funds.

4.2.2 Process control systems

Process Control System: A system consisting of a computer, process control equipment, and possibly a process interface system. *Note:* The process interface system may be part of a special-purpose computer.

In practice, process control systems can be characterized as one or more of the following forms:

- Discrete – Found in many manufacturing, motion and packaging applications. Robotic assembly, such as that found in automotive production, can be characterized as discrete process control. Most discrete manufacturing involves the production of discrete pieces of product, such as metal stamping.

- Batch – Some applications require that specific quantities of raw materials be combined in specific ways for particular durations to produce an intermediate or end result. One example is the production of adhesives and glues, which normally require the mixing of raw materials in a heated vessel for a period of time to form a quantity of end product. Other important examples are the production of food, beverages and medicine. Batch processes are generally used to produce a relatively low to intermediate quantity of product per year (a few pounds to millions of pounds).

- Continuous – Often, a physical system is represented though variables that are smooth and uninterrupted in time. The control of the water temperature in a heating jacket, for example, is an example of continuous process control. Some important continuous processes are the production of fuels, chemicals and plastics. Continuous processes, in manufacturing, are used to produce very large quantities of product per year(millions to billions of pounds).

Enterprise Collaboration Systems

Abbreviated as ECS, ***E****nterprise* ***C****ollaboration* ***S****ystems* is a type of information system (IS). ECS is a combination of groupware, tools, Internet, extranets and other networks needed to support enterprise-wide communications, such as the sharing of documents and knowledge to specific teams and individuals within the enterprise. Some examples of enterprise communication tools include e-mail, videoconferencing, collaborative document sharing, project management tools and others. The objective of an ECS is to provide each user with the tools for managing communications, documents and other information that individuals need to manage their own tasks efficiently in their departments.

ECS can be further divided into three types:

- Communication Tools
- Conferencing Tools
- Collaboration Tools

ECS Goals

- Communicate: share information with each other
- Coordinate: coordinate individual work efforts and use of resources with each other
- Collaborate: work together cooperatively on joint projects and assignments

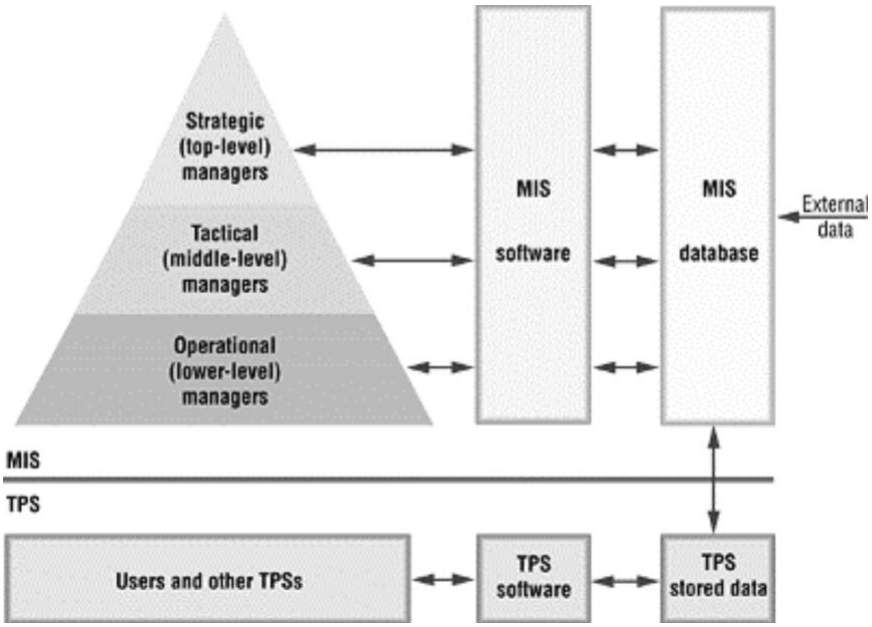
ECS Tools

4.3 Management Support Systems
The support of management tasks by the application of technologies. Sometimes called Decision Support Systems or Business Intelligence

Management Support Systems Tools

- DSS
- Management Science
- Business Analytics
- Data Mining
- Data Warehouse
- Business Intelligence
- OLAP
- CASE tools
- GSS
- EIS

4.3.1 Management Information Systems
System that supports management decision making by providing information in the form of reports and responses to queries to managers at different levels of the organization is known as the Management Information System. Also called as Management reporting system or as Information reporting system. MIS is sometimes used to describe all types of information systems



Outputs from MIS

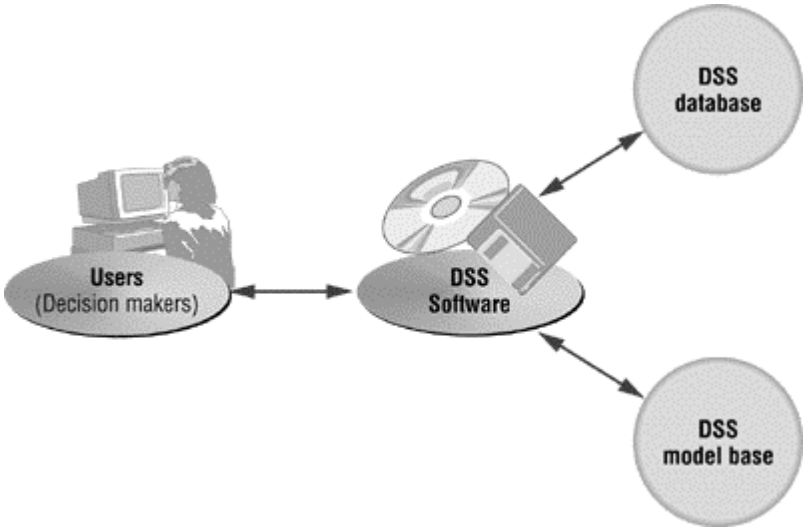
- Scheduled/periodic reports
- Exception reports
- Demand reports
- Push reports
- Ad hoc reports
- Query responses

4.3.2 Decision Support Systems

System that supports management decision making by analyzing data from a database and presenting the results of the analysis to managers is known as the decision Support System.

- MIS = reports of data with only simple analysis (e.g., totals, etc.)
- DSS = reports of the results of complex analysis of data (e.g., statistical analysis, mathematical odeling, etc.)

DSS Model



DSS Software

- Functions:
  - Select model from model base or development of complex model from components in model base (model base management system)
  - Retrieve data from database for analysis by model (database management system)
  - Present results to user (text, graph/chart)
- Analysis can include:
  - What-if analysis
  - Goal seeking analysis
  - Sensitivity analysis
  - Optimization analysis

4.3.3 Executive Information Systems

System that provides information and specialized support for top-level managers are known as Executive Information Systems. What type of information do top-levelmanagers need?

- External information
- Summary of internal information with drill down capabilities

EIS Capabilities

- On-line access to reports
- Query capability for MIS database
- Access to external databases
- Analysis capability for data from reports with output in graphic form
  - Drill-down capability
  - Office functions
    - ✓ E-mail
    - ✓ Appointment calendar
    - ✓ Basic word processing

4.4 Other Classifications of Information Systems

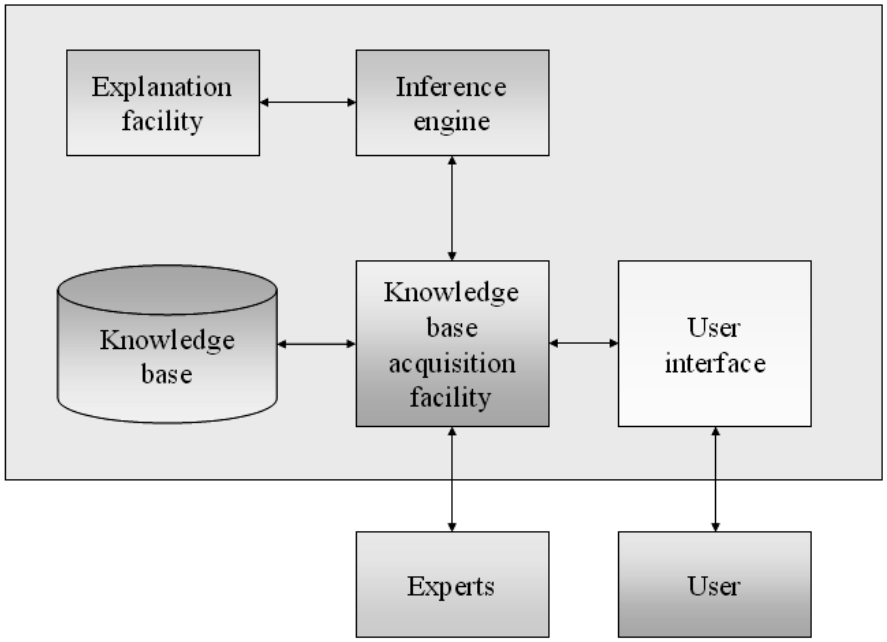
4 .4.1 Expert Systems

An Expert System is a computer program that is designed to hold the accumulated knowledge of one or more domain experts.

Components of an Expert System

- Knowledge base
  - Stores all relevant information, data, rules, cases, and relationships used by the expert system
- Inference engine
  - Seeks information and relationships from the knowledge base and provides answers, predictions, and suggestions in the way a human expert would
- Rule
  - A conditional statement that links given conditions to actions or outcomes
- Fuzzy logic
  - A specialty research area in computer science that allows shades of gray and does not require everything to be simply yes/no, or true/false

- Backward chaining
  - A method of reasoning that starts with conclusions and works backward to the supporting facts
- Forward chaining
  - A method of reasoning that starts with the facts and works forward to the conclusions



Why use Expert Systems

- Experts are not always available. An expert system can be used anywhere, any time.
- Human experts are not 100% reliable or consistent
- Experts may not be good at explaining decisions
- Cost effective

Problems with Expert Systems

- Limited domain
- Systems are not always up to date, and don't learn
- No "common sense"
- Experts needed to setup and maintain system

4.4.2 Knowledge Management Systems

Knowledge Management System provides capability for organizing, storing, accessing, and sharing organizational knowledge. Organize and store documents with explicit knowledge (document management system). Provide collaborative capabilities for sharing explicit and implicit knowledge among employees. KMS is mostly used at operational and tactical level.

Data is a representation of basic facts, figures, etc. Information is data that is useful or meaningful to someone. Knowledge is (not same as rules in expert systems) understanding that person has gained through education, experience, discovery, intuition, and insight.

- Explicit knowledge: can be stated or written
  - Ex: what to do when stock is too low

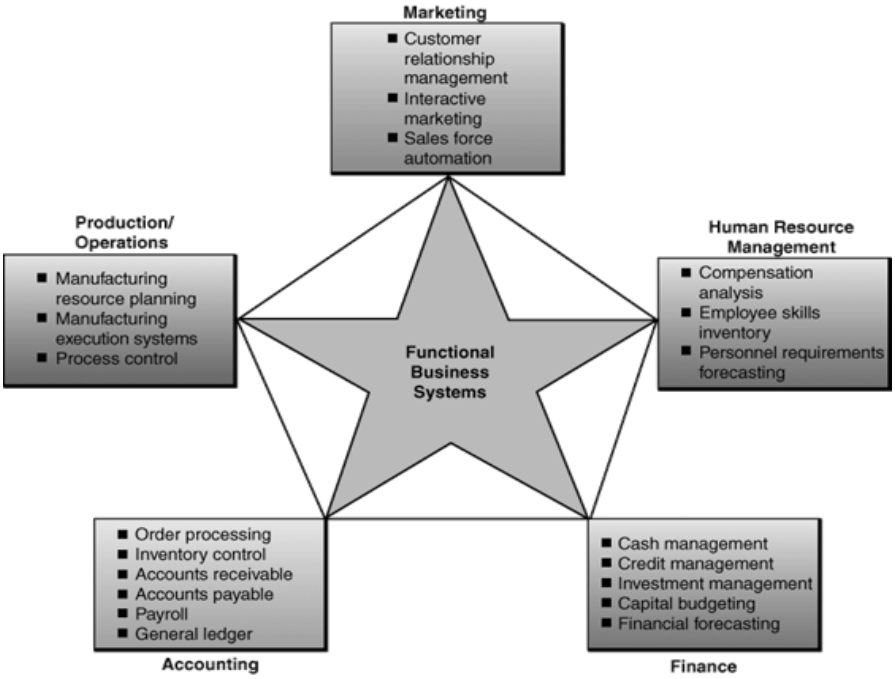
- Implicit knowledge: cannot be expressed but is understood
  - Ex: a particular stock level is too low today (because of knowledge about sales, the weather, trends see on TV the night before, etc.)

Knowledge is individual. Organizational knowledge is the sum of the knowledge of the people who work for the organization.

4.4.3 Functional Business Systems

A variety of information systems (transaction processing, management information systems, decision support, etc.). That support the business functions of accounting, finance, marketing, operations management and human resource management

Examples of Functional Business Information Systems



Marketing Information Systems

Marketing Information Systems use IT to support major components of the marketing function

- Interactive marketing
- Sales Force Automation
- Product Planning
- Pricing
- Advertising
- Sales Promotion

Manufacturing Information Systems

- Support the production/operations function
- Includes all activities concerned with planning and control of producing goods or services
- Examples include
  - Computer Integrated Manufacturing (CIM)
  - Computer Aided Manufacturing (CAM)

Human Resource Management (HRM)

- Information systems designed to support
  - Planning to meet the personnel needs of the business
  - Development of employees to their full potential
  - Control of all personnel policies and programs

Accounting Information Systems

- Record and report the flow of funds through an organization
- Produce financial statements
- Forecasts of future conditions

Financial Management Systems

- Support business managers and professionals in decisions concerning
  - The financing of a business
  - The allocation and control of financial resources within a business

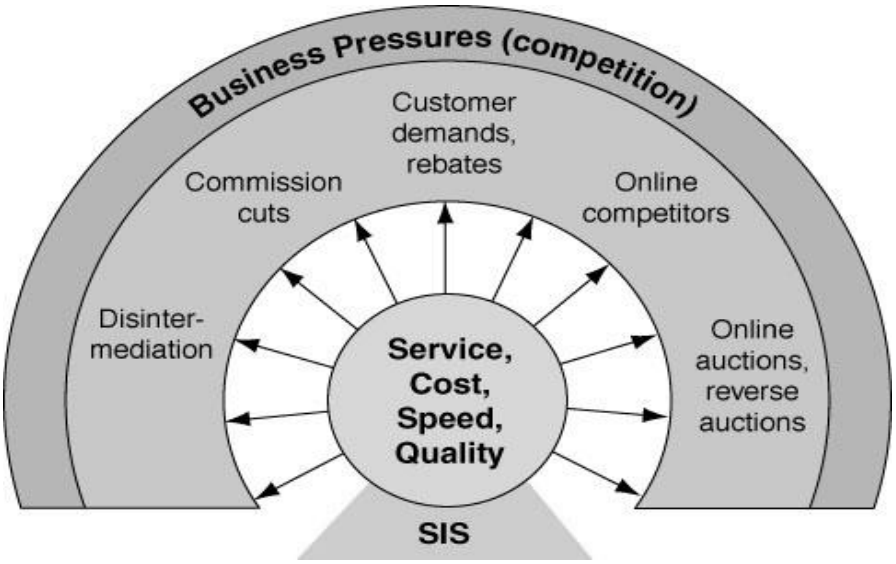
4.4.4 Strategic Information Systems

A Strategic Information System (SIS) is a system to manage information and assist in strategic decision making. A strategic information system has been defined as, "The information system to support or change enterprise's strategy."

A SIS is a type of Information System that is aligned with business strategy and structure. The alignment increases the capability to respond faster to environmental changes and thus creates a competitive advantage. SISs are different from other comparable systems as:

- They change the way the firm competes.
- They have an external (outward looking) focus.
- They are associated with higher project risk.
- They are innovative (and not easily copied).

SISs provide strategic solutions to the 5 Business Pressures:



Managerial Issues

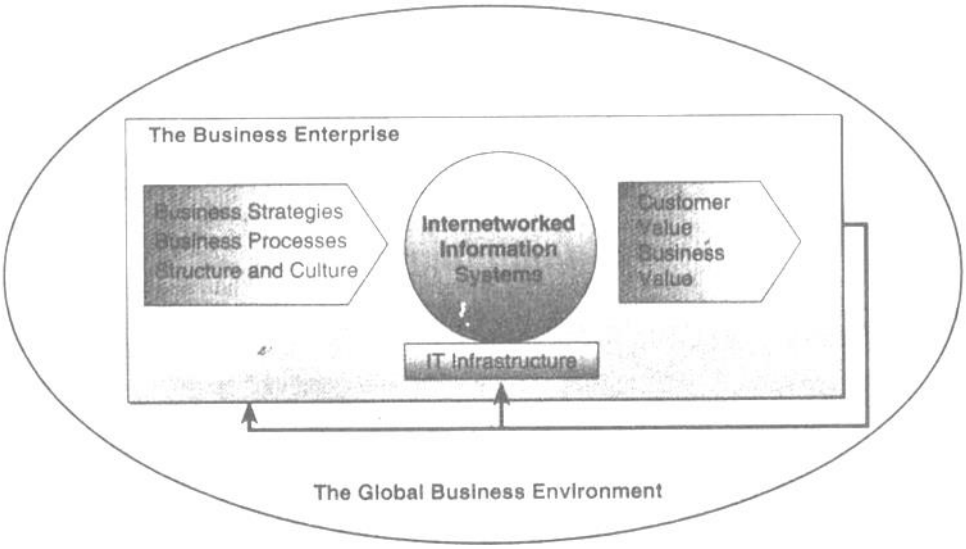
- Implementing SIS Can Be Risky. The investment involved in implementing Strategic Information Systems (SIS) is high.
- Strategic Information Systems Requires Planning. Planning for an SIS is a major concern of organizations.
- Sustaining Competitive Advantage Is Challenging. As companies become larger and more sophisticated, they develop resources to duplicate the systems of their competitors quickly.

Ethical Issues

- Gaining competitive advantage through the use of IT may involve unethical or even illegal actions.
- Companies can use IT to monitor the activities of other companies and may invade the privacy of individuals working there.

4.5 Managerial Challenges of Information Technology

Prospective managers and business professionals like you should become aware of the problems and opportunities presented by the use of information technology and learn how effectively confront such managerial challenges. Today's inter-networked information systems play a vital role in the business success of an enterprise. For example, the Internet, intranets, and extranets can provide much of the IT infrastructure a business needs for e-business operations, effective management, and competitive advantage.
However, the diagram given in the next page emphasizes that information systems and their technologies must be managed to support the business strategies, business processes, and organizational structures and culture of a business enterprise. That's because computer based information systems, though heavily dependent on information technologies, are designed, operated, and used by people in a variety of organizational settings and business environments. The goal of such companies is to increase their customer and business value in today's global business environment.



Therefore, the success of an information system should not be measured only by its *efficiency* in terms of minimizing costs, time, and the use of information resources. Success

should also be measured by the *effectiveness* of information technology in supporting an organization's business
strategies, enabling its business processes, enhancing its organizational structures and culture, and increasing the customer and business value of the enterprise.
However it is important that you realize that information technology and information systems can be mismanaged and misapplied so that IS performance problems create both technological and business failure. For Example: The table given below outlines two dramatic examples of how information technology contributed to business failure and success at two major corporations.

4.6 From Failure to Success with IT

The Boeing Company	Thomson Consumer Electronics
Business Failure Costly delays ($1.6 billion in 1997) in obtaining 6 million parts to build each aircraft with un-integrated IT systems.	**Business Failure** Retailers not getting quick replenishment of core products with old inventory systems.
New IT Solution Integrate entire supply chain into internal production systems	**New IT Solution** Demand collaboration system with top retailers that link directly into internal production and logistics systems.
Business Success Output Capacity up 100% in 4 years. Aircraft lead times reduced by 60%.	**Business Success** Out-of-stock scenarios reduced to 1% with forecast accuracy now above 95%.

Chapter 05 - Management Information Systems(MIS)

5.1 Overview of MIS

At the start, in businesses and other organizations, internal reporting was made manually and only periodically, as a by-product of the accounting system and with some additional statistics, and gave limited and delayed information on management performance.

In their infancy, business computers were used for the practical business of computing the payroll and keeping track of accounts payable and accounts receivable. As applications were developed that provided managers with information about sales, inventories, and other data that would help in managing the enterprise, the term "MIS" arose to describe these kinds of applications. Today, the term is used broadly in a number of contexts and includes (but is not limited to): decision support systems, resource and people management applications, project management and database retrieval application.

5.2 MIS Definition

Management Information Systems is an Organized approach to the study of information needs of a management at every level in making operational, tactical, and strategic decisions.
Its objective is to design and implement man-machine procedures, processes, and routines that provide suitably detailed reports in an accurate, consistent, and timely manner. Modern, computerized systems continuously gather relevant data, both from inside and outside the organization. This data is then processed, integrated, and stored in a centralized database (or data warehouse) where it is constantly updated and made available to all who have the authority to access it, in a form that suits their purpose.

5.3 Characteristics of a MIS

- Provides reports with fixed and standard formats
- Hard-copy and soft-copy reports
- Uses internal data stored in the computer system
- End users can develop custom reports
- Requires formal requests from users

5.4 MIS in Functional Areas of Business

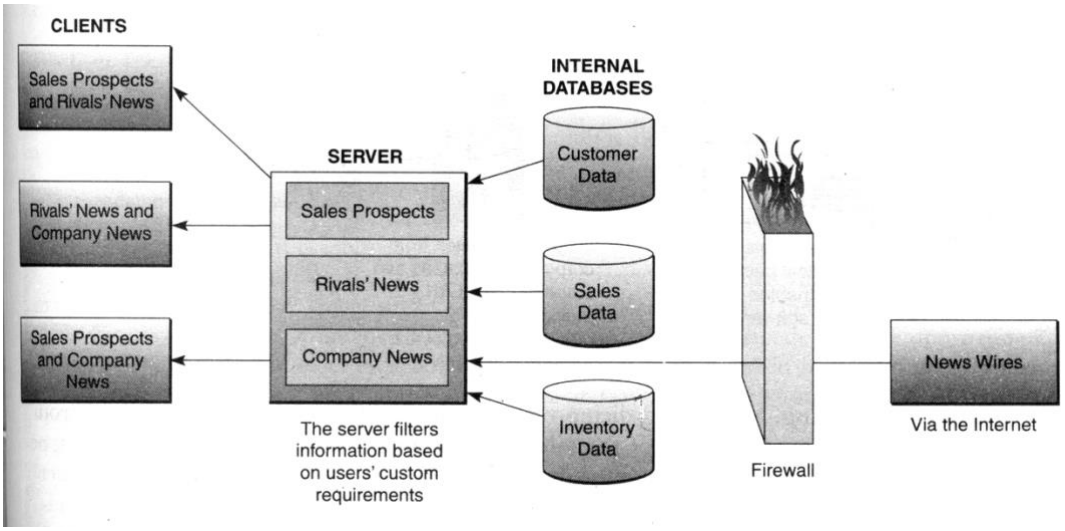
5.5 Management Reporting Alternatives

Management information systems provide a variety of information products to managers. Four major reporting alternatives are provided by such systems as mentioned below:

- **Periodic Scheduled Reports -** This traditional form of providing information to managers uses a pre-specified format designed to provide managers with information on a regular basis. Typical examples of such periodic scheduled reports are daily or weekly sales analysis reports and monthly financial statements.
- **Exception Reports -** In some cases, reports are produced only when exceptional conditions occur. In other cases, reports are produced periodically but contain information only about these exceptional conditions. For example, a credit manager can be provided with a report that contains only information on customers who exceed their credit limits. Exception reporting reduces *information overload,* instead of overwhelming decision makers with periodic detailed reports of business activity.

- **Demand Reports and Responses -** Information is available whenever a manager demands it. For example, Web browsers and DBMS query languages and report generators enable managers at PC workstations to get immediate responses or find and obtain customized reports as a result of their requests for the information they need. Thus, managers do not have to wait for periodic reports to arrive as scheduled.
- **Push Reporting -** Information is *pushed* to a manager's networked workstation. Thus, many companies are using web casting software to selectively broadcast reports and other information to the networked PCs of managers and specialists over their corporate intranets. (Refer Diagram on next page)

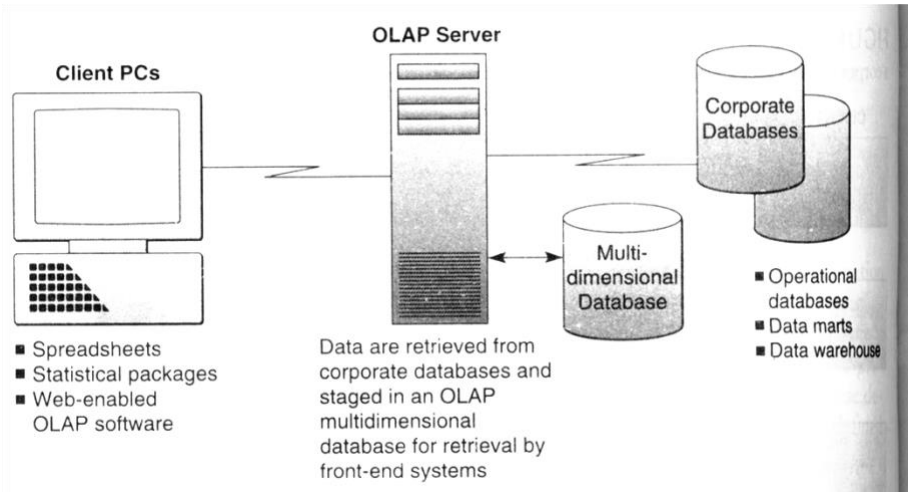
An example of the components in a marketing intelligence system that uses the Internet and a corporate intranet system to "push" information to employees.



5.6 Online Analytical Processing (OLAP)

The competitive and dynamic nature of today's global business environment is driving demands by business managers and analysts for information systems that can provide fast answers to complex business queries. The IS industry has responded to these demands with developments like analytical databases, data marts, data warehouses, data mining techniques, and multidimensional database structures, and with specialized servers and Web-enabled software products that support **online analytical processing**.

Online analytical processing enables managers and analysts to interactively examine and manipulate large amounts of detailed and consolidated data from many perspectives. OLAP involves analyzing complex relationships among thousands or even millions of data items stored in data marts, data warehouses, and other multidimensional databases to discover patterns, trends, and exception conditions. An OLAP session takes place online in real time, with rapid responses to a manager's or analyst's queries, so that their analytical or decision making process is undisturbed. (Refer Diagram below).



5.7 Consolidation – Consolidation involves the aggregation of data. This can involve simple roll ups or complex groupings involving interrelated data. For example, sales offices can be rolled up to districts and districts rolled up to regions.

5.8 Drill-Down - OLAP can go in the reverse direction and automatically display detail data that comprise consolidated data. This is called drill-down. For example, the sales by individual products or sales reps that make up a region's sales totals could be easily accessed.

5.9 Slicing & Dicing - Slicing and dicing refers to the ability to look at the database from different viewpoints. For example, one slice of the sales database might show all sales of product type within regions. Another slice might show all sales by sales channel within each product type. Slicing and dicing is often performed along a time axis in order to analyze trends and find time-based patterns in the data.

Chapter 06 - Decision Support Systems

6.1 Introduction to Decision Support System(DSS)

Decision Support Systems (DSS) are a specific class of computerized information systems that supports business and organizational decision-making activities. A properly-designed DSS is an interactive software-based system intended to help decision makers compile useful information from raw data, documents, personal knowledge, and/or business models to identify and solve problems and make decisions.

Typical information that a decision support application might gather and present would be:

- an inventory of all of your current information assets (including legacy and relational data sources, cubes, data warehouses, and data marts),
- comparative sales figures between one week and the next,
- projected revenue figures based on new product sales assumptions;
- the consequences of different decision alternatives, given past experience in a context that is described.

Example: Sales managers typically rely on management information systems to produce sales analysis reports. These reports contain sales performance figures by product line, salesperson, and sales region and so on. A decision support system on the other hand would also interactively show a sales manager the effects on sales performance of changes in a variety of factors (such as promotion expense and salesperson compensation). The DSS could the use several criteria (such as expected gross margin and market share) to evaluate and rank several alternative combinations of sales performance factors.
Therefore, DSS are designed to be ad hoc, quick-response systems that are initiated and controlled by business decision makers. DSS are thus able to directly support the specific types of decisions and the personal decision-making styles and needs of individual executives, managers, and business professionals.

6.2 Capabilities of a DSS

- Provide support in semi-structured and unstructured situations.
- Support for different managerial levels.
- Support to individuals and groups.
- Support to interdependent and/or sequential decisions.
- Support all phases of the decision support process.
- Support a variety of decision making processes and styles.
- DSS is adaptive.
- Have user friendly interfaces.
- Goal is to improve the effectiveness of decision making.
- Utilizes models for analysis.
- Provide access to the variety of data sources, formats and types.

6.3 Basic components of a DSS

There are five basic components in a DSS:

- Data management Subsystem

- DSS database
- Database management system
- Data directory
- Query facility

The DSS Database issues:

- Data warehouse
- Special independent DSS databases
- Extraction of data from internal, external and private sources
- *Web browser* access of data
- Multimedia databases
- Object-oriented databases
- Commercial database management systems (DBMS)

- Model Management Subsystem
  - Mirrors the database management subsystem

Model Management issues:

- Model level: Strategic, managerial (tactical) and operational, model building blocks
- Modeling languages
- Model execution, integration
- Use of AI and Fuzzy logic in MBMS

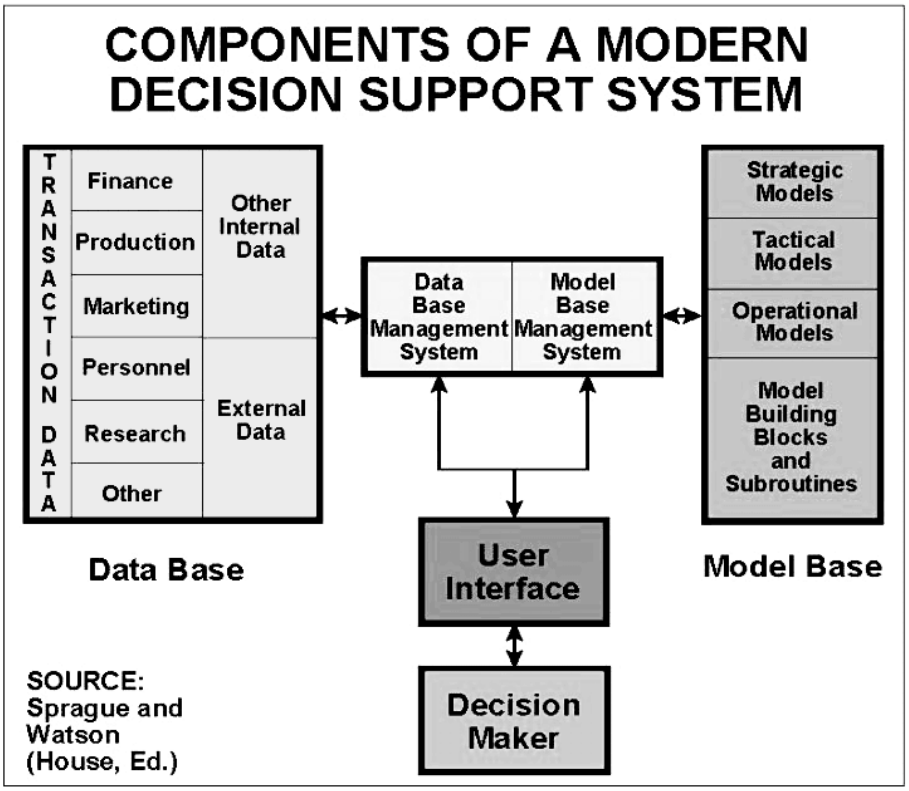
- Knowledge Management Subsystem
  - Provides expertise in solving complex unstructured and semi-structured problems
  - What models to use, how, interpreting results
  - Reasoning, handling uncertainty, learning from data
  - Expertise provided by an expert system or other intelligent system (AI techniques)
  - Leads to intelligent DSS
  - Example: Data mining

- The user Interface
  - Includes all communication between a user and the MSS
  - To most users, the user interface *is* the system

- The User
  - Managers
  - Staff specialists
  - Intermediary:
    - ✓ Staff Assistant
    - ✓ Expert Tool User
    - ✓ Business(System) Analyst
    - ✓ Group DSS facilitator

Depending on the system, each of these components may be very simple or highly elaborate. The database, or in advanced systems, a **database management system** (DBMS) or a data warehouse, consists of structured, real-life information, such as

customer account records, product sales history, employee schedules, or manufacturing process statistics. The model base, or model base management system (MBMS), contains one or more models for the kind of analysis the system will perform. For example, if the purpose of the system is to supply sales projections under different conditions, one model might be a linear regression formula derived from past sales and other factors. The user interface integrates the two into a coherent system and provides the decision maker with controls for—and possibly feedback about—managing the data and the models.



6.4 DSS Examples

That decision support systems could be categorized in terms of the generic operations that can be performed by such systems. These generic operations extend along a single dimension, ranging from extremely data-oriented to extremely model-oriented. Alter conducted a field study of 56 DSS that he categorized into seven distinct types of DSS.

- **File drawer systems** that provide access to data items.
- **Data analysis systems** that support the manipulation of data by computerized tools tailored to a specific task and setting or by more general tools and operators.
- **Analysis information systems** that provide access to a series of decision-oriented databases and small models.
- **Accounting and financial models** that calculate the consequences of possible actions.
- **Representational models** that estimate the consequences of actions on the basis of simulation models.
- **Optimization models** that provide guidelines for action by generating an optimal solution consistent with a series of constraints.

- **Suggestion models** that perform the logical processing leading to a specific suggested decision for a fairly structured or well-understood task.

6.5 Types of DSS

There are a number of Decision Support Systems. These can be categorized into five types:

- **Communication-driven DSS**

Most communications-driven DSSs are targetted at internal teams, including partners. Its purpose are to help conduct a meeting, or for users to collaborate. The most common technology used to deploy the DSS is a web or client server. Examples: chats and instant messaging softwares, online collaboration and net-meeting systems.

- **Data-driven DSS**

Most data-driven DSSs are targeted at managers, staff and also product/service suppliers. It is used to query a database or data warehouse to seek specific answers for specific purposes. It is deployed via a main frame system, client/server link, or via the web. Examples: computer-based databases that have a query system to check including the incorporation of data to add value to existing databases.

- **Document-driven DSS**

Document-driven DSSs are more common, targeted at a broad base of user groups. The purpose of such a DSS is to search web pages and find documents on a specific set of keywords or search terms. The usual technology used to set up such DSSs are via the web or a client/server system. Examples:

- **Knowledge-driven DSS:**

Knowledge-driven DSSs or 'knowledgebase' are they are known, are a catch-all category covering a broad range of systems covering users within the organization seting it up, but may also include others interacting with the organization - for example, consumers of a business. It is essentially used to provide management advice or to choose products/services. The typical deployment technology used to set up such systems could be slient/server systems, the web, or software runnung on stand-alone PCs.

- **Model-driven DSS**

Model-driven DSSs are complex systems that help analyse decisions or choose between different options. These are used by managers and staff members of a business, or people who interact with the organization, for a number of purposes depending on how the model is set up - scheduling, decision analyses etc. These DSSs can be deployed via software/hardware in stand-alone PCs, client/server systems, or the web.

6.6 Decision Support Package

DSS software packages can combine model components to create integrated model components to create integrated models that support specific type of decisions. DSS software typically contains built in analytical modelling routines and also enables you to build your own models. Many DSS packages are now available in microcomputer and Web-enabled versions. Of course, electronic spreadsheet packages also provide some of the model building (spreadsheet models) and analytical modelling (what-if and goal-seeking analysis) offered by more powerful DSS software.

Examples of special purpose DSS packages

DSS Packages
• **Retail:** Information Advantage and Unisys offer the Category Management Solution Suite, an OLAP decision support system and industry- specific data model.
• **Insurance:** Computer Associates offers RiskAdvisor, an insurance risk decision support system whose data model stores information in insurance industry specific tables designed for optimal query performance.
• **Telecom:** NCR and SABRE Decision Technologies have joined forces to create the NCR Customer Retention program for the communications industry including data marts for telephone companies to use for decision support in managing customer loyalty, quality of service, network management, fraud and marketing.

6.7 Using DSS

Using a decision support system involves an interactive analytical modelling process. For example: using a DSS software package for decision support may result in a series of displays in response to alternative what-if changes entered by a manager. This differs from the demand responses of management information systems, since decision makers are not demanding pre specified information. Rather they are exploring possible alternatives. Thus, they do not have to specify their information needs in advance. Instead they use the DSS to find the information they need to help them make a decision. That is the essence of the decision support system concept.
Using a decision support system involves four basic types of analytical modelling activities such as mentioned below:

- What-If-Analysis
- Sensitivity Analysis
- Goal Seeking Analysis
- Optimization Analysis

Type of Analytical Modelling	Activities and Examples

What-If-Analysis	Observing how changes to selected variables affect other variables. Example: What if we cut advertising by 10%? What would happen to sales?
Sensitivity Analysis	Observing how repeated changes to a single variable affect other variables. Example: Let's cut advertising by $100 repeatedly so we can see its relationship to sales.
Goal-Seeking-Analysis	Making repeated changes to selected variables until a chosen variable reaches a target value. Example: Let's try increases in advertising until sales reaches $1 million.
Optimization Analysis	Finding an optimum value for selected variables, given certain constraints. Example: What's the best amount of advertising to have, given our budget and choice of media?

6.8 Comparison of MIS and DSS

Differences in System Characteristics of MIS andvs DSS

Dimension	MIS	DSS
Type of users	Middle Management	All levels including Top Management and Professionals
Focus	Information	Decision Flexibility
Applications	Sales Forecasting Production Control	Strategic Planning Integrated Problems
Ease of use	Moderate	High
Processing interest	Efficiency	Effectiveness
Reason for development	Reporting basic information	Improved decision making

6.9 Geographic Information & Data Visualization.

Geographic Information Systems (GIS) and Data Visualization Systems (DVS) are special categories of DSS that integrate computer graphics with other DSS features.

A geographic information system is a DSS that uses geographic databases to construct and display maps and other graphics displays that support decisions affecting the geographic distribution pf people and other resources. Many companies are using GIS technology along with Global Positioning System (GPS) devices to help them choose new retail store locations, optimize distribution routes, or analyze the demographics of their target audiences. For example: Companies like Levi Strauss, Arby's Consolidated Rail and Federal Express use GIS packages to integrate maps, graphics and other geographic data with business data from spreadsheets and statistical packages. GIS software such as MapInfo and Atlas GIS is used for most business GIS applications.

Data Visualization Systems represent complex data using interactive three dimensional graphical forms such as charts, graphs and maps. DVS tools help users to interactively sort, subdivide, combine and organize data while it is in its graphical form. This helps users discover patterns, links and anomalies in business or scientific data in an interactive knowledge discovery and decision support process. Business applications like data mining typically use interactive graphs that let users drill down in real time and manipulate the underlying data of a business model to help clarify its meaning for business decision making.

Chapter 07 - Executive Information Systems

7.1 Executive Information Systems.

An **Executive Information System** (EIS) is a type of management information system intended to facilitate and support the information and decision-making needs of senior executives by providing easy access to both internal and external information relevant to meeting the strategic goals of the organization. It is commonly considered as a specialized form of a Decision Support System (DSS).

The emphasis of EIS is on graphical displays and easy-to-use user interfaces. They offer strong reporting and drill-down capabilities. In general, EIS are enterprise-wide DSS that help top-level executives analyze, compare, and highlight trends in important variables so that they can monitor performance and identify opportunities and problems. EIS and data warehousing technologies are converging in the marketplace.

7.2 History of EIS

Traditionally, executive information systems were developed as mainframe computer-based programs. The purpose was to package a company's data and to provide sales performance or market research statistics for decision makers, as such financial officers, marketing directors, and chief executive officers, who were not necessarily well acquainted with computers. The objective was to develop computer applications that would highlight information to satisfy senior executives' needs. Typically, an EIS provides data that would only need to support executive level decisions instead of the data for all the company.

Today, the application of EIS is not only in typical corporate hierarchies, but also at personal computers on a local area network. EIS now cross computer hardware platforms and integrate information stored on mainframes, personal computer systems, and minicomputers. As some client service companies adopt the latest enterprise information systems, employees can use their personal computers to get access to the company's data and decide which data are relevant for their decision makings. This arrangement makes all users able to customize their access to the proper company's data and provide relevant information to both upper and lower levels in companies.

7.3 Executive Information System Components

EIS components can be typically classified into the following categories:

Hardware

When talking about hardware for an EIS environment, we should focus on the hardware that meet executive's needs. The executive must be put the first and the executive's needs must be defined before the hardware can be selected. The basic computer hardware needed for a typical EIS includes four components:

1. ***Input data-entry devices-*** These devices allow the executive to enter, verify, and update data immediately;
2. ***The central processing unit (CPU)-*** which is the kernel because it controls the other computer system components;

3. ***Data storage files-*** The executive can use this part to save useful business information, and this part also help the executive to search historical business information easily;
4. ***Output devices-*** which provide a visual or permanent record for the executive to save or read. This device refers to the visual output device or printer.

In addition, with the advent of local area networks (LAN), several EIS products for networked workstations became available. These systems require less support and less expensive computer hardware. They also increase access of the EIS information to many more users within a company.

Software

Choosing the appropriate software is vital to design an effective EIS. Therefore, the software components and how they integrate the data into one system are very important. The basic software needed for a typical EIS includes four components:

1. ***Text base software*** - The most common form of text is probably the word processing document
2. ***Database*** - Heterogeneous databases residing on a range of vendor-specific and open computer platforms helps executives access to both company internal and external data
3. ***Graphic base*** - Graphics can turn volumes of text and statistics into visual information for executives. Typical graphic types are: time series charts, scatter diagrams, maps, motion graphics, sequence charts, and comparison-oriented graphs (i.e., bar charts);
4. ***Model base*** - The EIS models contain routine and special statistical, financial, and other quantitative analysis.

Now perhaps the more difficult problem to those executives is how to choose EIS software rather than how to use them, because the latest EIS software packages are more intelligible to non-technicians, self-documenting, and more flexible. Therefore, when we evaluate EIS software, we should think about if the package is easy to use, if the package responds readily to the executive's requests, and if the package is reasonably priced. Furthermore, we need consider if the package can run on the current hardware we have.

Interface

An EIS needs to be efficient to retrieve relevant data for decision makers, so the interface is very important. Several types of interfaces can be available to the EIS structure, such as scheduled reports, questions/answers, menu driven, command language, natural language, and input/output. It is crucial that the interface must fit the decision maker's decision-making style. If the executive is not comfortable with the information questions/answers style, the EIS will not be fully utilized. The ideal interface for an EIS would be simple to use and highly flexible, providing consistent performance, reflecting the executive's world, and containing help information and error messages.

Telecommunications

As decentralizing is becoming the current trend in companies, telecommunications will play a pivotal role in networked information systems. Transmitting data from one place to another has become crucial for establishing a reliable network. In addition,

telecommunications within an EIS can accelerate the need for access to distributed data.

7.4 EIS Features

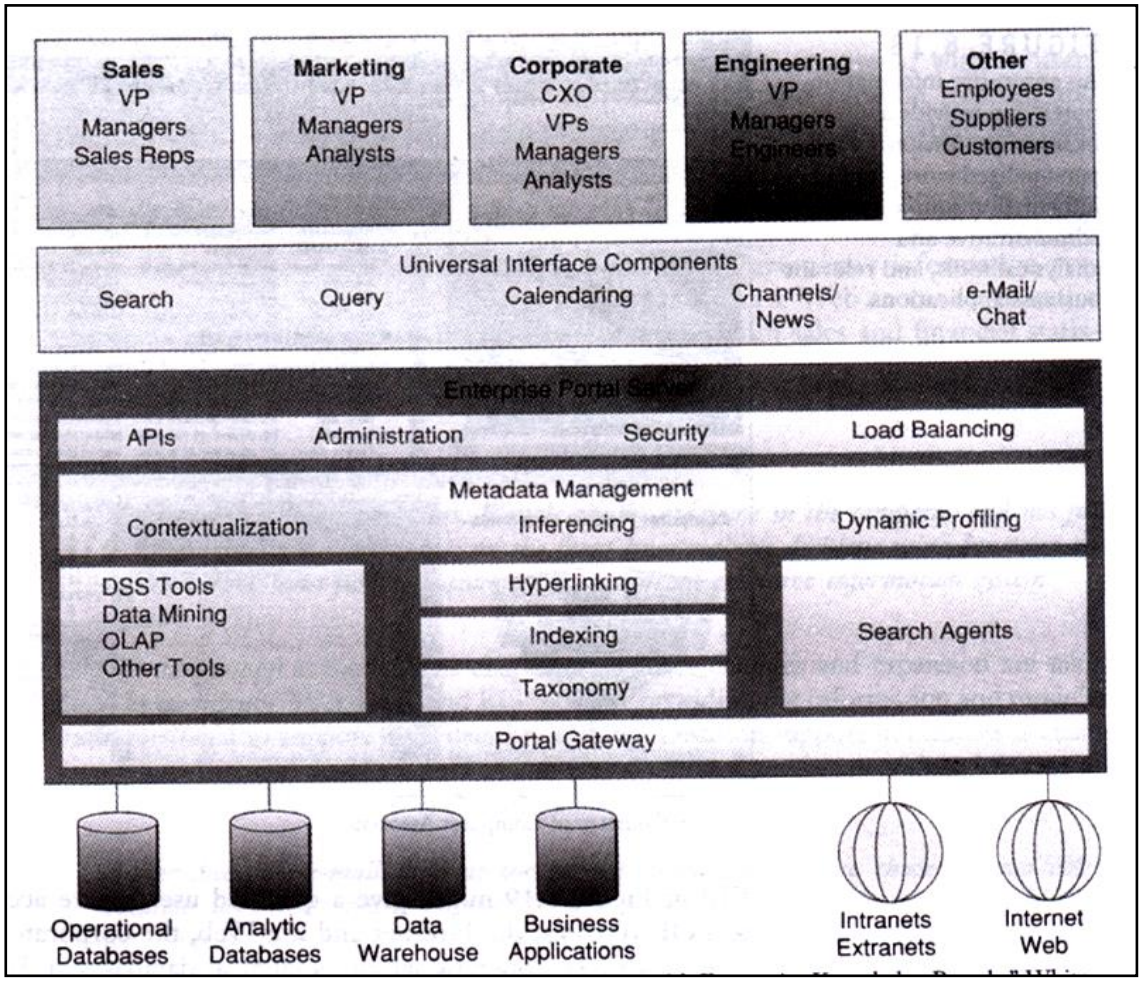
- Drill down
- Critical success Factors (CSF)
- Status access
- Analysis
- Exception reporting
- Colors and audio
- Navigation of information
- Communication

7.5 Enterprise Information Portals.

An enterprise information portal (EIP) is one of the most popular ways in which enterprises can allow their employees and customers to search and access corporate information. It is a single gateway for users, such as employees, customers and company's partners to log into and retrieve corporate information, company history and other services or resources. It is a Web based interface and integration of other technologies that gives all intranet users and selected extranet users access to a variety of internal and external business applications and services. For example internal applications might include access to e-mail, project websites, customer inventory and other corporate databases, decision support systems and knowledge management systems. External applications might include industry, financial, other Internet news services, links to industry discussion groups and links to customer and supplier Internet and extranet websites.
Enterprise information portals are typically tailored or personalized to the needs of individual business users or groups of users, giving them a personalized *digital dashboard* of information sources and applications.

The business benefits of enterprise information portals include providing more specific and selective information to business users, providing easy access to key corporate intranet website resources, delivering industry and business news, and providing better access to company data for selected customers, suppliers, or business partners. Enterprise information portals can also help avoid excessive surfing by employees across company and Internet websites by making it easier for them to receive or find the information and services they need, thus improve the productivity of a company's workforce.

The diagram below illustrates how companies are developing enterprise information portals as a way to provide Web-enabled information, knowledge, and decision support to their executives, managers, employees, suppliers, customers and other business partners.



Chapter 8: Data warehouse

Data warehouse is a repository of an organization's electronically stored data. Data warehouses are designed to facilitate reporting and analysis.

This definition of the data warehouse focuses on data storage. However, the means to retrieve and analyze data, to extract, transform and load data, and to manage the data dictionary are also considered essential components of a data warehousing system. Many references to data warehousing use this broader context. Thus, an expanded definition for data warehousing includes business intelligence tools, tools to extract, transform, and load data into the repository, and tools to manage and retrieve metadata.

Evolution in organization use of data warehouses

Organizations generally start off with relatively simple use of data warehousing. Over time, more sophisticated use of data warehousing evolves. The following general stages of use of the data warehouse can be distinguished:

- Off line Operational Database

Data warehouses in this initial stage are developed by simply copying the data off an operational system to another server where the processing load of reporting against the copied data does not impact the operational system's performance. It is usually the simplest and less technical type of data warehouse.

- Off line Data Warehouse

Data warehouses at this stage are updated from data in the operational systems on a regular basis and the data warehouse data is stored in a data structure designed to facilitate reporting

- Real Time Data Warehouse

Data warehouses at this stage are updated every time an operational system performs a transaction (e.g. an order or a delivery or a booking.). For instance, a Real Time Data Warehouse might incorporate data from a Point of Sales system and is updated with each sale that is made

- Integrated Data Warehouse

Data warehouses at this stage are updated every time an operational system performs a transaction. The data warehouses then generate transactions that are passed back into the operational systems. Some Integrated Data Warehouses are used by other data warehouses, allowing them to access them to process reports, as well as look up current data.

Benefits of data warehousing

Some of the benefits that a data warehouse provides are as follows:

- A data warehouse provides a common data model for all data of interest regardless of the data's source. This makes it easier to report and analyze information than it would be if multiple data models were used to retrieve information such as sales invoices, order receipts, general ledger charges, etc.
- Prior to loading data into the data warehouse, inconsistencies are identified and resolved. This greatly simplifies reporting and analysis.
- Information in the data warehouse is under the control of data warehouse users so that, even if the source system data is purged over time, the information in the warehouse can be stored safely for extended periods of time.
- Because they are separate from operational systems, data warehouses provide retrieval of data without slowing down operational systems.
- Data warehouses can work in conjunction with and, hence, enhance the value of operational business applications, notably customer relationship management (CRM) systems.
- Data warehouses facilitate decision support system applications such as trend reports (e.g., the items with the most sales in a particular area within the last two years), exception reports, and reports that show actual performance versus goals.

Disadvantages of data warehouses

There are also disadvantages to using a data warehouse. Some of them are:

- Data warehouses are not the optimal environment for unstructured data.
- Because data must be extracted, transformed and loaded into the warehouse, there is an element of latency in data warehouse data.
- Over their life, data warehouses can have high costs. The data warehouse is usually not static. Maintenance costs are high.
- Data warehouses can get outdated relatively quickly. There is a cost of delivering suboptimal information to the organization.
- There is often a fine line between data warehouses and operational systems. Duplicate, expensive functionality may be developed. Or, functionality may be developed in the data warehouse that, in retrospect, should have been developed in the operational systems and vice versa.

Data warehouse architecture

Architecture, in the context of an organization's data warehousing efforts, is a conceptualization of how the data warehouse is built. There is no right or wrong architecture. The worthiness of the architecture can be judged in how the conceptualization aids in the building, maintenance, and usage of the data warehouse.

One possible simple conceptualization of a data warehouse architecture consists of the following interconnected layers:

- Operational database layer

The source data for the data warehouse - An organization's Enterprise Resource Planning systems fall into this layer.

- Data access layer

The interface between the operational and informational access layer - Tools to extract, transform, load data into the warehouse fall into this layer.

- Metadata layer

The data directory - This is usually more detailed than an operational system data directory. There are dictionaries for the entire warehouse and sometimes dictionaries for the data that can be accessed by a particular reporting and analysis tool.

- Informational access layer

The data accessed for reporting and analyzing and the tools for reporting and analyzing data - Business intelligence tools fall into this layer. And the Inmon-Kimball differences about design methodology, discussed later in this article, have to do with this layer.

Data Mart

A data mart is a subset of an organizational data store, usually oriented to a specific purpose or major data subject that may be distributed to support business needs. Data marts are analytical data stores designed to focus on specific business functions for a specific community within an organization. Data marts are often derived from subsets of data in a data warehouse, though in the bottom-up data warehouse design methodology the data warehouse is created from the union of organizational data marts.

There can be multiple data marts inside a single corporation; each one relevant to one or more business units for which it was designed. DMs may or may not be dependent or related to other data marts in a single corporation. If the data marts are designed using conformed facts and dimensions, then they will be related. In some deployments, each department or business unit is considered the owner of its data mart including all the hardware, software and data.This enables each department to use, manipulate and develop their data any way they see fit; without altering information inside other data marts or the data warehouse. In other deployments where conformed dimensions are used, this business unit ownership will not hold true for shared dimensions like customer, product

Reasons for creating a data mart

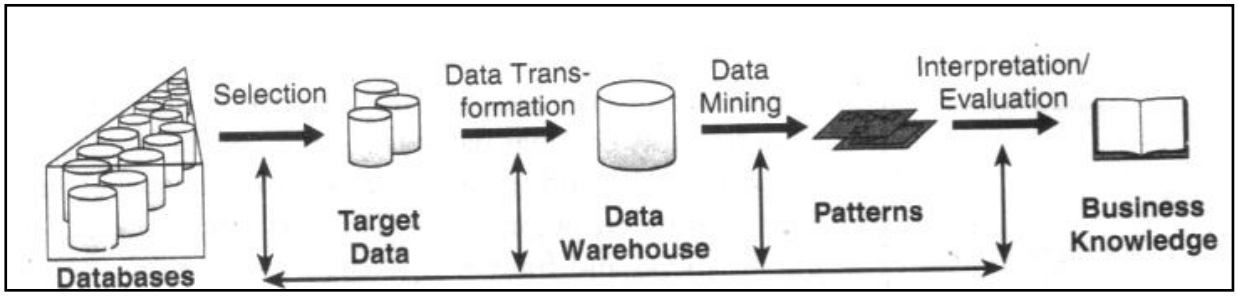
- Easy access to frequently needed data
- Creates collective view by a group of users
- Improves end-user response time
- Ease of creation
- Lower cost than implementing a full Data warehouse
- Potential users are more clearly defined than in a full Data warehouse

Dependent data mart

According to the Inmon school of data warehousing, a dependent data mart is a logical subset (view) or a physical subset (extract) of a larger data warehouse, isolated for one of the following reasons:

- A need for a special data model or schema: e.g., to restructure for OLAP
- Performance: to offload the data mart to a separate computer for greater efficiency or to obviate the need to manage that workload on the centralized data warehouse.
- Security: to separate an authorized data subset selectively
- Expediency: to bypass the data governance and authorizations required to incorporate a new application on the Enterprise Data Warehouse
- Proving Ground: to demonstrate the viability and ROI (return on investment) potential of an application prior to migrating it to the Enterprise Data Warehouse
- Politics: a coping strategy for IT (Information Technology) in situations where a user group has more influence than funding or is not a good citizen on the centralized data warehouse.
- Politics: a coping strategy for consumers of data in situations where a data warehouse team is unable to create a usable data warehouse

Data mining



Data mining is the process of extracting hidden patterns from data. As more data is gathered, with the amount of data doubling every three years. Data mining is becoming an increasingly important tool to transform this data into information. It is commonly used in a wide range of profiling practices, such as marketing, surveillance, fraud detection and scientific discovery.

While data mining can be used to uncover hidden patterns in data samples that have been "mined", it is important to be aware that the use of a sample of the data may produce results that are not indicative of the domain. Data mining will not uncover patterns that are present in the domain, but not in the sample. There is a tendency for insufficiently knowledgeable "consumers" of the results to treat the technique as a sort of crystal ball and attribute "magical thinking" to it. Like any other tool, it only functions in conjunction with the appropriate raw material: in this case, indicative and representative data that the user must first collect. Further, the discovery of a particular pattern in a particular set of data does not necessarily mean that pattern is representative of the whole population from which that data was drawn. Hence, an important part of the process is the verification and validation of patterns on other samples of data.

Data mining can discover new correlations, patterns, and trends in vast amounts of business data (frequently several terabytes of data), stored in data warehouses. Data mining software uses pattern recognition algorithms, as well as a variety of mathematical and statistical techniques to go through mountains of data to extract previously unknown strategic business information. For example: One Midwest grocery chain used the data mining capacity of Oracle software to analyse the local buying patterns. They discovered that when men bought diapers on Thursdays and Saturdays, they also tended to buy beer. Further analysis showed that these shoppers typically did their weekly shopping on Saturdays. On Thursdays, however they only bought a few items. Based on this analysis the retailer concluded that they purchased the beer to have it available for the upcoming weekend. The grocery chain then used this newly discovered information in many ways in order to increase their revenue. One of the activity they did was, they moved the beer display closer to the diaper display in the retail store so that they could make sure that beer and diapers together were sold at full price on Thursdays as well.

If you are interested in a small case study on how data mining is collected, used and profited off of, you can look at your local supermarket. Your supermarket is usually an extremely lean and organized entity that relies on data mining to make sure that it is profitable. Usually your supermarket employs a POS (Point Of Sale) system that collects data from each item that is purchased. The POS system collects data on the item brand name, category, size, time and date of the purchase and at what price the item was purchased at. In addition, the supermarket usually has a customer rewards program, which also is input into the POS system. This information can directly link the products purchased with an individual. All this data for every purchase made for years and years is stored in a database in a computer by the supermarket.

Now that you have a database with millions upon millions of data fields and records what are you going to do with it? Well, you data mine it. Knowledge is power and with so much data you can uncover trends, statistical correlations, relationships and patterns that can help your business become more efficient, effective and streamlined.

The supermarket can now figure out which brands sell the most, what time of the day, week, month or year is the most busiest, what products do consumers buy with certain items. For instance, if a person buys white bread, what other item would they be inclined to buy? Typically we can find its peanut butter and jelly. There is so much good information that a supermarket can use just by data mining their own data that they have collected.

How does data mining work?

While large-scale information technology has been evolving separate transaction and analytical systems, data mining provides the link between the two. Data mining software analyzes relationships and patterns in stored transaction data based on open-ended user queries. Several types of analytical software are available: statistical, machine learning, and neural networks. Generally, any of four types of relationships are sought:

- Classes: Stored data is used to locate data in predetermined groups. For example, a restaurant chain could mine customer purchase data to determine when customers visit and what they typically order. This information could be used to increase traffic by having daily specials.

- Clusters: Data items are grouped according to logical relationships or consumer preferences. For example, data can be mined to identify market segments or consumer affinities.
- Associations: Data can be mined to identify associations. The beer-diaper example is an example of associative mining.
- Sequential patterns: Data is mined to anticipate behavior patterns and trends. For example, an outdoor equipment retailer could predict the likelihood of a backpack being purchased based on a consumer's purchase of sleeping bags and hiking shoes.

Data mining consists of five major elements:

- Extract, transform, and load transaction data onto the data warehouse system.
- Store and manage the data in a multidimensional database system.
- Provide data access to business analysts and information technology professionals.
- Analyze the data by application software.
- Present the data in a useful format, such as a graph or table.

Some Applications of Data Mining

The following are some the successful applications of data mining:

1. Market Segmentation
2. Identifying “GOOD” and “BAD” customers
3. Fraud Detection
4. Detecting cross selling opportunities
5. Basis for marketing decisions such as shelving in supermarkets, sales promotions e.t.c)
6. Stock Selection
7. Play selection in NBA

Data Mining has been able to grasp the attention of many in the field of scientific research, businesses, banking sector, intelligence agencies and many others from the early days of its inception. However its use was not as easy as it is now. The rapid growth of various tools and software during the past few years enable it to be used more widely than ever before. The ease with which one can carry out complex data mining techniques using these tools is simply outstanding.

Data Mining is used by businesses to do improve its marketing and to understand the buying patterns of its clients. Attrition Analysis, Customer Segmentation and Cross Selling are the most important ways through which data mining is showing the new ways in which businesses can multiply its revenue.

Data Mining is now used in the banking sector for credit card fraud detection by identifying the patterns involved in fraudulent transactions. It is also used to reduce credit risk by classifying a potential client and predicting bad loans.

Data Mining is used by intelligence agencies like FBI and CIA to identify threats of terrorism. After the 9/11 incident it has become one of the prime means to uncover terrorist plots. However this led to concerns among the people as data collected for such works undermines the privacy of a large number of people.

The primary difference between you application database and a data warehouse is that while the former is designed (and optimized) to record , the latter has to be designed (and optimized) to respond to analysis questions that are critical for your business.

Application databases are OLTP (On-Line Transaction Processing) systems where every transaction has to be recorded, and super-fast at that. Consider the scenario where a bank ATM has disbursed cash to a customer but was unable to record this event in the bank records. If this started happening frequently, the bank wouldn't stay in business for too long. So the banking system is designed to make sure that every transaction gets recorded within the time you stand before the ATM machine. This system is write-optimized, and you shouldn't crib if your analysis query (read operation) takes a lot of time on such a system.

A Data Warehouse (DW) on the other end, is a database (yes, you are right, it's a database) that is designed for facilitating querying and analysis. Often designed as OLAP (On-Line Analytical Processing) systems, these databases contain read-only data that can be queried and analyzed far more efficiently as compared to your regular OLTP application databases. In this sense an OLAP system is designed to be read-optimized.

Separation from your application database also ensures that your business intelligence solution is scalable (your bank and ATMs don't go down just because the CFO asked for a report), better documented and managed (god help the novice who is given the application database diagrams and asked to locate the needle of data in the proverbial haystack of table proliferation), and can answer questions far more efficiently and frequently.

Creation of a DW leads to a direct increase in quality of analyses as the table structures are simpler (you keep only the needed information in simpler tables), standardized (well-documented table structures), and often denormalized (to reduce the linkages between tables and the corresponding complexity of queries). A DW drastically reduces the 'cost-per-analysis' and thus permits more analysis per FTE. Having a well-designed DW is the foundation successful BI/Analytics initiatives are built upon.

If you are still running your reports off the main application database, answer this simple question: Would the solution still work next year with 20% more customers, 50% more business, 70% more users, and 300% more reports? What about the year after next? If you are sure that your solution will run without any changes, great!! However, if you have already budgeted to buy new state-of-the-art hardware and 25 new Oracle licenses with those partition-options and the 33 other cool-sounding features, good luck to you. (You can probably send me a ticket to Hawaii, since it's gonna cost you just a minute fraction of your budget)

It's probably simpler and more sensible to create a new DW exclusively for your BI needs. And if you are cash strapped, you could easily do that at extremely low costs by using excellent open source databases like MySQL.

Chapter: 9 Strategic Uses of Information Technology

There are many ways that organizations may view and use information technology. For example: companies may choose to use information systems strategically, or they may be content to use IT to support efficient everyday operations. But if a company emphasized strategic business uses of information technology, its management would view IT as a major competitive differentiator. It would then devise business strategies that would use IT to develop products, services and capabilities that would give the company major advantages in the markets in which it competes.
Information technology can change the way business compete. So you should also view information systems strategically, that is:

1. As vital competitive networks
2. As a means of organizational renewal
3. As a necessary investment in technologies that help a company adopt strategies
4. Business processes that enable it to reengineer or reinvent itself in order to survive and succeed in today's dynamic business environment.

Competitive Strategy Concepts

The major role of information systems applications in business was to provide effective support of a company's strategies for gaining competitive advantage. This strategic role of information systems involves using information technology to develop products, services and capabilities that give companies major advantages over the competitive forces it faces in the global market place.
This creates strategic information systems, information systems that support or shape the competitive position and strategies of a business enterprise. So therefore a strategic information system can be any kind of information system (TPS, MIS, DSS, etc.) that uses information technology to help an organization:

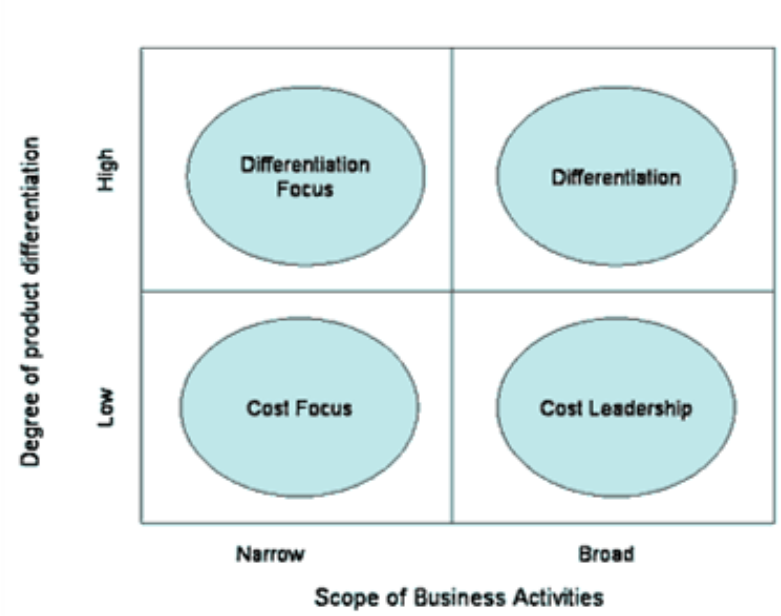
1. Gain a competitive advantage
2. Reduce a competitive disadvantage
3. Meet other strategic enterprise objectives

The table given below gives answers to how can business managers use investments in information technology to directly support a firm's competitive strategies:

Basic Strategies in the Business Use of Information Technology
Lower Costs • Use IT to substantially reduce the cost of business processes. • Use IT to lower the costs of customers or suppliers. • How IT is used to keep cost as low as possible or even make it lower than in the old system. eg. Automated hotel front desk system By using automated front desk system, this hotel doesn't need to hire human to do the tasks. Automated Hotel Front Desk System
Differentiate • Develop new IT features to differentiate products and services. • Use IT features to reduce the differentiation advantages of competitors. • Use IT features to focus products and services at selected market niches. • Use IT to create a unique product or service that differs from the existing product. • eg. Capsule hotel in Japan This capsule hotel shows a different type of hotel. Here, they don't need the same space as ordinary hotel to create the

same number of rooms as the ordinary hotel. And it needs IT to run the system. Capsule Hotel in Japan
Innovate • Create new products and services that include IT components. • Develop unique new markets or market niches with the help of IT. • Make radical changes to business processes with IT that dramatically cut costs, improve quality, efficiency, or customer service, or shorten time to market. • Use IT to create a new product or service that is actually needed and useful. • eg. Automated parking system this automated parking system is a very useful system found to ease the lack of parking space due to smaller building space and increased parking capacity. Automated parking system
Promote Growth • Use IT to manage regional and global business expansion. • Use IT to diversify and integrate into other products and services. • Use IT to control / manage a business locally and globally, eg. dhl. Com We can track / monitor our shipment online. dhl.com
Develop Alliances • Use IT to create virtual organizations of business partners. • Develop inter-enterprise information systems linked by the Internet and extranets that support strategic business relationships with customers, suppliers, subcontractors, and others. • Use IT to develop networks with people from all around the world. • eg. Facebook We can connect with our friends even when separated by distance. We can also add new friends from our friends. We can build new networks with new people

The four strategies are summarised in the figure below:



The differentiation and cost leadership strategies seek competitive advantage in a broad range of market or industry segments. By contrast, the differentiation focus and cost focus strategies are adopted in a narrow market or industry.

Competitive Advantage

Competitive Advantage - Definition

A competitive advantage is an advantage over competitors gained by offering consumers greater value, either by means of lower prices or by providing greater benefits and service that justifies higher prices.

When a firm sustains profits that exceed the average for its industry, the firm is said to possess a competitive advantage over its rivals. The goal of much of business strategy is to achieve a sustainable competitive advantage.

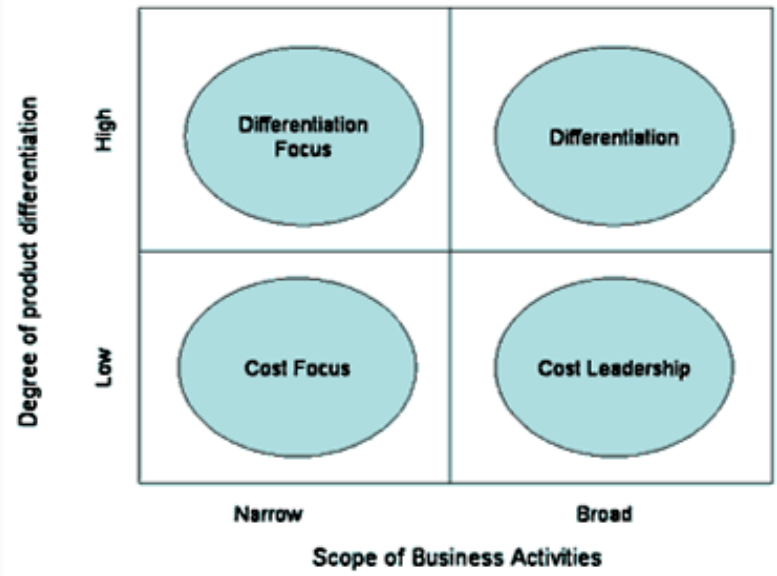
Michael Porter identified two basic types of competitive advantage:

- cost advantage
- differentiation advantage

A competitive advantage exists when the firm is able to deliver the same benefits as competitors but at a lower cost (cost advantage), or deliver benefits that exceed those of competing products (differentiation advantage). Thus, a competitive advantage enables the firm to create superior value for its customers and superior profits for itself.

Cost and differentiation advantages are known as positional advantages since they describe the firm's position in the industry as a leader in either cost or differentiation.

The four strategies are summarised in the figure below:



Following on from his work analysing the competitive forces in an industry, Michael Porter suggested four "generic" business strategies that could be adopted in order to gain competitive advantage. The four strategies relate to the extent to which the scope of a businesses' activities are narrow versus broad and the extent to which a business seeks to differentiate its products.

market or industry segments. By contrast, the differentiation focus and cost focus strategies are adopted in a narrow market or industry.

- Strategy - Differentiation

This strategy involves selecting one or more criteria used by buyers in a market - and then positioning the business uniquely to meet those criteria. This strategy is usually associated with charging a premium price for the product - often to reflect the higher production costs and extra value-added features provided for the consumer. Differentiation is about charging a premium price that more than covers the additional production costs, and about giving customers clear reasons to prefer the product over other, less differentiated products.

Examples of Differentiation Strategy: Mercedes cars; Bang & Olufsen

- Strategy - Cost Leadership

With this strategy, the objective is to become the lowest-cost producer in the industry. Many (perhaps all) market segments in the industry are supplied with the emphasis placed minimising costs. If the achieved selling price can at least equal (or near)the average for the market, then the lowest-cost producer will (in theory) enjoy the best profits. This strategy is usually associated with large-scale businesses offering "standard" products with relatively little differentiation that are perfectly acceptable to

the majority of customers. Occasionally, a low-cost leader will also discount its product to maximise sales, particularly if it has a significant cost advantage over the competition and, in doing so, it can further increase its market share.

Examples of Cost Leadership: Nissan; Tesco; Dell Computers

- Strategy - Differentiation Focus

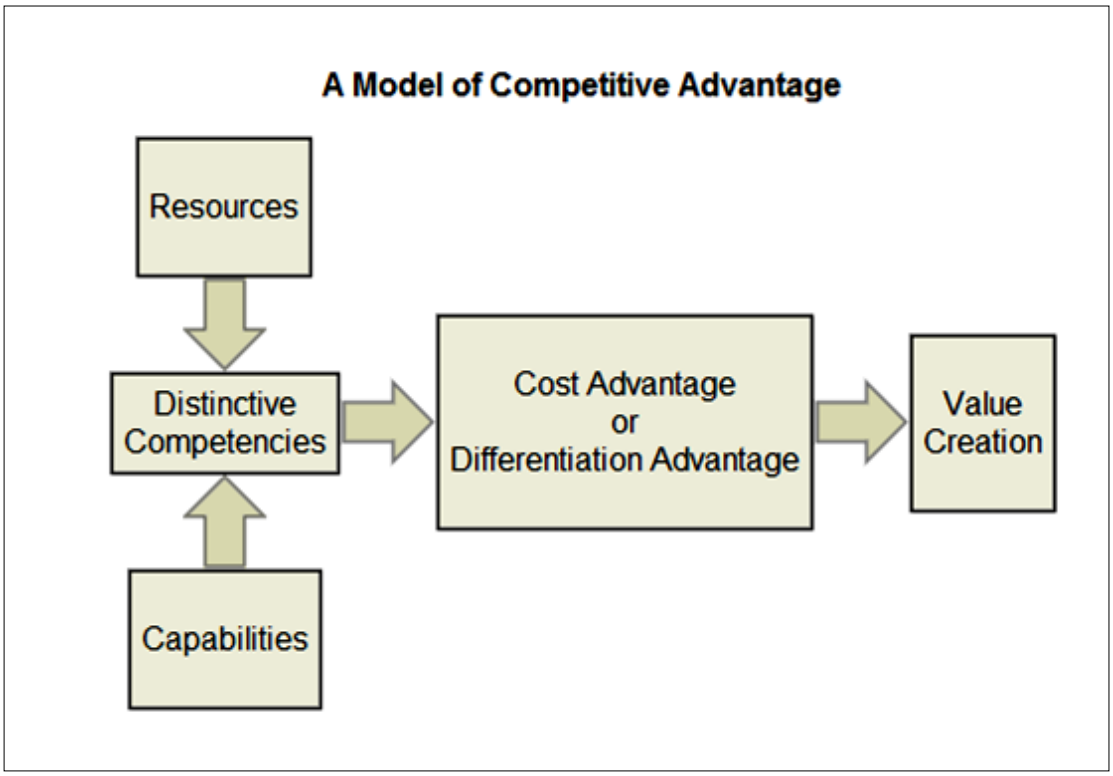
In the differentiation focus strategy, a business aims to differentiate within just one or a small number of target market segments. The special customer needs of the segment mean that there are opportunities to provide products that are clearly different from competitors who may be targeting a broader group of customers. The important issue for any business adopting this strategy is to ensure that customers really do have different needs and wants - in other words that there is a valid basis for differentiation - and that existing competitor products are not meeting those needs and wants.

Examples of Differentiation Focus: any successful niche retailers; (e.g. The Perfume Shop); or specialist holiday operator (e.g. Carrier)

- Strategy - Cost Focus

Here a business seeks a lower-cost advantage in just on or a small number of market segments. The product will be basic - perhaps a similar product to the higher-priced and featured market leader, but acceptable to sufficient consumers. Such products are often called "me-too's".

Examples of Cost Focus: Many smaller retailers featuring own-label or discounted



label products.

Resources and Capabilities

According to the resource-based view, in order to develop a competitive advantage the firm must have resources and capabilities that are superior to those of its competitors. Without this superiority, the competitors simply could replicate what the firm was doing and any advantage quickly would disappear.

Resources are the firm-specific assets useful for creating a cost or differentiation advantage and that few competitors can acquire easily. The following are some examples of such resources:

- Patents and trademarks
- Proprietary know-how
- Installed customer base
- Reputation of the firm
- Brand equity

Capabilities refer to the firm's ability to utilize its resources effectively. An example of a capability is the ability to bring a product to market faster than competitors. Such capabilities are embedded in the routines of the organization and are not easily documented as procedures and thus are difficult for competitors to replicate.

The firm's resources and capabilities together form its distinctive competencies. These competencies enable innovation, efficiency, quality, and customer responsiveness, all of which can be leveraged to create a cost advantage or a differentiation advantage.

Other Competitive Strategies

There are many other competitive strategies in addition to the ones described in the table above such as:

- Locking in Customers or suppliers
- Building switching costs
- Raising barriers to entry
- Leveraging investment in information technology

Investments in information technology can allow a business to lock in customer and suppliers (and lock out competitors) by building valuable new relationships with them. This can deter both customers and suppliers from abandoning a firm for its competitors or intimidating a firm into accepting less profitable relationships. Early attempts to use information systems technology in these relationships focused on significantly improving the quality of service to customers and suppliers in a firm’s distribution, marketing, sales and service activities. Then businesses moved to more innovative uses of information technology.

A major emphasis in strategic information systems has been to find ways to build switching costs into the relationships between a firm and its customers or suppliers. That is, investments in information systems technology can make customers or suppliers dependent on the continued use of innovative, mutually beneficial inter-enterprise information systems.

By making investments in information technology to improve its operations or promote innovation, a firm could also erect barriers to entry that would discourage or delay other companies from entering a market. Typically, this happens by increasing the amount of investment or the complexity of the technology required to compete in an industry or a market segment. Such actions would tend to discourage firms already in the industry and deter external firms from entering the industry.

Investing in information technology enables a firm to build strategic IT capabilities that allow it to take advantage of strategic opportunities when they arise. In many cases, this results when a company invests in advanced computer based information systems to improve the efficiency of its own business processes. Then armed with this strategic technology platform, the firm can leverage investment in information technology by developing new products and services that would not be possible without a strong IT capability. An important current example is the development of corporate intranets and extranets by many companies, which enables them to leverage their previous investments in Internet browsers, PCs, servers, and client/server networks. The following table summarises the additional use of It that have been discussed.

Other Strategic Uses of Information Technology
• Develop inter-enterprise information systems whose convenience and efficiency create switching costs that lock in customers or suppliers.
• Make major investments in advanced IT applications that build barriers to entry against industry competitors or outsiders.
• Include IT components in products in services to make substitution of competing products or services more difficult.
• Leverage investments in IS people, hardware, software, databases, and networks from operational uses into strategic applications.

Building a Customer Focused Business

The driving force behind world economic growth has changed from manufacturing volume to improving customer value. As a result, the key to success factor for many firms is maximizing customer value.

For many companies, the chief business value of becoming a customer focused business lies in its ability to help them keep customers loyal, anticipate their future needs, respond to customer concerns, and provide top quality service. This strategic focus on customer value recognizes that quality, rather than prices, has become the primary determinant in a customer's perception of value. From a customer's point of view, companies that consistently offer the best value are able to keep track of their customer's individual preferences, keep up with the market trends, supply products, services, and information anytime, anywhere, and provide customer services tailored to individuals needs. As a result electronic commerce has become a strategic opportunity for companies, large and small, to offer fast, responsive, high quality products and services tailored to individual customer preferences.

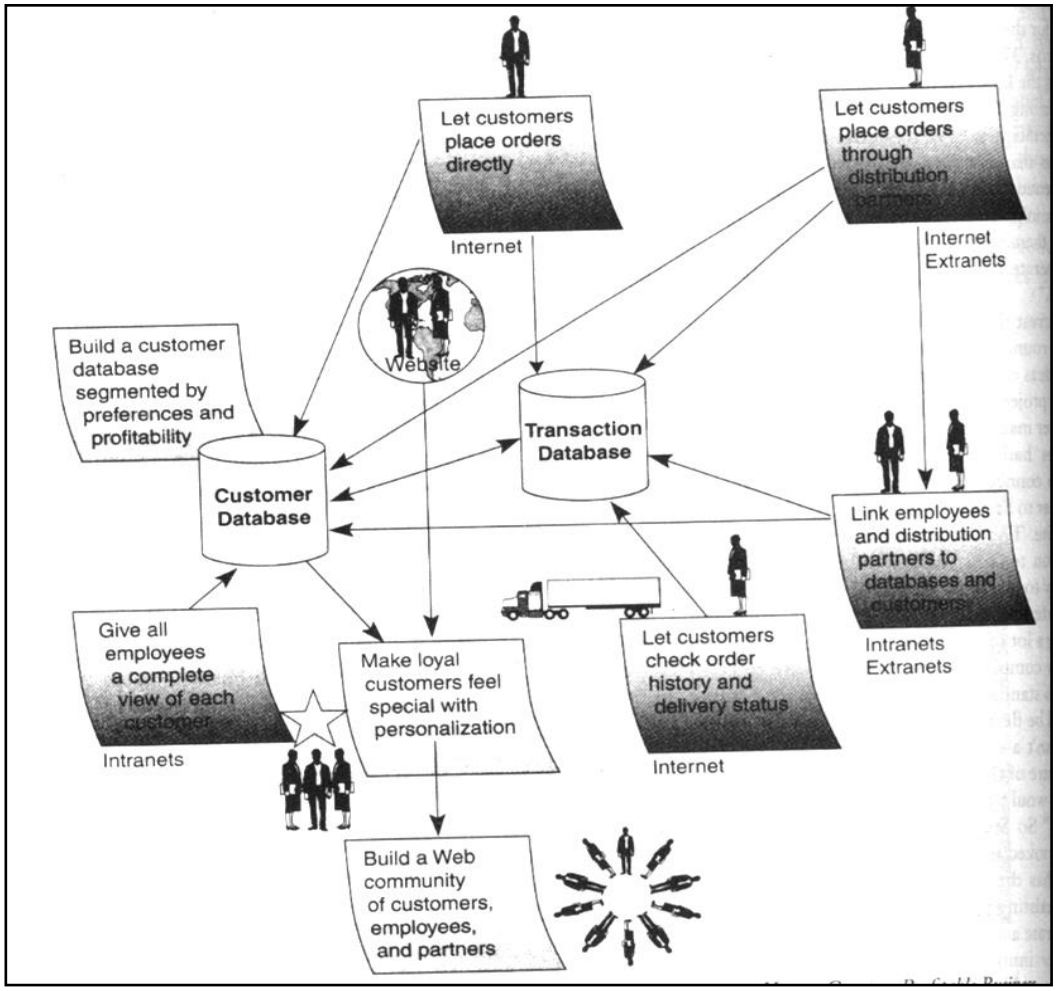
Internet technologies can make customers the focal point of all e-business and e-commerce applications. Internet, intranet, and extranet websites create new channels for interactive communications within a company, with customers, and with the suppliers, business partners, and others in the external environment. This enables continual interaction with customers by most functions and encourages cross-functional collaboration with customers in product development, marketing, delivery, service, and technical support.

Typically, e-commerce customers use the Internet to ask questions, air complaints, evaluate products, request support, and make and report their purchases. Using the Internet and corporate intranets, specialists in business functions throughout the enterprise can contribute to an effective response. This encourages the creation of cross-functional discussion groups and problem-solving teams dedicated to customer involvement, service, and support. Even the Internet and extranet links to suppliers and business partners can be used to enlist them in a way of doing business that

ensures prompt delivery of quality components and services to meet a company's commitments to its customers. This is how a business demonstrates its focus on customer value.

The diagram given in the next page illustrates the interrelationships in a customer-focused business. Intranets, extranets, e-commerce websites, and web-enabled internal business processes form the invisible IT platform that supports this e-business model. This enables the business to focus on targeting the kinds of customers it really wants, and "owning" the customer's total business experience with the company. A successful business streamlines all business processes that impact their customers, and provides its employees with a complete view of each customer, so that they can offer their customers top quality personalized service. A customer focused business helps their e-commerce customers to help themselves, while also helping them to do their jobs. Finally a successful business nurtures an online community of customers, employees, and business partners that builds great customer loyalty, while fostering cooperation to provide an outstanding customer experience.

How a customer focused business builds customer value and loyalty in electronic commerce



Chapter: 10 Information Systems Planning

What should a plan be?

A plan should be a realistic view of the expectations. Depending upon the activities, a plan can be long range, intermediate range or short range. It is the framework within which it must operate. For management seeking external support, the plan is the most important document and key to growth. Preparation of a comprehensive plan will not guarantee success, but lack of a sound plan will almost certainly ensure failure.
Purpose of Plan

Just as no two organizations are alike, so also their plans. It is therefore important to prepare a plan keeping in view the necessities of the enterprise. A plan is an important aspect of business. It serves the following three critical functions:

- Helps management to clarify, focus, and research their businesses or project's development and prospects.
- Provides a considered and logical framework within which a business can develop and pursue business strategies over the next three to five years.
- Offers a benchmark against which actual performance can be measured and reviewed.

Importance of the planning Process

A plan can play a vital role in helping to avoid mistakes or recognize hidden opportunities. Preparing a satisfactory plan of the organization is essential. The planning process enables management to understand more clearly what they want to achieve, and how and when they can do it.

A well-prepared business plan demonstrates that the managers know the business and that they have thought through its development in terms of products, management, finances, and most importantly, markets and competition.

Planning helps in forecasting the future, makes the future visible to some extent. It bridges between where we are and where we want to go. Planning is looking ahead.

Types of Planning

Planning is usually defined in three forms, which correspond to three planning horizons. The diagram below summarizes these three planning types and some of their characteristics. Our emphasis in this section is strategic planning (the top row).

Strategic systems planning deals with planning for the use of IT for strategic purposes. It has traditionally been thought to have a longer planning horizon than operational or tactical planning as shown in the diagram below. In today's Internet age, though, some strategic planning is short term indeed. Nevertheless, strategic planning attempts to form a view of the future 3 to 5 years out to help determine what should be done now.

Horizon	*Focus*	*Issues*	*Primary Responsibility*
3–5 years	Strategic	Vision, architecture, business goals	Senior management CIO
1–2 years	Tactical	Resource allocation, project selection	Middle managers IS line partners Steering committee
6 months–1 year	Operational	Project management, meeting time, and budget targets	IS professionals Line managers Partners

Although systems planning efforts are usually called strategic, the emphasis on strategy has undergone a definite shift over the past several years. The table below shows some of these shifts. The basic trend is to move from a tactical midrange focus to a truly strategic effort.

Strategic Information Systems Planning Techniques

Due to the importance and the difficulty of systems planning, it is valuable to have a framework or methodology to use in the process of planning. Over the years, a number of techniques have been proposed to help Information System executives do a better job of planning. The seven techniques given below take different views of IS planning, including looking at the assimilation of IT in organizations, defining information needs, understanding the competitive market, categorizing applications into a portfolio, mapping relationships, and working out about the future. The following are the seven planning techniques:

1. **Stages of Growth**
2. **Critical Success Factors**
3. **Competitive Forces Model**
4. **Value Chain Analysis**
5. **SWOT Analysis**

Stages of Growth

Richard Nolan and Chuck Gibson published a landmark paper in 1974 entitled “Managing the four Stages of EDP Growth”. In it, they observed that many organizations go through four stages in the introduction and assimilation of new technology.

Stages of growth model

The stages-of-growth model is a theoretical model for the growth of information technology (IT) in a business or similar organization. It was developed by Richard L. Nolan during the 1970s, and published by him in the Harvard Business Review

Nolan’s model concerns the general approach to IT in business. The model proposes that evolution of IT in organizations begins slowly in Stage I, the "initiation" stage.This stage is marked by "hands off" user awareness and an emphasis on functional applications to reduce costs. Stage I is followed by further growth of IT in the "contagion" stage. In this stage there is a proliferation of applications as well as the

potential for more problems to arise. During Stage III a need for "control" arises. Centralized controls are put in place and a shift occurs from management of computers to management of data resources. Next, in Stage IV, "integration" of diverse technological solutions evolves. Management of data allows development without increasing IT expenditures in Stage V. Finally, in Stage VI, "maturity",high control is exercised by using all the information from the previous stages.

Stage I – Initiation

In this stage, information technology is first introduced into the organization. According to Nolan's article in 1973, computers were introduced into companies for two reasons. The first reason deals with the company reaching a size where the administrative processes cannot be accomplished without computers. Also, the success of the business justifies large investment in specialized equipment. The second reason deals with computational needs. Nolan defined the critical size of the company as the most prevalent reason for computer acquisition.

This introductory software is simple to use and cheap to implement, which provides substantial monetary savings to the company. During this stage, the IT department receives little attention from management and work in a "carefree" atmosphere.

Stage II – Contagion

Even though the computers are recognized as "change agents" in Stage I, Nolan acknowledged that many users become alienated by computing. Because of this, Stage II is characterized by a managerial need to explain the potential of computer applications to alienated users. This leads to the adoption of computers in a range of different areas. A problem that arises in Stage II is that project and budgetary controls are not developed. Unavoidably, this leads to a saturation of existing computer capacity and more sophisticated computer systems being obtained. System sophistication requires employing specialized professionals. Due to the shortage of qualified individuals, implementing these employees results in high salaries. The budget for computer organization rises significantly and causes concern for management. Although the price of Stage II is high, it is evident that planning and control of computer systems is necessary.

Stage III – Control

Stage III is a reaction against excessive and uncontrolled expenditures of time and money spent on computer systems, and the major problem for management is the organization of tasks for control of computer operating costs. In this stage, project management and management report systems are organized, which leads to development of programming, documentation, and operation standards. During Stage III, a shift occurs from management of computers to management of data resources. This shift is an outcome of analysis of how to increase management control and planning in expending data processing operations. Also, the shift provides flexibility in data processing that is needed in a case of management's new controls. The major characteristic of Stage III is reconstruction of data processing operation.

Stage IV – Integration

Stage IV features the adoption of new technology to integrate systems that were previously separate entities. This creates data processing (IT) expenditure growth rates similar to that of Stage II. In the latter half of Stage IV, exclusive reliance on computer controls leads to inefficiencies. The inefficiencies associated with rapid growth may create another wave of problems simultaneously. This is the last stage that Nolan acknowledged in his initial proposal of the stages of growth in 1973.

Stage V – Data administration

Nolan determined that four stages were not enough to describe the proliferation of IT in an organization and added Stage V in 1979. Stage V features a new emphasis on managing corporate data rather than IT. Like the proceeding Stage VI, it is marked by the development and maturity of the new concept of data administration.

Stage VI – Maturity

In Stage VI, the application portfolio — tasks like orderly entry, general ledger, and material requirements planning — is completed and its structure “mirrors” the organization and information flows in the company. During this stage, tracking sales growth becomes an important aspect. On the average, 10% batch and remote job entry, 60% are dedicated to data base and data communications processing, 5% personal computing, 25% minicomputer processing. Management control systems are used the most in Stage VI (40%). There are three aspects of management control; manufacturing, marketing and financial. Manufacturing control demands forecasting, looking down the road for future needs. Marketing control strictly deals with research. Financial control, forecasts cash requirements for the future. Stage VI exercises high control, by compiling all of the information from Stages I through V. This allows the organization to function at high levels of efficiency and effectiveness

Competitive Fore Model

Porter's Five Forces - A MODEL FOR INDUSTRY ANALYSIS

The model of pure competition implies that risk-adjusted rates of return should be constant across firms and industries. However, numerous economic studies have affirmed that different industries can sustain different levels of profitability; part of this difference is explained by industry structure.

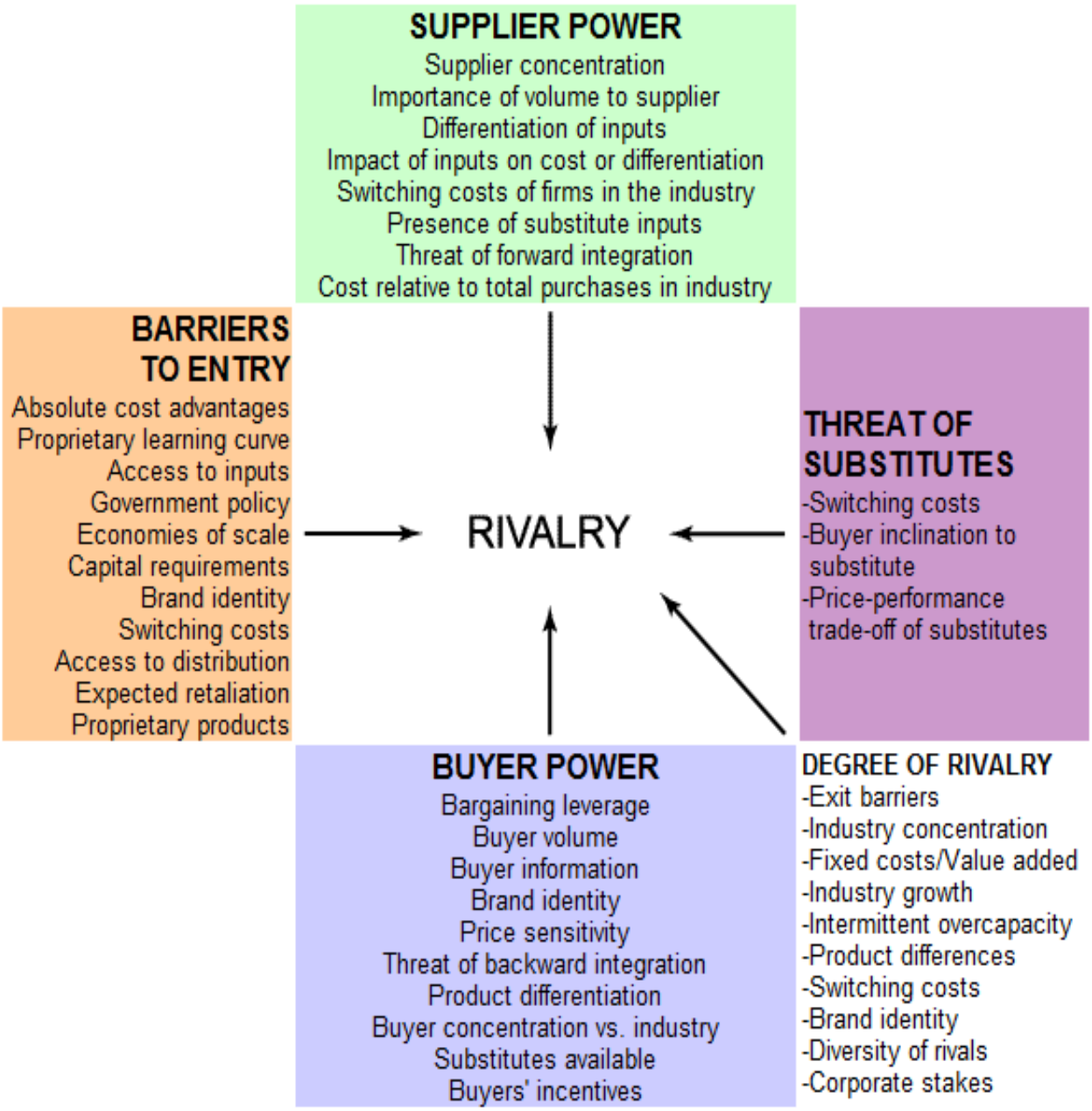
Michael Porter provided a framework that models an industry as being influenced by five forces. The strategic business manager seeking to develop an edge over rival firms can use this model to better understand the industry context in which the firm operates.

The Five Forces model of Porter is an outside-in business unit strategy tool that is used to make an analysis of the attractiveness (value...) of an industry structure. The Competitive Forces analysis is made by the identification of 5 fundamental competitive forces:

- the entry of competitors (how easy or difficult is it for new entrants to start to compete, which barriers do exist)

- the threat of substitutes (how easy can our product or service be substituted, especially cheaper)
- the bargaining power of buyers (how strong is the position of buyers, can they work together to order large volumes)
- the bargaining power of suppliers (how strong is the position of sellers, are there many or only few potential suppliers, is there a monopoly)
- the rivalry among the existing players (is there a strong competition between the existing players, is one player very dominant or all all equal in strength/size)

Diagram of Porter's 5 Forces



Bargaining Power of Suppliers

The term 'suppliers' comprises all sources for inputs that are needed in order to provide goods or services.

Supplier bargaining power is likely to be high when:

- The market is dominated by a few large suppliers rather than a fragmented source of supply,
- There are no substitutes for the particular input,
- The suppliers customers are fragmented, so their bargaining power is low,
- The switching costs from one supplier to another are high,
- There is the possibility of the supplier integrating forwards in order to obtain higher prices and margins. This threat is especially high when
- The buying industry has a higher profitability than the supplying industry,
- Forward integration provides economies of scale for the supplier,
- The buying industry hinders the supplying industry in their development (e.g. reluctance to accept new releases of products),
- The buying industry has low barriers to entry.

In such situations, the buying industry often faces a high pressure on margins from their suppliers. The relationship to powerful suppliers can potentially reduce strategic options for the organization.

Bargaining Power of Customers

Similarly, the bargaining power of customers determines how much customers can impose pressure on margins and volumes.

Customers bargaining power is likely to be high when

- They buy large volumes, there is a concentration of buyers,
- The supplying industry comprises a large number of small operators
- The supplying industry operates with high fixed costs,
- The product is undifferentiated and can be replaces by substitutes,
- Switching to an alternative product is relatively simple and is not related to high costs,
- Customers have low margins and are price-sensitive,
- Customers could produce the product themselves,

- The product is not of strategically important for the customer,
- The customer knows about the production costs of the product
- There is the possibility for the customer integrating backwards.

Threat of New Entrants

The competition in an industry will be the higher, the easier it is for other companies to enter this industry. In such a situation, new entrants could change major determinants of the market environment (e.g. market shares, prices, customer loyalty) at any time. There is always a latent pressure for reaction and adjustment for existing players in this industry.

The threat of new entries will depend on the extent to which there are barriers to entry. These are typically

- Economies of scale (minimum size requirements for profitable operations),
- High initial investments and fixed costs,
- Cost advantages of existing players due to experience curve effects of operation with fully depreciated assets,
- Brand loyalty of customers
- Protected intellectual property like patents, licenses etc,
- Scarcity of important resources, e.g. qualified expert staff
- Access to raw materials is controlled by existing players,
- Distribution channels are controlled by existing players,
- Existing players have close customer relations, e.g. from long-term service contracts,
- High switching costs for customers
- Legislation and government action

Threat of Substitutes

A threat from substitutes exists if there are alternative products with lower prices of better performance parameters for the same purpose. They could potentially attract a significant proportion of market volume and hence reduce the potential sales volume for existing players. This category also relates to complementary products.

Similarly to the threat of new entrants, the treat of substitutes is determined by factors like

- Brand loyalty of customers,

- Close customer relationships,
- Switching costs for customers,
- The relative price for performance of substitutes,
- Current trends.

Competitive Rivalry between Existing Players

This force describes the intensity of competition between existing players (companies) in an industry. High competitive pressure results in pressure on prices, margins, and hence, on profitability for every single company in the industry.
Competition between existing players is likely to be high when

- There are many players of about the same size,
- Players have similar strategies
- There is not much differentiation between players and their products, hence, there is much price competition
- Low market growth rates (growth of a particular company is possible only at the expense of a competitor),
- Barriers for exit are high (e.g. expensive and highly specialized equipment).

Influencing the Power of Five Forces

After the analysis of current and potential future state of the five competitive forces, managers can search for options to influence these forces in their organization's interest. Although industry-specific business models will limit options, the own strategy can change the impact of competitive forces on the organization. The objective is to reduce the power of competitive forces.

The following figure provides some examples. They are of general nature. Hence, they have to be adjusted to each organization's specific situation. The options of an organization are determined not only by the external market environment, but also by its own internal resources, competences and objectives.

4.1 Reducing the Bargaining Power of Suppliers	4.2 Reducing the Bargaining Power of Customers
· Partnering · Supply chain management · Supply chain training · Increase dependency · Build knowledge of supplier costs and methods · Take over a supplier	· Partnering · Supply chain management · Increase loyalty · Increase incentives and value added · Move purchase decision away from price · Cut put powerful intermediaries (go directly to customer)
4.3 Reducing the Treat of New Entrants	**4.4 Reducing the Threat of Substitutes**
· Increase minimum efficient scales of operations · Create a marketing / brand image (loyalty as a barrier) · Patents, protection of intellectual property · Alliances with linked products / services · Tie up with suppliers · Tie up with distributors	· Legal actions · Increase switching costs · Alliances · Customer surveys to learn about their preferences · Enter substitute market and influence from within · Accentuate differences (real or perceived)

4.5 Reducing the Competitive Rivalry between Existing Players
· Avoid price competition · Differentiate your product · Buy out competition · Reduce industry over-capacity · Focus on different segments · Communicate with competitors

Porter's model of Five Competitive Forces has been subject of much critique. Its main weakness results from the historical context in which it was developed. In the early eighties, cyclical growth characterized the global economy. Thus, primary corporate objectives consisted of profitability and survival. A major prerequisite for achieving these objectives has been optimization of strategy in relation to the external environment. At that time, development in most industries has been fairly stable and predictable, compared with today's dynamics.

In general, the meaningfulness of this model is reduced by the following factors:

· In the economic sense, the model assumes a classic perfect market. The more an industry is regulated, the less meaningful insights the model can deliver.

· The model is best applicable for analysis of simple market structures. A comprehensive description and analysis of all five forces gets very difficult in complex industries with multiple interrelations, product groups, by-products and segments. A too narrow focus on particular segments of such industries, however, bears the risk of missing important elements.

· The model assumes relatively static market structures. This is hardly the case in today's dynamic markets. Technological breakthroughs and dynamic market entrants from start-ups or other industries may completely change business models, entry barriers and relationships along the supply chain within short times. The Five Forces model may have some use for later analysis of the new situation; but it will hardly provide much meaningful advice for preventive actions.

· The model is based on the idea of competition. It assumes that companies try to achieve competitive advantages over other players in the markets as well as over suppliers or customers. With this focus, it dos not really take into consideration strategies like strategic alliances, electronic linking of information systems of all companies along a value chain, virtual enterprise-networks or others.

Overall, Porters Five Forces Model has some major limitations in today's market environment. It is not able to take into account new business models and the dynamics of markets. The value of Porters model is more that it enables managers to think about the current situation of their industry in a structured, easy-to-understand way – as a starting point for further analysis.

Value chain analysis

Value Chain Analysis describes the activities that take place in a business and relates them to an analysis of the competitive strength of the business. Influential work by Michael Porter suggested that the activities of a business could be grouped under two headings:

(1) Primary Activities - those that are directly concerned with creating and delivering a product (e.g. component assembly); and

(2) Support Activities, which whilst they are not directly involved in production, may increase effectiveness or efficiency (e.g. human resource management). It is rare for a business to undertake all primary and support activities.

Value Chain Analysis is one way of identifying which activities are best undertaken by a business and which are best provided by others ("out sourced").

Linking Value Chain Analysis to Competitive Advantage

What activities a business undertakes is directly linked to achieving competitive advantage. For example, a business which wishes to outperform its competitors through differentiating itself through higher quality will have to perform its value chain activities better than the opposition. By contrast, a strategy based on seeking cost leadership will require a reduction in the costs associated with the value chain activities, or a reduction in the total amount of resources used.

Primary Activities

Primary value chain activities include:

Primary Activity	Description
Inbound logistics	All those activities concerned with receiving and storing externally sourced materials
Operations	The manufacture of products and services - the way in which resource inputs (e.g. materials) are converted to outputs (e.g. products)
Outbound logistics	All those activities associated with getting finished goods and services to buyers
Marketing and sales	Essentially an information activity - informing buyers and consumers about products and services (benefits, use, price etc.)
Service	All those activities associated with maintaining product performance after the product has been sold

Support Activities

Support activities include:

Secondary Activity	**Description**
Procurement	This concerns how resources are acquired for a business (e.g. sourcing and negotiating with materials suppliers)
Human Resource Management	Those activities concerned with recruiting, developing, motivating and rewarding the workforce of a business
Technology Development	Activities concerned with managing information processing and the development and protection of "knowledge" in a business

Infrastructure	Concerned with a wide range of support systems and functions such as finance, planning, quality control and general senior management

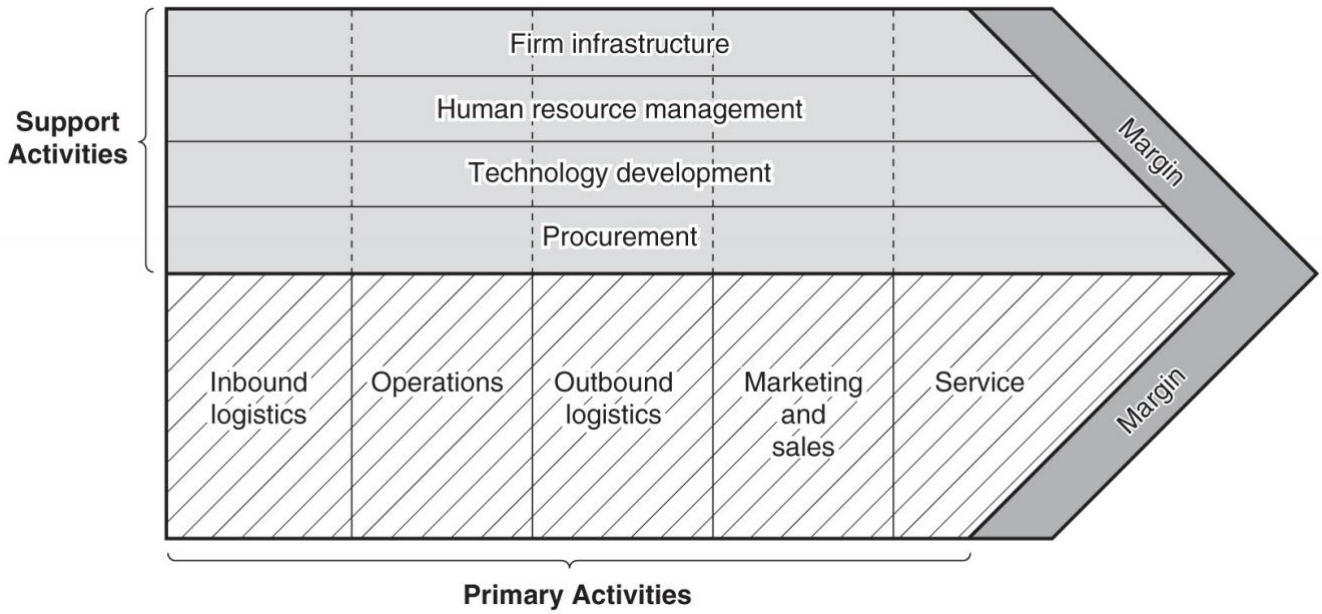
Steps in Value Chain Analysis

Value chain analysis can be broken down into a three sequential steps:

(1) Break down a market/organisation into its key activities under each of the major headings in the model;

(2) Assess the potential for adding value via cost advantage or differentiation, or identify current activities where a business appears to be at a competitive disadvantage;

(3) Determine strategies built around focusing on activities where competitive advantage can be sustained



SWOT Analysis

Definition:

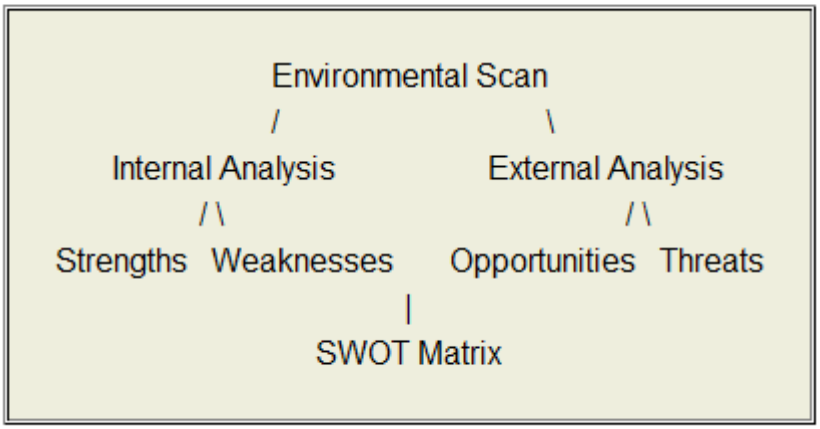
SWOT is an abbreviation for Strengths, Weaknesses, Opportunities and Threats

SWOT analysis is an important tool for auditing the overall strategic position of a business and its environment.

Once key strategic issues have been identified, they feed into business objectives, particularly marketing objectives. SWOT analysis can be used in conjunction with other

tools for audit and analysis, such as PEST analysis and Porter's Five-Forces analysis. It is also a very popular tool with business and marketing students because it is quick and easy to learn.

SWOT Analysis Framework



The Key Distinction - Internal and External Issues

Strengths and weaknesses are Internal factors. For example, a strength could be your specialist marketing expertise. A weakness could be the lack of a new product.

Opportunities and threats are external factors. For example, an opportunity could be a developing distribution channel such as the Internet, or changing consumer lifestyles that potentially increase demand for a company's products. A threat could be a new competitor in an important existing market or a technological change that makes existing products potentially obsolete.

it is worth pointing out that SWOT analysis can be very subjective - two people rarely come-up with the same version of a SWOT analysis even when given the same information about the same business and its environment. Accordingly, SWOT analysis is best used as a guide and not a prescription. Adding and weighting criteria to each factor increases the validity of the analysis.

SWOT / TOWS Matrix

	Strengths	Weaknesses
Opportunities	S-O strategies	W-O strategies
Threats	S-T strategies	W-T strategies

Areas to Consider

Some of the key areas to consider when identifying and evaluating Strengths, Weaknesses, Opportunities and Threats are listed in the example SWOT analysis below:

Strengths

A firm's strengths are its resources and capabilities that can be used as a basis for developing a competitive advantage. Examples of such strengths include:

- patents
- strong brand names
- good reputation among customers
- cost advantages from proprietary know-how
- exclusive access to high grade natural resources
- favorable access to distribution networks

Weaknesses

The absence of certain strengths may be viewed as a weakness. For example, each of the following may be considered weaknesses:

- lack of patent protection
- a weak brand name
- poor reputation among customers
- high cost structure
- lack of access to the best natural resources
- lack of access to key distribution channels

In some cases, a weakness may be the flip side of strength. Take the case in which a firm has a large amount of manufacturing capacity. While this capacity may be considered a strength that competitors do not share, it also may be a considered a weakness if the large investment in manufacturing capacity prevents the firm from reacting quickly to changes in the strategic environment.

Opportunities

The external environmental analysis may reveal certain new opportunities for profit and growth. Some examples of such opportunities include:

- an unfulfilled customer need
- arrival of new technologies
- loosening of regulations
- removal of international trade barriers

Threats

Changes in the external environmental also may present threats to the firm. Some examples of such threats include:

- shifts in consumer tastes away from the firm's products
- emergence of substitute products
- new regulations
- increased trade barriers

Critical Success Factors

The Critical Success Factor (CSF) method is a method for defining executive information needs. It focuses on individual managers and their current information needs, whether factual or opinion information. The CSF method has become a popular planning approach and can be used to help companies identify information systems they need to develop.
For each executive, critical success factors (CSFs) are the few key areas of the job where things must go right for the organization to flourish. Executives usually have fewer than 10 of these factors that they should each monitor. Furthermore, CSFs are both time sensitive and time dependent so they should be re-examined as often as necessary to keep abreast of the current business climate.
There are four sources for these CSFs as mentioned below:

1. industry the business is in,
2. company itself and situation within industry,
3. environment (consumer trends), and
4. temporal organizational factors (inventory)

In addition to the above, there are two other types of CSFs

1. Monitoring – keeping abreast of ongoing operations
2. Building – which involves tracking the progress of “programs for change” initiated by the executive.

CSFs vary from organization to organization, from time period to time period and from executive to executive.

One way to use CSF method is to list current corporate objectives and goals then use them to determine which factors are critical for accomplishing the objectives, along with two or three prime measures for each factor. Discovering these factors is the time consuming portion.

Chapter 11 -Customer Relationship Management

Today, customers are in charge. IT is easier than ever for customers to perform comparison shopping and with a click of the mouse to switch between companies. As a result, customer relationships have become a company's most valued asset. These relationships are worth more than the company's products, stores, factories, web address, and even employees. Every company's strategy should address how to find and retain the most profitable customers possible.

The primary business value of customer relationships today is indisputable. That is why we say that becoming a customer-focused business was one of the top business strategies that can be supported by information technology. Thus many companies are implementing customer relationship management (CRM) business initiatives and information systems as part of a customer focused or customer centric strategy to improve their chances for success in today's competitive business environment.

Customer relationship management systems are enabling businesses of all sizes and industries to dramatically improve their focus on customer service.

What is CRM?

Managing the full range of the customer relationship involves two related objectives as mentioned below:

1. To provide the organization and all of its customers-facing employees with a single, complete view of every customer at every touch point and across all channels
2. To provide the customer with a single, complete view of the company and its extended channels

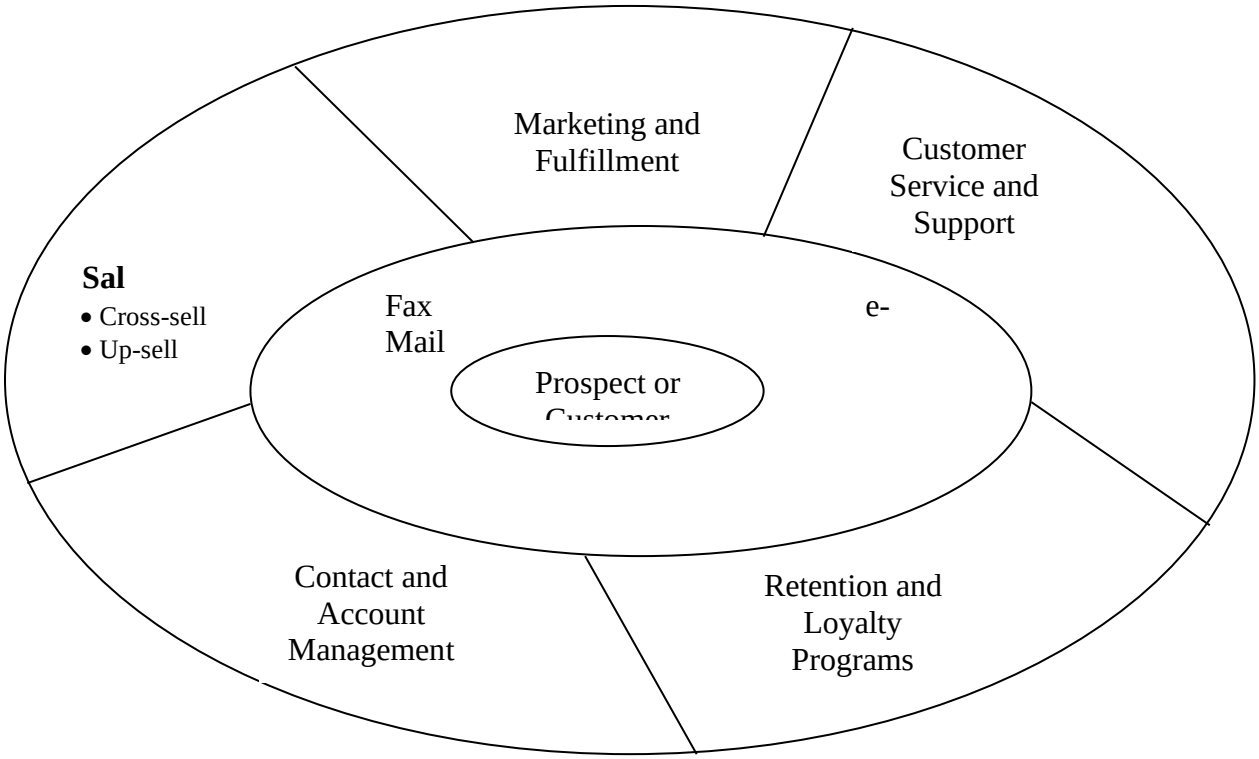
CRM uses information technology to create a cross functional enterprise system that integrates and automates many of the customer serving processes in sales, marketing, and customer services that interact with a company's customers. CRM systems also create an IT framework of Web enabled software and databases that integrates these processes with the rest of a company's business operations. CRM systems include a family of software modules that provides the tools that enable a business and its employees to provide fast, convenient, dependable, and consistent service to its customers.

Siebel Systems, Oracle, PeopleSoft, SAP AG, and Epiphany are some of the leading vendors of CRM software.

The diagram given in the next page illustrates some of the major components of a CRM system. These components can be described as follows:

Contact and Account Management – CRM software helps sales, marketing, and service professional capture and track relevant data about every past and planned contact with prospects and customers, as well as other business and life cycle events of customers. Information is captures from all customer touchpoints, such as telephone, fax, e-mail, the company's website, retail stores, kiosks and personal contact. CRM systems store the data in a common customer database that integrates all customer account information and makes it available throughout the company via Internet, intranet or other network links for sales, marketing, service, and other CRM applications.

Sales – A CRM system provides sales reps with the software tools and company data sources they need to support and manage their sales activities, and optimize cross-selling and up-selling. Examples include sales prospect and product information, product configuration and sales quote generation capabilities. CRM also gives them real-time access to a single common view of the customer, enabling them to check on all aspects of a customer's account status and history before scheduling their sales calls. For example: a CRM system would alert a bank sales rep to call customers who make large deposits to sell them premier credit or investment services. Or it would alert a salesperson of unresolved service, delivery, or payment problems that could be resolved through a personal contact with a customer.



Marketing and Fulfilment – CRM systems help marketing professionals accomplish direct marketing campaigns by automating such tasks as qualifying leads for targeted marketing, and scheduling and tracking direct marketing mailings. Then the CRM software helps marketing professionals capture and manage prospect and customer response data in the CRM database, and analyze the customer and business value of a company's direct marketing campaigns. CRM also assists in the fulfilment of prospect and customer responses and requests by quickly scheduling sales contacts and providing appropriate information on products and services to them, while capturing relevant information for the CRM database.

Customer service and Support – A CRM system provides service reps with software tools and real-time access to the common customer database shared by sales and marketing professionals. CRM helps customer service managers create, assign, and manage requests for service by customers. Call centre software routes calls to customer support agents based on their skills and authority to handle specific kind of service requests. Help desk software assists customer service reps in helping customers who are having problems with a product or service, by providing relevant service data and suggestions for resolving problems. Web-based self service enables customers to easily access personalized support information at the company website,

while giving them an option to receive further assistance online or by phone from customer service personnel.

Retention and Loyalty Programs – Consider the following:

- It costs six times more to sell to a new customer than to sell to an existing one.
- A typical dissatisfied customer will tell eight to ten people about his or her experience.
- A Company can boost its profits 85% by increasing its annual customer retention by only 5%.
- The odds of selling a product to a new customer are 15% whereas the odds of selling a product to an existing customer are 50%.
- Seventy percent of complaining customers will do business the company again if it quickly takes care of a service problem.

That's why enhancing and optimizing customer retention and loyalty is a major business strategy and primary objective of customer relationship management. CRM systems try to help a company identify, reward, and market to their most loyal and profitable customers. CRM analytical software includes data mining tools and other analytical marketing software, while CRM databases may consist of a customer data warehouse and CRM data marts. These tools are used to identify profitable and loyal customers and direct and evaluate a company's targeted marketing and relationship marketing programs towards them.

The Three Phases of CRM

The following are the three phases of relationship between customers and the business:

Acquire – A business relies on CRM software tools and databases to help it acquire new customers by doing a superior job of contact management, sales prospecting, selling, direct marketing and fulfillment. The goal of these CRM functions is to help customers perceive the value of a superior product offered by an outstanding company.

Enhance – Web-enabled CRM account management and customer service and support tools help keep customers happy by supporting superior service from a responsive networked team of sales and service specialists and business partners. CRM sales force automation; direct marketing and fulfilment tools help companies' cross-sell and up-sell to their customers, thus increasing their profitability to the business. The value perceived by customers is the convenience of one-stop shopping at attractive prices.

Retain – CRM analytical software and databases help a company proactively identify and reward its most loyal and profitable customers to retain and expand their business via targeted marketing and relationship marketing programs. The value perceived by customers is of a rewarding personalized business relationship with their company.

Benefits and Challenges of CRM

The potential business benefits of CRM are many. For example: CRM allows a business to identify and target their best customers those who are the most profitable to the business so they can be retained as lifelong customers for greater and more profitable services. It makes possible real-time customization and personalization of products and services based on customer wants, needs, buying habits, and life cycles.

CRM can also keep track of when a customer contacts the company regardless of the contact point. CRM systems can enable a company to provide a consistent customer experience and superior service and support across all the contact points a customer chooses. All of these benefits would provide strategic business value to a company and major value to its customers.

CRM Failures

The business benefits of CRM are not guaranteed and instead, have proven elusive at many companies. Surveys by industry research groups include a report that over 50% of CRM projects did not produce the results that were promised. In another research report, 20% of businesses surveyed reported that CRM implementations has actually damaged long standing customer relationships and in a survey of senior management satisfaction, CRM ranked near the bottom in user satisfaction even though 72% expected to have CRM systems implemented shortly.

The major reason for such a high rate of failure or dissatisfaction with CRM initiatives is the lack of understanding and preparation. That is too often business managers rely on a new major application of information technology (like CRM) to solve a business problem without first developing the business process changes and change management programs that are required. For example: in many cases, failed CRM projects were implemented without the participation of the business stakeholders involved. Therefore, employees and customers were not prepared for the new processes or challenges that were part of the new CRM implementation.

Trends in CRM

Increasingly, enterprises must create tighter collaborative linkages with partners, suppliers, and customers, squeezing out time and costs while enhancing the customer experience and the total value proposition.

The diagram below outlines the four categories of CRM that are being implemented by many companies today and summarizes their benefits to a business. These categories mat also be viewed as stages or trends in how many companies implement CRM applications, and the diagram also outlines some of the capabilities of CRM software products. Most business start out with operational CRM systems such as sales force automation and customer service centers. Then analytical CRM applications are implemented using several analytical marketing tools, such as data mining, to extract vital data about customers and prospects for targeted marketing campaigns.

Increasingly, businesses are moving to collaborative CRM systems, to involve business partners as well as customers in collaborative customer services. This includes systems for customer self-service and feedback, as well as **partner relationship management** (PRM) systems. PRM applications apply many of the same tools used in CRM systems to enhance collaboration between a company and its business partners, such as distributors and dealers, to better coordinate and optimize sales and service to customers across all marketing channels. Finally, many businesses are building Internet, intranet, extranet Web-based CRM portals as a common gateway for various levels of access to all customer information, as well as operational, analytical, and collaborative CRM tools for customers, employees, and business partners.

Types of CRM	Business Value
Operational CRM	• Supports customer interaction with greater convenience through a variety of channels, including phone, fax, e-mail, chat, and mobile devices. • Synchronizes customer interactions consistently across all channels. • Makes your company easier to do business with.
Analytical CRM	• Extracts in-depth customer history, preferences, and profitability information from your data warehouse and other databases. • Allows you to analyze, predict, and derive customer value and behaviour and forecast demand. • Lets you approach your customers with relevant information and offers that are tailored to their needs.
Collaborative CRM	• Enables easy collaboration with customers, suppliers, and partners. • Improves efficiency and integration throughout the supply chain. • Allows greater responsiveness to customer needs through sourcing of products and services outside of your enterprise.
Portal-based CRM	• Provides all users with the tools and information that fit their individual roles and preferences. • Empowers all employees to respond to customer demands more quickly and become truly customer-focused. • Provides the capability to instantly access, link, and use all internal and external customer information.

Chapter 13 : Enterprise Resource Planning

The Business Backbone

Introduction

What do Microsoft, Coca-Cola, Cisco, EH Lilly, Alcoa, and Nokia have in common? Unlike most businesses, which operate on 25-year-old back-office systems, these market leaders reengineered their businesses to run at breakneck speed by implementing a transactional backbone called enterprise resource planning (ERP). These companies credit their ERP systems with having helped them reduce inventories, shorten cycle times, few costs, and improve overall operations.

Businesses of all kinds have now implemented enterprise resource planning (ERP) systems. ERP serves as a cross-functional enterprise backbone that integrates and automates many internal business processes and information systems within the manufacturing, logistics, distribution, accounting, finance, and human resource functions of a company. Large companies throughout the world began installing ERP systems in the 1990s as a conceptual framework and catalyst for reengineering their business processes. ERP also served as the vital software engine needed to integrate and accomplish the cross-functional processes that resulted. Now, ERP is recognized as a necessary ingredient that many companies need in order to gain the efficiency, agility, and responsiveness required to succeed in today's dynamic business environment.

What is ERP?

ERP is a way to integrate the data and processes of an organization into a single system. Usually ERP systems are having many components including hardware and software, in order to achieve proper integration, most ERP systems use a unified database to store data for various functions found throughout the organization.

The term ERP is being originally referred to how a large organization planned to use organizational wide resources effectively. In the past, ERP systems were used in larger more industrial types of companies and the use of ERP has changed and is extremely comprehensive, today the term can refer to any type of company, no matter what industry it will be falling in. In fact, ERP systems are used in almost any type of organization which is large or small.

Today's ERP systems can cover a wide range of functions and integrate them into single unified database. For example, the functions such as Human Resources, Supply Chain Management, Customer Relations Management, Financials, Manufacturing functions and Warehouse Management functions were all once stand alone software applications, usually housed with their own database and network, today, they all can fit under one umbrella.

Key of the ERP is integration of all the data and process of the organization from different areas to one single place. That integration ensures easy access of data. And there will be a single database, and multiple software tools will be manipulating those data on different areas of the organization.

Software tools would be added in an ideal ERP system to manipulate data on;

1. Production / Manufacturing process
2. Financial Management process
3. Human Resources Management process

4. Supply Chain Management process
5. Project management process
6. Customer Relationship Management process
7. Date warehousing process

8. **Benefits and Challenges of ERP**

Before the implementation of ERP system, most of the companies have isolated systems which are local to specific department. Then the communication problems were there. Before implementing an ERP system it is essential to have a pre planning and consulting in order to achieve high performance.

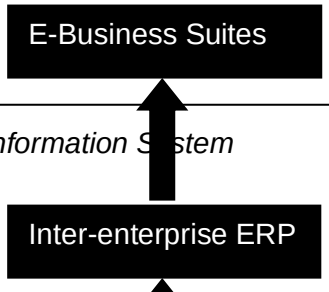
ERP systems can generate significant business benefits for a company. Many other companies have found major business value in their use of ERP in several basic ways such as mentioned below.

- **Quality and Efficiency -** ERP creates a framework for integrating and improving a company's internal business processes that results in significant improvements in the quality and efficiency of customer service, production, and distribution.
- **Decreased Costs -** Many companies report significant reductions in transaction processing costs and hardware, software, and IT support staff compared to the non-integrated legacy systems that were replaced by their new ERP systems.
- **Decision Support -** ERP provides vital cross-functional information on business performance quickly to managers to significantly improve their ability to make better decisions in a timely manner across the entire business enterprise.
- **Enterprise Agility -** Implementing ERP systems breaks down many former departmental and functional walls or "silos" of business processes, information systems, and information resources. This results in more flexible organizational structures, managerial responsibilities, and work roles, and therefore a more agile and adaptive organization and workforce that can more easily capitalize on new business opportunities.

Trends in ERP

Today, ERP is still evolving, adapting to developments in technology and the demands of the market. Four important trends are shaping ERP's continuing evolution. They are as follows:

1. improvements in integration and flexibility
2. extensions to e-business applications
3. a broader reach to new users
4. The adaptation of Internet technologies.



The diagram above illustrates four major developments and trends that are evolving in ERP applications. First, the ERP software packages that were the mainstay of ERP implementations in the 1990s, and were often criticized for their inflexibility, have gradually been modified into more flexible products. Companies who installed ERP systems pressured software vendors to adopt more open flexible, standards-based software architectures. This makes the software easier to integrate with application programs of business users, as well as making it easer to make minor modifications to suit a company's business processes. An example is SAP R/3 Enterprise, released in 2002 by SAP AG as a successor to earlier versions of SAP R3. Other leading ERP vendors, including Oracle, People-Soft, and J. D. Edwards, have also developed more flexible ERP products.

Web-enabling ERP software is a second development in the evolution of ERP. The growth of the Internet and corporate intranets and extranets prompted software companies to use Internet technologies to build Web interfaces and networking capabilities into ERP systems. These features make ERP systems easier to use and connect to other internal applications as well as to the systems of a company's business partners. This Internet connectivity has led to the development of inter-enterprise ERP systems that provide Web-enabled links between key business systems (such as inventory and production) of a company and its customers, suppliers, distributors, and others. These external links signalled a move toward the integration of internal-facing ERP applications with the external-focused applications of supply chain management (SCM) and a company's supply chain partners.

All of these developments have provided the business and technological momentum for the integration of ERP functions into **e-business suites.** The major ERP software companies have developed modular, Web-enabled software suites that integrate ERP, customer relationship management, supply chain management, procurement, decision support, enterprise portals, and other business applications and functions. Examples include Oracle's e-Business Suite and SAP's mySAP. Some e-business suites disassemble ERP components and integrate them into other modules, while other products keep ERP as a distinct module in the software suite. Of course, the goal of

these software suites is to enable companies to run most of their business processes using one Web-enabled system of integrated software and databases, instead of a variety of separate e-business applications.

Advantages of using ERP:

1. A totally integrated system
2. All the tasks can be streamline
3. Easy to share data among departments and even branches
4. Improve efficiency and productivity
5. It will reduce the operational cost of the organization
6. Proper tracking and forecasting

Some Disadvantages of ERP:

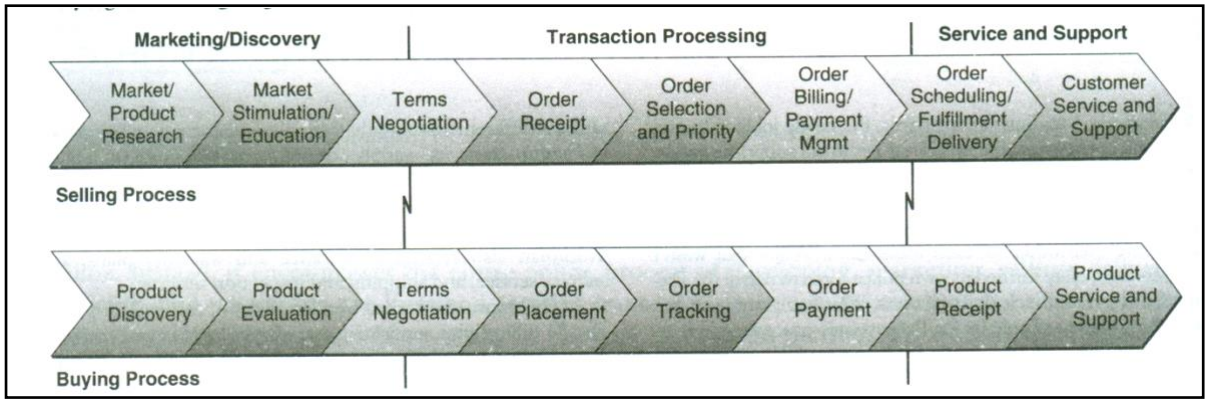
1. Need to be re-engineered the existing system
2. Customization of the business process will be difficult task
3. User training will be an overhead

Chapter 14 – Electronic Commerce Fundamentals

E-Commerce is changing the shape of competition, the speed of action, and the streamlining of interactions, products and payments from customers to companies and from companies to suppliers.

For most companies today, **electronic commerce** is more than just buying and selling products online. Instead, it encompasses the entire online process of developing, marketing, selling, delivering, servicing, and paying for products and services transacted on inter-networked, global marketplaces of customers, with the support of a worldwide network of business partners. Electronic commerce systems rely on the resources of the Internet and many other information technologies to support every step of this process. We will also see that many companies, large and small, are engaged in some form of e-commerce activities. Therefore, developing an e-commerce capability has become an important option that should be considered by most businesses today.

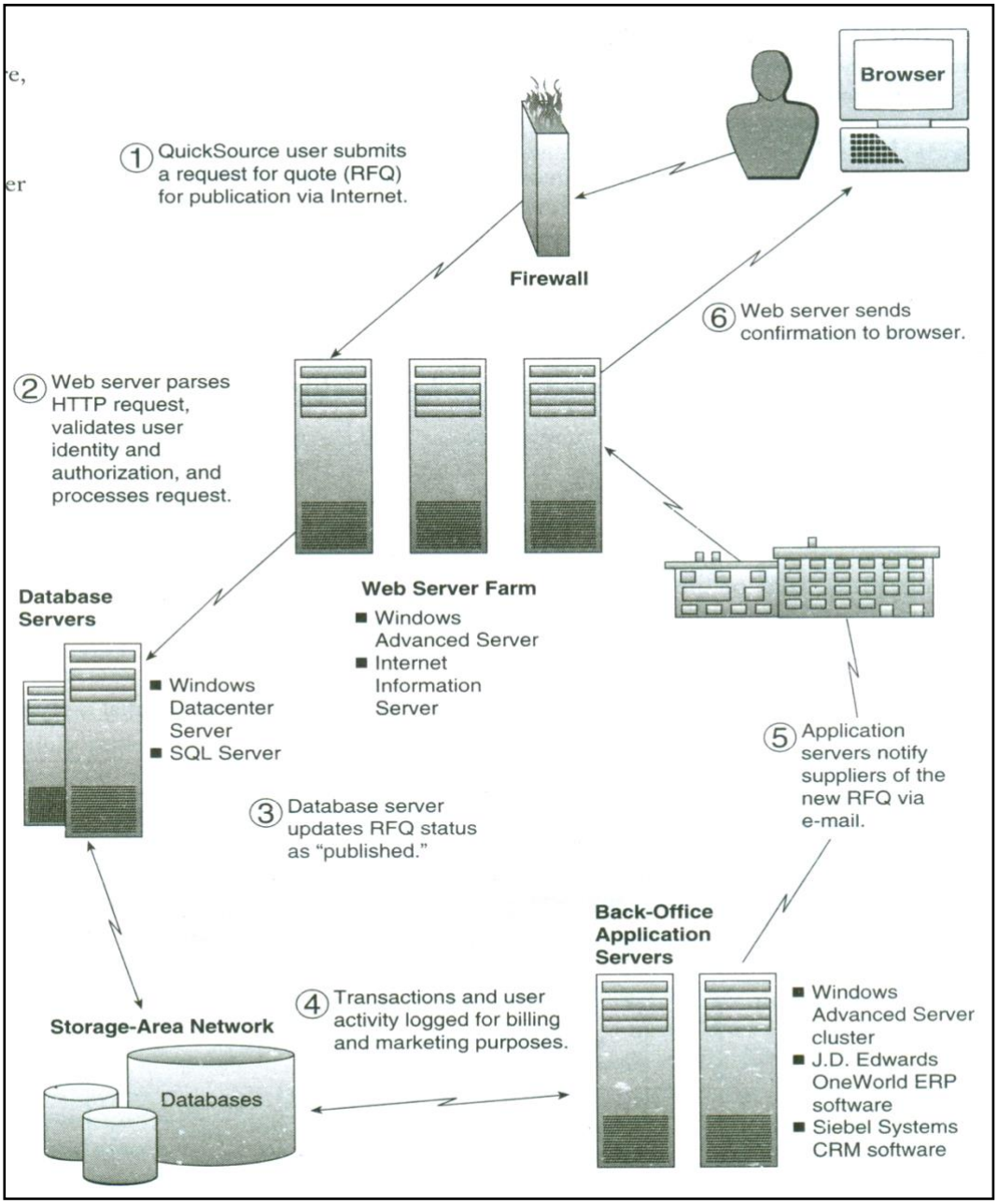
The Scope of E-Commerce



The diagram above illustrates the range of business processes involved in the marketing, buying, selling, and servicing of products and services in companies that engage in e-commerce. Companies involved in e-commerce as either buyers or sellers rely on Internet-based technologies and e-commerce applications and services to accomplish marketing, discovery, transaction processing, and product and customer service processes. For example, electronic commerce can include interactive marketing, ordering, payment, and customer support processes at e-commerce catalog and auction sites on the World Wide Web. But e-commerce also includes e-business processes such as extranet access of inventory databases by customers and suppliers (transaction processing), intranet access of customer relationship management systems by sales and customer service reps (service and support), and customer collaboration in product development via e-mail exchanges and Internet news-groups (marketing/discovery).

E-Commerce Technologies

What technologies are necessary for electronic commerce? The short answer is that most information technologies and Internet technologies that are involved in electronic commerce systems. A more specific answer is illustrated in the diagram on next page, which is an example of the technology resources required by many e-commerce systems. The figure illustrates some of the hardware, software, data, and network components used by Free Markets Inc. to provide B2B online auction e-commerce services.



Categories of E-Commerce

Many companies today are participating in or sponsoring three basic categories of electronic commerce applications:

- business-to-consumer
- business-to-business
- consumer-to-consumer e-commerce Note:

Businesses must develop attractive electronic marketplaces to sell products and services to consumers. For example, many companies offer e-commerce websites that provide virtual storefronts and multimedia catalogs, interactive order processing, secure electronic payment systems, and online customer support.

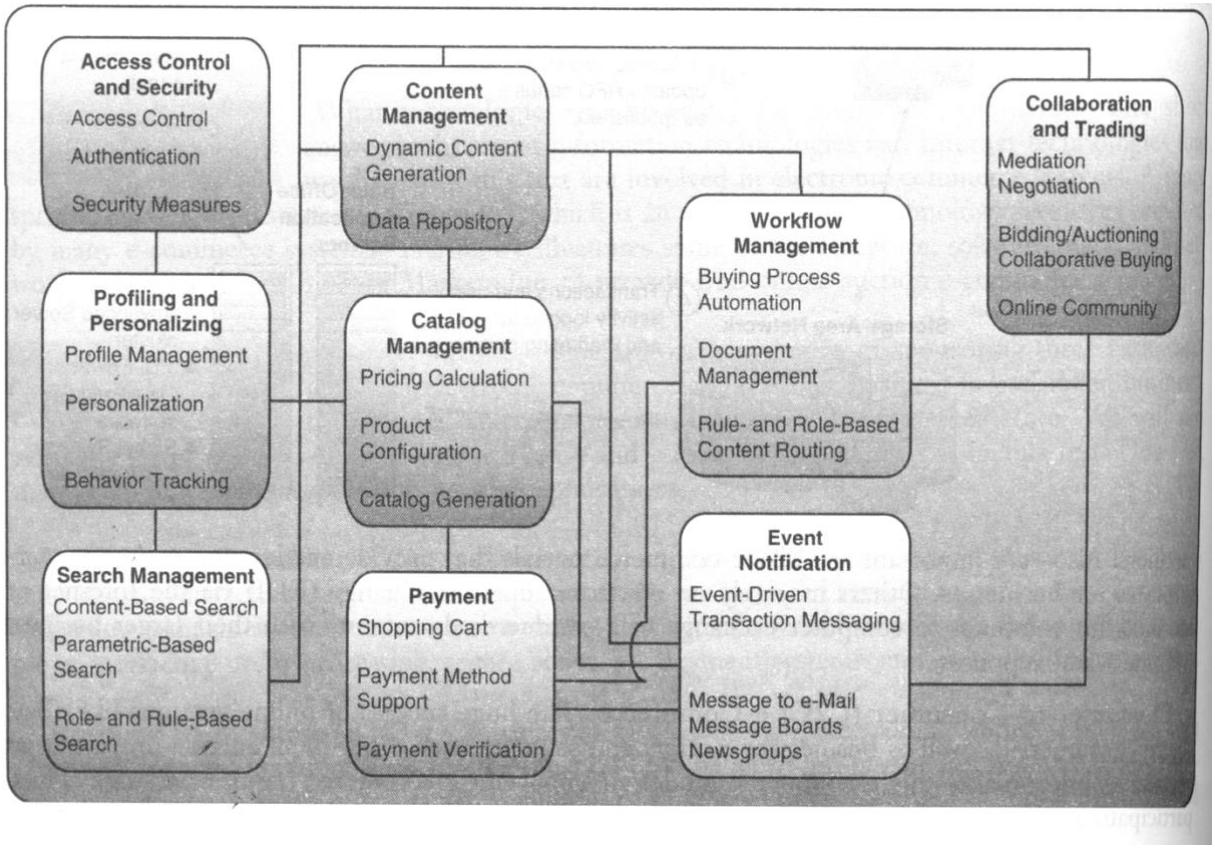
Business-to-Business (B2B) e-Commerce - This category of electronic commerce involves both electronic business marketplaces and direct market links between

businesses. For example, many companies offer secure Internet or extranet e-commerce catalogue websites for their business customers and suppliers. Also very important are B2B e-commerce portals that provide auction and exchange marketplaces for businesses. Others may rely on electronic data interchange (EDI) via the Internet or extranets for computer-to-computer exchange of e-commerce documents with their larger business customers and suppliers.

Consumer-to-Consumer (C2C) e-Commerce - The huge success of online auctions like eBay, where consumers (as well as businesses) can buy and sell with each other in an auction process at an auction website, makes this e-commerce model an important e-commerce business strategy. Thus, participating in or sponsoring consumer or business auctions is an important e-commerce alternative for B2C, C2B (consumer-to-business), or B2B e-commerce. Electronic personal advertising of products or services to buy or sell by consumers at electronic newspaper sites, consumer e-commerce portals, or personal websites is also an important form of C2C e-commerce.

Essential E-Commerce Processes

The essential e-commerce processes required for the successful operation and management of e-commerce activities are illustrated in the diagram below. This figure outlines the nine key components of an *e-commerce process architecture* that is the foundation of the e-commerce initiatives of many companies today. We will concentrate on the role these processes play in e-commerce systems, but you should recognize that many of these components may also be used in internal, non-commerce e-business applications. An example would be an intranet-based human resource system used by a company's employees, which might use all but the catalog management and product payment processes shown in the diagram below.



Access Control and Security

E-commerce processes must establish mutual trust and secure access between the parties in an e-commerce transaction by authenticating users, authorizing access, and enforcing security features. For example, these processes establish that a customer and e-commerce site are who they say they are through user names and passwords, encryption keys, or digital certificates and signatures. The e-commerce site must then authorize access to only those parts of the site that an individual user needs to accomplish his or her particular transactions. Thus, you usually will be given access to all resources of an e-commerce site except for other people's accounts, restricted company data, and webmaster administration areas. Companies engaged in B2B e-commerce may rely on secure industry exchanges for procuring goods and services, or Web trading portals that allow only registered customers' access to trading information and applications. Other security processes protect the resources of e-commerce sites from threats such as hacker attacks, theft of passwords or credit card numbers, and system failures.

Profiling and Personalizing

Once you have gained access to an e-commerce site, profiling processes can occur that gather data on you and your website behaviour and choices, and build electronic profiles of your characteristics and preferences. User profiles are developed using profiling tools such as user registration, cookie files, website behaviour tracking software, and user feedback. These profiles are then used to recognize you as an individual user and provide you with a personalized view of the contents of the site, as well as product recommendations and personalized Web advertising as part of a *one-to-one marketing* strategy. Profiling processes are also used to help authenticate your identity for account management and payment purposes, and to gather data for customer relationship management, marketing planning, and website management.

Search Management

Efficient and effective search processes provide a top e-commerce website capability that helps customers find the specific product or service they want to evaluate or buy. E-commerce software packages can include a website search engine component, or a company may acquire a customized e-commerce search engine from search technology companies like Google and Requisite Technology. Search engines may use a combination of search techniques, including searches based on content (a product description, for example), or by parameters (above, below, or between a range of values for multiple properties of a product, for example).

Content and Catalogue Content management

Content management software helps e-commerce companies develop, generate, deliver, update, and archive text data and multimedia information at e-commerce websites. For example, German media giant Bertelsmann, part owner of BarnesandNoble.com, uses **"StoryServer"** content manager software to generate Web page templates that enable online editors from six international offices to easily publish and update book reviews and other product information, which are sold (syndicated) to other e-commerce sites.

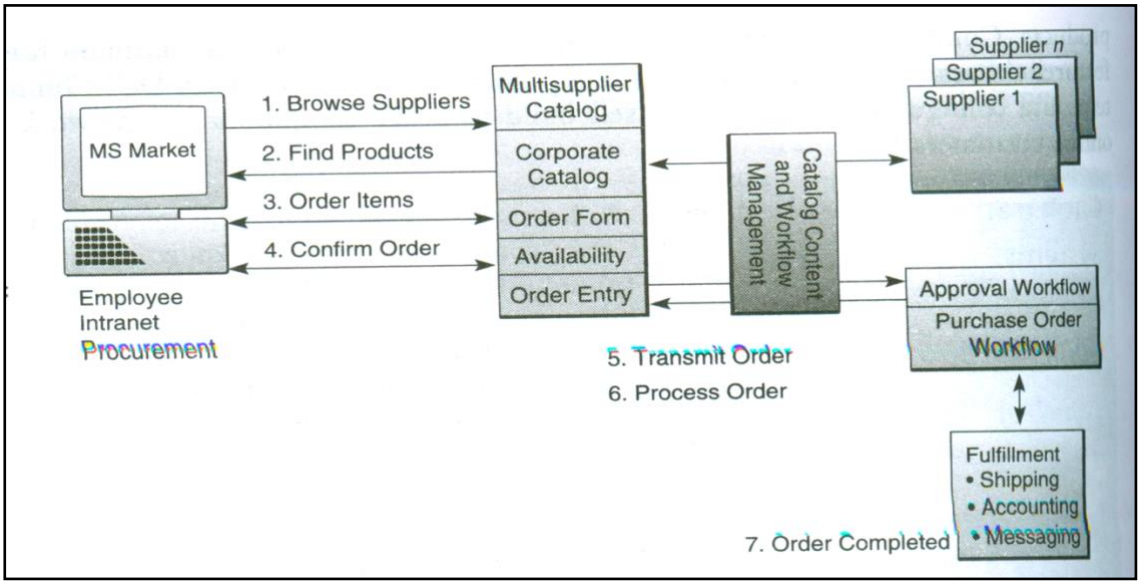
E-commerce content frequently takes the form of multimedia catalogues of product information. So generating and managing catalogue content is a major subset of content management or catalogue management. For example, W.W. Grainger & Co., a multibillion-dollar industrial parts distributor, uses the **"CenterStage"** catalogue management software suite to retrieve data from more than 2,000 supplier databases, standardize the data and translate it into HTML or XML for Web use, and organize and enhance the data for speedy delivery as multimedia Web pages at their www.grainger.com website.

Content and catalogue management software works with the profiling tools we mentioned earlier to personalize the content of Web pages seen by individual users. For example, Travelocity.com uses **"OnDisplay"** content manager software to push personalized promotional information about other travel opportunities to users while they are involved in an online travel-related transaction.

Finally, content and catalogue management may be expanded to include *product configuration* processes that support Web-based customer self-service and the *mass customization* of a company's products. Configuration software helps online customers select the optimum feasible set of product features that can be included in a finished product. For example, both Dell Computer and Cisco Systems use configuration software to sell build-to-order computers and network processors to their online customers.

Workflow Management

Many of the business processes in e-commerce applications can be managed and partially automated with the help of **workflow management** software. E-business workflow systems for enterprise collaboration help employees electronically collaborate to accomplish structured work tasks within knowledge-based business processes. Workflow management in both e-business and e-commerce depends on *workflow software engine* containing software models of the business processes to be accomplished. The workflow models express the predefined sets of business rules, roles of stakeholders, authorization requirements, routing alternatives, databases used, and sequence of tasks required for each e-commerce process. Thus, workflow systems ensure that the proper transactions, decisions, and work activities are performed, and the correct data and documents are routed to the right employees, customers, suppliers, and other business stakeholders.



For example, the diagram above illustrates the e-commerce procurement processes of the **"MS Market system of Microsoft Corporation"**. Microsoft employees use their global intranet and the catalogue/content management and workflow management software engines built into MS Market to electronically purchase more than $3 billion annually of business supplies and materials from approved suppliers connected to the MS Market system by their corporate extranets.

Event Notification

Most e-commerce applications are *event-driven* systems that respond to a multitude of events from a new customer's first website access, to payment and delivery processes, and to innumerable customer relationship and supply chain management activities. That is why **event notification** processes play an important role in e-commerce systems, since customers, suppliers, employees, and other stakeholders must be notified of all events that might affect their status in a transaction. Event notification software works with the workflow management software to monitor all e-commerce processes and record all relevant events, including unexpected changes or problem situations. Then it works with user-profiling software to automatically notify all involved stakeholders of important transaction events using appropriate user-preferred methods of electronic messaging, such as e-mail, newsgroup, pager, and fax communications. This includes notifying a company's management so they can monitor their employees' responsiveness to e-commerce events and customer and supplier feedback.

For example, when you purchase a product at a retail e-commerce website like Amazon.com, you automatically receive an e-mail record of your order. Then you may receive e-mail notifications of any change in product availability or shipment status, and finally, an e-mail message notifying you that your order has been shipped and is complete.

Electronic Payment Processes

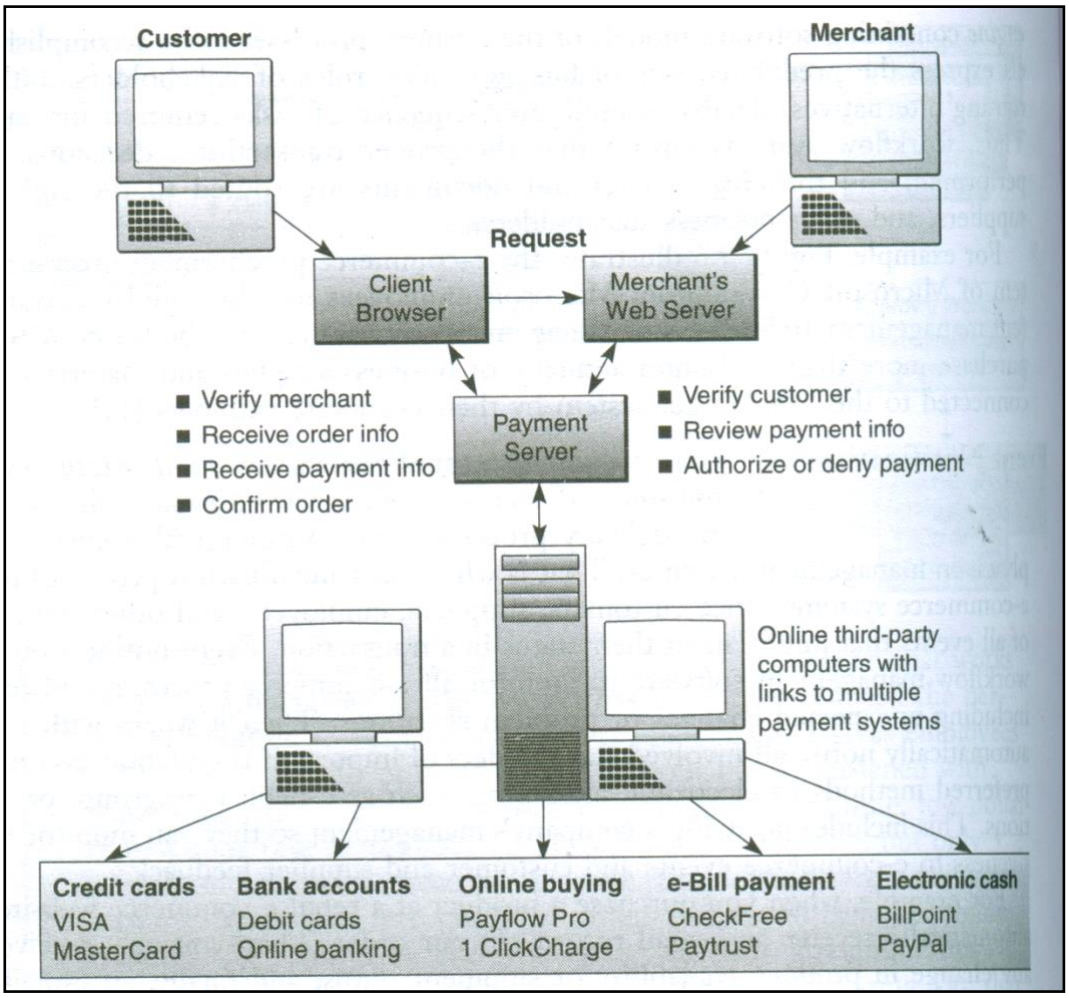
Payment for the products and services purchased is an obvious and vital set of processes in electronic commerce transactions. But payment processes are not simple, because of the near-anonymous electronic nature of transactions taking place between the networked computer systems of buyers and sellers, and the many security issues involved. Electronic commerce payment processes are also complex because of the wide variety of debit and credit alternatives and financial institutions and intermediaries that may be part of the process. Therefore, a variety of electronic **payment systems** has evolved over time. In addition, new payment systems are being developed and tested to meet the security and technical challenges of electronic commerce over the Internet.

Web Payment Processes

Most e-commerce systems on the Web involving businesses and consumers (B2C) depend on credit card payment processes. But many B2B e-commerce systems rely on more complex payment processes based on the use of purchase orders. However, both types of e-commerce typically use an electronic *shopping cart* process, which enables customers to select products from website catalogue db plays and put them temporarily in a virtual shopping basket for later checkout and processing. The diagram in the following page illustrates and summarizes a B2C electronic payment system with several payment alternatives.

Electronic Funds Transfer

Electronic funds transfer (EFT) systems are a major form of electronic payment systems in banking and retailing industries. EFT systems use a variety of information technologies to capture and process money and credit transfers between banks and businesses and their customers. For example, banking networks support teller terminals at all bank offices and automated teller machines (ATMs) at locations throughout the world. Banks, credit card companies, and other businesses may support pay-by-phone services. Very popular also are Web-based payment services, such as *PayPal* and *BillPoint* for cash transfers, and *CheckFree* and *PayTrust* for automatic bill payment that enable the customers of banks and other bill payment services to use the Internet to electronically pay bills. In addition, most point-of-sale terminals in retail stores are networked to bank EFT systems. This makes it possible for you to use a credit card or debit card to instantly pay for gas, groceries, or other purchases at participating retail outlets.



Secure Electronic Payments

When you make an online purchase on the Internet, your credit card information is vulnerable to interception by *network sniffers,* software that easily recognizes credit card number formats. Several basic security measures are being used to solve this security problem:

1. encrypt (code and scramble) the data passing between the customer and merchant
2. encrypt the data passing between the customer and the company authorizing the credit card transaction
3. Take sensitive information off-line.

For example, many companies use the Secure Socket Layer (SSL) security method developed by Netscape Communications that automatically encrypts data passing between your Web browser and a merchant's server. However, sensitive information is still vulnerable to misuse once it's decrypted (decoded and unscrambled) and stored on a merchant's server. So a digital wallet payment system was developed. In this method, you add security software add-on modules to your Web browser. That enables your browser to encrypt your credit card data in such a way that *only the bank that author*izes credit card transactions for the merchant gets to see it. All the merchant is told is whether your credit card transaction is approved or not.

The Secure Electronic Transaction, or SET, standard for electronic payment security extends this digital wallet approach. In this method, software encrypts a digital envelope of digital certificates specifying the payment details for each transaction. SET has been agreed to by VISA, MasterCard, IBM, Microsoft, Netscape, and most other industry players. Therefore, a system like SET may become the standard for secure electronic payments on me Internet. However, SET has been stalled by the reluctance of companies to incur its increased hardware, software, and cost requirements.

Chapter 15 - Artificial Intelligence Technologies in Business

Artificial Intelligence (AI) technologies are being used in variety of ways to improve the decision support provided to managers and business professionals in many companies.
AI enabled applications are at work in:

- Information distribution and retrieval
- Database mining
- Product design
- Manufacturing
- Inspection
- Training
- User support
- Surgical Planning
- Resource scheduling
- Complex resource management

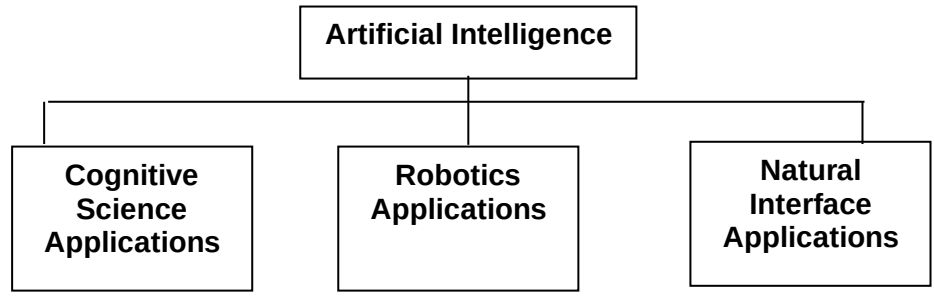
An Overview of Artificial Intelligence

AI is a field of science and technology based on disciplines such as computer science, biology, psychology, linguistics, mathematics and engineering. The goal of AI is to develop computers that can simulate the ability to think as well as see, hear, walk, talk and feel. A major trust of AI is the simulation of computer functions normally associated with human intelligence such as reasoning, learning and problem solving as summarized in the table below:

Attributes of Intelligent Behaviour
• Thinking and reasoning
• Use reasoning to find solutions for problems
• Learning and gain experience
• Apply previous experience for new problem
• Exhibit creativity and imagination
• Deal with complex or perplexing situations
• Respond quickly and successfully to new situations
• Recognize the relative importance of elements in a situation
• Handle ambiguous, incomplete or erroneous information

The Domain of Artificial Intelligence

The diagram below illustrates the major domains of AI research and development.



- Expert Systems
- Learning Systems
- Fuzzy Logic
- Genetic Algorithms
- Neural Networks
- Intelligent Agents

- Visual Perception
- Tactility
- Dexterity
- Locomotion
- Navigation

- Natural Languages
- Speech Recognition
- Multisensory Interfaces
- Virtual Reality

Commercial Applications of AI
Decision Support • Intelligent work environment that will help you capture the ***why*** as well as ***what*** of engineered design and decision making. • Intelligent human-computer interface (HCI) systems that can understand spoken language and gestures, and facilitate problem solving by supporting organization wide collaborations to solve particular problems. • Situation assessment and resource allocation software for uses that range from airlines and airports to logistics centres.
Information Retrieval • AI-based intra and Internet systems that distill tidal waves of information into simple presentations. • Natural language technology to retrieve any sort of online information, from text to pictures, videos, maps and audio clips in response to English questions. • Database mining for marketing trend analysis, financial forecasting, maintenance cost reduction etc.
Virtual Reality • X-ray like vision enabled by enhanced-reality visualization that allows brain surgeons to “see through” intervening tissue to operate, monitor, and evaluate disease progression. • Automated animation, haptic interfaces such as table top computers that allow users to interact with virtual objects via touch.
Robotics • Machine vision inspections systems for gauging, guiding, identifying and inspecting products and providing competitive advantage in manufacturing. • Cutting-edge robotics systems from micro robots and hands and legs to cognitive robotic and trainable modular vision systems.

Cognitive Science

This area of AI is based on research in biology, neurology, psychology, mathematics, and many allied disciplines. It focuses on researching how the human brain works and how human think and learn. The results of such research in *human information processing* are the basis for the development of a variety of computer based applications in artificial intelligence.

Applications in the cognitive science area of AI include the development of expert systems and other knowledge based systems that add a knowledge base and some reasoning capability to information systems. Also included are *adaptive learning systems* that can modify their behaviours based on information they acquire as they operate. Computer based Chess games are primitive examples of such applications though many more applications are being implemented.

Fuzzy logic systems can process data that are incomplete or ambiguous that is fuzzy data. Thus they can solve semi structured problems with incomplete knowledge by developing approximate inferences and answers as human do.

Neural networks software can learn by processing sample problems and their solutions. As neural networks start to recognize patterns, they can begin to program themselves to solve such problems on their own.

Genetic algorithm software uses Darwinian (survival of the fittest), randomizing and other mathematics functions to simulate evolutionary processes that can generate increasingly better solutions to problems.

Intelligent agents use expert system and other AI technologies to serve as software substitutes for a variety of end user applications.

Types of Intelligent Agents
User Interface Agents • ***Interface Tutors*** – Observe user computer operations, correct user mistakes and provide hints and advice on efficient software use. • ***Presentation Agents*** – Show information in a variety of reporting and presentation forms and media based on user preferences. • ***Network Navigation Agents*** – Discover paths to information and provide ways to view information that are preferred by a user. • ***Role playing agents*** – Play what-if games and other roles to help users understand information and make better decisions.
Information Management Agents • ***Search Agents*** – Helps users finds files and databases, search for desired information and suggest and find new types of information products, media and resources. • ***Information brokers*** – Provide commercial services to discover and develop information resources that fit the business or personal needs of a user. • ***Information Filters*** – Receive, find, filter, discard, save, forward and notify users about products received or desired, including e-mail, voice mail and all other information media.

Robotics

Artificial Intelligence, engineering and physiology are the basic disciplines of robotics. This technology produces robot machines with computer intelligence and computer controlled, human like physical capabilities. This area thus includes:

- Applications designed to give robots the power of sight or visual perception
- Touch or tactile capabilities
- Dexterity or skill in handling and manipulation
- Locomotion or the physical ability to move over any environment

- Navigation or the intelligence to properly find one's way to a destination

Natural Interfaces

The development of natural interfaces is considered as a major area of AI applications and is essential to the natural use of computers by humans. For example, the development of *natural languages* and speech recognition are major thrusts of this area of AI. Being able to talk to computers and robots in conversational human languages and have them understand us as easily understand as each other is a goal of AI research. This involves research and development in linguistics, psychology, computer science, and other disciplines. Other natural interface research applications include the development of multisensory devices that use a variety of body movements to operate computers. This is related to the engineering application area of *virtual reality*. Virtual reality involves using multisensory human computer interfaces that enable human users to experience computer-simulated objects, spaces, activities, and "worlds" as if they actually exist.

Expert Systems

One of the most practical and widely implemented applications of AI in business is the development of expert systems and other knowledge based information systems. A knowledge based information system (KBIS) adds a knowledge base to the major components found in other types of computer based information systems. An expert system (ES) is a knowledge-based information system that uses its knowledge about a specific, complex application area to act as an expert consultant to end users. Expert systems provide answers to questions in a very specific problem area by making human like inferences about knowledge contained in a specialized knowledge base. They must also be able to explain their reasoning process and conclusions to a user. So expert systems can provide decision support to end users in the form of advice from an expert consultant in a specific problem area.

Components of an expert system

The components of an expert system include a knowledge base and software modules that perform inferences on the knowledge in the knowledge base and communicate answers to a user's questions.

Knowledge base – The knowledge base of an expert system contains the following

1. Facts about a specific area
2. Heuristics that express the reasoning procedures of an expert system on the subject

There are many ways that such knowledge is represented in expert systems such as given below:

Methods of Knowledge Representation
Case-Based Reasoning – Representing knowledge in an expert system's knowledge base in the form of cases, that is examples of past performance, occurrences and experiences.
Frame- Based Knowledge – Knowledge represented in the form of a hierarchy or network of frames. A frame is a collection of knowledge about an entity consisting of a complex package of data values describing its attributes.
Object- Based Knowledge – Knowledge represented as a network of objects. An object is a data element that includes both data and the methods or processes that act on those data.
Rule-Based Knowledge – Knowledge represented in the form of rules and statements of fact. Rules are statements that typically take the form of a premise and a conclusion such as: If (condition), Then (conclusion).

Software Resources

An expert system software package contains an inference engine and other programs for refining knowledge and communicating with the users. The inference engine program processes the knowledge (such as rules and facts) related to a specific problem. It then makes associations and inferences resulting in recommended courses of action for a user. User interface programs for communicating with end users are also needed, including an explanation program to explain the reasoning process to a user if requested. Knowledge acquisition programs are not part of an expert system but are software tools for knowledge base development as are expert systems shells, which are used for developing expert systems.