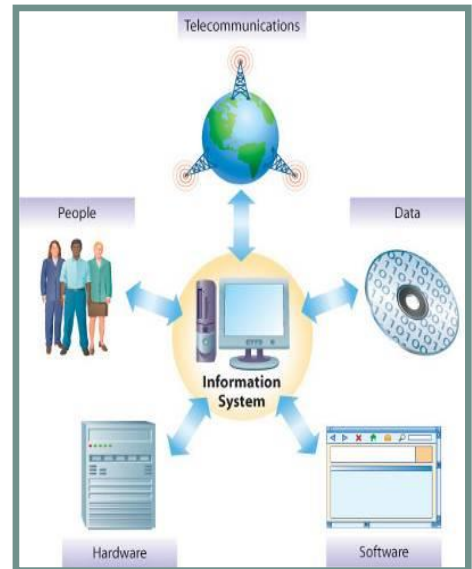**INTRODUCTION TO INFORMATION SYSTEM**

INFORMATION

Information can be defined as the data which is organized and presented at a time and place so that the decision maker may take necessary action. Information in other words is the result/product of processing data.

SYSTEM

A system is composed with set of interrelated components which has a clearly defined boundary and working together to achieve a common set of objectives by accepting inputs and producing outputs in an organized transformation process.

❑ Combination OR arrangement of six key elements:

   ❖ People

   ❖ Hardware

   ❖ Software

   ❖ Telecommunications networks

   ❖ Processes

❑ A set of interrelated components that collect (or retrieve), process, store, and distribute information to support decision making and control in an organization

❑ Information Technology falls under the information system, Information technology deals with technology involved in the system.

❑ E.g. An Information system like wiki.answer.com contains many information technologies, servers, operating system, software (apache),&code written for web server(php,C#,Perl) each one of mentioned part of this information system in itself is an information technology.

❑ Information system is a system designed to create, store, manipulate or disseminate (distribute) information.
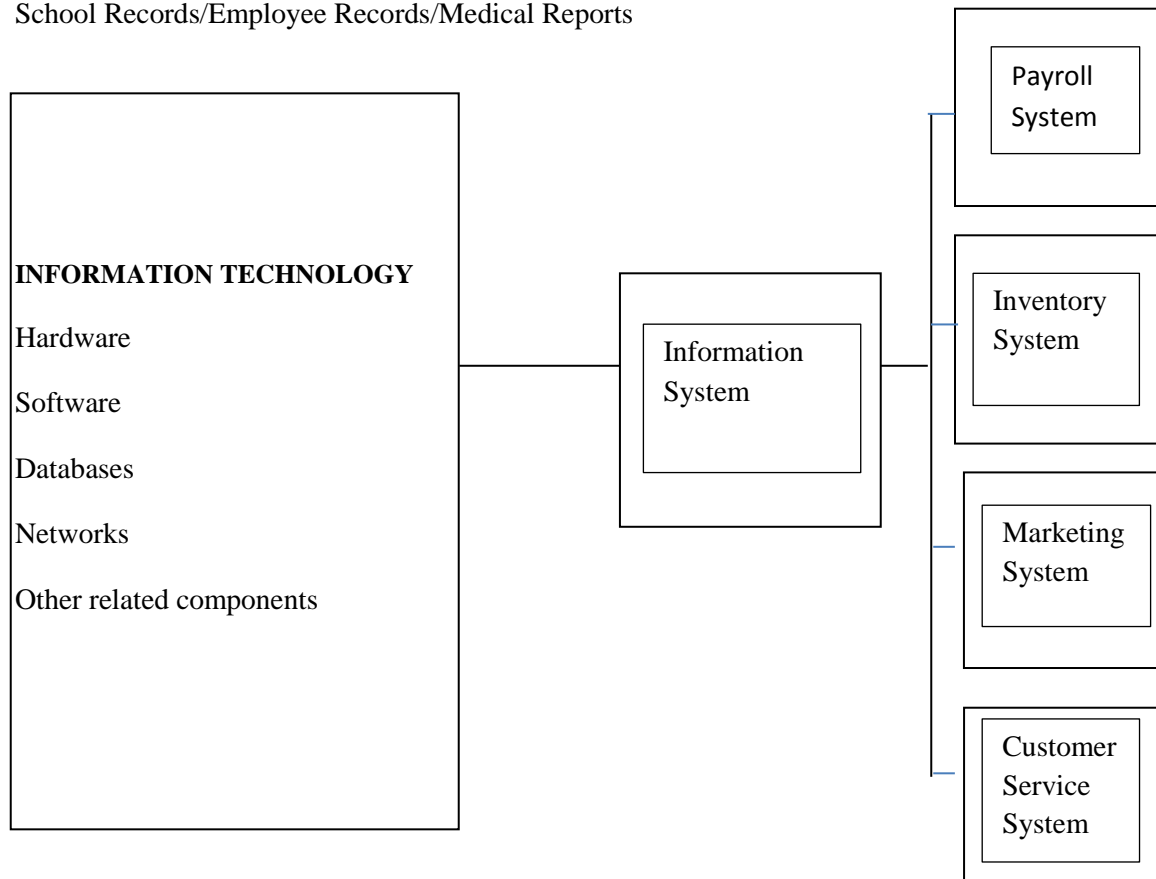
SOURCES OF IS

✓ **Data** – raw, unformatted information

   E.g : 5433333353

✓ **Information** – data that is transformed to have a meaning

   E.g: 543- 33-3353(can be **SSN** of Person) **Meaning:A SSN**

✓ **Knowledge** – body of governing procedures used to organize or manipulate data **E.g.** 543- 33-3353→John Joe **Meaning:** SSN-->Unique Person

✓ **Wisdom** – accumulated knowledge, beyond knowledge . Wisdom allows you to understand how to apply concepts from one domain to new situations or problems. Same SSN number can be used to extract different information of a person. **E.g.** 543- 33-3353→ John Joe

• School Records/Employee Records/Medical Reports

```
┌──────────────────────────┐                    ┌──────────────┐
│                          │                    │   Payroll    │
│ INFORMATION TECHNOLOGY   │                    │   System     │
│                          │                    └──────────────┘
│ Hardware                 │                    ┌──────────────┐
│                          │   ┌────────────┐   │  Inventory   │
│ Software                 │───│Information  │───│  System      │
│                          │   │System       │   └──────────────┘
│ Databases                │   └────────────┘   ┌──────────────┐
│                          │                    │  Marketing   │
│ Networks                 │                    │  System      │
│                          │                    └──────────────┘
│ Other related components │                    ┌──────────────┐
│                          │                    │  Customer    │
│                          │                    │  Service     │
│                          │                    │  System      │
└──────────────────────────┘                    └──────────────┘
```

Information technology can be considered as a subset of information systems. It deals with the technology part of any information system, and as such deals with hardware, servers, operating systems and software etc.

1.1 Classification and Evolution of IS

**(i)Electronic Data Processing (EDP) /Transaction Processing System(TPS) 1950s-1960s**

• Until the **1960s,** the role of most information systems was simple.

• Application that captures and process data about business transaction, it is a process to reduce and improve value added to the business. It includes data maintenance.

• Purposes such as transactions processing, record-keeping, accounting, recording, classifying, manipulating, maintaining, and summarizing data.

These process data resulting from business transactions, update operational databases, and produce business documents. **Examples of business processes supported by TPS include:** Payroll Processing , Sales and Order Processing , Inventory Management(Inventory is the raw materials, work-in-process products and finished goods that are considered to be the portion of a business's assets that are ready or will be ready for sale).

- Process day-to-day business event data at the operational level of the organization

- Business Process Redesign (BRP) i.e. study, analysis, redesign of fundamental business (transaction),it is a process to reduce cost and improve value added to business.

Sample Application

- Grocery store checkout cash register with connection to network

Figure   Architecture of a transaction processing system using the basic systems model.
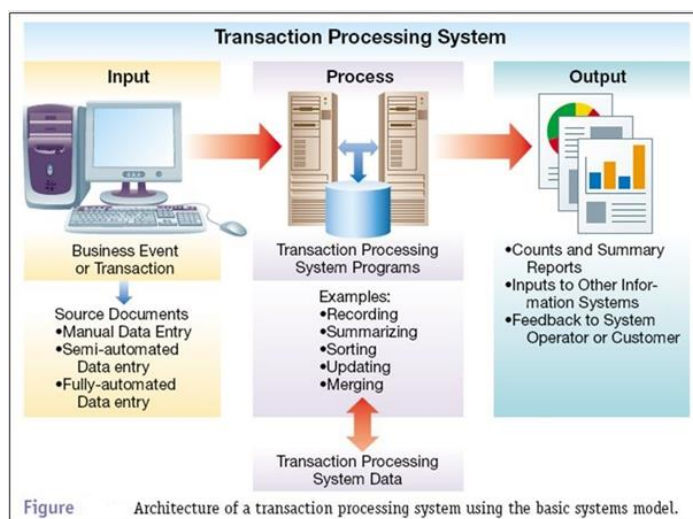
Types of TPS

- Online Transaction Processing: An online system handles transactions when the occur and provides output directly to users. Because it is interactive, online processing avoids delays and allows a constant dialog between the user and the system.
- The system processes transactions completely when and where they occur. Users interact directly with the information system. Users can access data randomly. The information system must be available whenever necessary to support business functions. Ex : University class registration process , Airlines reservation processing , concert/sporting event ticket reservation processing ,etc.
- Batch Transaction Processing: Data is processed in groups or batches. Batch processing is typically used for large amounts of data that must be processed on a routine schedule, such as paychecks or credit card transactions.
- A batch processing system has several main characteristics: collect, group, and process transactions periodically. Batch programs require no user involvement and require significantly fewer network resources than online systems. Ex: Students Final Grade Processing Payroll Processing, Bank checks Processing, etc.

(ii) Management Information Systems (MIS) 1960s-1970s

- MIS is a term with two meanings: It describes the field of study that encompasses the development, use , management and study of computer based information system in organizations .It also refers to a specific type of information system that is used to produce reports .
- The processing of data into useful informative reports. The concept of management information systems (MIS) was born which provides management oriented reporting to support the ongoing ,recurring business or a functional area within a business , such report usually takes form of scheduled reports(i.e. reports produced at predefined intervals) or ad hoc reports(i.e reports created due to unplanned information requests).
- This new role focused on developing business applications that provided managerial end users with predefined management reports that that would give managers the information they needed for decision-making purposes.
- **Examples of business processes supported by MIS include** Sales forecasting , financial management and forecasting , Manufacturing planning and scheduling, Inventory management and planning , Advertising and Product Pricing
- Produce detailed information to help manage a firm or a part of the firm
- Inventory management and planning system
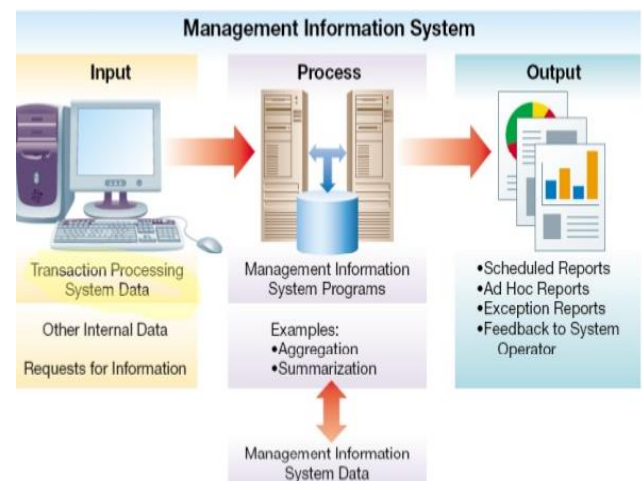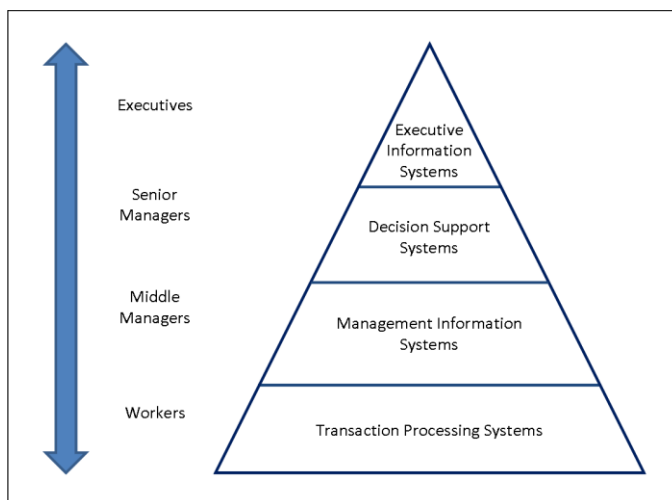
(iii)Decision support systems (DSS) 1970s

- By the 1970s, these pre-defined management reports were not sufficient to meet many of the decision-making needs of management. In order to satisfy such needs, 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 processes.

- Decision support systems – provide interactive ad hoc support for the decision-making processes of managers and other business professionals. Examples: product pricing, profitability forecasting and risk analysis systems.
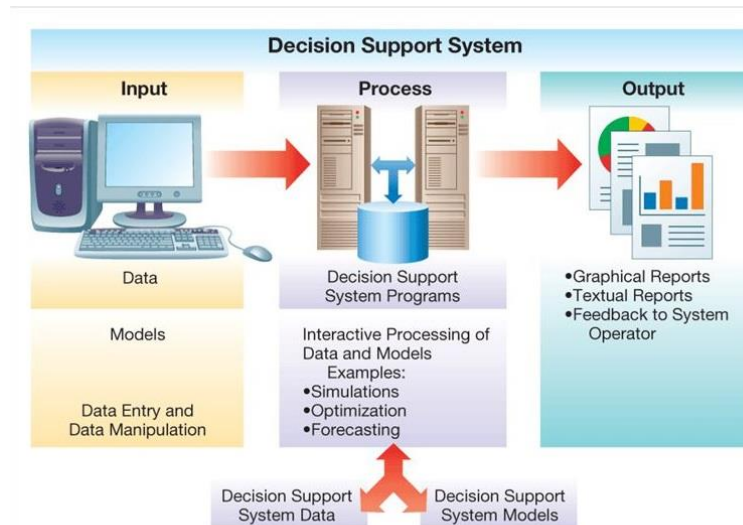
Figure   Architecture of a decision support system using the basic systems model.

Types of Decision Support Systems

The decision support systems can be broadly classified into two types, namely model-based DSS and data-based DSS.

1. Model Based DSS: These systems are standalone systems and they are not connected with other major corporate information systems. The capability of analysis of these systems is supported by some strong theory (or model) along with a good user interface that makes them easy to use.

The use of various models in these systems helps them to perform what-if and other similar analysis. They are used for creating simulation models, performing production planning and scheduling, and creating statistical and financial reports.

2. Data based DSS: These systems can analyze huge amount of data from different sources, such as organizational data, data from enterprise systems, and data from web. The data collected from different sources is stored in data warehouses. A data warehouse is a database that can store present and past data extracted from various operational systems, and provide certain reporting and query tools.

- Using these systems, managers are able to extract information from large pool of data which otherwise would have remained hidden and unused. The extracted information helps managers in making better decisions. Note that the corporate information systems are major class of systems that use data based decision support systems. The main techniques that are mostly used in data based DSS for analyzing the data are online analytical processing (OLAP) and data mining.

- **Online Analytical Processing (OLAP):** It is based on queries and can provide fast answers to complex business requests. It enables managers and analysts to interactively examine and manipulate the data available in the data warehouse from different viewpoints.

- **Data Mining:** It helps in extracting useful information by finding patterns or rules from existing data. This information is then used to predict future trends and behaviors.

Differences between Management information systems (MIS) and Decision support systems (DSS)

• Management information systems (MIS) fulfill the information needs of an organization to a larger extent, but they are not sufficient for meeting all the needs of information and decision making. In some situations, where the nature of decision is complex, the decision-makers would require additional information, analysis, and an appropriate DSS model to support decision-making.

Some of the major differences between Management information systems (MIS) and Decision support systems (DSS) are as follows:

1. MIS deals with mostly structured problems, whereas DSS provides information that helps in analyzing and finding solutions to semi-structured and unstructured problems.

2. MIS provides information on business performance that helps managers to control and administer the day-to-day business activities. On the other hand, DSS provides information and various decision support techniques that help managers to analyze specific problems or opportunities.

3. MIS produce reports based on routine flow of data; the format of these reports is predefined. In addition to regular reports, it may produce exception reports which help managers to analyze and control the cause and effect of the exception and take appropriate action.

On the other hand, decision support system is interactive and provides quick response to user queries. To obtain a sales analysis reports, for example, containing figures related to performance of sales based on the sales region, salesperson etc., a sales manager needs MIS. However, to know the effect of changes in different factors like expenses on promotion of a product, and compensation to salesperson on the performance of sales, sales managers can interactively use decision support systems.

4. Management information system produces information by extracting and manipulating business data, whereas Decision support system produces information by performing analytical modeling of the business data.

### (iv)Executive Information System 1980s

• An **executive information system** (**EIS**), also known as an **executive support system** (**ESS**), is a type of management information system that facilitates and supports senior executive information and decision-making needs. It provides easy access to internal and external information relevant to organizational goals. It is commonly considered a specialized form of decision support system (DSS).

• EIS emphasizes 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.

- Moreover, breakthroughs occurred in the development and application of artificial intelligence (AI) techniques to business information systems. With less need for human intervention, knowledge workers could be freed up to handle more complex tasks. Expert systems (ES) and other knowledge management systems (KMS) also forged a new role for information systems. ES can serve as consultants to users by providing expert advice in limited subject areas.

Business Processes supported by EIS include:

- Long range and strategic planning
- Executive level and decision making
- Monitoring of internal and external events and resources
- Crisis Management
- Staffing and Labor Relation
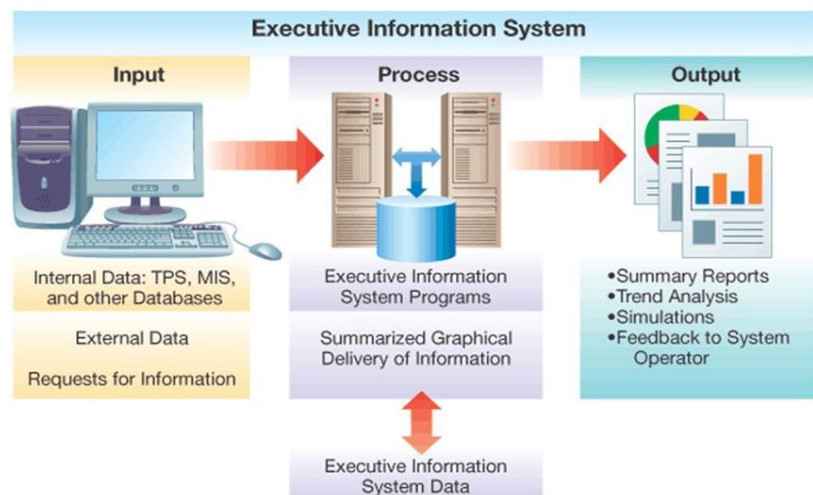
EXPERT SYSTEMS

- It is a type of intelligence system that uses reasoning methods based on methods based on knowledge about a specific problem domain in order to provide advice, much like human experts. Knowledge-based systems that provide expert advice and act as expert consultants to users. Examples: process monitor, and diagnostic maintenance systems.

- A computer application that performs a task that would otherwise be performed by a human expert. For example, there are expert systems that can diagnose human illnesses, make financial forecasts, and schedule routes for delivery vehicles. Some expert systems are designed to take the place of human experts, while others are designed to aid them.

Example: Expert System

Expert system to make a medical recommendation

- When you use an ES the systems asks you a series of questions, much as human experts would. It continues to ask questions, and each new question is determined by your response to the preceding questions .The ES matches the responses with the defined facts and rules until the responses point the system to a solution.

- Examples of ES include NEURAL NETWORKS, DATA MINING AND INTELLIGENCE SYSTEM etc.

(v)Enterprise Resource Planning Mid-1990s

- The mid- to late 1990s saw the revolutionary emergence of (ERP) systems.

- This organization-specific form of a strategic information system integrates all facts of a firm, including its planning, manufacturing, sales, resource management, customer relations, inventory control, order tracking, financial management, human resources and marketing – virtually every business function.

- The primary advantage of these ERP systems lies in their common interface for all computer-based organizational functions and their tight integration and data sharing needed for flexible strategic decision making.

Data warehouse (DW)

- A data warehouse stores data that have been extracted from the various operational, external and other databases of an organization. It is a central source of the data that have been cleaned, transformed and catalogued so they can be used by managers and other business professionals for data mining, online analytical processing and other forms of business analysis, market research and decision support.

Data mining (DM)

- Analyzes the vast amounts of historical that have been prepared for analysis in data warehouses

Online analytical processing (OLAP)

- 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, DW and other multi-dimensional databases to discover patterns, trends and exceptional 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.

Mobile Computing

- Information systems that support employees who are working with customers or business partners outside the physical boundaries of their company; can be done over wire or wireless networks.

CLASSIFICATION OF IS

Information Systems may be broadly classified as **Operations support systems and**

Management Support Systems

1. Operations support systems: process data generated by business operations

Major categories are:

i) Transaction processing Systems (TPS)

ii) Office Automation (OA)

2. Management Support Systems: provide information and support needed for

Effective decision making by managers

Major categories are

i) Management Information System (MIS)

ii) Decision Support Systems (DSS)

iii) Executive Information System (ESS)

Office Automation

- Supports wide range of business office activities that provide the improved workflow and communication between workers, regardless of whether or not these workers are located in same office. Personal IS   designed to meet the needs of single users to boost the individual productivity.

- Office automation refers to the varied computer machinery and software used to digitally create, collect, store, manipulate, and relay office information needed for accomplishing basic tasks.

Examples of the types of business processes supported by OAS include the following:

- Communication and Scheduling
- Document Preparation
- Analysis and Merging of Data
- Consolidation of Information
- Common Examples of OAS include
- Video-conferencing , GroupWare

Knowledge Management System

- Exist to help business create and share information. It is used in a business where employees create how knowledge and expertise which can be shared by other people in organization to create opportunities.

1.2   IS IN FUNCTIONAL AREA

- Supports a functional area by increasing its internal effectiveness and efficiency. Typically found for:

- Finance (FIN): provide internal and external professional access to stock, investment and capital spending information.

- Accounting (ACC): similar to financial MIS, more related to invoicing, payroll, receivables.

- Marketing (MKT): pricing, distribution, promotional, and information by customer and salesperson.
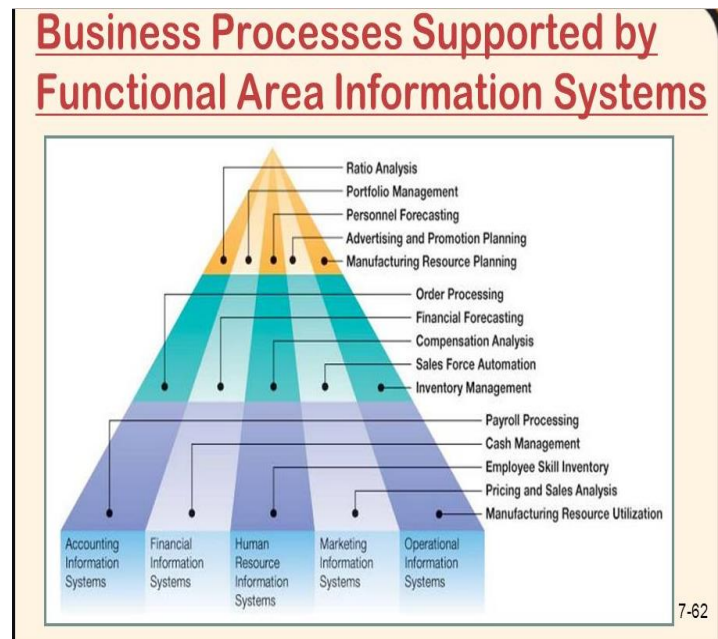
- Operations (OPS): regular reports on production, yield, quality, inventory levels. These systems typically deal with manufacturing, sourcing, and supply chain management.

- Human Resources Management (HR): employees, benefits, hiring, etc.

- Geographic Information System(GIS): It is a system for creating ,storing ,analyzing and managing geographically referenced information.

1.3 INFORMATION SYSTEM ARCHITECTURE

- Provides a framework into which various people with different perspectives can organize and view fundamental building blocks of information system.
- Need to improve performance.
- Need to improve information.
- Need to improve economics, control cost and profits.
- Need to improve control or security.
- Need to improve efficiency of people and process.
- To improve services to customers, suppliers, partners, employees.
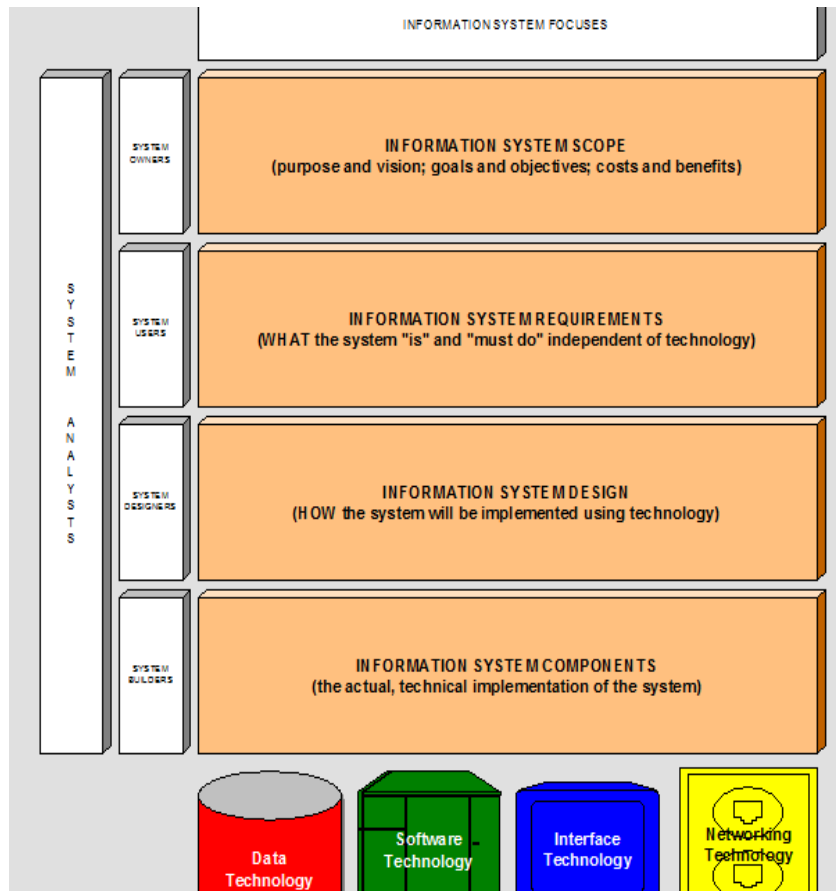
What is an Information Systems Architecture?

- Information systems architecture provides a unifying framework into which various people with different perspectives can organize and view the fundamental building blocks of information systems.

- Stakeholders have different views of the system and each has something "at stake" in determining the success of the system.

- Stakeholders can be broadly classified into four groups:

    - ✓ System Owners
    - ✓ System Users
    - ✓ System Designers
    - ✓ System Builders

Perspectives - The People Side of Information Systems

- ✓ What are Information Workers?
  - o The term information worker (also called knowledge worker) was coined to describe those people whose jobs involve the creation, collection, processing, distribution, and use of information.
- ✓ System Owners
  - o System owners are an information system's sponsors and chief advocates. They are usually responsible for budgeting the money and time to develop, operate, and maintain the information system. They are also ultimately responsible for the system's justification and acceptance.

- ✓ System Users

  - o **System users** are the people who use (and directly benefit from) the information system on a regular basis – capturing, validating, entering, responding to, storing, and exchanging data and information.
  - o There are many classes of system users including:
    - ▪ Internal Users
      - • Clerical and service workers
      - • Technical and professional staff
        - o Knowledge workers are a subset of information workers whose responsibilities are based on a specialized body of knowledge.
      - • Supervisors, middle managers, and executive managers
  - o There are many classes of system users including:
    - ▪ Remote and Mobile Users
    - ▪ External Users
- ✓ System Designers

  System designers translate users' business requirements and constraints into technical solutions. They design the computer files, databases, inputs, outputs, screens, networks, and programs that will meet the system users' requirements. They also integrate the technical solution back into the day-to-day business environment.
- ✓ System Builders
  - • **System builders** construct the information system components based upon the design specifications from the system designers. In many cases, the system designer and builder for a component are one and the same.
  - • The applications programmer is the classic example of a system builder.

  The Role of the System Analyst
  - • For the system owners and users, the analyst typically constructs and validates their views.
  - • For the system designers and builders, the analyst (at the very least) ensures that the technical views are consistent and compatible with the business views.

- ▪ Meets stakeholder needs
- ▪ Aligns its IT with business purposes

- Integrates all departments
- Promotes security
- Brings about data integrity and consistency and
- Reduces duplication and is cost-effective

1.4 QUALITIES OF INFORMATION SYSTEMS

- Information systems: readability, brows ability, and search ability.

- **Relevance**

    Information should be relevant to the strategic decision that company management is currently reviewing. Because companies may review several business opportunities at one time, avoiding information not relating to the decision is essential.

- **Accurate**

    MIS information should be accurate and avoid any inclusions of estimates or probable costs. Making decisions based on estimates can lead to cost overruns or lower profits from future operations.

- **Timely**

    Many management decisions are based on information from a certain time period, such as quarterly or annual periods. Information outside of the requested time frame may skew information and lead to an improperly informed decision.

- **Exhaustive**

    MIS information gathering should resemble an upside-down triangle. The early stages of information gathering should be exhaustive, including all types of company information. As management narrows its decision-making process, the information is refined to include only the most relevant pieces.

- **Cost-Effective**

    The MIS needs to be a cost-effective and efficient system for gathering information. Most of these systems are developed internally, creating costs that cannot be passed to clients.

- **Exception based**

    Top managers need only exception reports regarding the performance of the organization. Exception reporting principle states that only those items of information, which will be of particular interest to a manager, are reported. This approach results in saving precious time of the top management and enables the managers to devote more time in pursuit of alternatives for the growth of the organization

- **Available:**

Information may be useless if it is not readily accessible sin the desired form, when it is needed. Advances in technology have made information more accessible today than ever before.

- **Reliable:**

    The information should be counted on to be trustworthy. It should be accurate, consistent with facts and verifiable. Inadequate or incorrect information generally leads to decisions of poor quality. For example, sales figures that have not been adjusted for returns and refunds are not reliable.

- **Concise:**

    Too much information is a big burden on management and cannot be processed in time and accurately due to "bounded rationality". Bounded rationality determines the limits of the thinking process which cannot sort out and process large amounts of information. Accordingly, information should be to the point and just enough – no more, no less.

1.5 MANAGING INFORMATION SYSTEM RESOURCES

- The individual data being processed through the use of hardware and software and shared through network connection has allowed us to utilize more information in less time.
- Networks …connected in some manner that allows to sharing of resources
- Hardware and Peripheral Devices …tangible and can be touched
- Software …intangible and can't be touched physically
- Data …one piece of a record
- People …work together to create usable information
- Which IT Resources are Managed and By Whom?
- During the early 1950s, Information Systems Department (ISD) managed ALL of the only computing resource, the mainframe.
- Today, computing resources are located through the organization and almost all employees use computers in their work.
- This system is known as end user computing.
- The Role of the IS Department
- The ISD is responsible for corporate-level and shared resources and for using IT to solve end users' business problems.
- End users are responsible for their own computing resources and departmental resources.
- ISD and end users work together as partners to manage the IT resources.

1.6 BALANCED SCORECARD

- The balanced scorecard is a strategic planning and management system that is used extensively in business and industry, government, and nonprofit organizations worldwide to align business activities to the vision and strategy of the organization, improve internal and external communications, and monitor organization performance against strategic goals.

- When you can't measure, you can't manage.

- Scorecard is about making your performance measureable.

- You need to consider all perspectives of measurements. So that you get a complete analysis. So you need it to be Balance Scorecard (BSC).

It is known as strategy map for

A) Mercantile
   Better Product

   Research for current needs
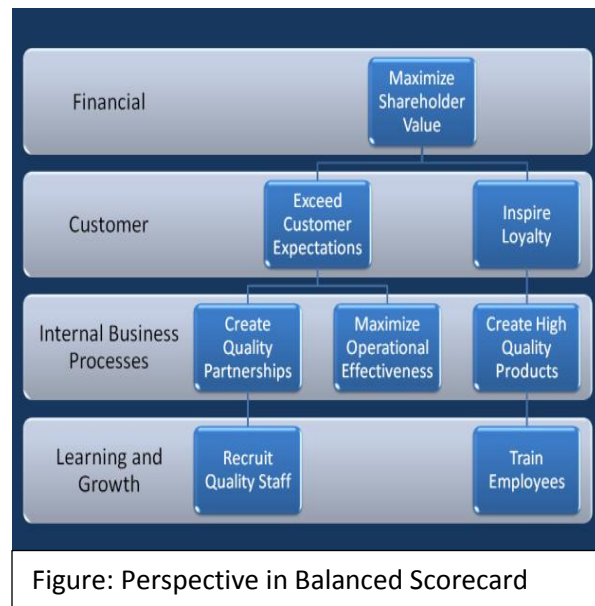   Customer Satisfaction
   Profit
B) Community Health
   Collection of Funds
   Proper Training for staffs
   Proper Mobilization plans
   Better Public Health.

Figure: Perspective in Balanced Scorecard

PERSPECTIVES IN BALANCED SCORECARD

A **shareholder** owns part of a company through stock ownership, while a **stakeholder** is interested in the performance of a company for reasons other than just stock appreciation. What value we need to provide to customer in order to achieve financial goal .Visual Representation of Scorecard is Dash board
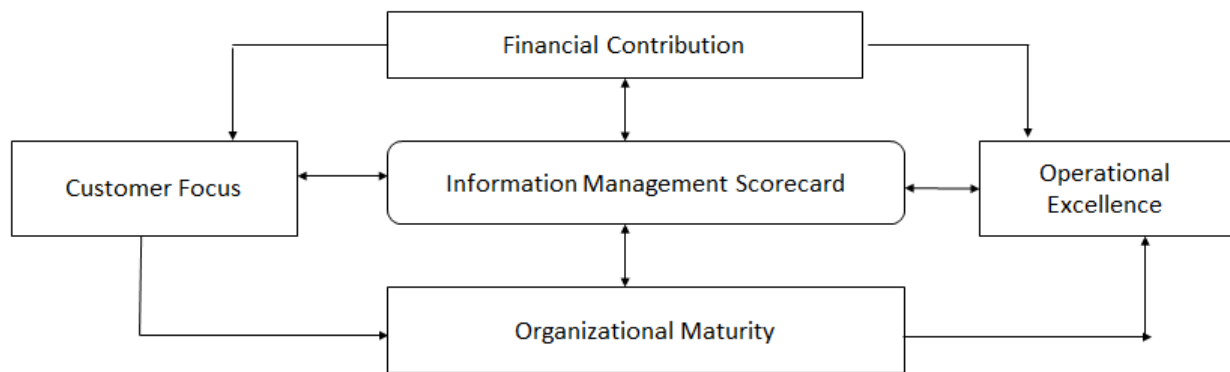
Implementing BSC in IT Environment

Implementing Information Management Scorecard

STRATEGIC INITATIVES