

## Data

### Data

- ◆ Data are values of qualitative or quantitative variables, belonging to a set of items.
- ◆ Represents something in the real world. Raw material for data processing. Relates to fact, event and transactions.
- ◆ Data in computing (or data processing) are represented in a structure, often tabular (represented by rows and columns), a tree (a set of nodes with parent-children relationship) or a graph structure (a set of interconnected nodes).
- ◆ Data are typically the results of measurements and can be visualised using graphs A “given” or “fact”; a number, a statement, or a picture.

## Data

### Data

#### **Big Data**

- Big data is a term for data sets that are so large or complex that traditional data processing application software is inadequate to deal with them.
- Challenges include capture, storage, analysis, data curation, search, sharing, transfer, visualization, querying, updating and information privacy.

## Information

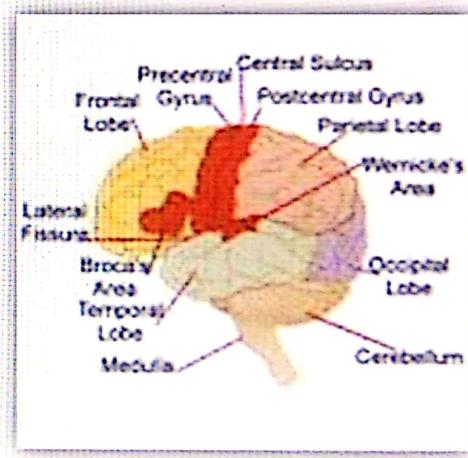
### Information

- ◆ Knowledge communicated or received concerning a particular fact or circumstance
- ◆ Information means processed data (processed in such a way as to be meaningful to the person who receives it).
- ◆ Meaning within a context.
- ◆ Have some relationships.

# System

## System

- ◆ A system is a group of interrelated components working together toward a common goal by accepting inputs and producing outputs in an organized transformation process.
- ◆ A system (sometimes called a dynamic system) has three basic interacting components or functions and that is INPUT, PROCESSING and OUTPUT.



## System

### Input :

- ◆ Involves capturing and assembling elements that enter the system to be processed.

### Processing :

- ◆ Involves transformation processes that convert input into output.

### Output :

- ◆ Involves transferring elements that have been produced by a transformation process to their ultimate destination.

## System

- ◆ Two additional components of the system concept include FEEDBACK and CONTROL.
- ◆ *Feedback* (is data about the performance of a system).
- ◆ *Control* (involves monitoring and evaluating feedback to determine whether a system is moving toward the achievement of its goals. The control function then makes necessary adjustments to a system's input and processing components to ensure that it produces proper output).

## Human vs. Computers



### **Humans**

Think ✓

Have common sense

Can make decisions

Can instruct the computer what to do

Can learn new methods and techniques

Can accumulate expertise



### **Computers**

Calculate and perform programmed logical operations extremely rapidly

Store and retrieve data and information extremely rapidly

Perform complex logical and arithmetical functions accurately

Execute long, tedious operations

Perform routine tasks less expensively than humans

Are adaptable (can be programmed and reprogrammed)

## Information System

- ◆ An Information System (IS) is any combination of information technology and people's activities using that technology to support operations, management, and decision-making.
- ◆ In a very broad sense, the term information system is frequently used to refer to the interaction between people, algorithmic processes, data and technology.
- ◆ In this sense, the term is used to refer not only to the **Information and Communication Technology (ICT)** an organization uses, but also to the way in which people interact with this technology in support of business processes.

## Information System

- ◆ Information Systems (IS) is a professional and academic discipline concerned with the strategic, managerial and operational activities involved in the gathering, processing, storing, distributing and use of information, and its associated technologies, in society and organizations.
- ◆ An **Information System (IS)** can be any organized combination of **people, hardware, software, communications networks, and data resources** that collects, transforms, and disseminates information in an organization.

## Information System

- ◆ **Information System**, an integrated set of components for collecting, storing, and processing data and for providing information, knowledge, and digital products.

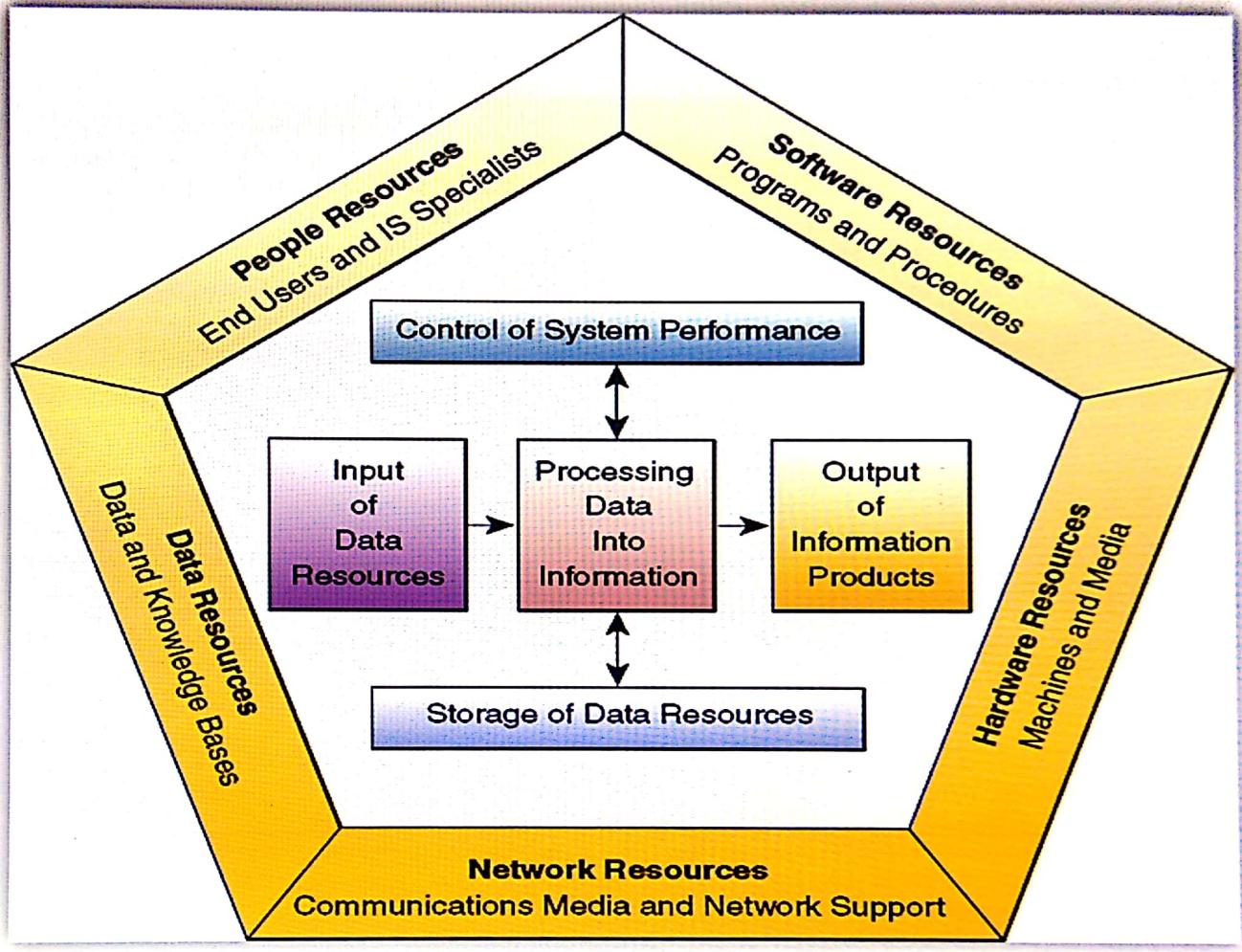
## Information Technology (IT)

- ◆ The study or use of systems (especially computers and telecommunications) for storing, retrieving, and sending information.
- ◆ It is the application of computers to store, retrieve, transmit and manipulate data, often in the context of a business or other enterprise.
- ◆ IT is considered a subset of Information and Communications Technology (ICT).

## **Computer Based IS (CBIS)**

- ◆ Computer-Based Information Systems (CBIS) uses hardware, software, the Internet, and other telecommunications networks, computer-based data resource management techniques, and other forms of Information Technologies (IT) to transform data resources into a variety of information products for consumers and business professionals.

## Components of an Information Systems



## Components of an Information Systems

### ◆ [1] *People Resources*

People are required for operation of all ISs.

People resources include:

**End Users (users or clients)** : These people use the IS or the information it produces. They can be accountants, salespersons, engineers, clerks, customers or managers. Most of us are information system end users. And most end users in business are knowledge workers, that is people who spend most of their time communicating and collaborating in teams and workgroups and creating, using and distributing information.

**IS Specialists** : These people develop and operate information systems. They include systems analysts, software developers, system operators and other managerial, technical and clerical IS personnel.

## Knowledge Worker

- ◆ **Knowledge Worker**

Knowledge workers in today's workforce are individuals who are valued for their ability to act and communicate with knowledge within a specific subject area.

They will often advance the overall understanding of that subject through focused analysis, design and/or development. They use research skills to define problems and to identify alternatives. Fueled by their expertise and insight, they work to solve those problems, in an effort to influence company decisions, priorities and strategies.

## Knowledge Worker

Knowledge workers bring benefits to organizations in a variety of important ways.

These include:

- \* *analyzing data to establish relationships*
- \* *assessing input in order to evaluate complex or conflicting priorities*
- \* *identifying and understanding trends*
- \* *understanding cause and effect*
- \* *ability to brainstorm, thinking broadly*
- \* *ability to drill down, creating more focus*
- \* *producing a new capability*
- \* *creating or modifying a strategy*

## Components of an Information Systems

### ◆ [2] **Hardware Resources**

These include all the physical devices and materials used in information processing, including all machines (computers, video monitors, magnetic disk drives, printers, optical scanners, etc.) and data media (*i.e. tangible objects on which data are recorded, from sheets of paper to magnetic or optical disks*).

Key components include:

**Computer Systems** : These are the CPUs and their related peripherals, such as terminals and networked PCs.

**Computer Peripherals** : These are input and output devices like keyboards, monitors, and secondary storage.

## Components of an Information Systems

### ◆ [3] *Software Resources*

These include all sets of information processing instructions.

Software resources include:

**System Software** : This controls the computer.

**Application Software** : These are for a specific end user task, such as word-processing.

**Procedures** : These are the operating instructions for the people who use the IS.

## Components of an Information Systems

### ◆ [4] Data Resources

Data is both the raw material of and among the most valuable organizational resources in the IS.

Data can be in alphanumeric, text, image and/or audio form.

Data are typically organized into either -

*Databases* - which hold processed and organized data or

*Knowledge bases* - which hold knowledge in a variety of forms such as facts and rules of inference about a given subject.

## Components of an Information Systems

### ◆ [5] *Network Resources*

Telecommunications networks like the Internet, intranets, and extranets have become essential to the successful electronic business and commerce operations of all types of organizations and their computer-based information systems.

Telecommunications networks consist of computers, communications processors, and other devices interconnected by communications media and controlled by communications software.

## Components of an Information Systems

### ◆ [5] *Network Resources*

The concept of network resources emphasizes that communications networks are a fundamental resource component of all information systems. Network resources include:

Communications media (twisted-pair wire, coaxial cable, fiber-optic cable, and microwave, cellular, and satellite wireless systems).

Network support (people, hardware, software, and data resources that directly support the operation and use of a communications network).

# Importance of Information Systems

- Businesses can constantly improve their efficiency of their operations in order to achieve higher profitability.
- They can do this by constantly having the correct amount of stock in store so consumers can always get what they want.

## Operational excellence

- ISs play a major role for businesses in creating new products and services.
- New business models can be created and these can describe how a company produce, create and sell there products.

## New products, services, and business models

- The better services a company provides its consumers with more likely they are too come back to them and as result the more they will buy off the supplier therefore creating a good relationship with both parties.

## Customer and supplier intimacy

# Importance of Information Systems

- ISs make it possible for managers to use real time data when making a decision to therefore make better decisions and not have to waste time looking for information.

- If companies achieve any of these 6 reasons to use IS they will generally create a competitive advantage over their rivals.

## Improved decision making

- Business invest in these systems to make their jobs as easy as possibly.
- An example is Citibank introduced the first ATM machine to make it easier for customers to access their money and to cut down queues in their banks.

## Competitive advantage

## Survival

## Information Quality (IQ)

- ◆ Information quality (IQ) is a term to describe the quality of the content of information systems.
- ◆ It is often defined as: "*The fitness for use of the information provided.*"
- ◆ Quality - The degree to which information has content, form, and time characteristics that gives it value to specific end users.
- ◆ Information that is outdated, inaccurate, or hard to understand would not be very meaningful, useful, or valuable to you or other end users.

## Information Quality (IQ)

- ◆ People want information of high quality, that is, information products whose characteristics, attributes, or qualities help make it valuable to them.
- ◆ Three dimensions of information are time, content, and form.

# Information Quality (IQ)

## TIME

- Timeliness
- Currency
- Frequency
- Time Period

## CONTENT

- Accuracy
- Relevance
- Completeness
- Conciseness
- Scope
- Performance

## FORM

- Clarity
- Detail
- Order
- Presentation
- Media

## 3-Dimensions of IQ

### ◆ [1] Time Dimension

*Timeliness* : Information should be provided when it is needed.

*Currency* : Information should be up-to-date when it is provided.

*Frequency* : Information should be provided as often as needed.

*Time Period* : Information can be provided about past, present, and future time periods.

## 3-Dimensions of IQ

### ◆ [2] Content Dimension

*Accuracy* : Information should be free from errors.

*Relevance* : Information should be related to the information needs of a specific the recipient.

*Completeness* : All the information that is needed should be provided.

*Conciseness* : Only the information that is needed should be provided.

*Scope* : Information can have a broad or narrow scope, or an internal or external focus.

*Performance* : Information can reveal performance by measuring activities accomplished, progress made, or resources accumulated.

## 3-Dimensions of IQ

### ◆ [3] Form Dimension

*Clarity* : Information should be provided in a form that is easy to understand.

*Detail* : Information can be provided in detail or summary form.

*Order* : Information can be arranged in a predetermined sequence.

*Presentation* : Information can be presented in narrative, numeric, graphic, or other forms.

*Media* : Information can be provided in the form of printed paper documents, video displays, or other media.

## Recognizing Information Systems (IS)

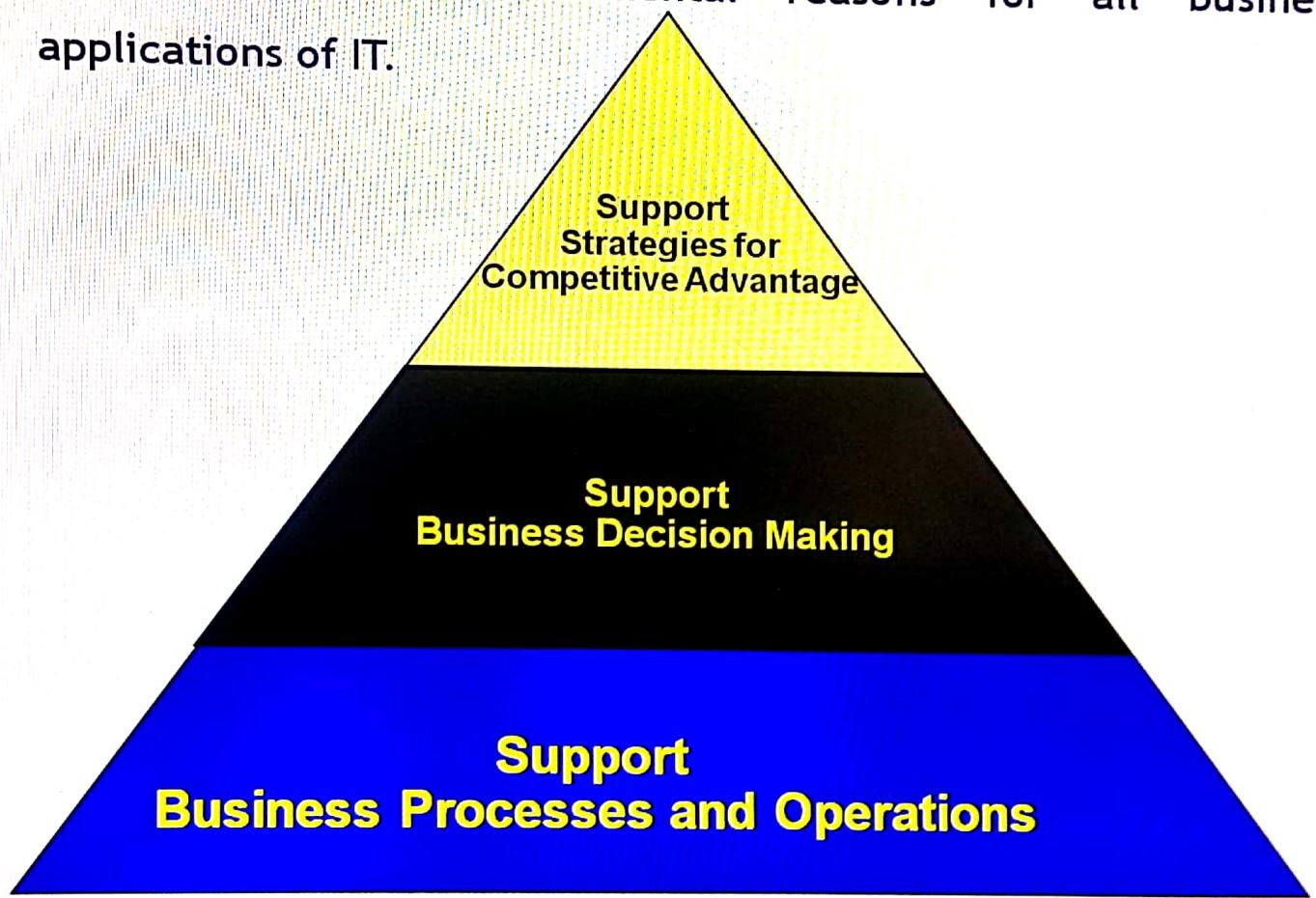
- ◆ As a business professional, you should be able to recognize the fundamental components of IS you encounter in the real world.
- ◆ This means that you should be able to identify :
  - The people, hardware, software, data and network resources they use.
  - The types of information products they produce.
  - The way they perform input, processing, output, storage and control activities.

## Fundamental roles of IS

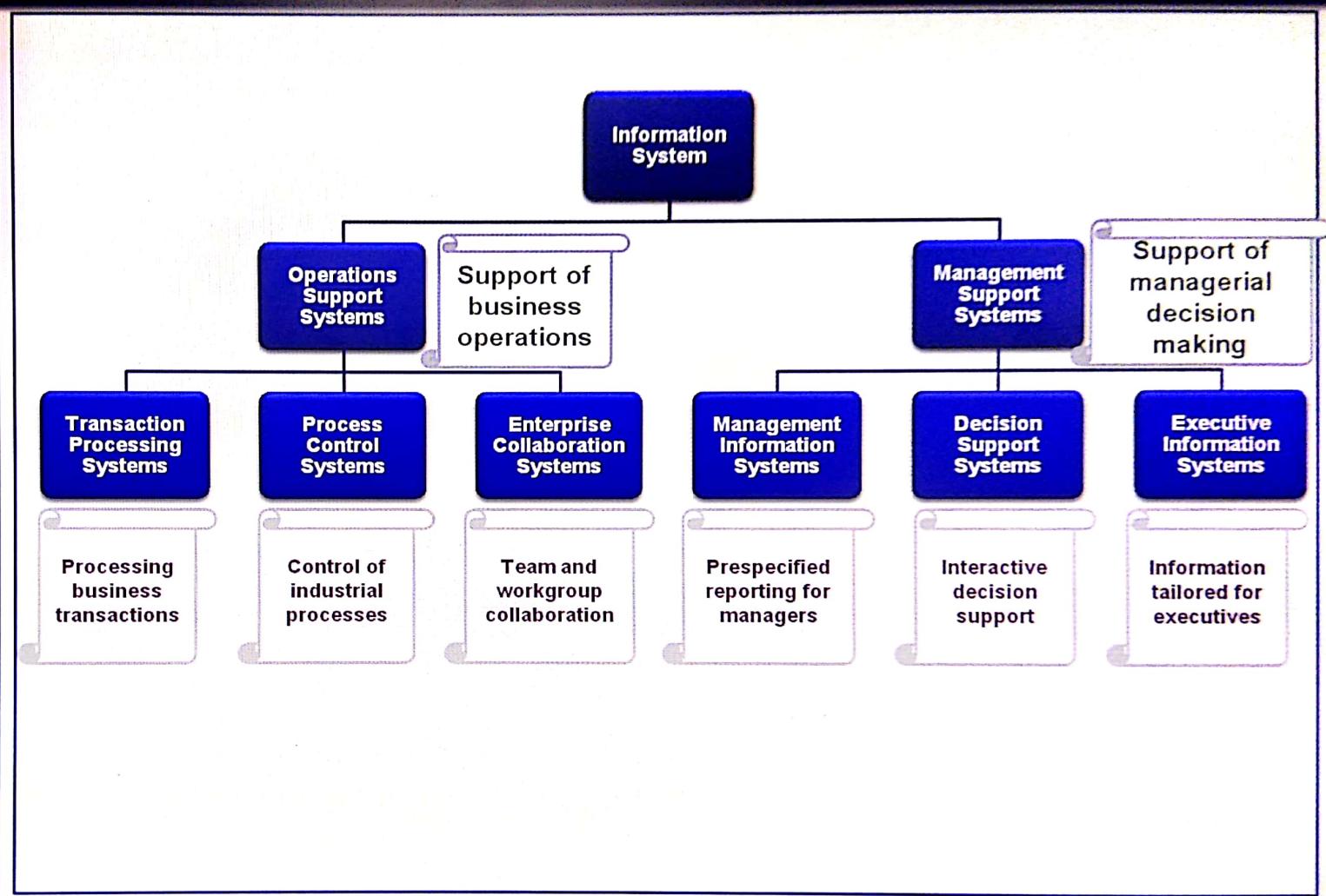
- ◆ There are three fundamental reasons for all business applications of IT.

## Fundamental roles of IS

- ◆ There are three fundamental reasons for all business applications of IT.



## Types of ISs



## Types of Operations Support Systems

### Transaction Processing Systems (TPS)

- Process data resulting from business transactions, update operational databases and produce business documents.
- *Examples* : sales and inventory processing and accounting systems

### Process Control Systems (PCS)

- Monitor and control industrial processes.
- *Examples* : petroleum refining, power generation and steel production system

### Enterprise Collaboration Systems (ECS)

- Support team, workgroup and enterprise communications and collaboration
- *Example* : E-mail, chat and videoconferencing groupware systems

## Types of Management Information Systems

### Management Information Systems (MIS)

- Provide information in the form of prespecified reports and displays to support business decision making.
- Example : sales analysis , production performance and cost trend reporting systems

### Decision Support System (DSS)

- Provide interactive ad hoc support for the decision making processes of managers and other business professionals.
- Example : product pricing, profitability forecasting and risk analysis systems

### Executive Information Systems (EIS)

- Provide critical Information from many sources tailored to the information needs of executives.
- Example : actions of competitors, economic developments to support strategic planning.

## Other Categories of ISs

- ◆ *Expert Systems* : Knowledge-based systems that provide expert advice and act as expert consultants to users.
- ◆ *Knowledge management systems* : are knowledge-based systems that supports the creation, organization and dissemination of business knowledge within the enterprise.
- ◆ *Strategic IS* : support operations of management processes that provide a firm with strategic product services and capabilities for competitive advantage.
- ◆ *Functional Based Systems* : support a variety of operational and managerial applications of the basic business functions of company.

## TPS, MIS, DSS and ESS

<b>Types of System</b>	<b>Information Inputs</b>	<b>Processing</b>	<b>Information Outputs</b>	<b>Users</b>
TPS	Transactions, Events	Sorting, listing, merging, updating	Detailed reports, lists, summaries	Operational personnel, Supervisors
MIS	Summary transaction data, high-volume data, simple models	Routine reports, Simple models, low-level analysis	Summary and exception reports	Middle managers
DSS	Low-volume data or massive databases optimized for data analysis, analytic models and data analysis tools	Interactive, simulations, analysis	Special reports, decision analyses, responses to queries	Professional, Staff managers
ESS	Aggregate data, external, internal	Graphics, Simulations, Interactive	Projections, responses to queries	Senior managers, Executives

## **Internet, Intranet and Extranet**

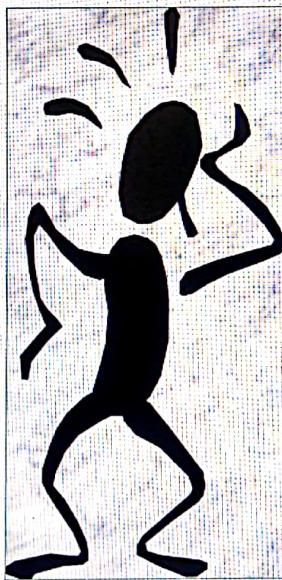
- ◆ **INTERNET:** a network of networks
- ◆ **INTRANET:** An Internet-like network within an organization.
- ◆ **EXTRANET:** A network that links selected resources of a company with its customers, suppliers and other business partners, using the Internet or private networks to link the organizations' intranets.

## Fundamentals of Strategic Advantage

- ◆ Technology is no longer an afterthought in forming business strategy, but the actual cause and driver.
- ◆ The strategic role of information systems involve using information technology to develop products, services and capabilities that give a company major advantage over the competitive forces it faces in the global marketplace.
- ◆ This creates strategic information systems, (information systems that support or shape the competitive position and strategies of an E-business enterprise).
- ◆ So a strategic information system can be any kind of information system that helps an organization to gain a competitive advantage, reduce a competitive disadvantage, or meet other strategic enterprise objectives.

## Fundamentals of Strategic Advantage

- ◆ A firm can survive in the long run if it successfully develops strategies to confront five generic competitive forces that shape the structure of competition in its industry.
- ◆ These are :



Bargaining power of Customers

Bargaining power of Suppliers

Rivalry of Competitors

Threat of New Entrants

Threat of Substitutes

## Fundamentals of Strategic Advantage

- ◆ Business can encounter the threats of competitive forces that they face by implementing five basic competitive strategies.



**Cost Leadership Strategies**

**Differentiation Strategies**

**Innovation Strategies**

**Growth Strategies**

**Alliance Strategies**

## Fundamentals of Strategic Advantage

- ◆ **COST STRATEGIES** : Becoming a low-cost producer in the industry allows the company to lower prices to customers. Competitors with higher costs cannot afford to compete with the low-cost leader on price.
- ◆ **DIFFERENTIATION STRATEGIES** : Some companies create competitive advantage by distinguishing their products on one or more features important to their customers. Unique features or benefits may justify price differences and/or stimulate demand.
- ◆ **INNOVATION STRATEGIES** : Unique products or services or changes in business processes can cause fundamental changes in the way an industry does business.

## Fundamentals of Strategic Advantage

- ◆ **GROWTH STRATEGIES** : Significantly expanding production capacity, entering new global markets, diversifying into new areas, or integrating related products or services can all be a springboard to strong company growth.
- ◆ **ALLIANCE STRATEGIES** : Establishing new business linkages and alliances with customers, suppliers, former competitors, consultants, and others can create competitive advantage

## Information Technology (IT) in India

- ◆ Information Technology in India is an industry consisting of two major components : [a] IT services and [b] Business Process Outsourcing (BPO).
- ◆ India's prime minister has started 'Digital India' project to give IT a secured position inside & outside India.
- ◆ The Digital India programme is a flagship programme of the Government of India with a vision to transform India into a digitally empowered society and knowledge economy.

## Digital India

- ◆ The journey of e-Governance initiatives in India took a broader dimension in mid 90s for wider sectoral applications with emphasis on citizen-centric services. Later on, many States/UTs started various e-Governance projects.
- ◆ Though these e-Governance projects were citizen-centric, they could make lesser than the desired impact. Government of India launched **National e-Governance Plan (NeGP)** in 2006.
- ◆ 31 Mission Mode Projects covering various domains were initiated. Despite the successful implementation of many e-Governance projects across the country, e-Governance as a whole has not been able to make the desired impact and fulfill all its objectives.

## Digital India

- ◆ It has been felt that a lot more thrust is required to ensure e-Governance in the country promote inclusive growth that covers electronic services, products, devices and job opportunities.
- ◆ Moreover, electronic manufacturing in the country needs to be strengthened.
- ◆ In order to transform the entire ecosystem of public services through the use of information technology, the Government of India has launched the Digital India programme with the vision to transform India into a digitally empowered society and knowledge economy.

- ◆ The vision of Digital India programme is *to transform India into a digitally empowered society and knowledge economy.*

### Vision Areas of Digital India

- ◆ The Digital India programme is centred on three key vision areas:
  - [1] Digital Infrastructure as a Core Utility to Every Citizen
  - [2] Governance and Services on Demand
  - [3] Digital Empowerment of Citizens

## [1] Digital Infrastructure as a Core Utility to Every Citizen

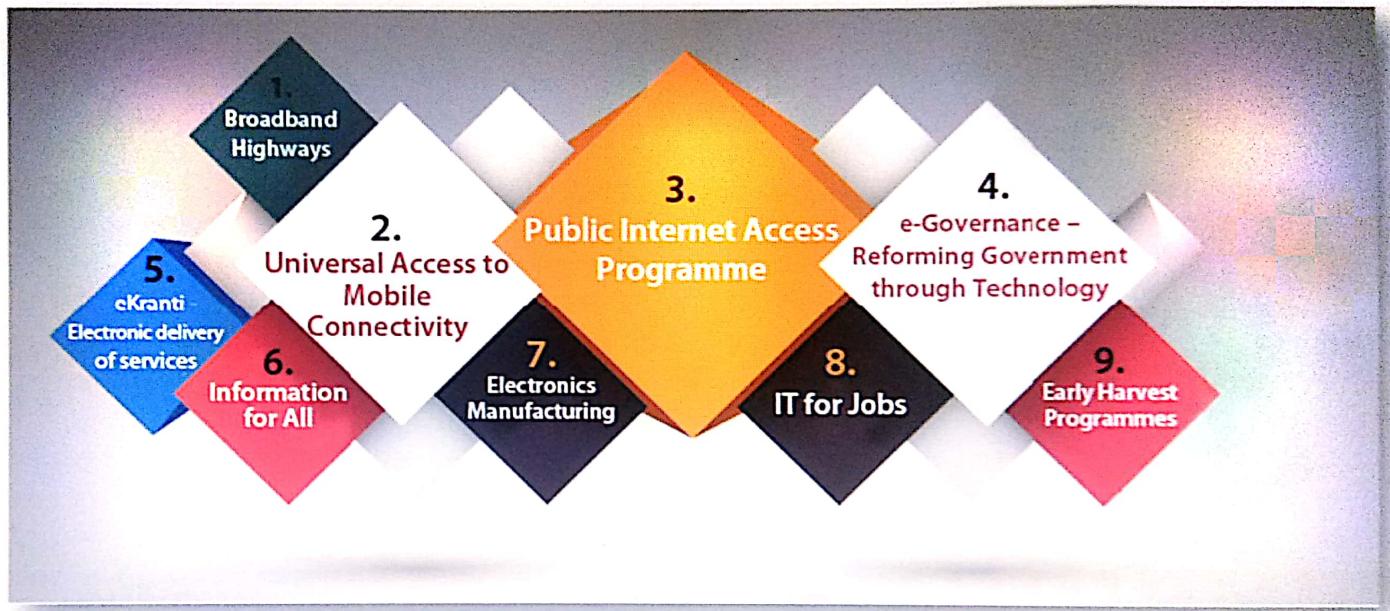
- ◆ Availability of high speed internet as a core utility for delivery of services to citizens.
- ◆ Cradle to grave digital identity that is unique, lifelong, online and authenticable to every citizen.
- ◆ Mobile phone & bank account enabling citizen participation in digital & financial space.
- ◆ Easy access to a Common Service Centre.
- ◆ Shareable private space on a public cloud.
- ◆ Safe and secure cyber-space.

## [2] Governance and Services on Demand

- ◆ Seamlessly integrated services across departments or jurisdictions.
- ◆ Availability of services in real time from online & mobile platforms.
- ◆ All citizen entitlements to be portable and available on the cloud.
- ◆ Digitally transformed services for improving ease of doing business.
- ◆ Making financial transactions electronic & cashless.
- ◆ Leveraging Geospatial Information Systems (GIS) for decision support systems & development.

### **[3] Digital Empowerment of Citizens**

- ◆ Universal digital literacy.
- ◆ Universally accessible digital resources.
- ◆ Availability of digital resources / services in Indian languages.
- ◆ Collaborative digital platforms for participative governance.
- ◆ Citizens not required to physically submit Govt. documents / certificates.



Source : <http://www.digitalindia.gov.in/content/programme-pillars>