Unit 2: Foundation concepts: The components of IS LH 7

- System concepts: A foundation: System, Feedback and Control.
- System characteristics.
- Components of IS.
- Information system resources.
- People, hardware, software, data, Network.
- Information System Activities.
- Input, Process, Storage of data, Output of Information Products, Control.
- Recognizing Information systems.

What is a System?

- A system is…
  - A set of interrelated components, With a clearly defined boundary Working together To achieve a common set of objectives. By accepting inputs and producing outputs In an organized transformation process.

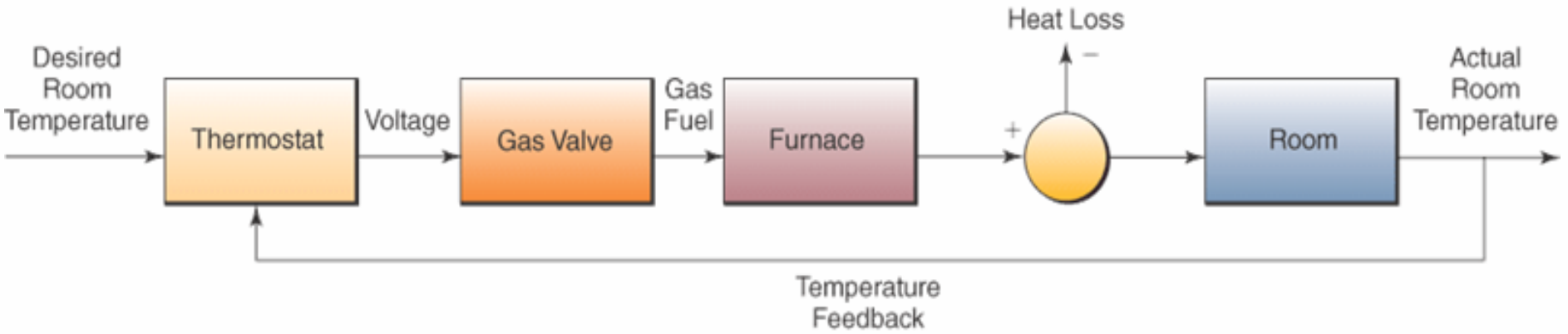
- Input
  - Capturing and assembling elements that enter the system to be processed

- Processing
  - Transformation process that converts input into output

- Output
  - Transferring transformed elements to their ultimate destination

Cybernetic System

- All systems have *input*, *processing*, and *output*
- A **cybernetic system**, a self-monitoring, self-regulating system, adds feedback and control:
  - **Feedback** is data about the performance of a system and is used to enhance quality of the ouput by making appropriate adjustment input and processing step.
  - **Control** involves monitoring and evaluating feedback to determine whether a system is moving toward the achievement of its goal.



Activities of System

- Input, Process and Output
- Environment
  - Internal
  - External
- Boundary
- Interface
- Feedback and Control.

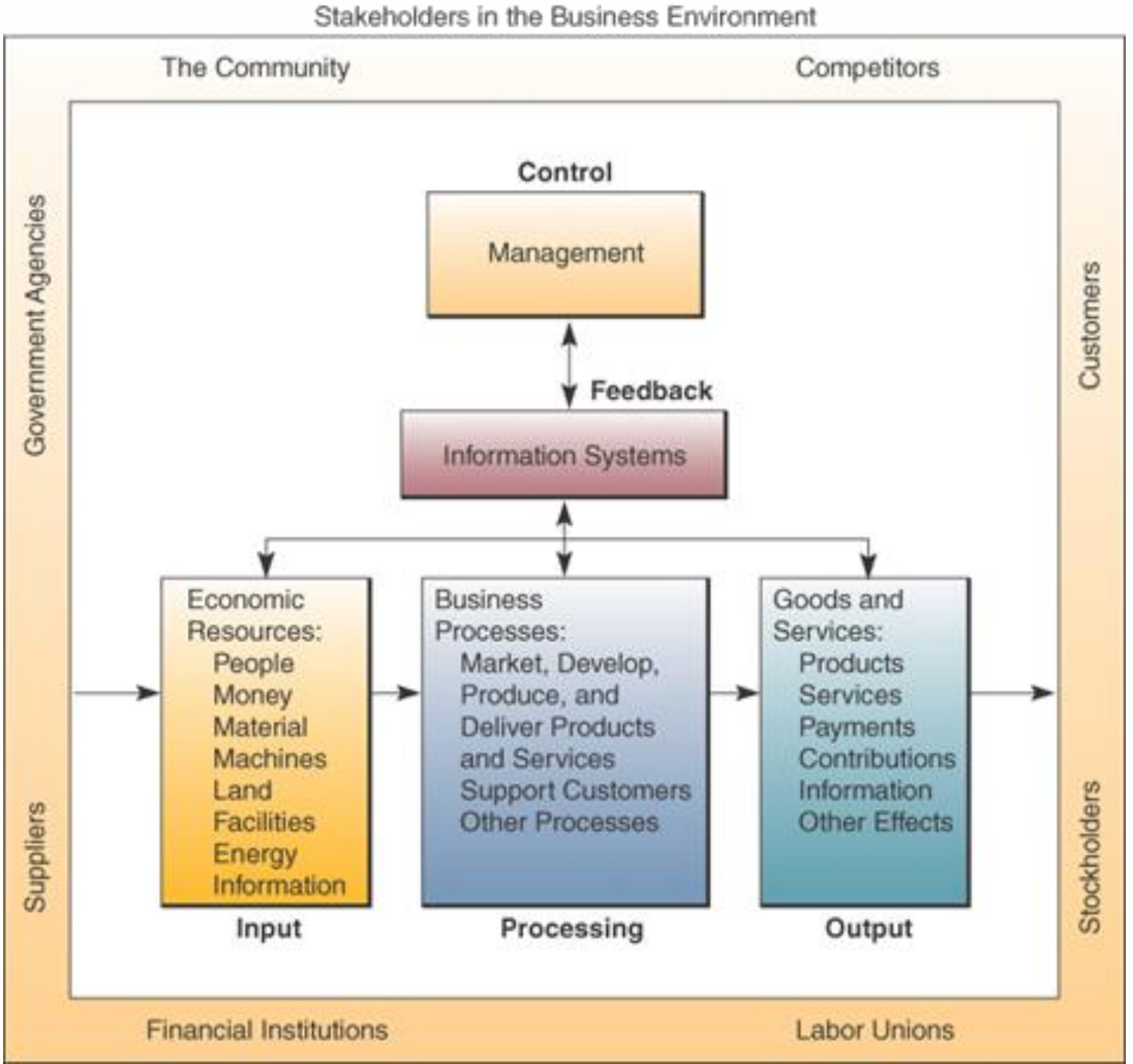
Characteristics of System

1. Common Goal
2. Integration
3. Interaction
4. Interdependence
5. Organization

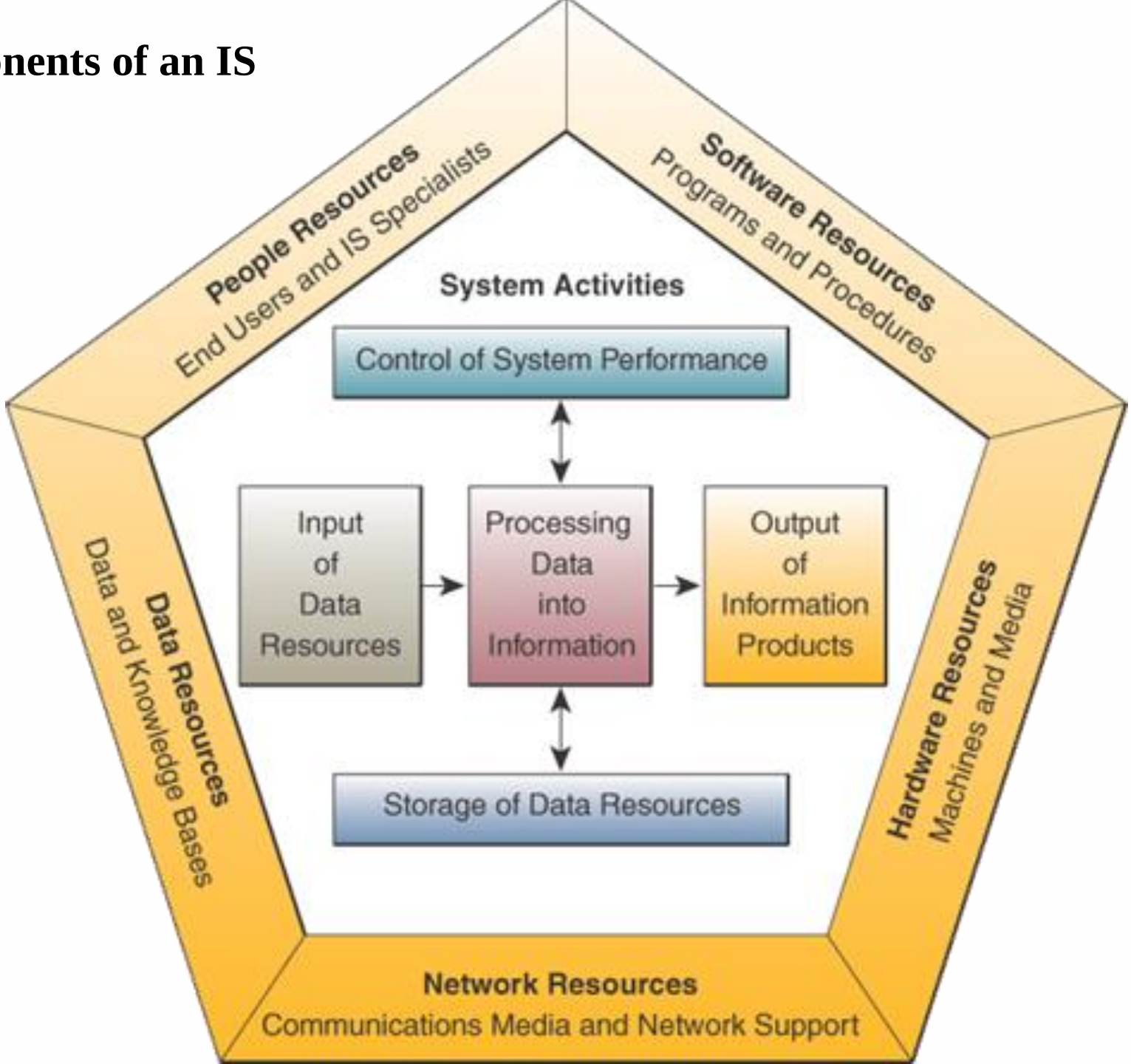
System Types

- Open and Closed System
- Physical and Abstract System
- Probabilistic and Deterministic system
- Natural and Man Made System

Business as System



Components of an IS



- Figure above 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 different resources to perform input, processing, output, storage, and control activities that transform data resources into information products.

- This information system model highlights the relationships among the components and activities of information systems.

It also provides a framework that emphasizes five major concepts that can be applied to all types of information systems:

- People, hardware, software, data, and networks are the five basic resources of information systems.

- People resources include end users and IS specialists, hardware resources consist of machines and media, software resources include both programs and procedures, data resources include data and knowledge bases, and network resources include communications media and networks.

- Data resources are transformed by information processing activities into a variety of information products for end users.

- Information processing consists of the system activities of input, processing, output, storage, and control.

Information System Resources

An information system depends on the resources of people, hardware, software, data and networks to perform input, processing, output, storage and control activities that convert data resources into information.

IS consists of 5 major resources:

- People
- Hardware
- Software
- Data resources
- Network resources

- **People resources:** People are the essential ingredient for the successful operation of all information systems. This people resource includes:

  - **End users** are also called users or clients are people who use an information system or the information it produces. They can be customers, salespersons, engineers etc... Most of us are IS end users.

  - **IS SPECIALISTS** are people who develop and operate information system. They include system analysis, software developers, system operators and other managerial, technical and clerical IS personnel.

Hardware resources:

- It includes all physical devices and materials used in information processing. Examples of hardware in computer based information system are:

  - **Computer system** which consists of central processing units containing microprocessors and a variety of interconnected peripheral devices. Example: handheld, laptop, midrange computer systems and large mainframe computer systems.

  - **Computer peripherals** which are devices such as a keyboard or electronic mouse for input of data and commands a video screen or printer for output of information and magnetic or optical disks for storage of data resources.

Software resources: It includes all set of information processing instructions It Comprises of:

Programs

- Provide instructions for operation, which direct and control computer hardware)

- Eg. operating system programs, spreadsheet programs, word processing programs, payroll programs, etc.

Procedures

- Provide sets of information processing instructions

- Eg. data entry procedures, error correction procedures, paycheck distribution procedures, etc.

System software: Controls and supports the operations of a computer system. Eg. OS

Application software : Directs processing for a particular use of computers by end users

- It can be generic (off-the-shelf) or custom build software.
- Generic software is mass produced with the intention that it will be used by a wide variety of different users in a range of different situations. Bespoke (Custom-Built) software is created for a specific purpose which will be used in a known environment.

Eg. a payroll program, a word processing program, a sales analysis program

Data resources:

- It Includes product descriptions, customer records, employee files, inventory databases.

- Data can be stored in many forms, including traditional alphanumeric data with numbers, alphabetical and other characters, text data, image data such as graphic shapes & figures, photographic & video images, audio data, etc.

- The data resources of IS are typically organized, stored, and accessed by a variety of data resource management technologies as;

  Databases – hold processed & organized data

- **Process:** set of logically related tasks performed to achieve a defined outcome, or simply turning data into information

- **Knowledge:** Process of defining relationships among data to create useful information requires knowledge. In other words knowledge is the awareness and understanding of a set of information and the ways that information can be made useful to support a specific task or reach a decision

- For example, we want to calculate the salaries of the employees, which depend on the number of hours worked in a week .

- Data would be the Employee No. and No. of hours worked by that employee.

- Rule would be to calculate salary at the rate of 100 Rs. per hour.

- Information would be the total no. of hours and then that total multiplied by 100.

- Knowledge would be to apply that formula/rule on the total number of hours to create useful information.

Data Versus Information

Data are raw facts about physical phenomena or business transactions

- Set of values of qualitative or quantitative variables
- It is a “given,” or fact; a number, a statement, or a picture
- It represents something in the real world
- It is the raw materials in the production of information
- Eg-Each student's test score is one piece of data.

Information is data that has been converted into meaningful and useful context for end users

- When data is processed, organized, structured or presented in a given context so as to make it useful, it is called information.
- It is data that have meaning within a context
- It shows data in relationships
- It describes data after manipulation
- Eg-The average score of a class or of the entire school is information that can be derived from the given data.

Network resources:

Telecommunications technologies and networks like the internet, intranets and extranets. The concept of network resources emphasizes that communications technologies and networks are a fundamentals resource component of all information systems.

Network resources include:

- **Communications media** is includes twisted pairs wire, coaxial and fiber optic cables and microwave, cellular and satellite wireless technologies.

- **Network infrastructure** this generic category emphasizes that many hardware, software and data technologies are needed to support the operation and use of a communication networks.

IS Activities

- **Input** of data resources
  - Data entry activities
- **Processing** of data into information
  - Calculations, comparisons, sorting, and so on
- **Output** of information products
  - Messages, reports, forms, graphic images
- **Storage** of data resources
  - Data elements and databases
- **Control** of system performance
  - Monitoring and evaluating feedback

Recognizing Information System

- As a business professional, we should be able to recognize the fundamental components of information systems we encounter in the real world.
- This demand means that we 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.
- This kind of understanding will help one be a better user, developer, and manager of information systems. This is important to our future success as a manager, entrepreneur, business professional, or modern business technologist.

Following are

- Not included in syllabus but important for the exam point of view.

Information **To be valuable to managers and decision makers, information should have the following characteristics:**

Accessible	Information should be easily accessible by authorized users so that they can obtain it in the right format and at the right time to meet their needs.
Accurate	Error free. Inaccurate information may be generated because inaccurate data is fed into the transformation process (called GIGO).
Complete	Information contains all the important facts. For example an investment report that does not contain all important costs is not complete.
Economical	Information should be economical to produce. Decision makers must always balance the value of information with the cost of producing it.
Flexible	Information that can be used for a variety of purposes.

Relevant	**Relevant information is important to the decision maker, i.e. users can make sense out of it and in accordance with their work.**
Reliable	Information that can be depended upon. In many cases, reliability of information depends on the reliability of data collection method.
Secure	Information should be secure from access by unauthorized users.
Simple	*I*nformation should be simple, not very complex. In fact, too much information can cause information overload.
Timely	Information is delivered when it is needed.
Verifiable	This means you can check it to make sure it is correct, perhaps by checking many sources for the same information.

Information System VS Information Technology

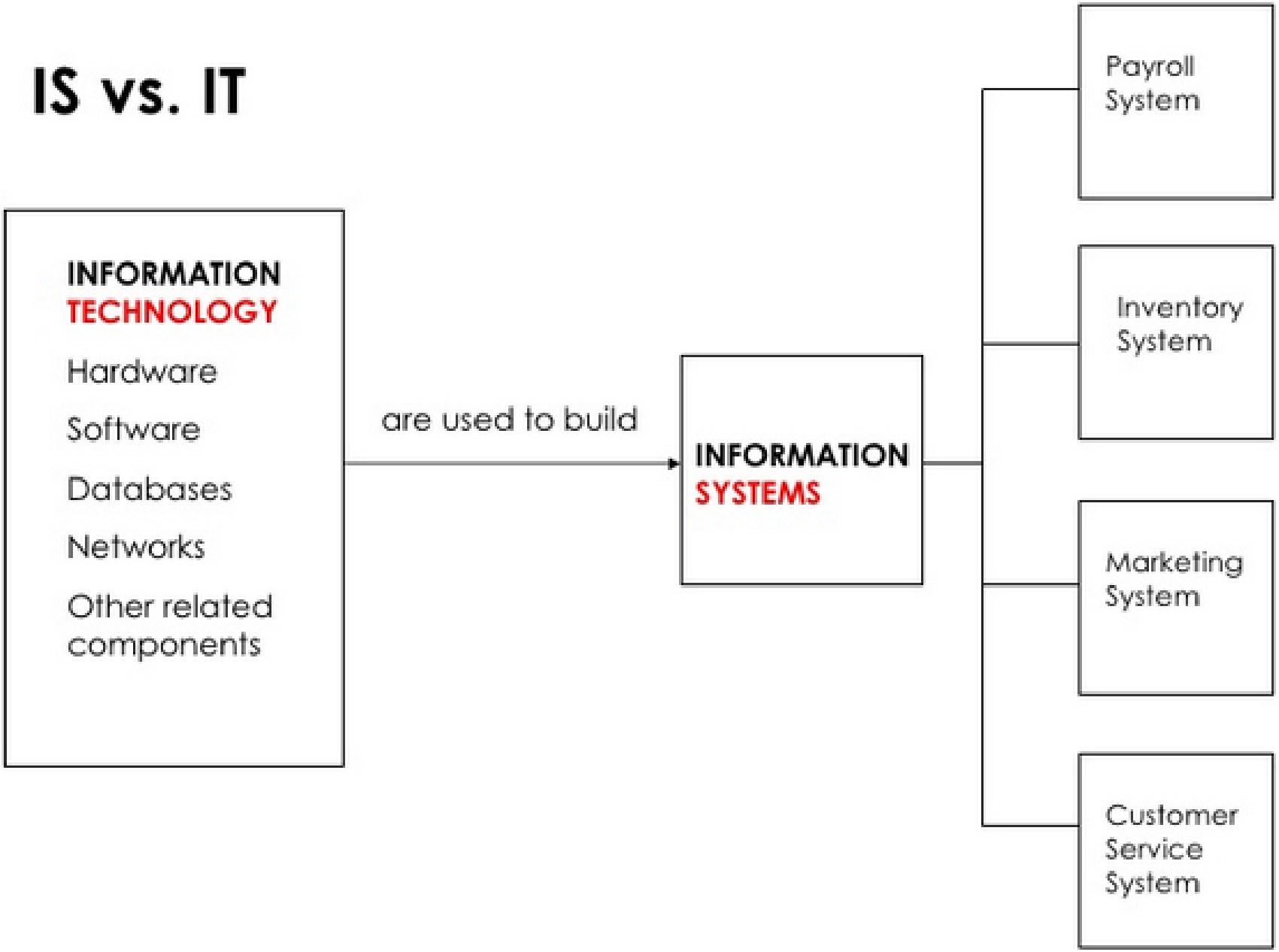
Information Systems (IS)

- Information Systems (IS) is a discipline that **bridges business and computer** science. It refers to systems designed to create, store, manipulate, or disseminate information. Therefore, it is a system **composed of people and Information Technology** that processes or interprets information. Is Consist (Hardware, Software, Data, Network, People, Process)

Information technology

- **IT** is a **subset of information systems** and it falls under the information systems umbrella, and deals with the technology involved in the systems themselves. IT consist (Hardware, Software, Data, Network)

IS vs. IT


INFORMATION TECHNOLOGY
Hardware
Software
Databases
Networks
Other related components
are used to build
INFORMATION SYSTEMS
Payroll System
Inventory System
Marketing System
Customer Service System

Roles of IS in Business

New Products and Services:

The IS makes it easier to analyze independent processes such as information to produce valuable products or services and organized work activities.

IS can give a company the competitive advantage by analyzing how a company creates, produce, and sell their products or services.

Information Storage

Records are needed to find the cause of problems and proper solutions

Manual data storage will cost the company lots of time, especially when it comes to searching for specific data. A quality information system stores data in database which makes the process of finding it convenient

Roles of IS in Business

Easier Decision Making

With the use of IS, it’s easier to deliver all the necessary information and model the results and this can help you make better decisions.

The information system can be used to run different scenarios and create market simulation.

Roles of IS in Business

Competitive advantage

1. **Low-cost leadership**

   Use Information system to achieve operational cost at lower price

   Method to get product at lower price.

   - Economic of scale (High Production)
   - Economies of scope (Development under the same roof/ process Paper N Parcel)
   - Process Design (Automation)
   - Lower Input cost (Outsourcing)

Competitive advantage

2. **Market niche**

Enable a specific market focus and serve narrow target market better than competitors (Sugar Free Cake, Aloe vera Juice).

3. **Product differentiation**

Use information system to enable new products and services (Dettol)

4. **Customer and Supplier intimacy.**

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 Feedback and tracking)

Expanding Roles of IS

1. **Data Processing: 1950s-1960s**
2. **Management Reporting: 1960s-1970s**
3. **Decision support: 1970s-1980s**
4. **Strategic and End User Support: 1980s-1990s**
5. **Global Internetworking: 1990s-2000s**
6. **Management Dashboards: 21st century**

Globalization and its challenge

Globalization

Globalization is a process of interaction and integration among the people, companies, and governments of different nations.

Challenges of Globalization

- ❖Language Challenge
- ❖Organization (culture)
- ❖Technology
- ❖The Challenge of distance and time
- ❖The challenge of Regulation and tariffs and solution
- ❖The challenge of differences in payment mechanism

Challenges of Globalization

Language challenge:

English is a universal language of the internet but the percentage of English speaking countries is around 38.8% as opposed to 62.2% of non English speaking countries.

The challenge is that international partners have to agree on a common language. Information needs to be translated because the computer cannot translate accurately;

Some countries require that the account system be written in their languages. It is a challenge to have a universal accounting system.

Solution:
Large companies translate information in local languages. Website design and translation should be done in local offices. For example Google is design and translated in 150 languages. Organizations need to create multiple accounting systems in different languages.

Challenges of Globalization

Technological Barrier

- The challenge that information systems face is that many countries do not have adequate information technology infrastructures.

- Limited skilled manpower and lack of updated infrastructures.

- Companies having branches in countries with low bandwidth have the challenge of creating their websites. Portals like yahoo and Google have the challenge of using the technology of different countries in their interface as we will see later in this paper. In countries with low bandwidth internet the system will be very slow.

Solution: Companies need to create two versions of websites to offer alternative to compensate for the slow bandwidth. I think companies also need to work with the infrastructure that works best for those countries.

Challenge of Globalization

Culture Challenge

- Each country has its tradition and culture that may not apply in another country. The information system is challenged globally by cultural differences in other countries and regions of the world.

- The challenges that businesses will face are tastes, gestures, treatment of people, ethical issues.

- A company like McDonalds that is American company may face the challenge of tastes in and infrastructure in other companty

- The Chinese culture, the color “red” is representation of passion, celebration, and happiness which is a good sign. Even the stocks are represented in red. On the other hand in Yahoo Taiwan, green is a sign for good and red is a sign for danger or something bad. The interface of the icons varies with cultures. Those creating websites and portals in different countries have to pay attention to what appeals to the culture of the people.

Solution: Multicultural firms should employ personnel locally to design versions of the websites to appeal to a particular country. Organizations dealing with products that has to do with taste need to explore ways of incorporating local taste to their food to meet the local demand

The challenge Globalization

- **The challenge of Regulation and tariffs and solution**

- Countries have different importing regulations. The regulations have a variety of issues, trade secrets, patents, copyrights, protection of personal or financial data, and privacy.

- It is time consuming to keep track of the regulations and tariffs of computer systems in multinational and transnational organizations. Employees may not know how to comply with laws, regulations and tariffs of destination countries.
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  Solution: Programs like Nextlinx can help importers and exporters for web commerce. Nextlinx is specialized in global trade. It provides solutions to importers, exporters and logistics providers. Nextlinx is integrated in the firm's systems. Nextlinx handles all the logistics in international order of software. It determines cost, trade agreement, trade import and export, and global knowledge.

- https://www.businesswire.com/news/home/20031121005021/en/Company-Profile-NextLinx-Corporation

The challenge Globalization

- **The challenge of differences in payment mechanism**
  The value of currency is a great challenge for international trade. The method of payment too is another challenge to international trade.

  Solution: International firms must have multiple payment mechanism. The goal of most people is the use of one device of payment for international trade.

The challenge Globalization

The challenge of time and distance and solutions

- Time differences make it difficult to talk to people on other sides of the globe. It takes days and sometimes months to get products to other countries. This leads to delays in business transactions. It is difficult for employees and customers in different countries to get connected.

- Time stamping could be a challenge to keep track of creation and modification time of a document.

- **Solution**: Teleconferencing systems can help with accommodation of employees in other time zones. Chart rooms and bulletin boards for communication are other ways to bridge the time gap. Customer support personnel to work 24/7.

Globalization and opportunity

Opportunities

- Improved Living Standards
- Increased Creativity and Innovation
- Lowered Costs for Goods and Services
- Easy Access to Foreign Culture

Globalization Opportunities

Improved Living Standards

- According to the World Bank, extreme poverty has been reduced by 35% since 1990.
- Nearly 1.1 billion people have moved out of extreme poverty since then.
- With development of globalization and job opportunity living standard of people has changed rapidly.

Globalization Opportunities

Increased Creativity and Innovation

- Global competition can encourage creativity and innovation, helping companies to stay one step ahead of competitors. This drive toward quality and price can improve products and keeps costs low.

- The free movement of labor and capital means that ideas from developing nations can drive innovation around the world.

Globalization Opportunities

Lowered Costs for Goods and Services

- Lowered costs help people in both developing and developed countries live better on less money.

- Huge cost reductions from inexpensive manufacturing and logistics have lowered the cost of living for everyone around the world.

Easy Access to Foreign Culture

- Globalization has also made it easier to access foreign culture, including food, movies, music, and art. The free flow of people, goods, and information has made it possible

Why Firms Use IS

To achieve 6 strategic business objectives

Operational Excellence

- Achieving higher levels of efficiency and productivity in business operations, plus changes in management behaviour
- Example: Wal-Mart's Retail Link system links suppliers to stores for in-time replacements.

Competitive Advantage

- Achieve higher sales and profit through using IS by:
- Doing things better
- Charging less for superior products
- Real time responding
- Using the internet is co-petitive advantage.

Survival

- Information technologies are necessity of doing business
- Industry-level changes, e.g. Citibank's introduction of ATMs
- New Products/ Services/ Business Model

Business model:

- describes how company produces, delivers, and sells product or service to create wealth
- Information systems and technology a major enabling tool for new products, services, business models
- E.g. Apple's iPod, iTunes online music business

Customer and Supplier Intimacy

- Serving **customers** well leads to customers returning, which raises revenues and profits
- Intimacy with **suppliers** allows them to provide vital inputs, which lowers costs
- E.g. JCPenney's information system which links sales records to contract manufacturer

Improved decision making

- Managers need right information at right time
- IS provide real-time data for making decisions
- E.g. Verizon's Web-based digital dashboard to provide managers with real-time data on customer complaints, network performance, line outages, etc.
- Results in restoration and repairing fast and effective

Dimensions of Information System (IS)

- Using IS effectively depends on the understanding of organization, technology and management . Only computer literacy is not important, rather broader IS literacy is important to implement a productive IS and this field of MIS is to achieve it. Information System Literacy means to know how and why technology is applied in business.
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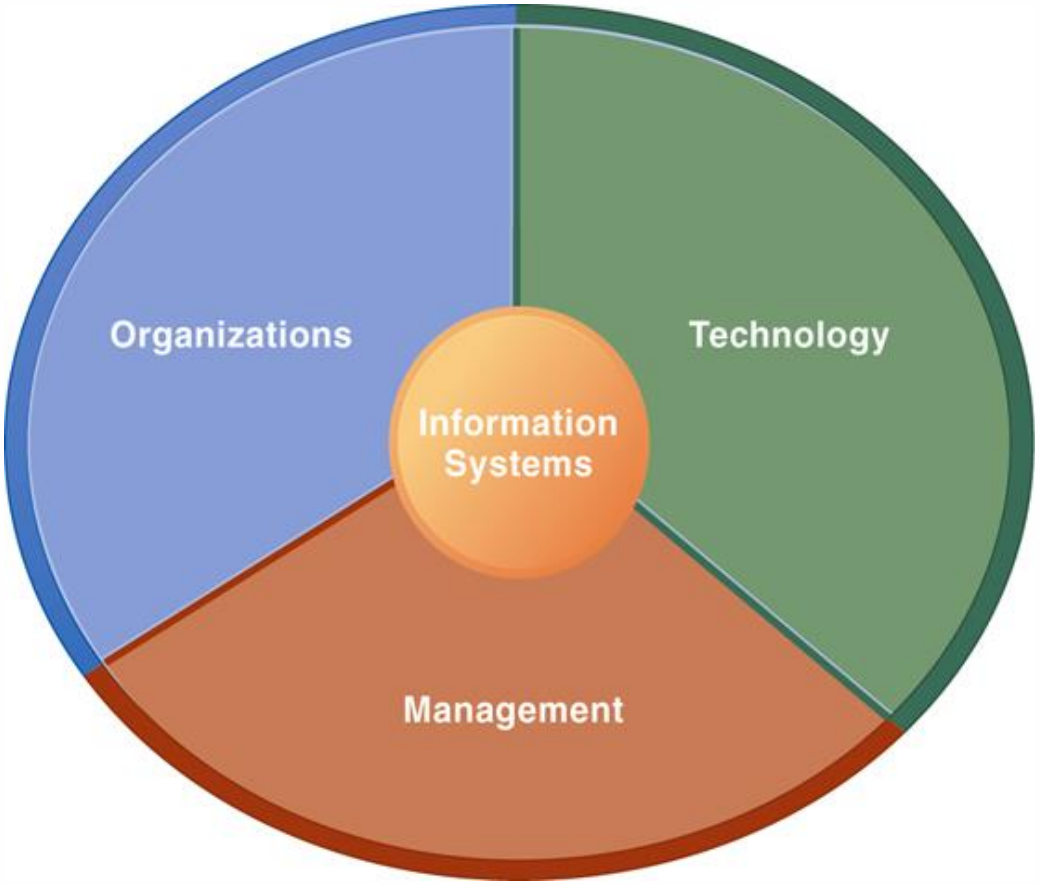

Organization

- Key elements : People, Structure, Business Processes, Politics, Culture
- Organizational structure has different levels and specialities

Management

- Make decisions, formulate action plan and solve organizational problem
- Managers set organizational strategy for responding to business challenges
- In addition, managers must act creatively:
- Creation of new products and services
- Occasionally re-creating the organization

Technology

- Hardware: physical component
- Software: instruction control Hardware
- Data management technology
- Network and telecommunications technology
- Network: Hardware + Software link computers
- Internet: Network to provide services
- **IT infrastructure:** platform to build the IS

Summary

- IS instrument for creating value to firms
- The value of information is directly linked to how it helps decision makers achieve the organization’s goals
- Information systems must be applied thoughtfully and carefully so that society and industry can .maximum benefits