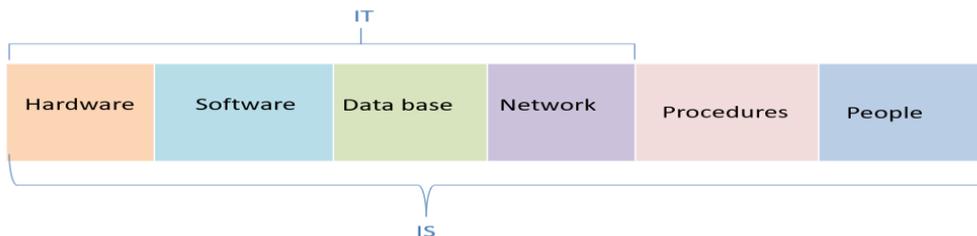


Introduction to Information System Notes

Chapter 1: Introduction to Information Systems

- **Data** Elementary description of things, events, activities, and transactions that are recorded, classified, and stored but are not organized to convey any specific meaning. Raw fact that describe the characteristics of an event or object.
- **Information** is data that have been organized so that they have meaning and value to the recipient. Data converted into a meaningful context.
- **Knowledge** consists of data and/or information that have been organised and processed to convey understanding and accumulated learning, and expertise as they apply to a current business problem.
- **How can data be processed and analysed to form Information?** By using Information systems
- **A Computer Based Information System (CBIS)** known as Information System is a system that performs some or all of its tasks using computer technology. An Information System can be defined technically as a set of interrelated components that collect (or receive), process, store and distribute information for specific purpose eg: support decision making,
- **Fundamental components of IS:** **1) Hardware** is a the physical equipment used for input, processing and output activities in an information system. Together, these devices accept data and information, process them, and display them. **2)Software** is a program or collection of programs that control and coordinate the hardware. Operating software such as linux and Microsoft windows, and utility software anti-virus, Application software is used for specific information processing needs(data management software such as Access **3)Networks** allow computers to share data and services. Range from two computers joined together to the biggest network (internet) **4) Database** is a collection of related files or tables containing data. **5) Procedures** are the set of instructions about how to combine hardware, software, databases, and networks in order to process information and generate the desired output. **6)People**(users)those individuals who use the hardware
- **Is Information system similar to Information technology?** Information technology consists of all hardware and software that a firm needs to achieve its objective. Information technology refers to computer-based tools (hardware and software, communications technologies) that support information- processing.
- **Major Capabilities of Information Systems:** 1)**Perform high-speed**, high-volume numerical computations 2)Provide **fast communication** and collaboration 3)**Store huge amounts** of information 4)Allow **quick and inexpensive** access to vast amounts of information 5)**Automate business processes** and manual tasks
- **Why are Information Systems Important?** **1)Operational Excellence:** IS enables users to achieve higher level of efficiency and productivity. **2)New product, services:** IS is a major enabling tool for firms to create new product and service. Business are using information systems to sense and respond to rapidly changing customer demand. Eg:customer feedback. **3) Customer and supplier Intimacy:** Service providers can keep track of user's preferences and improve intimacy: Hotel staff can keep track of guests' preferences. When a customer arrives at the hotel, the system automatically changes the room conditions such as dimming the lights. **4)Improved decision Making:** IS enable users (e.g. mangers) to access the right information at the right time to make an informed decision. use human capital management system for real time insight into individual employee information, IS enables managers to quickly review employee performance ratings for pervious years and drill down into more details.
- **5) Competitive Advantage:** any assets that provide an organization with an edge against its competitors in some measure such as cost, quality, or speed.
- **Why are information systems important to society?** 1)Make better/**faster diagnoses** 2)**Streamline the process of researching & developing new drugs** 3)Allow surgeons to **use robots to remotely perform surgery**



What are components of computer-based information system Airline Reservation System?

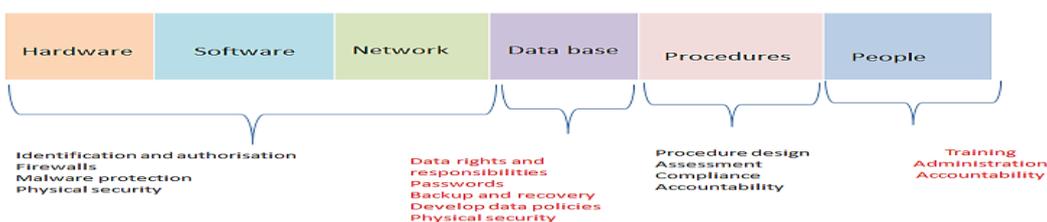
Hardware: computers, printers **Software:** programs to record customer bookings and promotions

Database: about flights, customers

Procedures: Rules, policies followed by airline, travel agents etc.

People: Customers, airline staff etc. **Networks:** WAN.

What are Security Safeguards related to the five components of Information systems



- **Entity-relationship diagram:** A diagram that represents the entities in the database and their relationships.
- **Data Warehouse:** integrate multiple large databases and other data sources into a single repository. Such a repository, containing both historic and (almost) current data for analysis and reporting, is suitable for direct querying, analysis, or processing. Much like a physical warehouse for products and components, a data warehouse stores and distributes data on computer-based information systems.
- **Data Mart:** a **low-cost, scaled-down version of a data warehouse** that is designed for the end-user needs in a strategic business unit (SBU) or an individual department. Rather than storing all enterprise data in one data warehouse, many organizations have created multiple data marts, each containing a subset of the data for a single aspect of a company's business, such as finance or personnel. As a data mart only contains the data needed by a limited segment of users (as opposed to a company-wide data warehouse), it is typically **easier to query and reduces the time** needed to perform analytical queries.
- **Big Data:** Big data is a broad term used for large and **complex structured and unstructured data** that is difficult or impossible to process using traditional data processing method. Characteristics of Big data include:
 - (1)Volume:** incredible volume of data. Many factors contribute to the increase in data **volume-data stored over the years**, unstructured data streaming in from social media, increasing amount of sensors, and machine-to-machine data . One of the biggest opportunities is the sheer volume of data, which, for example, enables organizations to make business decisions based on more factors.
 - (2)Velocity:** On the one hand, data flow into organizations at increasingly higher rates; on the other hand, data-driven **organizations have to process and use the data ever more quickly.**
 - (3)Variety:** useful data can come in the form of structured data (such as transaction data), which fit neatly into spread sheets; semi structured data, such as clickstreams and sensor data; or unstructured data, such as audio and video data. **Especially semi structured and unstructured data tend to be messy** and are often incomplete, and the quality and origins of data such as user-generated content are typically unclear and at times questionable; further, analysing unstructured data tends to be expensive in terms of effort, time, and expertise needed.
- **What are the benefits of making Big Data available?** Help organizations to gain value and improve performance. Eg: banks use big data to determine the likelihood of a customer repaying a loan.
- **Data mining:** provides capabilities for discovering "hidden" predictive relationships in the data.. An algorithm refers to the step-by-step procedures used to make a calculation or perform some type of computer-based process. Typically, data mining algorithms search for patterns, trends, or rules that are hidden in the data so as to develop predictive models.
- **Association Discovery :** Association discovery is a technique used to find associations or correlations among sets of items. For example, a supermarket chain wants to find out which items are typically purchased together in order to redesign the store's layout. Mining sales transactions over the past 5 years may reveal that 80% of the time, people who purchase coffee also purchase sugar.
- **Clustering:** is the process of grouping related records together on the basis of having similar values for attributes, thus finding structure in the data.
- **Classification:** is used when the groups ("classes") are known beforehand, and records are segmented into these classes. For example, a bank may have found that there are different classes of customers who differ in their likelihood of defaulting on a loan. As such, all customers can be classified into different (known) risk categories in order to ensure that the bank does not exceed a desired level of risk within its loan portfolio.
- **Knowledge Management (KM):** knowledge management refers to the processes an organization uses to gain the greatest value from its knowledge assets.
- **Explicit knowledge:** knowledge that can be documented, archived, and codified, often with the help of information systems. In an organization, explicit knowledge consists of the policies, procedural guides, reports, products, strategies, goals, core competencies. Explicit knowledge is objective and rational. It can be codified and verbalized and easily transmitted to others.
- **Tacit knowledge:** processes and procedures that is located in a person's mind on how to effectively perform a particular task. In an organization, tacit knowledge consists of an organization's experiences, insights, expertise, know-how, trade secrets, skill sets, understanding, and learning. Tacit knowledge is the accumulation of subjective or experiential learning. It is difficult to be documented (write it down) and verbalized in order to transfer to others.

The KMS Cycle: **(1)Create knowledge:** Knowledge is created as people determine new ways of doing things or develop know-how. Sometimes external knowledge is brought in. **(2)Capture knowledge:** New knowledge must be identified as valuable and be represented in a reasonable way. **(3)Refine knowledge:** New knowledge must be placed in context so that it is actionable. This is where tacit qualities (human insights) must be captured along with explicit facts. **(3)Store knowledge:** Useful knowledge must then be stored in a reasonable format in a knowledge repository so that other people in the organization can access it.

(4)Manage knowledge: Like a library, the knowledge must be kept current. It must be reviewed regularly to verify that it is relevant and accurate. **(5)Disseminate knowledge:** Knowledge must be made available in a useful format to anyone in the organization who needs it, anywhere and anytime.

- **Knowledge Management Systems (KMS):** knowledge management system refers to a collection communication technologies, information storage and retrieval systems to enable the generation, storage, sharing, and management of tacit and explicit knowledge assets

Chapter 5: Information Security

- **Threat:** Threats are typically defined as undesirable events that can cause harm and can arise from actions performed by agents internal or external to an organization.
- **Vulnerability:** Weakness in a system that permit a threat to harm the confidentiality, integrity and/or availability of the system.
- **Threat agents** The threat agent is the actor that imposes the threat to the system. Three classes are: **(1) Human Threats:** This class includes threats caused by human actions such as insiders(employees) or hackers which cause harm or risk in systems. **(2) Environmental factors:** are threats caused by non-human agent. It comes from natural disaster threats. **(3) Technological Threats:** Technological threats are caused by physical and chemical processes on material.

What are factors contributing to vulnerability of IS?

- (1)**Communication networks are interconnected.** The potential for unauthorized access, abuse, or fraud is not limited to a single location but can occur at any access points in the network. It is possible to access data flow over networks, steal valuable data during transmission, or alter data without permission.
 - (2)**Domestic and offshore partnering** with another company contributes to IS vulnerability if valuable information resides on networks and computers outside the control of the organization. Without strong safeguards valuable data can be lost, destroyed or fall into wrong hands.
 - (3)**Smaller, more portable computers & storage devices:** Portability and being small makes cell phones, smartphones, tablet computers and USB easy to lose or steal.
 - (4)**Lack of management support:** For the entire organization to take security policies and procedures seriously, senior managers must ensure that employees are following security procedures.
- **Information Systems security threat:**
 - (1) **Espionage or Trespass:** occurs when an unauthorized individual attempts to gain illegal access to organizational information (cross the legal boundary). Covert (secret) activities, such as the theft of trade secret, bribery, blackmail and technological surveillance to gain advantages over rivals. Espionage is also often carried out by compromising someone who works for a targeted company through bribery, coercion, or blackmail. Cracking into a company's computer system has become a fairly common practice, where criminals steal confidential data and trade secrets that could be sold to others.
 - (2)**Denial-of-Service Attack:** A Denial-of-Service attack (DoS) is a cyber attack on the availability of services and resources on the victim's computer. The attacker dispatches a deluge of data packets to the victim's computer. This floods the victim's computer and engages all the resources, hence making them inaccessible.
 - (3)**Identity theft:** Identity theft is the stealing of another person's personal data for the financial purpose to frame him/her for a crime.
 - (4)**Social Engineering:** the perpetrator uses social skills to trick or manipulate legitimate employees into providing confidential information.
 - (5)**Cyber terrorism:** Attack via the internet using a target's computer systems to cause physical, real-world harm and interrupting the flow of information.
 - (6)**Phishing** involves getting a user to enter personal information via a fake website.
 - (7)**Pharming** involves modifying DNS entries, which causes users to be directed to the wrong website when they visit a certain Web address.
 - **Virus:** destructive program , that performs malicious actions(by attaching to other computer programs or data files to be executed) and disrupts the normal functioning of information systems.
 - **Worm:** Segment of computer code that performs malicious actions and will replicate, or spread, by itself . Worms are standalone and when it is infected on a computer, it searches for other computers connected through a local area network (LAN) or Internet connection. When a worm finds another computer, it replicates itself to the new computer and so on. Due to the copying nature of a worm and it consumes too much system memory causing web servers, network servers and individual computers to stop responding.
 - **Trojan Horse:** Trojan horses appear to be legitimate, benign programs but carry a destructive payload. Trojan release payloads, nasty malware applications. Trojan horses typically do not replicate themselves but, like viruses, can do much damage, such as by giving the creator unauthorized access to a system. **Logic bombs** or **time bombs** are variations of Trojan horses. **Logic Bombs** also do not reproduce themselves and are designed to operate without disrupting normal computer function. Instead, they lie in wait for unsuspecting computer users to perform a triggering operation. **Time bombs** are set off by specific dates, such as the birthday of a famous person.
- ### Alien Software
- (1)**Spamware:** that uses your computer as a launch pad for spammers. **Spam:** Spam is electronic junk mail or junk newsgroup postings, usually for the purpose of advertising for some product and/or service. Spammers commonly use zombie computers to send out millions of e-mail messages to the computer users. As a result, Internet service providers and those who manage e-mail within organizations often use **spam filters** to fight spam. Typical spam filters use **multiple defence layers**—consisting of dedicated hardware and software. Using techniques such as **sophisticated machine learning algorithms**, one commonly used approach for preventing bots from submitting forms is the use of **CAPTCHAs**.

Information Systems planning process

Step 1: Analyse the *organisational strategic plan*

- Organization Strategic Plan: identifies the firm's overall mission, the goals that follow from that mission, and the broad steps required to reach these goals.
- IS Strategic Plan: set of goals that describe the IT infrastructure and identify the major IT initiatives needed to achieve the organization's goals. It must (1) be aligned with the organization's strategic plan (2) must efficiently allocate IS development resources among competing projects so the projects can be completed on time and within budget and still have the required functionality.
- IS Operational Plan: consists of a clear set of projects that the IS department and the functional area managers will execute in support of the IS strategic plan.

Step 2: Develop the *IS Strategic plan*

- The organisational strategic plan and the existing IT architecture provide the inputs in developing the IS strategic plan.
- The IT architecture delineates the way an organisation's information resources should be used to accomplish its mission. It encompasses both the technical and the managerial aspects of information resources. The technical aspects include hardware and operating systems, networking, data management systems and applications software. The managerial aspects specify how the IT department will be managed, how the functional area managers will be involved and how IT decisions will be made.
- IT planning must be aligned with the organisation's strategic plan. It must efficiently allocate IS development resources among competing projects so the projects can be completed on time and within budget and still have the required functionality.

Step 3: Develop *IS Operational plan*

- IS operational plan consists of a clear set of projects that the IS department and the functional area managers will execute. A typical IS operational plan contains the following elements:
- mission: the mission of the IS function (derived from the IT strategy)
- IS environment: a summary of the information needs of the functional areas and of the organisation as a whole
- objectives of the IS function: the best current estimate of the goals of the IS function
- constraints on the IS function: technological, financial, personnel and other resource limitations on the IS function
- the application portfolio: a prioritised inventory of present applications and a detailed plan of projects to be developed or continued during the current year
- resource allocation and project management: a listing of how and when who is going to do what

Summary

- **Analyze the organization's strategic plan**

Identify the firm's mission, goals, and steps required to reach these goals

- **Develop the IS strategic plan**

Develop a set of goals that describe IT infrastructure, and resources needed to reach the organization goals.

- **Develop IS operational plan**

Develop a set of IS projects that will be executed to support the IS strategic plan

- IT Steering Committee: comprised of a group of managers and staff who represent the various organizational units, is created to establish IT priorities and to ensure that the IS function is meeting the organization's needs.

Strategies for Acquiring IT Applications

Fundamental Decisions in IT Application Acquisition:

(1) How much computer code does the company want to write? A company can choose to use a totally prewritten application (write no computer code), to customize a prewritten application (write some computer code), or to custom-write an entire application (write all new computer code).

- **Purchase a Prewritten Application:** Many commercial software packages contain the standard features required by IS. Therefore, purchasing an existing package can be a cost-effective and time-saving strategy compared with custom-developing the application in-house.
- **Customize a Prewritten Application:** Customizing existing software is an especially attractive option if the software vendor allows the company to modify the application to meet its needs. However, this option may not be attractive in cases where customization is the only method of providing the necessary flexibility to address the company's needs. It also is not the best strategy when the software is either very expensive or likely to become obsolete in a short time.