Explores the basic concepts of ICT together with its role and applicability in today's knowledge-based society

Basic Building Blocks of Information and Their Characteristics

Data

- Data refers to raw facts and figures that are input into a system. It can be numbers, words, sounds, or images, but in their raw form, they lack specific meaning.
- It doesn't bear a particular meaning nor have organized in order to make decisions.

Types of Data

1. Quantitave Data:
   - Measurable data expressed numerically.
   - Can be subjected to Arithmetic Operation.

     Eg: Marks Obtained in the ICT Paper.

2. Qualitative Data:
   - Non-measurable data that describe properties.
   - Cannot be subjected to Arithmetic Operation.

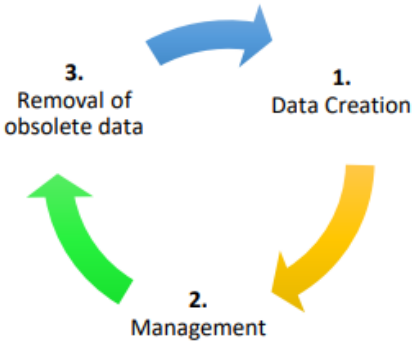
     Eg: Goodwill of an Organization.

Life Cycle of Data

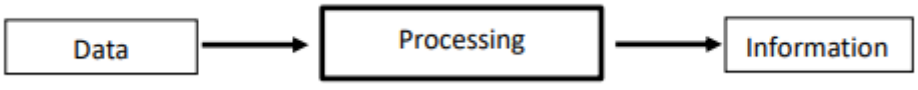
1. Data Creation:
   Data is generated or introduced into the system.
   Eg: Data gathered during student admission.

2. Management of Data
   Ensures data is stored securely and is accessible when needed.
   Eg: Managing student records in a database.

3. Removal of Obsolete Data.
   Deleting outdated or unnecessary data to maintain efficiency.
   Eg: Removing records of graduated students.



Data vs Information



Individual pieces of data are rarely useful alone. For data to become information, data needs to be put into context.

Information

Information is data that has been organized and processed in a meaningful way to make it useful for decision-making.

Relationship Between Data and Information:

- Data serves as input to a process, while information is the meaningful output.
- Information generated from one system can be used as data for another system.

Characteristics of valuable information

1. **Relevance:**
   Value of the information will depend on its relevance for a particular person.

2. **Timeliness:**
   An information should be updated. Timely information is valuable for making effective decisions.

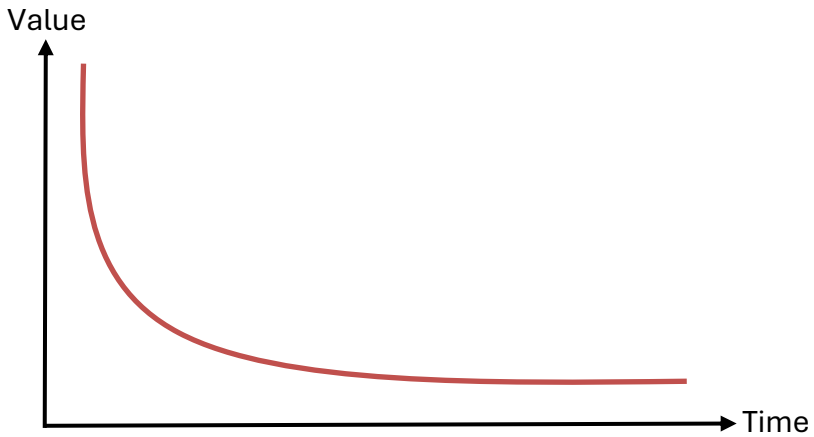
3. **Accuracy:**
   Accurate information is helpful for making correct decisions.

4. **Completeness:**
   Information presented with the context are useful where incomplete information is not sufficient to make decisions.

5. **Understandability:**
   Information should be clear.

The golden rule of information

- Graphically represents the value of information in its maximum level at the moment the information is created or the information is released.
- The value of the information is reduced gradually with the time and become less valuable.



Big Data

Big data refers to vast volumes of data generated daily by organizations and individuals. Organizations such as private companies and research institutions capture terabytes of data about their users' interactions in businesses and social media. The volume of data that one has to deal has been exploded to unimaginable levels with the time.



Eg: Datas' of Large Organizations like Meta, Google and etc.

What are Big Data Analytics

Big Data Analytics largely involve collecting data from different sources, manage it in a way that it becomes available to be consumed by analysts and finally deliver data products to fulfil the organization's data requirements.

Investigates the need of technology to create, disseminate and manage data and information

Importance of Information in Daily Life

- **Decision Making:** Helps in selecting the best course of action based on accurate data.
- **Policy Making:** Enables governments and organizations to create effective policies.
- **Predictions:** Supports forecasting, such as weather predictions or stock market trends.
- **Planning, Scheduling, and Monitoring:** Assists in project management and resource allocation.

Drawbacks of Processing Data Manually.

Data processing and information creation can be done manually.

Eg : Calculating Grocery Shop Bill manually

But Some Drawbacks occur when Data is Processed Manually.

- Consuming more time in entering and organizing data.
- Human errors may lead to inaccurate information.
- Inefficient in sharing information.
- Hard to provide a quality service to the customers.
- Data inconsistency may occur.

Data Inconsistency: Occurring the same data in two different files in different formats or values.

Automatic Data Processing

Automatic data processing leverages technology to store, process, and retrieve data efficiently with minimal human intervention, outperforming manual methods in speed and accuracy. Examples include emergency broadcasts, security updates, and weather alerts. In hazardous environments like war zones or space research, automation ensures safety and reliability.

The rise of the **Information and Communication Technology (ICT) era** has revolutionized data handling, turning the world into a global village. Technologies like the Internet, WWW, mobile communication, and cloud computing provide fast, convenient, and accurate ways to create, share, and manage information, overcoming the limitations of manual processes.

The Role of ICT in Global Societal Advancement

The advent of the **Information and Communication Technology (ICT) era** has transformed the world into a **global village**, fostering:

- **Endless Connectivity:** Seamless communication across the globe.
- **Interactive Technologies:** Engaging tools that enhance productivity.
- **Information Sharing:** Rapid and widespread distribution of data.
- **Infinite Data Access:** Networking tools that enable fast, easy, and accurate creation and dissemination of information.

ICT plays a pivotal role in shaping modern organizations and society by leveraging advancements such as the **Internet**, **World Wide Web (WWW)**, **mobile communication**, **mobile computing**, and **cloud computing**, overcoming the limitations of manual methods.

The Internet

- **1957:** The U.S. government formed the **Advanced Research Projects Agency (ARPA)** to ensure leadership in science and technology for military applications.
- **1969:** ARPA established **ARPANET**, the first computer network, connecting major universities and research institutions.
- ARPANET was designed to withstand a nuclear attack, allowing communication to continue if sites were destroyed.
- Initially, ARPANET was used only by computer professionals, engineers, and scientists familiar with its complex system.
- **1971:** ARPANET expanded to 15 nodes, linking research hubs.
- **1972:** Email was introduced as the first major application of ARPANET.
- **1973:** ARPANET made its first international connections, reaching Europe.
- **1983:** The **Transmission Control Protocol/Internet Protocol (TCP/IP)** became the standard protocol for ARPANET, laying the groundwork for the Internet.
- **1984:** The **Domain Name System (DNS)** was introduced to make addresses easier to use, replacing numerical IP addresses with names (e.g., "example.com").
- **1989:** ARPANET was decommissioned, and its technologies evolved into the broader **Internet**.
- **1990:** Tim Berners-Lee invented the **World Wide Web (WWW)** at CERN, introducing web browsers and hyperlinks to navigate the Internet.
- **1993:** The first widely used web browser, **Mosaic**, was released, making the Internet accessible to the general public.
- The Internet became public, cooperative, and self-sustaining, accessible to millions worldwide.

Services provided by the Internet

1. World Wide Web (WWW)
2. File Transfer (FTP)
3. Email
4. Video conferencing
5. Telnet
6. Internet Relay chat
7. IP Telephone
8. IPTV.



1. Word Wide Web (WWW)

- The World Wide Web (WWW) was created in 1991 by Tim Berners-Lee.
- Tim Berners-Lee directs the World Wide Web Consortium (W3C), which oversees Web technology standards.
- The WWW is a system of interlinked hypertext documents accessed via the Internet.
- Hypertext documents are files containing text, images, videos, and links, allowing navigation between documents using hyperlinks.
- HTTP (Hypertext Transfer Protocol) is the set of rules used to transfer files on the WWW, including text, images, sound, and video.
- A web browser is required to access the WWW, with popular browsers including Chrome, Firefox, Safari, and Edge.
- A web page is a single document on the WWW, while a website is a collection of related web pages.
- The first page of a website is called the home page.
- Each website has a unique address known as a Uniform Resource Locator (URL).
- When a user enters a URL, the browser sends an HTTP request to the server hosting the website, which responds by sending the files needed to render the web page.
- HTTPS is a secure version of HTTP that encrypts data for privacy and security.
- The WWW began as a tool for sharing scientific information and has grown into a platform used by billions worldwide.
- HTML (HyperText Markup Language) is the standard language for creating web pages on the WWW.
- Websites are stored on servers, which make them accessible via the Internet through web hosting.
- Search engines like Google and Bing allow users to find web pages by entering keywords.
- The WWW enables various activities, including e-commerce, education, communication, and entertainment.
- It has made the world more connected, transforming it into a global village.

2. File Transfer Protocol (FTP)

- **File Transfer Protocol (FTP)** is a standard network protocol used to transfer files between computers over a TCP/IP network like the Internet.
- FTP can transfer all file types, including text files, images, and large multimedia files.
- **Secure FTP (SFTP)** and **FTPS** add encryption to FTP, ensuring secure file transfers by protecting data from interception.

3. Email

- **Email (Electronic Mail)** is a method of exchanging digital messages over the Internet or other computer networks.
- Messages sent via email can include text, attachments (documents, images, audio, video), and hyperlinks.
- Email operates on a client-server model, where users interact with email clients (e.g., Gmail, Outlook) that connect to email servers.
- Each user is identified by a unique **email address** (e.g., user@example.com), consisting of a username, the "@" symbol, and a domain name.
- Email follows standard protocols for communication:
    - **SMTP (Simple Mail Transfer Protocol):**
      Used to send emails from the sender's client to the recipient's email server.
    - **POP3 (Post Office Protocol version 3):**
      Allows downloading emails from the server to the client, removing them from the server.
    - **IMAP (Internet Message Access Protocol):**
      Enables accessing emails on the server while keeping them synchronized across multiple devices.

4. Video Conferencing

- A communication technology allowing real-time video and audio interaction between users in different locations.
- Requires devices with cameras, microphones, and internet connectivity.
- Common platforms include Zoom, Microsoft Teams, and Google Meet.
- Used for virtual meetings, online classes, and remote work.

5. TelNet

- A protocol used to access remote computers over a network.
- Provides command-line access to a server, enabling users to manage it as if they were directly connected.
- Lacks encryption, making it less secure compared to modern alternatives like SSH (Secure Shell).

6. Internet Relay Chat

- A text-based communication protocol used for real-time chatting.
- Users join channels (chat rooms) on IRC servers to interact.
- Though less popular today, IRC laid the foundation for modern chat apps.

7. IP Telephone

- Internet Protocol (IP) telephony transmits voice calls over the Internet instead of traditional phone lines.
- VoIP (Voice over IP) technology is used, with platforms like Skype and WhatsApp as common examples.

8. IPTV

- Delivers television content over the Internet instead of traditional broadcast methods.
- Offers features like live streaming, video-on-demand (VoD), and time-shifted TV.
- Examples include Netflix, Hulu, and IPTV service providers.

Mobile Communication and Computing

Mobile Communication

Mobile Communication is the process of sharing information (voice, text, or data) over long distances without using wires or cables. Simply, Wireless data transmission.

Early mobile systems could only connect two users on a single channel. Therefore, to Support Multiple users on a Single Channel following technologies were used:

- **TDMA (Time Division Multiple Access):**
  Divides the channel into time slots, so users take turns.

- **CDMA (Code Division Multiple Access):**
  Allows multiple users to share the same channel by assigning unique codes to their signals.

- **FDMA (Frequency Division Multiple Access):**
  Assigns different frequencies to different users.

Mobile Computing

Mobile Computing is a technology that allows transmission of data, voice and video via a computer or any other wireless enabled device without having to be connected to a fixed physical link.

Key Features of Mobile Computing

1. **Portability**:
   Devices are lightweight and can be carried anywhere (e.g., smartphones, tablets, laptops).

2. **Wireless Communication**:
   Uses technologies like 4G/5G, Wi-Fi, or Bluetooth to exchange data without physical cables.

What is the Difference between Mobile Computing and Communication?

Mobile Communication is the process of transmitting data without are wired connection, While Mobile Computing is the Technology that allows you to do this Process.

Eg: When you send a Message to your Friend through your Smart Phone, The Process of Message being sent to your friend is Mobile Communication. While, the Technology that helped you which is the Mobile Phone and 4G Internet Connection is Mobile Computing.

Cloud Computing

- The "cloud" refers to the Internet or a network of remote servers that provide services and resources.
- Cloud computing allows users to store, access, and manage data and applications online, instead of on local devices or servers.
- Examples include email services (like Gmail), online storage (like Google Drive), and virtual meetings (like Zoom).

Features of Cloud Computing:

- Provides on-demand services over the Internet.
- Offers scalable resources such as storage, processing power, and software.
- Reduces the need for local hardware and maintenance.

Three Main Service Models of Cloud Computing

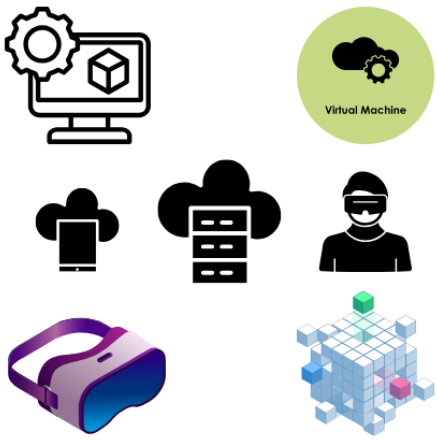
1. **Infrastructure As A Service (IAAS)**
   Provides access to essential computing resources like virtual machines, storage, and networks.

   Examples:
   - Hosting websites on virtual machines.
   - Virtual desktops for employees.
   - Game servers.

   What it does:
   IaaS gives you the basic building blocks—computers, storage, and networks—so you can set up your own systems. It's like renting an empty office space and filling it with your own furniture.

   Simple Example:
   Imagine you're building a website. IaaS gives you a virtual machine to run your website, but you're responsible for installing the software, managing the data, and keeping it running.

   Everyday Example:
   Amazon Web Services (AWS) or Google Cloud Platform lets companies rent virtual servers instead of buying their own.



2. **Platform As A Service (PAAS)**
   Provides the runtime environment for applications, development & deployment tools, etc.

   Examples:
   - Database management tools.
   - Web hosting platforms like Heroku.
   - Tools for app deployment.

   What it does:
   PaaS gives you a platform to develop and deploy apps without worrying about the underlying infrastructure. It's like renting a fully furnished office where you just work—no need to worry about setting it up.

   Simple Example:
   If you're a developer building an app, PaaS gives you the tools and environment (like a database and web server) so you can focus on coding.

   Everyday Example:
   Google App Engine or Microsoft Azure lets developers upload their code, and the platform handles everything else like servers and databases.



3. **Software As A Service (SAAS)**
   Allows to use software applications as a service to end users.

   Examples:
   - Gmail, Microsoft Office 365, and Google Docs.
   - CRM tools like Salesforce.

   What it does:
   SaaS provides ready-to-use software online. You don't have to install or maintain anything—just log in and start using it.

   Simple Example:
   Think of Gmail. You don't worry about how the email system works—you just send and receive emails.

   Everyday Example:
   Microsoft 365, Google Docs, or Zoom are all SaaS. You just sign in and start working.



Formulates an Abstract model of information creation and evaluates its compliance with ICT

What is a System?

A system is an interconnected set of components working together to achieve a common goal. It consists of inputs, processes, outputs, and feedback loops.

Examples of Systems:

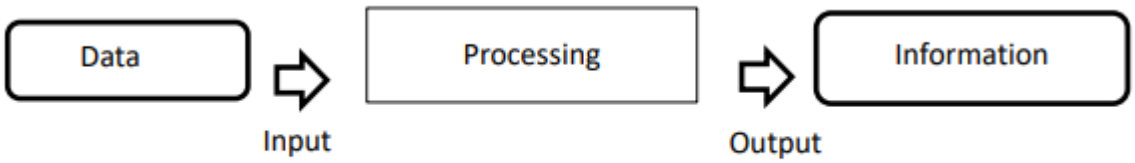
- A **school**: Inputs (students, materials), processing (teaching), output (educated students).
- A **vehicle**: Inputs (fuel, driver), processing (engine running), output (movement).

The Abstract Model of Information

In an information system data input into the system is processed using processing instructions given and information is produced as output. This is called an abstract model of information.

The three key stages of the model are:

- **Input**: Data is fed into the system.
- **Processing**: The system processes the data according to specific instructions.
- **Output**: The processed data is presented as meaningful information.



Abstract Model of Information

How a Computer Can be Considered as a System?

A digital computer carries out the following five functions:

1. Takes data as input.
2. Stores the data/instructions in its memory and uses them as required.
3. Processes the data and converts it into useful information.
4. Generates the output.
5. Controls all the above four steps.

A computer is considered a system because it follows the fundamental components of a system and complies very well with the Abstract model of Information:
It takes **input** (data), processes the input to generate **output** (useful information), and controls these processes, just like any system with interconnected components working together to achieve a common goal.

Selects and classifies the basic components of a computer system

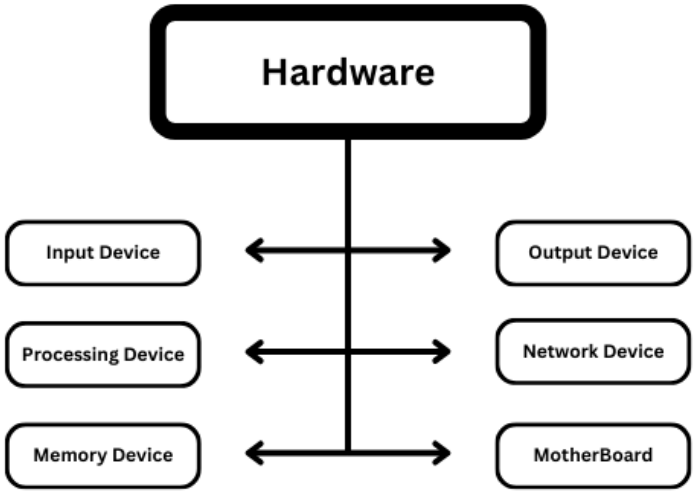
Four Major Components of a Computer System

1. Hardware
2. Software
3. Firmware
4. Liveware

Hardware

Computer hardware refers to the physical components of a computer system that are responsible for performing tasks and storing data. It includes all the tangible elements that can be seen and touched.

Hardware components can be categorized into Input Devices, Output Devices, Processing Devices, Networking Devices and Memory Devices. In addition to those types of hardware there is a circuit board located inside a computer system called mother board by means of which every hardware component is connected to each other.



- **Input Devices**: Devices like the keyboard, mouse, and scanner that allow the user to interact with the computer.
- **Output Devices**: Devices like monitors, printers, and speakers that display or deliver information from the computer to the user.
- **Processing Devices**: Hardware that performs calculations and operations on data, e.g., CPU, GPU.
- **Networking Devices**: Hardware that enables communication between computers, e.g., router, modem, network card.
- **Memory Devices**: Hardware that stores data temporarily or permanently, e.g., RAM, hard drive, SSD.
- **Motherboard**: The main circuit board that connects all hardware components, allowing them to communicate with each other.

NOTE: Types of Hardware will be Detailly discussed in Unit 02

Software

Software refers to the collection of programs, data, and instructions that tell the hardware what to do. Unlike hardware, software is intangible and provides the necessary functionality for a computer system to perform specific tasks.

There are two main types of software:

1. **System Software:**
   System software (systems software) is the computer software designed to operate and control the computer hardware and to provide a platform for running application software. System software can be separated into three different categories as follows.

   - Operating Systems –Windows, Linux, Mac OS
   - Utility Software– Virus Guard, Device drivers
   - Language Translators – Compiler, Interpreter

2. **Application Software:**
   Application software products are designed to satisfy a particular need of a particular environment. Application software may consist of a single program, such as Microsoft's notepad for writing and editing a simple text. It may also consist of a collection of programs, often called a software package, which work together to accomplish a task.

Apart from the Main Types, Software can also be Classified as:

1. **Open-Source Software:**
   This type of software comes with a source code that is available to the public. Anyone can view, use, modify, and redistribute it. This allows developers to contribute to improving the software, fix bugs, or create custom versions. Open-source software is often free, though some may offer paid services or features.

   Examples:
   Linux operating system, Mozilla Firefox, and Apache web server.

2. **Proprietary Software:**
   In contrast, proprietary software is closed-source, meaning its source code is not available to the public. Users are granted permission to use the software under specific terms defined by the owner or company that developed it. Proprietary software usually requires a purchase or license to use and does not allow modification, redistribution, or access to its underlying code.

   Examples:
   Microsoft Windows, Adobe Photoshop, and Apple macOS.

Firmware

Firmware is a computer program that is "embedded" in a hardware device, that is, an essential part of the hardware. It is sometimes called embedded software. In computers firmware embedded in ROM and which handles booting up process of computers.

For example, in computers, the firmware is responsible for handling the **booting process**, meaning it helps initialize the hardware and load the operating system when the computer is powered on. Other devices, like printers, cameras, and smartphones, also contain firmware that controls their core functions.

Liveware

Liveware refers computer users. According to user commands generally computers are functioning

Analyses the activities of data processing

Steps of Data Processing

1. Data gathering
2. Data validation
3. Data Input
4. Data processing
5. Data output
6. Data storage

Data Gathering

Data gathering methods can be categorized into **manual**, **semi-automated**, and **automated** methods, each with varying tools and techniques for collecting data efficiently.

Manual Methods:

1. Interviews –
   Detailed questions and answers help in capturing thorough and fair data, particularly useful for qualitative research.

2. Questionnaires –
   Used for quantitative data, these can be answered anonymously, making them suitable for confidential and unbiased responses.

3. Observation –
   Data is collected by observing behaviors or phenomena in real time.



Semi-Automated and Automated Methods:

These methods use specialized tools for faster and more accurate data collection, especially when large volumes of data are involved.

1. Optical Mark Reader (OMR) –
   A device used to scan pencil marks on specially designed forms, commonly used for marking MCQ answer sheets.

2. Optical Character Recognition (OCR) –
   Software that reads and converts printed or handwritten text into editable digital text.

3. Magnetic Ink Character Recognition (MICR) –
   A reader that captures data from magnetic ink, typically found on cheques.

4. Magnetic Strip Readers –
   These readers capture data stored on the magnetic strips of credit cards and ATM cards.

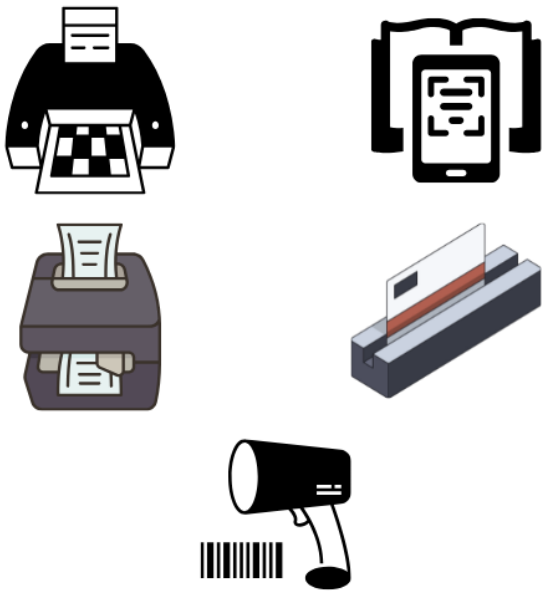
5. Barcode Readers –
   Devices that scan barcodes using visible light to input data into computer systems.

6. Sensors –
   Electronic devices used to collect data from various environments, often connected in a sensor network for efficient data transmission to a central data center.

Sensor Networks:

- Wireless Sensor Networks (WSNs) consist of nodes equipped with sensors, microcontrollers, wireless transceivers, and energy sources. These networks can gather data from multiple locations, enabling quick data collection and transmission.

These methods, ranging from manual to automated, help in efficiently collecting, processing, and analyzing data across various domains.



Data validation

Data validation is the process of ensuring that the data entered into a system is accurate, complete, and within the required or permissible range. It is used to prevent errors, ensure consistency, and enhance the quality of data in databases or applications.

Types of Data Validation Methods:

1. Data Type Check -
   Ensures that the correct data type (numeric, text, date, currency, etc.) is entered into the system. This method prevents errors caused by inputting incompatible types of data.

2. Presence Check -
   Verifies that data is entered in mandatory fields. It ensures that critical information is not left blank, making sure all required fields are filled.

3. Range Check -
   Checks whether the inputted data falls within a specified, allowed range. For example, ensuring that marks are between 0 and 100, or that dates are within a particular time frame. This check is commonly applied to numerical, currency, or date/time data.

4. Length Check -
   Ensures that the entered data has the correct number of characters. For example, a phone number may be validated to ensure it has 10 digits, or a password might need to be at least 8 characters long.
5. Format Check -
   Verifies that the data follows a specific format, such as an email address (e.g., user@example.com) or a date (e.g., DD/MM/YYYY). This ensures data matches a predefined pattern.

Data Input

Data input refers to the method or manner in which data is entered into a computer system or database. It defines how and when the data is provided to the system, whether in real-time, in batches, or from a direct or remote source.

1. **Direct Data Input**
   Data is input into the system directly without the need for user interaction during the input process. This could be done through devices like barcode scanners or sensors that input data automatically into a system.

2. **Remote Data Input**
   In this mode, data is input into the system from a remote location, typically over a network. The system is specially designed to store and process data from different geographical places, such as data entered at a branch office being sent to a central database.

3. **Online Data Input**
   Data is input into the system in real-time as transactions occur. Online data input is immediate, allowing for instant updates to databases or systems, such as when a customer makes a purchase on an e-commerce site.

4. **Offline Data Input**
   Data is input into the system at a later time, typically in batches, rather than in real-time. In this method, transactions are recorded and stored temporarily, and then processed in batches during off-peak hours or at scheduled intervals, like uploading files once a day.

Data Processing

Data processing refers to the sequence of actions taken to collect, manipulate, and analyze data in order to produce meaningful information.

1. **Batch Processing**: Data is collected and stored until a specific time when it is processed in a "batch." This method is efficient for handling large volumes of data, and it is commonly used in systems like billing and payroll.

2. **Real-Time Processing**: Data is processed immediately as it is entered into the system, with input, processing, and output occurring simultaneously. This type of processing is used in systems such as monitoring systems, booking systems, and automated systems in fields like manufacturing, aviation, and power plants.

Data Output

Direct Presentation to User: Output can be presented directly to the user via various devices:

- **Monitors**: Used to display soft copies (digital content) to the user.
- **Multimedia Projectors**: Used for displaying digital content on larger surfaces (often for presentations).
- **Printers**: Used for producing hard copies (physical printed copies) of the data.

Data Storage

Storage methods refer to the techniques and devices used to save, manage, and retrieve data in a computing system. These methods can be categorized into:

1. **Local Storage**: Data is stored directly within the computer using physical devices:

   - **Hard Disk Drives (HDD)**: A common storage device for saving large amounts of data.
   - **Compact Discs (CD)**: Used for storing smaller amounts of data.
   - **Digital Versatile Discs (DVD)**: Similar to CDs but with higher storage capacity.
   - **Tape Drives**: Used primarily for backup and archiving large volumes of data.

2. **Remote Storage**: Data is stored off-site on the internet or through cloud services, offering remote access when needed. This requires internet connectivity for retrieval and management. Examples include cloud storage platforms like Google Drive or Dropbox.

Investigates the application of ICT in different domains

Education

- Computer-Based Education (CBE): Involves control, delivery, and evaluation of learning through computers.
    1. Simulations: Computer programs help perform experiments that are impossible in real life, especially in fields like medicine and engineering.
    2. Distance Learning & E-Learning: Learning remotely without needing to travel to a learning center.
    3. Better Content Delivery: Multimedia and interactive content make lessons more engaging.
    4. Individualized Learning: ICT helps tailor learning to individual student needs.

Healthcare

- Computerized Systems in Healthcare: Used for patient records, diagnostics, and surgeries.

    1. Diagnostic Systems: Help diagnose illnesses by analyzing data.
    2. Lab Diagnostics: Tests and report generation are done by computers.
    3. Patient Monitoring: Monitors patient health signs (e.g., ECG).
    4. Pharmacy Systems: Computers check drug details like expiry and side effects.
    5. Surgery: Computers assist in surgeries.

Agriculture

- ICT in Agriculture: Used to control greenhouse conditions, monitor plant growth, and automate farming tasks.

    1. Robotics: Used for plant monitoring, harvesting, and controlling pests.
    2. RFID: Tracks livestock in farmhouses.

Business & Finance

- Use in Business: Computers aid in payroll, budgeting, sales analysis, and stock management.

    1. Banking: Online services for account management, ATM machines for withdrawals.
    2. Marketing & Advertising: Computers help create graphics, animations, and home shopping catalogs.

Engineering

- CAD (Computer-Aided Design): Helps design and modify engineering drawings and 3D virtual models.
- CASE (Computer-Aided Software Engineering): Assists in software development processes like coding and testing.

Tourism

- **Internet & Tourism**: The Internet has made it easier to find tourist information, book services, and communicate with travel agencies.

Media & Journalism

- **ICT in Media**: Facilitates content creation, sharing, and global communication for news outlets.

Law Enforcement

- **ICT in Law Enforcement**: Helps in recording, storing, and analyzing information for investigations.
- **Tools**: CCTV, GPS, and telecommunication systems support criminal investigations.

Evaluates the impact of ICT in the society

Social and Economic Benefits of ICT

- Social Benefits:
  ICT enhances communication, allowing people to connect through online platforms like social media, gaming, and chat, improving entertainment and leisure.

- Economic Benefits:
  ICT drives economic growth by increasing productivity in sectors like manufacturing and labor, contributing to higher GDP and trade.

- Productivity Boost:
  Embracing ICT improves productivity at individual and business levels, resulting in better efficiency and performance.

- Global Information Access:
  ICT bridges the gap for global information access, improving the flow and dissemination of information worldwide.

- Cloud Computing:
  Provides better applications, services, security, and reliable information availability, enhancing overall business and individual efficiency.



Social, economic, environmental, ethical, legal and privacy issues caused by ICT

- **Job Losses**: ICT adoption can lead to job losses as automation and computers reduce the need for human workers.

- **Health Issues**: Prolonged ICT use for entertainment, such as gaming, can lead to physical problems like eye strain, repetitive strain injury (RSI), and wrist/hand issues.

- **Digital Divide**: Refers to the inequality in access to ICT, with some people having more resources and knowledge than others. Bridging this gap requires better access to technology and ICT education.

- **E-Waste**: Electronic waste poses an environmental hazard as toxic chemicals like lead and arsenic can contaminate soil and water. E-waste recycling and green computing practices are necessary to mitigate this issue.

- **Intellectual Property and Ethics**: Intellectual property rights for digital materials like software, music, and academic content are difficult to protect. Additionally, not all internet users follow proper net etiquette, leading to ethical issues.

Bad Practices in the world of ICT

1. **Phishing**: A fraudulent attempt to steal sensitive information like usernames, passwords, or credit card details by pretending to be a trustworthy entity. To protect against phishing, use firewalls, strong passwords, and avoid opening suspicious emails or clicking on untrusted links.

2. **Piracy**: The illegal copying, distribution, or use of software without authorization.

3. **Intellectual Property (IP) Laws/Copyright**: IP laws protect the rights of creators of original works, such as books, inventions, and artwork. These laws prevent unauthorized use or reproduction of someone else's intellectual property.

4. **Plagiarism**: The act of stealing someone else's ideas, thoughts, or work and presenting them as one's own original work

Licensed Vs Unlicensed Software

Licensed Software

- **Licensed Software** refers to software that comes with a legal agreement (the **license**) that defines how the software can be used, distributed, and modified.

- The two main categories of **licensed software** are:
    1. **Proprietary Software**: This type of licensed software is owned by a company or individual, and the license usually restricts the user from modifying or redistributing the source code.

    2. **FOSS (Free and Open Source Software)**: This type of licensed software allows users to access, modify, and distribute the source code, usually under an open-source license.

The key point here is that both **Proprietary Software** and **FOSS** are **licensed**—they come with a legal license that defines how the software can be used, but the nature of those licenses differs.

- **Proprietary Software** has restrictive licenses that limit user rights (e.g., you cannot modify the source code).
- **FOSS** has more permissive licenses that allow users to freely modify and redistribute the software.

Therefore, **Proprietary** and **FOSS** are both subcategories of **licensed software** and are essential for understanding the broader concept of software licensing.

Unlicensed Software

Unlicensed Software refers to software that is either **not legally authorized** for distribution or use, or is distributed outside of the official licensing agreements.

Eg: Old Video Games