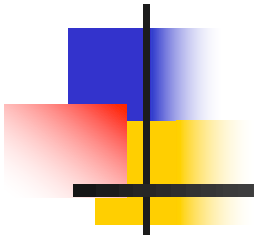
Hanoi University of Science and Technology - SOICT

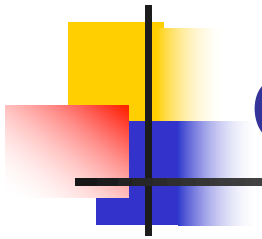


Introduction to ICT

(INFORMATION AND COMMUNICATION TECHNOLOGY)

LECTURE 1

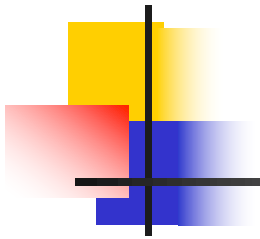
Introduction and Overview



Contents

1. Basic Concepts of ICT

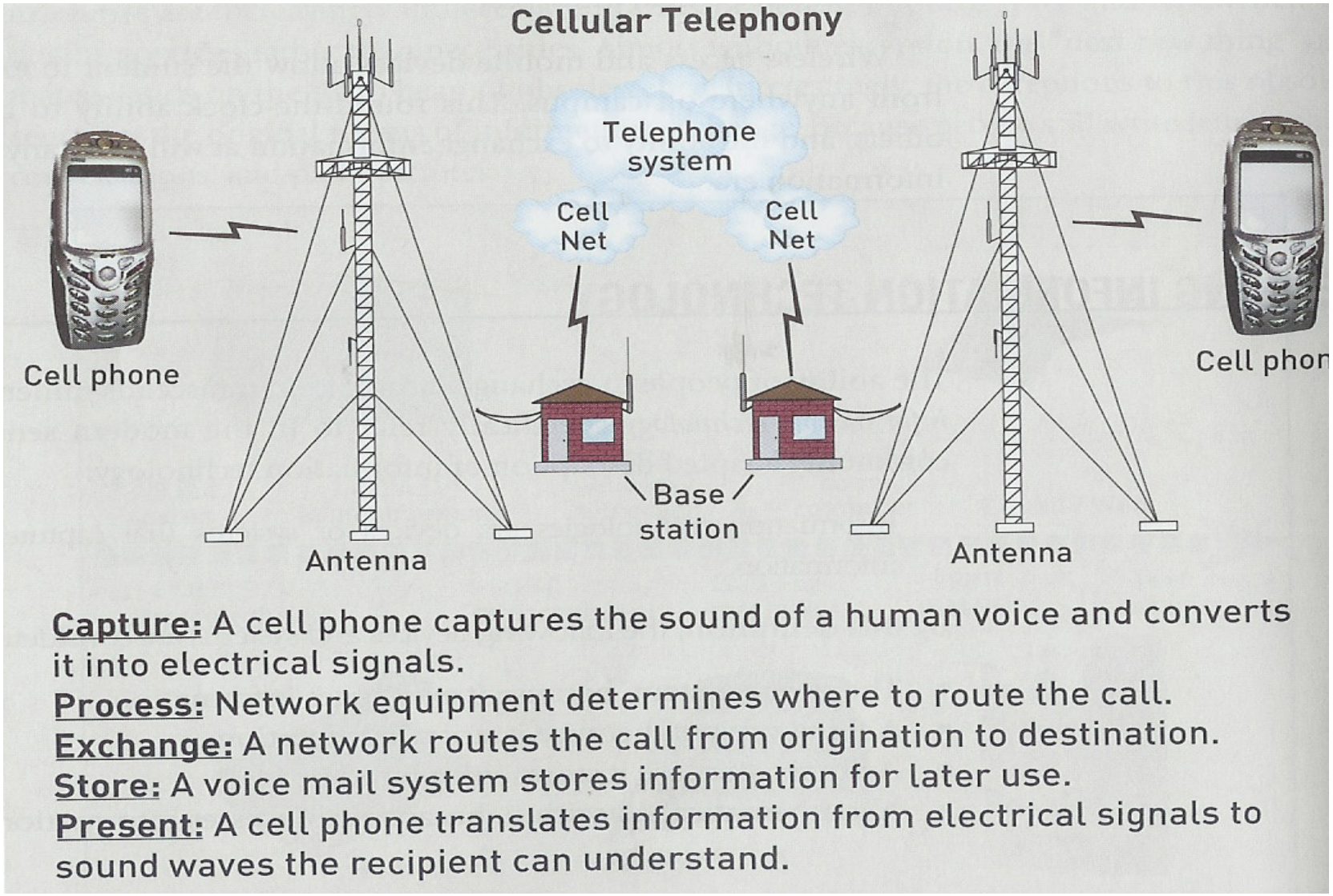
- *Informatics (Computer Science):* The science of Computer and information processing on computer.
- *Information Technology* – IT (or so-called *Information Technology and Communication* – ICT recently) is the combination of Informatics and Communication Technology



Defining Information Technology

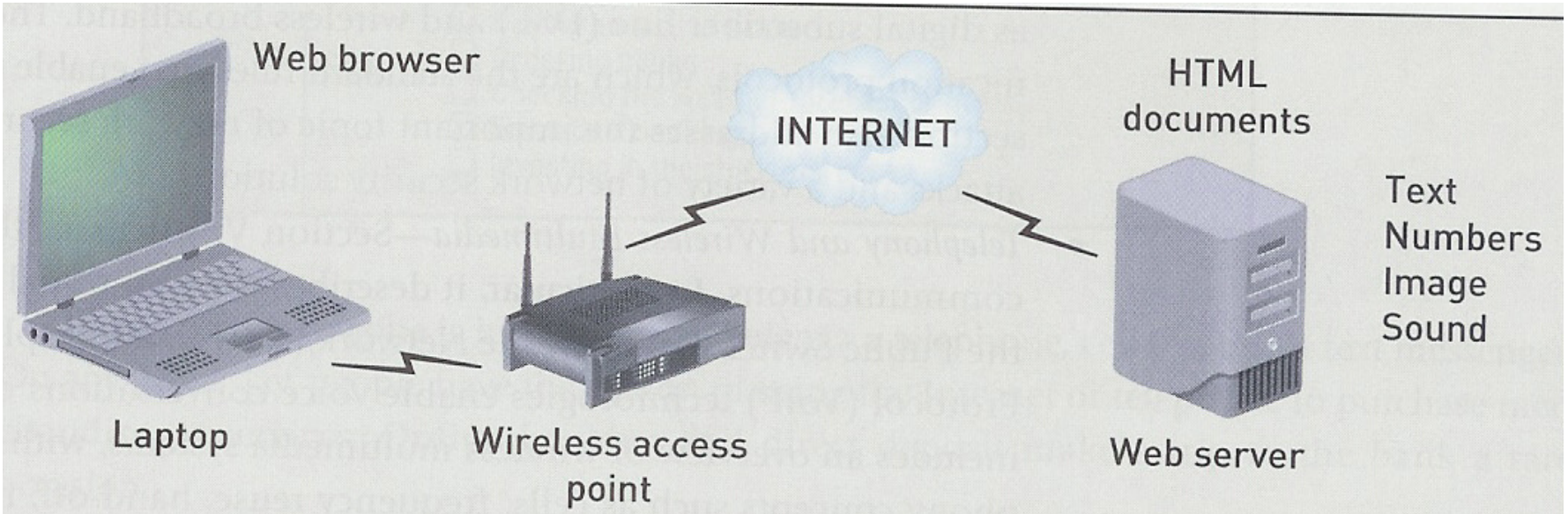
- **Information Technologies (IT)** are systems of hardware and/or software that capture, process, exchange, store and/or present information using electrical, magnetic and/or electromagnetic energy.

IT Example: Cellular Telephony



Capture: A cell phone captures the sound of a human voice and converts it into electrical signals.
Process: Network equipment determines where to route the call.
Exchange: A network routes the call from origination to destination.
Store: A voice mail system stores information for later use.
Present: A cell phone translates information from electrical signals to sound waves the recipient can understand.

IT Example: Wireless Internet



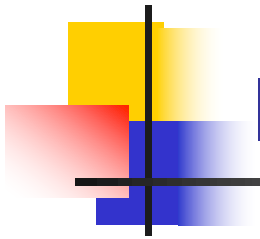
Capture: A Web designer captures multimedia information in HTML format.

Process: A Web server processes information like reservations or transactions.

Exchange: Information is exchanged from the Web server over the Internet to a wireless access point and to a Wi-Fi enabled laptop.

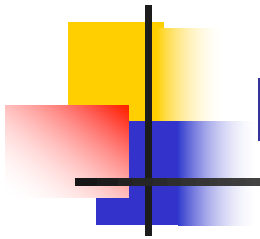
Store: The Web server stores information content.

Present: Information is conveyed to a user via a Web browser on a laptop.



IT in Society (people)

- Personal Communication
  - Conversations (phone, cell)
  - Messaging (E-mail, SMS)
  - Video Coms
- Entertainment
  - Web surfing
  - Downloading video and audio files
  - Interactive gaming
- Day-to-Day living
  - Buying airline tecket
  - Ordering books
  - Electronic banking/ stock market



IT in Society (business)

- Internal Communication
  - Computer network
  - Corporate website
  - Video teleconferencing
  - Messaging (SMS, email)
- Electronic Commerce
  - Call Centres
  - Electronic transactions
  - Online sales
- Business operations
  - Factory operation systems
  - Databases

Examples on IT Careers

- Information Security Jobs
  - Address information security
- IT Analyst
  - Translate business requirement into technical specification
- Network Administration
  - Configure and operate computer network
- Management Consulting
  - Provide consulting for government and organizations
- Database Administration
  - Managing corporate database
- Computer Forensics Expert
  - Extracts computer evidence for detecting/preventing /prosecuting crimes
- IT Sales:
  - people on frontline to sell products
- Software development:
  - develop software solutions

ICT IN DIFFERENT SUBJECTS

A) ICT IN NATURAL SCIENCE

- Spread sheet to tabulate calculate results
- To see visual effect of manipulating variable
- To draw charts
- Composing documents &presentation

B) ICT IN MATHS

- Students can use applets available on internet for performing mathematical problem
- Can use modelling packaging like mathematacia
- Suitable statistical software tools (ex. Excel) to eliminate hours of calculation

C) ICT IN SOCIAL SCIENCE

- For presentation of topic using graphics
- Use spreadsheet for listing dates, events, countries & person involved
- Report making on Social & ethical issues via Internet

2. Information System

Five main parts of an Information System (IS):

- People (end users): the most important factor that contribute to the success of an Information System. Computers are all to make people more productive.
- Procedures: rules or guidelines for people to follow when using software, hardware, and data, always need to be well-documented.
- Software: so-called Computer Programs, consists of the step-by-step instructions that tell the computer how to do its work to convert data into information of vice versa.
- Hardware: The equipment that processes the data to create information, is controlled by software.
- Data: The raw, unprocessed facts, including text, numbers, images, and sounds. Information is made by Data Processing Procedures in Computer.

Five main parts of an Information System

An additional factor: ***Connectivity*** is becoming more and more important, provide a shared collaboration environment to enable network applications.

3. People

People
Are end users who use computers to make themselves more productive

- The key and most important factor of any Information System.
- Computer was designed to meet people's need, to serve people.
- Requirement:
  - Competent skills with Computer.
  - In-depth know-how of Computer and Information Technology.

3. People

Computers in Medicine and Education

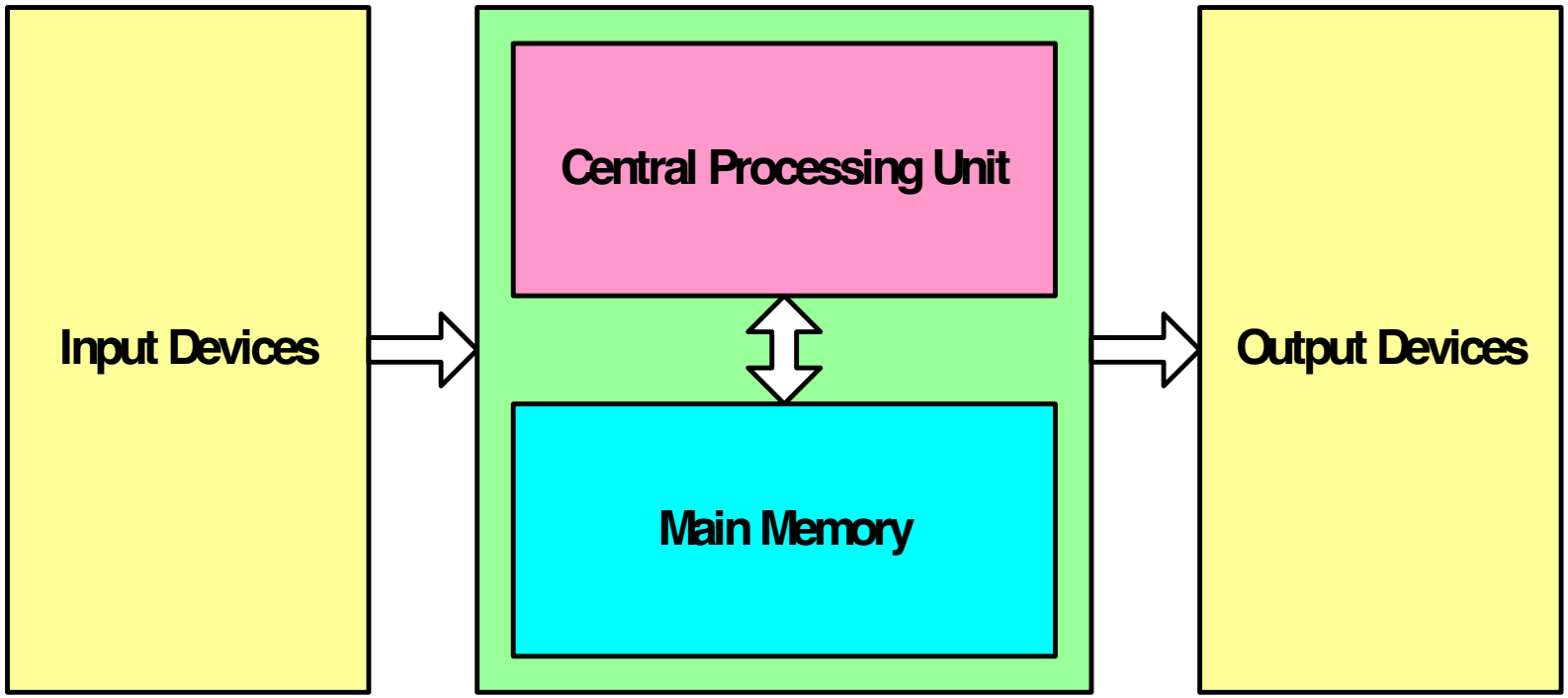
…human must be the central factor !

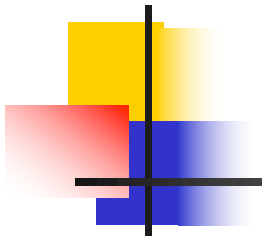
4. Computer Hardware

- Computers are electronic devices that can follow instructions to accept input, process that input, then produce information.
- Computer program is a sequence of instructions stored in memory which is used to guide the computer to manage a specified task

→ Working principle: follow instructions from a stored-program (software).

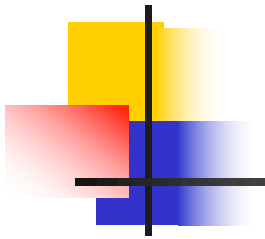
Fundamental model of Computer





Computer classification

- Supercomputer
- Mainframe Computer
- Minicomputer
- Microcomputer



Supercomputers & Mainframe Computer

- Super fast and expensive
- Suitable for big problem/application which require a huge amount of data processing
- Examples: Deep Blue, Blue Gene
- Typical applications:
  - Earth simulation
  - Weather forecast, earth quakes, tsunamis…
  - Geological simulation to locate oil-fields
  - Nuclear explosion simulation

Supercomputer

The Earth Simulator running simulations of global climate (NEC, Japan 2002)

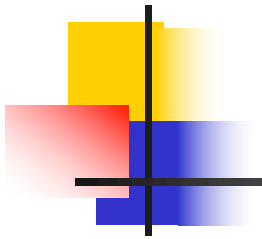
Mainframe

IBM eServer zSeries 990 (2003)

Minicomputer

Sun Fire V490 Server

Sun Fire E4900 Server



Microcomputers

- Desktop Computers
- Notebook Computers, Laptop Computers
- Handheld Computers, Palmtop Computers, PDA - Personal Digital Assistants

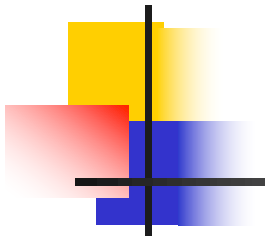
Microcomputers

Microcomputer hardware

- System Unit: Chassis, Mainboard, Microprocessor, Memory, I/O Cards, Power Supply.
- Input/Output devices: keyboard, mouse, monitor, printer …
- Storage devices: Floppy / Hard disk drives, Optical drives (CD/DVD), Flash drives.
- Communication and Network devices: Modems, NICs…

5. Computer Software

- Software are all computer programs.
- Program is a sequence of instructions to tell the computer how to process data and produce output information following user requirement.
- 2 major kinds:
  - System software
  - Application software

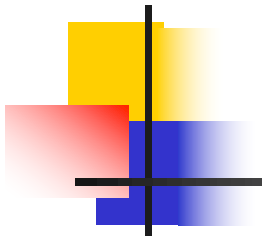


System software

- **System software** enables the application software to interact with the computer hardware – background software.
  - **Operating systems:** programs that control computer resources, provide users-computer interface, and run applications.
    - Windows XP, MacOS, Linux, ...
  - Utilities: specific tasks like Disk Defragment, Compress/Decompress files
  - Device drivers: control I/O devices

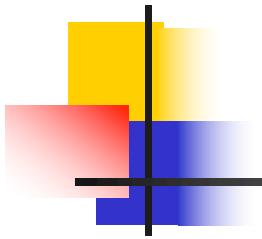
Application software

- **Application software:** end-user software, including *general-purpose and special-purpose applications.*
- There are many types of application software:
  - Office software
  - Management software
  - e-Learning software
  - e-Commerce software
  - e-Library software
  - Graphics & Image Processing software
  - Multimedia software
  - CAD – Computer Aided Design software
  - Communication software
  - Entertainment software
  - Web Pages
  - ...



6. Data and Information

- Data are raw, unprocessed facts, including text, numbers, images, and sounds. Processed data will become information.
- Information is the data processed with people's requirement.
- All the data must be represent in binary format to be stored and processed by computer.
- Data is stored in computer in files: document, music, video, spreadsheet, database…

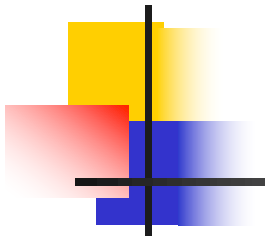


Basic data types

- Numbers
- Text
- Sounds
- Images
- …

Unit of information

- Bit (Binary Digit): basic unit of information in computer, taking a value of either 0 or 1 .
- Byte: a combination of 8 bits, can represent 256 different values (2^8)
- KB (Kilobyte) = 2^{10} bytes = 1024 bytes
- MB (Megabyte) = 2^{10} KB = 2^{20}bytes (10^6)
- GB (Gigabyte) = 2^{10} MB = 2^{30}bytes (10^9)
- TB (Terabyte) = 2^{10} GB = 2^{40}bytes (10^{12})
- PB (Petabyte) = 2^{10} TB = 2^{50}bytes
- EB (Exabyte) = 2^{10} PB = 2^{60}bytes



7. Computer Network and the Internet

- **Connectivity** is the capability to share information between microcomputer over distance or space.
- Computer Network: multiple computers are connected to share data and resources.
- Internet: world-wide computer network.
- World Wide Web (www): a service provides standardized interface to access multimedia resources on the Internet.