

GSP2203: Information and Communication Technology (ICT)

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Learning Objectives

After reading this unit, you will be able to:

- Define and explain the notion of Information and Communication Technology
- Describe the scope of ICT domain and its evolution
- List and explain the standard ICT Tools and appreciate the various ICT Skills
- Discuss ICT applications across various disciplines
- Appreciate the growth and challenges in the Nigeria's ICT sector

1. Information Communication Technology (ICT)

1.1 Definition of ICT

There are various views to defining the notion of ICT across the world; the term Information Technology (IT) first appeared in a 1958 article published in the Harvard Business Review, in which authors Leavitt and Whisler commented that "the new technology does not yet have a single established name. We shall call it *information technology*" (Phillips, 2000). Among the commonly used definitions is:

Definition: ICT is the acquisition, processing, storage and dissemination of vocal, pictorial, textual and numerical information by a microelectronics-based combination of computing and telecommunications (Karl, 1961).

1.2 Domain of ICT

ICT domain entails anything that renders data, information or perceived knowledge in any visual format whatsoever, via any multimedia distribution mechanism.

ICT spans wide variety of areas that include but are not limited to things such as processes:

- Computer software
- Information systems
- Computer hardware
- Programming languages
- Data management

ICT professionals perform a variety of functions that include:

- Development and Installation of Applications
- Designing complex computer networks,
- Design and management of Information databases
- Data management
- Software designs as well as
- Management and administration of entire systems.

ICT has spread beyond Personal computers and network technology, into integrations of other technologies such as the use of smart phones, Internet TVs, Autonomous automobiles, etc.

1.3 ICT Tools

Computer is considered to be the backbone of the entire ICT domain.

1.3.1 Definition: A computer is a programmable Machine designed to sequentially and automatically carry out a sequence of arithmetic or logical operations. The particular sequence of operations can be changed readily, allowing multitasking and parallel processing.

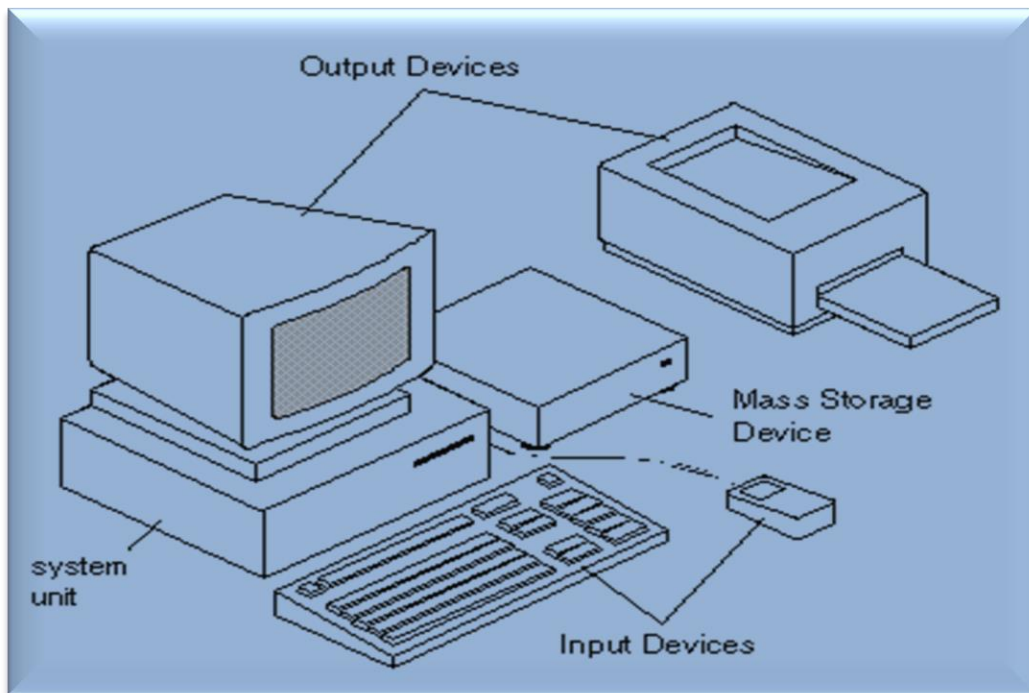


Figure 1: A Personal Computer System

1.3.2 Computer System Components: Conventionally a computer (Figure 1) consists of some form of memory for data storage, Central processing unit that carries out arithmetic and logic operations, and a sequencing and control element that can change the order of operations based on the information that is stored. Peripheral devices allow information to be entered from external sources, and allow the results of operations to be sent out.

1.3.3 Evolution of Computer: The first use of the word "computer" was recorded in 1613, referring to a person who carried out calculations, or computations, and the word continued with the same meaning until the middle of the 20th century. From the end of the 19th century onwards, the word began to take on its more familiar meaning, describing a machine that carries out computations.

Early Computers

First electronic computers were developed in the mid-20th century (1940–1945). Originally, they were the size of a large room, consuming as much power as several hundred modern computers. During the first half of the 20th century, many scientific computing needs were met by increasingly sophisticated analog computers that used a direct mechanical or electrical model of the problem as a basis for computing. However, these were not reprogrammable and generally lacked the versatility and accuracy of modern digital computers. The ENIAC computer, which became operational in 1946, is considered to be the first general-purpose electronic computer.

Modern Computers

Modern computers, based on integrated circuits (*digital electronics*), are billions of times more capable than the early machines, and occupy a fraction of the space.

Simple computers are small enough to fit into mobile devices, and can be powered by a small battery. Personal computers in their various forms are icons (Figure 4) of the Information Age. The history of the modern computer begins with two separate technologies: **automated calculation and re-programmability**.



Figure 4: Modern Computer Devices

Early vs. Modern Computers

The defining feature of modern computers which distinguishes them from all other machines is that they can be Programmed and reprogrammed. Modern computers often have machine code in the form of a programming language.

A computer program may be just a few instructions or extend to millions of instructions. Examples are the programs for word processing and web browsing. A typical modern computer can execute billions of instructions per second (gigaflops) and rarely makes a mistake over many years of operation.

1.4 ICT Skills

The diversity of ICT skills is growing at a fast pace; some of the typical skills include:

i. Computer Networking: Computer Networking deals with communication between computer systems or devices. A computer network is any set of computers or devices connected to each other with the ability to exchange data. Examples of different networks are:

- Local area network (LAN)
- Wide area network (WAN)
- Wireless LANs (WLAN)
- Wireless WANs (WWAN)
- Grid and Cloud Computing, etc.

ii. Information Technology Infrastructure Library (ITIL): is a set of concepts and techniques for managing IT infrastructure, development, and operations. ITIL is the most widely accepted approach to IT service management in the world. ITIL provides a cohesive set of best practices, drawn from the public and private sectors internationally.

iii. Information Security: Refers to protecting information and information systems from unauthorized access, use, disclosure, disruption, modification, or destruction. The goals of information security include protecting the confidentiality, integrity and availability of information. Accessibility across various devices is paramount, see Figure 5.



Figure 5: Secured Wireless Networks

iv. Media: The modernization of the conventional media (Radio, Television, Telephony, etc.) and the development of *social networks* stem from innovations in advanced digital hardware as well as design and development of software applications suitable for both fixed and mobile computing devices. Today, with the social media, the speed at which information (voice, video and data) go around the world outpaced any form of conventional mechanisms.

1.5 Applications of ICT

Information Technology is used in different ways:

- i. Connectivity
- ii. Navigation
- iii. Project management
- iv. Reporting
- v. Interactivity
- vi. Manufacturing
- vii. Document and Data processing
- viii. Space Exploration and Surveillance

1.6 Nigeria's ICT Sector: Growth and Challenges

The growth of ICT is changing the way economic and social development occurs in most countries. New ICT-related tools have been known to:

- make institutions and markets more productive;
- enhance skills and learning;
- improve governance at all levels; and
- make it easier for services to be accessed

In Nigeria, the advent of democracy led to noticeable gains in ICT use. There are indeed indications that considerable progress had been made in the information technology and telecoms sector since the advent of democracy, in Nigeria. Awareness of the potentials of using IT to transform the nation's economy is already widespread among policy makers and leaders of the organised private sector. This is evident from the **establishment of several ICT related agencies, organizations and institutions** around the nation.

In a Research ICT Africa (RIA) survey, reported by (Odufuwa, 2012), the Nigerian telecommunications market is fully liberalised, highly competitive, and evolving with time. Since 1992, a wide range of regulatory initiatives has been undertaken to open up the market to private operators to provide products and services across the entire spectrum of ICT domain. These initiatives, particularly in relation to market entry, have resulted in an impressive 53% compound annual growth rate (CAGR) in overall fixed and mobile subscriptions since 2001. Quarterly telecommunications sectoral growth is up to 35%, and the sector's annual contribution to GDP was estimated at 6.73% in 2012 (Odufuwa, 2012).

Challenges

In spite of the widely publicised successes, the RIA *Sector Performance Review* index (Odufuwa, 2012), shows that Nigeria lags behind many other African countries with respect to a number of market indicators. Among the surveyed countries, Nigeria ranks 5th with respect to mobile penetration and 5th in terms of industry perception of the effectiveness of domestic telecommunications regulation.

Similarly, a report by the International Telecommunication Union (ITU) on most advanced countries in ICT also showed that out of the top 154 countries, the Third World and developing nations are missing.

Remediation

While the prospects for the Nigerian ICT sector seem promising, achieving the necessary scale and pace of growth is predicated on finding the correct mix of regulatory initiatives, government interventions and creation of good enabling environment as well as incentives for the operators for the rapid growth of ICT at the Local, States and Federal level.

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