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INFORMATION AND COMMUNICATIONS TECHNOLOGIES (ICT)

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ABSTRACT

Information and communications technology usually abbreviated as **ICT**, is often used as an extended synonym for information technology (IT), but is usually a more general term that stresses the role of unified communications and the integration of telecommunications (telephone lines and wireless signals), computers, middleware as well as necessary software, storage- and audio-visual systems, which enable users to create, access, store, transmit, and manipulate information. In other words, ICT consists of IT as well as telecommunication, broadcast media, all types of audio and video processing and transmission and network based control and monitoring functions. The expression was first used in 1997 in a report by Dennis Stevenson to the UK government and promoted by the new National Curriculum documents for the UK in 2000.

The term *ICT* is now also used to refer to the merging (convergence) of audio-visual and telephone networks with computer networks through a single cabling or link system. There are large economic incentives (huge cost savings due to elimination of the telephone network) to merge the audio-visual, building management and telephone network with the computer network system using a single unified system of cabling, signal distribution and management. This in turn has spurred the growth of organizations with the term ICT in their names to indicate their specialization in the process of merging the different network systems.

INTRODUCTION

BACKGROUND

Information and Communications Technologies (ICT) advances since the end of the 20th Century have led to multiple convergences of content, computing, telecommunications and broadcasting. They have brought about changes in other areas, particularly in knowledge management and human resources development. Increasing capacity of ICT has further been empowered by the growth of a global network of computer networks known as the Internet. It has impacted the way business is conducted, facilitated learning and knowledge sharing, generated global information flows, empowered citizens and communities in ways that have redefined governance, and have created significant wealth and economic growth resulting in a global information society.

Stands for "Information and Communication Technologies." ICT refers to technologies that provide access to information through telecommunications. It is similar to Information Technology (IT), but focuses primarily on communication technologies. This includes the Internet, wireless networks, cell phones, and other communication mediums.

In the past few decades, information and communication technologies have provided society with a vast array of new communication capabilities. For example, people can communicate in real-time with others in different countries using technologies such as instant messaging, voice over IP (VoIP), and video-conferencing. Social networking websites like Facebook allow users from all over the world to remain in contact and communicate on a regular basis.

Modern information and communication technologies have created a "global village," in which people can communicate with others across the world as if they were living next door. For this reason, ICT is often studied in the context of how modern communication technologies affect society.

DEFINITION

According to the European Commission, the importance of ICTs lies less in the technology itself than in its ability to create greater access to information and communication in underserved populations. Many countries around the world have established organizations for the promotion of ICTs, because it is feared that unless less technologically advanced areas have a chance to catch up, the increasing technological advances in developed nations will only serve to exacerbate the already-existing economic gap between technological "have" and "have not" areas. Internationally, the United Nations actively promotes ICTs for Development (ICT4D) as a means of bridging the digital divide.

The definition of ICT needs a serious consideration of the general confusion in the understanding of the word 'Technology' - for without a clear understanding of 'Technology' much of the rest of this site cannot hang together. Quite simply, as I declared in my Presidential Address (EIDCT 1987) "*Technology Is Not Things - but People*". Prof. G B Harrison (Ex Trent Polytechnic) gives us this definition:

Technology *is the process of using scientific, material and human resources in order to meet human need or purpose*.

If we then consider a simple definition of **Information** as '*that which can be communicated and understood',* we can then put together a basic definition of IT as:

Information Technology is *the use of information in order to meet human need or purpose.*

The definition of **ICT therefore became:** *the use of information in order to meet human need or purpose including reference to the use of contemporary devices such as the Internet.* However, in an ever-changing world of Video-phones, mobile computing, blogs, Skype and OSS perhaps we should no longer just include the Internet, but leave the definition at 'contemporary devices...?'

Vision

The National ICT Policy is aligned to the following vision statement:

"Tanzania to become a hub of ICT Infrastructure and ICT solutions that enhance sustainable socio- economic development and accelerated poverty reduction both nationally and globally."

Mission

The overall mission of this Policy is:

"To enhance nation-wide economic growth and social progress by encouraging beneficial ICT activities in all sectors through providing a conducive framework for investments in capacity building and in promoting multi-layered co-operation and knowledge sharing locally as well as globally."

ICT

Lets focus on the three words behind ICT:

INFORMATION

COMMUNICATIONS

TECHNOLOGY

CT covers any product that will store, retrieve, manipulate, transmits or receives information electronically in a digital form. For example, personal computers, digital television, email, robots.

So ICT is concerned with the **storage**, **retrieval**, **manipulation**, **transmission** or **receip**t of digital data. Importantly, it is also concerned with the way these different uses can work with each other.

In business, ICT is often categorised into two broad types of product: -

(1) **The traditional computer-based technologies** (things you can typically do on a personal computer or using computers at home or at work); and

(2) The more recent, and fast-growing range of **digital communication technologies** (which allow people and organisations to communicate and share information digitally)

Let's take a brief look at these two categories to demonstrate the kinds of products and ideas that are covered by ICT:

Traditional Computer Based Technologies

These types of ICT include:

Application	Use
Standard Office Applications - Main Examples	
Word processing	E.g. Microsoft Word: Write letters, reports etc
Spreadsheets	E.g. Microsoft Excel; Analyse financial information; calculations; create forecasting models etc
Database software	E.g. Oracle, Microsoft SQL Server, Access; Managing data in many forms, from basic lists (e.g. customer contacts through to complex material (e.g. catalogue)
Presentation software	E.g. Microsoft PowerPoint; make presentations, either directly using a computer screen or data projector. Publish in digital format via email or over the Internet
Desktop publishing	E.g. Adobe Indesign, Quark Express, Microsoft Publisher; produce newsletters, magazines and other complex documents.
Graphics software	E.g Adobe Photoshop and Illustrator; Macromedia Freehand and Fireworks; create and edit images such as logos, drawings or pictures for use in DTP, web sites or other publications
Specialist Applications - Examples (there are many!)	
Accounting package	E.g. Sage, Oracle; Manage an organisation's accounts including revenues/sales, purchases, bank accounts etc. A wide range of systems is available ranging from basic packages suitable for small businesses through to sophisticated ones aimed at multinational companies.

Computer Aided Design

Customer Relations Management (CRM)

Computer Aided Design (CAD) is the use of computers to assist the design process. Specialised CAD programs exist for many types of design: architectural, engineering, electronics, roadways

Software that allows businesses to better understand their customers by collecting and analysing data on them such as their product preferences, buying habits etc. Often linked to software applications that run call centres and loyalty cards for example.

Traditional Computer Based Technologies

The C part of ICT refers to the **communication** of data by electronic means, usually over some distance. This is often achieved via **networks** of sending and receiving equipment, wires and satellite links.

The technologies involved in communication tend to be complex. You certainly don't need to understand them for your ICT course. However, there are aspects of digital communications that you needs to be aware of. These relate primarily to the **types of network** and the ways of connecting to the Internet. Let's look at these two briefly (further revision notes provide much more detail to support your study).

Internal networks

Usually referred to as a **local area network (LAN)**, this involves linking a number of hardware items (input and output devices plus computer processing) together within an office or building.

The aim of a LAN is to be able to share **hardware** facilities such as printers or scanners, software applications and data. This type of network is invaluable in the office environment where colleagues need to have access to common data or programmes.

External networks

Often you need to communicate with someone outside your internal network, in this case you will need to be part of a **Wide Area Network (WAN**). The Internet is the ultimate WAN - it is a vast network of networks.

ICT IN A BROADER CONTEXT

Your ICT course will almost certainly cover the above examples of ICT in action, perhaps focusing on the use of key applications such as spreadsheets, databases, presentation, graphics and web design software.

It will also consider the following important topics that deal with the way ICT is used and managed in an organisation:

The nature of information (the "I" in ICT); this covers topics such as the meaning and value of information; how information is controlled; the limitations of ICT; legal considerations

Management of information - this covers how data is captured, verified and stored for effective use; the manipulation, processing and distribution of information; keeping information secure; designing networks to share information

Information systems strategy - this considers how ICT can be used within a business or organisation as part of achieving goals and objectives

As you can see, ICT is a broad and fast-changing subject. We hope our free study materials (revision notes, quizzes, presentations etc) will help you master IT

USE OF INFORMATION AND COMMUNICATION TECHNOLOGY

ICT provided by the University for the use of employees, students and other members of the University community is the property of the University, and is intended to be used in a manner that is consistent with the University's mission.

These guidelines apply to all of the University's information and communication technologies, including, hardware such as personal computers, personal digital assistants, telephones and printing devices, as well as software and other forms of information and communication technology that exist today or may be developed in the future. The use of personally-owned equipment on the University's networks is covered by these guidelines as this also involves the use of University resources.

Additionally, these guidelines address the services that are provided through the University's ICT, including e-mail, Internet access, departmental network services, telephone, fax and voice-mail, and other technologies. Moreover, as information technology protocols, applications, utilities and services are constantly changing, nothing in these guidelines restricts the authority of the relevant offices from initiating new rules or guidelines as circumstances dictate or as technology evolves.

Users of University ICT are expected to limit their use to the performance of University-related activities, although a reasonable allowance will be made for personal use. Whether or not an amount of personal use would be considered reasonable would depend on the particular circumstances and the applicable laws and policies. Users of University ICT are required to abide by all applicable laws and policies in addition to these guidelines. Reasonable personal use does not include in any circumstances the visiting of pornographic websites, the storage or distribution of pornographic material, or the accessing, storage or distribution of unlawful or otherwise inappropriate (within the meaning of the guidelines) information.

STRATEGIES FOR SUSTAINED ICT GROWTH IN INDIA

- Improving the quality of Education
- Increasing the number of Universities and colleges
- Industry Academic linkages
- Providing High bandwidth Data-com Network
- Tax incentives for R&D
- Setting-up dedicated VC funds for ICT dev
- Promotion of IP development

PRODUCT AND TECHNOLOGY COMPANIES

- The last two to three years have seen seeding and growth of many technology and product-led companies in India
- Ranking high on scalability and cost, India is becoming the destination of choice for IT-enables services
- A large number of product and technology initiatives in India have been the brainchild of professionals with experience at leading technology companies
- Components and technology licensing represent an even bigger opportunity for India companies.

STRATEGIES TAKEN FOR BRIDGING THE DIGITAL DIVIDE

- Linking the Rural India with Urban India
- Distance Education
- Implementation of E-Governance projects
- Drive for Local /Regional Language support
- Promotion of IT enabled services

  industry in the rural India

STRATEGIES

- Getting enablers in place Decision making bodies, institutions, policies, IT Architecture
- Defining thrust areas
- Catalyzing creation of infrastructure
- Leveraging private sector initiative
- Accelerating emergence of a knowledge hub
- Generating the right social environment

INFRASTRUCTURE FOR E-GOVERNANCE

- APSWAN (AP State Wide Area Network)
  - Connects Hyderabad to 25 cities & towns in AP
  - Provides connectivity for data, voice and video
  - Video-conferencing – enables close monitoring
  - Implemented with private sector funding - BOO model
- AP Secretariat Campus Area Network – 2000 nodes
- Citizens database with 76.7 million records
- Land records database with 12 million records
- Datawarehouse (on PARAM super-computer)
- AP Development Monitoring System on GIS
- IT Architecture, Security Policy & Public Key Infrastructure
- Extensive training infrastructure
  - CIOs programme, Project related training, computer literacy

Services available now

- Utility Bill /Tax Payments
  - Water, Electricity, Property Tax
- Licenses
  - Learner's License, Driving License
  - Registration of new vehicles
  - Change of address / owner of vehicle
  - Trade license
- Certificates
  - Birth, Death certificates
  - Encumbrance Certificates
- ***Valuation Certificates***

Services planned

- Telephone bills
- Filing of applications for passports
- Booking of bus, train tickets
- Reservation of services at TTD
- Filing of various forms, applications
- Private (B2C) services
  - Insurance & financial services
  - Education & healthcare
  - Share transactions
  - Cellular phone bill payments

IT for SMART Governance

- IT for high quality citizen services
  - CARD, MPHS, TWINS, FAST, AP Portal
- IT for high internal efficiencies
  - SKIMS, APDMS, C2K, Treasuries, CMIS
- IT for better enforcement of law

- COMPACT, Police, Excise, Courts

- IT for human resource development

  - MSIT, Ku Band
  - Computer Literacy in Schools
  - PHC project

- IT for Promotion

  - Industries, IT, Welfare, Agricultural Extension

The 6-C model for e-Governance

- Content
- Competencies
- Connectivity
- Cyber-laws
- Citizen interface
- Capital

A World of Opportunity

- Software Development Centres
- Creation of IT infrastructure
- Data Centres
- Implementation of E-Governance projects
  - On BOO & BOOT basis
- Call Centres
- Back Office
- Community Internet Infrastructure
- Hardware Manufacturing Facilities

GLOSSARY

Broadcasting: A term referring to the distribution of information using radio, television, Internet and intranet or webcasting.

Digital Divide: The technological gap between countries that have fully exploited ICT and those that have not. The digital divide is often associated with the resulting gap in terms of economic development.

E-Commerce Electronic Commerce: Business activities involving consumers, manufacturers, suppliers, service providers and intermediaries using computer networks such as the Internet.

Global Information Infrastructure (GII): The components making up a wide area network arising from multiple heterogeneous networks, which facilitate multidimensional communication among different nations, business and organisations.

"Hollowing-out" : The term given to the adverse impact of globalisation and ICT on developing country economies (and their Government revenues) as a result of commercial transactions that are performed electronically and are invisible to their financial institutions and legal frameworks.

Information and Communication Technologies (ICT): Is a generic term used to express the convergence of information technology, broadcasting and communications. One prominent example is the Internet.

Information Based Economy (IBE): A country or region where ICT is used to develop economic foundation and market transactions.

Information Society (IS): A country or region where information technology has been fully exploited and is part of everyday life as an enabler of information sharing, communication and diffusion.

Information Technology (IT): Embraces the use of computers, telecommunications and office systems technologies for the collection, processing, storing, packaging and dissemination of information.

Internet Exchange Point (IXP): It is a "peering point" for Interconnecting ISPs and/or other IXPs for the purpose of localising national traffic routing as opposed to using international routes to accomplish Inter-ISP traffic flow.

Internet Service Provider (ISP) : Also known as Internet Access Providers – Is a company that provides infrastructure for access to the Internet or for interconnecting other ISPs and content-based or application-based services on the Internet.

Knowledge Based Economy (KBE): A country or region where ICT is extensively used to enhance knowledge so that higher human capital brings further improvement to the economy.

Local Area Network (LAN): A computer network that spans a relatively small area. Most LANs are confined to a single building or group of buildings. However, one LAN can be connected to other LANs over any distance via telephone lines and radio waves.

Teledensity: The number of telephones per 100 people in a region.

"Mock up": The possibility of teaching ICT literacy need not be constrained by an absence of computer equipment, since pupils in schools unable to afford such equipment might be guided to construct model computers out of locally available materials. This allows the pupils to gain an understanding of the principles and values associated with computers, networks and peripherals without having real computers in their schools. If teachers were trained accordingly, this type of education will reach even the remotest households. A simile is children making mock-up cars and trucks.

Voice over Internet Protocol (VoIP) : Also known as Voice over Internet, IP Telephony or Internet Telephony – refers to telephone services provided over the Internet as the transmission medium.

Wide Area Network (WAN) : A computer network that spans a relatively large geographical area. Typically, a WAN consists of two or more local-area networks (LANs). Computers connected to a wide-area network are often connected through public networks, such as the telephone system. They can also be connected through leased lines or satellites. The largest WAN in existence is the Internet.

E-L EARNING

Although most commonly associated with higher education and corporate training, e-learning encompasses learning at all levels, both formal and non-formal, that uses an information network—the Internet, an intranet (LAN) or extranet (WAN)—whether wholly or in part, for course delivery, interaction, evaluation and/or facilitation. Others prefer the term online learning. Web-based learning is a subset of e-learning and refers to learning using an Internet mainly using a browser (such as Chrome or Firefox or Internet Explorer).

CATEGORIES

ICT in education can be broadly categorized in the following ways as

- ICT as a subject (i.e., computer studies)
- ICT as a tool to support traditional subjects (i.e., computer-based learning,

presentation, research)

- ICT as an administrative tool (i.e., education management information systems/EMIS)

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