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College of Information and Communications Technology

ITP1132

Social Issues and Professional Practice

Chapter 1: Social Context

LEARNING OUTCOMES

At the end of the lesson, students shall be able to:

1. Understand the history of IT
2. Recognize the transition in Communication and Network Usage
3. Analyze the several stage of innovation in the three main technological fields.

Key Terms

1. Micro-electronics
2. Moore's Law
3. Big Data
4. Node
5. Transmission Control Protocol
6. ARPANET
7. WORLD WIDE WEB
8. Data mining

LESSON 1: History of I.T.



It was during the Second World War, and in its aftermath, that major technological breakthroughs in electronics took place: the first programmable computer and the transistor. Yet it was not until the 1970s that new information technologies became widely diffused, accelerating their synergistic development and converging into a new paradigm. These occurred in several stages of innovation in the three main technological fields: micro-electronics, computers, and telecommunications.

- The transistor made the fast processing of electric impulses in a binary mode possible. This enabled the coding of logic and communication between machines. Semiconductor processing devices integrated circuits or 'chips' are now made of millions of transistors.
- The comparatively 'giant leap' forward occurred in 1971 when Intel introduced the 4-bit 4004 microprocessors, that is the computer on a chip, and information-processing power could thus be installed everywhere
- The observation that the number of transistors in an integrated circuit doubles approximately every two years is referred to as Moore's law (named after Gordon Moore). Practically, there was about a doubling of computer processing power every 18-24 months. This will not continue indefinitely due to physical constraints, but combined with developments in parallel processing, computing capacity is still increasing to this day.
- Also, greater miniaturization, further specialization, and the decreasing price of increasingly powerful chips made it possible to place them in every machine in our everyday life, from dishwashers and microwave ovens to automobiles.

- In the last two decades of the 20th century and the first decade of the 21st, increasing chip power resulted in a dramatic enhancement of micro-computing power. Since the mid-1980s, microcomputers could no longer be conceived of in isolation: they were linked up in networks, with increasing mobility, on the basis of portable computers and later mobile phones. This, along with the capacity to add memory and processing capacity by sharing computing power in an electronic network, decisively shifted the computer age in the 1990s from centralized data storage and processing in mainframes to networked, interactive computer power-sharing and desktop computers. This change did not only affect the whole technological system, but its social and organizational interactions as well.
- Into the 2010s, storage capacity was so cheap and computing power increased enough, that the time of Big Data commenced, where massive amounts of data are analyzed algorithmically to find patterns. Such data may have been collected on purpose for it, such as the measurements to compute the black hole image and brain scan image analyses, or 'on the side' initially and then exploited and collected on purpose, such as online user behavior.

Take Note: Big Data has no single definition, but there are either 3 Vs or 5 Vs associated with it: Volume, Velocity, and Variety, to which Veracity, and Value have been added more recently. That is, respectively the huge amounts of data, the speed at which they are generated, the different types of formats of the data, the trustworthiness of that data, and the money one can make with it.

Networks toward Social Media

This network capability only became possible because of major developments both in telecommunication and computer networking technologies during the 1970s. But at the same time such changes were only made possible by new micro-electronic devices and stepped-up computing capacity. Telecommunication have been revolutionized further by the combination of "node" technologies electronic switches and routers and new linkages transmission technologies. Major advances in opt-electronics fiber optics and laser transmission and digital packet transmission technology dramatically broadened the capacity of transmission technology dramatically bounded the capacity of transmission line. This opto-electronics-based transmission capacity, together with advanced switching and routing architectures, such as Transmission Control Protocol/ Interconnection Protocol (TCP/IP), are the foundation of the Internet.

In the 1960s there was a call to investigate how computers could be 'connected' to each other in order to create an environment to enhance computer research. The US Department of Defense, through the Advanced Research Projects Agency (ARPA), created the first large computer network in 1969. This resulted in ARPANET, which connected numerous US universities to each other. Eventually, it employed the internet protocol suite (TCP/IP) from 1983. In 1988, South Africa's pioneering email connection to the US and later an internet node was set up at Rhodes University.

Further still, different forms of utilization of the radio spectrum traditional broadcasting, direct satellite broadcasting, microwaves, digital cellular telephony, as well as coaxial cable and fibre optics, offer a diversity and versatility of transmission technologies, which are being adapted to a whole range of uses, and make possible ubiquitous communication between mobile users. Thus, cellular telephony diffused with force all over the world, taking off from the mid-1990s. In 2000, technologies were available for a universal-coverage, personal communication device, only waiting for a number of technical, legal, and business issues to be sorted out before reaching the market.

Each leap and bound in a specific technological field amplifies the effects of related information technologies. For instance, the current smartphone could be seen as "a camera with which you also can call", having changed photo camera technologies along the way. The convergence of all these electronic technologies into the field of interactive communication led to the creation of the current

version of the Internet. Time will tell whether it is the most revolutionary technological medium of the Information Age.

The social power and expansion of the internet was at about the same time as the invention of the World Wide Web by Tim Berners-Lee at CERN in 1989. He also decided that the technology should not be proprietary, and this was instrumental in its spread after its release in 1991. It soon superseded the other forms of internet communication, Usenet and gopher, which charged licensing fees for the original server implementation.

From the late 1980s there was a growth of commercial providers of networks the infrastructure. Together with the WWW, this led to a growth of the Web, where now anybody could get connected, and the so-called New Economy of tech companies online, such as offering the ability to buy books online rather than only in the bookshop.

Manuel Castells discusses the information age from those early days with its characteristic optimism, which you may wish to read and in particular the preface to the 2010 edition of his “The rise of the network society the information Age”

Data Management Toward Big Data



While the progress of connecting devices and the Web is one of the success stories, the other one is data management. The first main step in the early 1970s were the relational databases to store data and manipulate them. This was principally to query the data being stored, such as employee data, library records.

The early 1990s saw the rise of datamining put all the data in aso-called data warehouse a time-aware database that is slightly differently structured than a relational database and test hypotheses on that data using association rules and statistics.

The late 2000s saw a third jump in the data management, combining it with even more statistical techniques and algorithms on much more data. Popular techniques are the various machine learning algorithms. This data could be collected in different places, hence, have different formats, is generated fast, and a lot of it is generated

Take Note: Machine learning focuses on algorithms to achieve good predictions based on large amounts of training data.

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Activity NO. 1

Directions: In each question give your best answer.

- Describe your thoughts about the progress of IT from the last two decades of the 20th Century to the first decade of the 21st Century. What are the relevant changes and advancements that you see most helpful in a fast-paced new age of technology? (10 pts.)

- Give at least five(5) pros and five(5) cons of the Internet and Social Media in the 21st Century. Use a table to illustrate your points. (5 pts.)

PROS	CONS

LESSON 2: Time of Transition in Communication and Network Usage



A new form of society has arisen through a number of major concurrent social, technological, economic, and cultural transformations. This change is at a global scale, but this does not entail that everyone is participating equally in it many segments of the population of the planet are excluded from the global networks that accumulate knowledge, wealth, and power.

A particular feature of the recent past 20 years' transformation has been the radical changes in the ways people communicate.

The top-down mass media mode has been augmented with, and to some extent replaced by, horizontal digital communication between peers and by what has been called citizen journalism.

This brought with it a reduced amount of power by the gate keepers of the mass media and empowered individual citizens to distribute information or disinformation example 'fake news', propaganda, as the case may be for either mode of communication.

The changes that have taken place have affected the generations in different ways. For instance, now there are WhatsApp parent groups at schools, or classes have such groups themselves for student communication, and people are used to such instant communication. Compare this with the 'telephone trees' for distribution of information that was functional for many years before a parent/student was called with a message by the teacher who called two other parents/students and so forth until the class was covered. In between, from about the late 1990s, and to some extent currently still, there are the email lists, and for UCT's course management system, Vula, there are still announcements and chatrooms to distribute information.

Transformation of Communication

Communication is the distinctive feature of humans and the fast-paced changes in communication technologies has intensified in recent years. This has had a profound effect on society.

The Internet is old by computing standards having started 1969 but it only diffused on a large scale twenty years later, because of several factors:

- Regulatory changes & privatization in the 1990s
- Open source software & open protocols
- Greater bandwidth in telecommunications and switching capacity
- Diffusion of personal computers and local networks
- User-friendly software programs that made it easy to upload, access, and communicate content: beginning with the World Wide Web server and browser designed by Tim Berners-Lee at CERN in 1990
- Rapidly growing social demand for the networking of everything, arising from both the needs of the business world and the public's desire to build its own communication networks. The number of Internet users on the planet grew from under 40 million in 1995 to about 1.5 billion in 2009 and is estimated at 4.3 billion in March 2019.

Examples of changes in communication are, among others, text-based communication rather than making a phone call, writing an email instead of walking over to a colleague's desk or writing letters, posting holiday pictures on social media rather than sending postcards to friends and family, and being contactable almost anywhere compared to being 'disconnected' when one is travelling.

Democratic Communication

It is not only social media users who understand the power of Internet with respect to voicing community issues and engaging citizens. Democratic governments throughout the world have been using ICTs for improving their services. We all know that democratic countries function well when their government officials understand the needs of their constituents and are able to communicate with them easily. Governments make use of ICT for communication.

There are three basic areas where ICT is used, which are access to information, transaction services, and citizen participation:

1. Statistics South Africa(SSA)provides census data through their website.
2. South African Revenue Services (SARS) allows the submission of tax returns among other services through their eFiling service.

3. Johannesburg Road Agency (JRA) developed a mobile application that empowers citizens with the ability to be able to report potholes quickly.

Dependence of the Internet to express dissent in repressive governments may not be the best approach, since governments alongside private companies control the infrastructure.

This means that governments can prevent people from using the Internet as a medium. There are cases where people have successfully used social media and other Internet services in repressive regimes, as in the case of the Green Movement in Iran.

These successes are also accompanied by the improvement of the government's ability to use the Internet against its own citizens. The first benefit that was enjoyed by the Green Movement from social media was that it allowed ordinary citizens to circulate information, thus breaking the regime's monopoly on news distribution.

It was also used to mobilize support from expatriates there with bringing the country's issues to the international stage. This was particularly important because international journalists had been expelled.

The government has countered it by placing all ISPs under the control of the state, deploying website blocking technology, limiting Internet speeds, regulating blog writers, using the Internet for the distribution of propaganda, and the formation of an office whose responsibility is to root out and arrest dissenters on the Web.

Worldwide Mobile Revolution

1990s, there has been an explosion of increasing capacity of connectivity and bandwidth in successive generations of mobile phones. This has been the fastest diffusing technology in the history of communication. In 1991 there were about 16 million wireless phone subscriptions in the world.

By July 2008, subscriptions had surpassed 3.4 billion and is currently estimated at around 4.5-5 billion mobile phone subscriptions. Such numbers have to be considered with caution before assuming 2/3 of the population has wireless access some people have more than one subscription one SIM card for data and one for airtime and others share their phone with friends and family.

Digital Convergence

In the 2000s, we have witnessed increasing technological convergence between the Internet, wireless communication, and multiple applications for communicating over wireless networks. This has multiplied the points of access to the Internet. This communication network can exchange anything that can be digitized texts, audios, videos, software.

There has also been a price reduction in the production of certain electronics thus leading to the ubiquity of certain sensors. This has resulted in what is called the Internet of Things. This the ability to have devices such fridges, stoves and traditional machines such as computers to be able to share data.

This is particularly important for the developing world because the growth rate of Internet penetration has slowed due to the scarcity of wired telephone lines. In the new model of telecommunications, wireless communication has become the predominant form of communication everywhere, especially in developing countries. Thus, the ability to connect to the Internet from a wireless device is now the critical factor for a new wave of Internet diffusion on the planet. This depends on the building of wireless infrastructure, on new protocols for wireless Internet, and on the spread of advanced broadband capacity.

Take Note: Digital Convergence refers to the fact that we no longer need separate communications channels for different media such as voice, video, text because they are all digitized and can share the same connections and platforms.

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Activity NO. 2

Directions: Give your best answer for each question.

1. Based on your own understanding, how do these different modes of communication have affected society? (If the space below is too short for your answer pls use an A4 bond paper for your answers) (10 pts.)

LESSON 3: Interactive Media and Mass Self-Communication



The World Wide Web offers a means of interactive communication since the “Web 2.0” that started around the 2000s and that made ‘posting’ content a lot easier than before. A result is that the boundaries between mass media communication and all other forms of communication are blurring. With its diverse range of applications, it is the communication fabric of our lives, for work, for personal connection, for information, for entertainment, for public services, for politics, and for religion.

It is used to access mass media television, radio, newspapers, and digitized culture or information: films, music, books, and journal articles. It has already transformed television as its reception becomes individualized thanks to a range of streaming services.

This is mass communication, but user-generated content is a very different means of mass communication to what was ever seen before. Unlike traditional broadcast media, anyone can post a video in YouTube, with few restrictions. In most countries everyone is a publisher and there is equal freedom in what is chosen for viewing. A user selects the video she wants to watch and comment on from a huge listing of possibilities. Pressures are of course exercised on free expression on YouTube, particularly legal threats for copyright infringements.

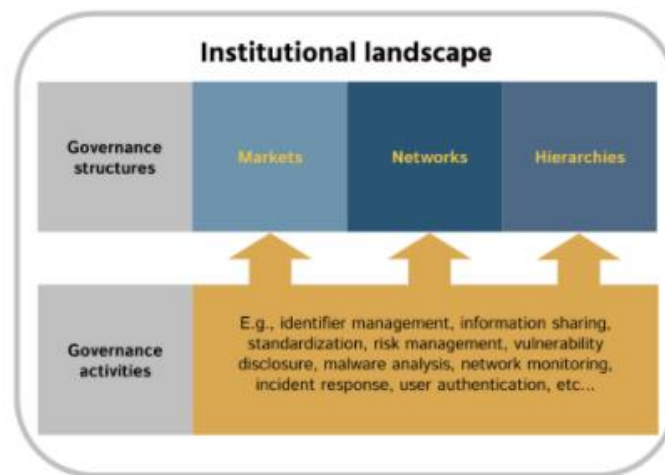
Internet Governance

Internet governance refers to the rules, policies, standards and practices that coordinate and shape global cyberspace

The Internet is a vast network of independently-managed networks, woven together by globally standardized data communication protocols primarily, Internet Protocol, TCP, UDP, DNS and BGP. The common adoption and use of these protocols unified the world of information and communications like never before. Millions of digital devices and massive amounts of data, software applications, and electronic services became compatible and interoperable. The Internet created a new environment, a complex and dynamic “cyberspace.”

While Internet connectivity generated innovative new services, capabilities and unprecedented forms of sharing and cooperation, it also created new forms of crime, abuse, surveillance and social conflict. Internet governance is the process whereby cyberspace participants resolve conflicts over these problems and develop a workable order.

The Forms of Internet Governance



We say Internet governance and not government because many issues in cyberspace are not and probably cannot be handled by the traditional territorial national institutions. Governance implies a polycentric, less hierarchical order; it requires transnational cooperation amongst standards developers, network operators, online service providers, users, governments and international organizations if it is to solve problems while retaining the openness and interoperability of cyberspace.

For better or worse, national policy plays an important role in shaping the Internet, but the rise of cyberspace has produced, and will continue to produce, new institutions and governance arrangements that respond to its unique characteristics.

Three broad categories of governance:

- **Markets** - are driven by private transactions and the price mechanism.
- **Hierarchies**- govern interactions through orders or compulsion by an authority, such as law enforcement by a state, a binding treaty, or the organizational control of a firm.
- **Networks**- are semi-permanent, voluntary negotiation systems that allow interdependent actors to opt for collaboration or unilateral action in the absence of an overarching authority.

Internet governance involves a complex mixture of all three governance structures, including various forms of self-governance by market actors.

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Activity NO. 3

Directions: Give your best answer for each question.

1. Using your own words, explain what is Interactive Media and Mass Self-Communication? (10 pts.)

2. What are the three broad categories of governance? Explain based on what you have learned. (5 pts.)

Assignment:

1. Discuss: What is Computer Ethics?
2. Give the three general subject areas of ethical theories and describe each according to your own understanding.
3. Give the five most pressing ethical and legal issues confronting the industry today. Discuss its implications and give tangible solutions.
4. Summarize the chapter discussing your take aways and conclusions. Word count: No less than 1000 words.

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