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Current Trends in Information Technology: Which Way for Modern it Experts

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Abstract - *Information Technology is currently the enabler of most services. Advancements in technology have affected society's way of living both positively and negatively. Today, most of the fields of human life are affected by new Technology. The advancement has brought about various Technological trends like Cloud Computing, Mobile Computing, Social media, Ubiquitous computing, data analytics, data science and Internet of Things (IoT), a network of a large amount of objects, computing devices embedded with microchips, sensors, actuators making this world a smart place to live. This paper discusses the various technological trends of information technology, evolving technologies, the percentage impact of technologies on business and government and finally, a framework on the way forward for IT experts generated.*

Keywords - *Information Technology Advancements, Cloud Computing, Mobile Computing, Social Media, Internet of Things (IoT), IT Expert, Ubiquitous computing, Emerging Trends*

I. INTRODUCTION

The history of Information Technology is traced to early civilizations when the art of recording information developed. It followed the mechanical and later electronic path as in today's society. At an early age, information was recorded on objects such as stones, metal plates, cloth, and paper-like materials. The term Information Technology is a collective term for the various technologies involved in the processing and transmission of information, which includes computing, telecommunication and microelectronics, just to mention a few [1].

The evolution of Information Technology included some steps, which led to various developments**.** The first breakthrough was the invention of paper and ink. The invention of the paper in 105 A.D. in China and subsequently the ink also. Paper provided a better and more durable writing medium than the earlier fragile ones [1]. The other most important landmark in the history of recorded knowledge was the invention of movable type by Gutenberg in 1438. A.D. in Germany. It led to the proliferation of literature and brought a revolutionary change in the development of the library.

The third in the series of great inventions is the development in the field of telecommunication, which includes. Telegraph - In 1837 by An American SFB Morse. Telephone - In 1876 by Alexander. Graham Bell, Radio - In 1895 by an Italian G. Marconi. Television - In 1925 by a Scotsman J.L. Baird Laser - In 1960 by an American Theodore Mainan - Optical Fibre Communication - Communication Satellites - Facsimile Transmission - Electronic mail etc. [1].

It is common knowledge that Information Technology has affected the human being in almost all spheres of life in most sectors, including education, healthcare, business, communication or our day-to-day tasks [2]. Information Technology helps us to gather, communicate, manage and interconnect a large volume of data and information. Various technologies in IT are growing very fast, like cloud computing, mobile computing, social media etc., which is changing the way of doing the jobs [2]. With the help of cloud computing, we are able to get hardware and software resources virtually on pay per demand basis [3]. This helps an individual as well as organizations to avoid installing heavy and costly software on their systems. [4]Through cloud computing, we are able to get applications, platforms as well as infrastructure over the internet [3].

Mobile computing enables human beings to access and process data on their mobile devices at the speed of a personal computer [3]. Social media helps to interact with people over the globe in a very user-friendly manner [5]. Wireless devices are becoming very popular these days. Ubiquitous computing or Internet of Things (IoT) is making almost every object IT-enabled that can sense, process as well as transmit data among different objects in real-time over the existing networks. This helps us to control the objects remotely, thus saving our time. Ubiquitous computing is the major area of research these days, and in the coming year's number of embedded objects with computing device have increased very fast. This paper will discuss and review related literature on the various technological trends of information technology that are evolving rapidly and the way forward for IT experts [6].

II. RELATED LITERATUR ON IT TRENDS

The information technology industry has been regarded as an emerging industry with vast technological growth [7]. The industry has been experiencing tremendous trends since its origin. Information technology has contributed significantly since the start of a new millennium, and most companies share some common goals to bring innovation in various fields of Technology. This paper discusses in detail using previous studies, literature reviews and journals the current trends of information technology and a way forward for Information Technology experts [7].

A. Cloud Computing

Cloud Computing is one of the latest advancements in information technology that has impacted more on organisations growth on a daily basis. Cloud Computing is said to comprise a pool of shared resources, which includes servers, storage, networks, services, and applications that can be shared with individuals as well as with organizations on pay per use basis in a cost-efficient manner. Cloud computing services are usually owned and managed by third-party providers who deliver the services to the user on a pay-per-use basis [3]. Cloud Computing has various computing services that are very key to clients. These services include; Software as a Service (SaaS*):* SaaS is a very familiar type of cloud service to the customers. Software as a Service is the topmost layer of cloud computing architecture that offers a complete application to the customer over the internet [5].

Among the most familiar software as a Service (SaaS) applications currently used for businesses are CRM applications like Salesforce, storage solutions like Google Drive, Dropbox and productivity applications suit like Google apps [3]

Fig. 1 Cloud computing services

Source: [3]

Another key service is Platform as a Service (PaaS) which is the middle layer of cloud computing architecture that offers an execution environment as a service for the software without any need of downloading software or installation of software for the developers or end-users [3]. Examples of Platform as a Service (PaaS) are Microsoft Azure and Google App Engine. The other service is Infrastructure as a Service (IaaS)*:* Infrastructure as a Service is the bottom layer of cloud computing architecture that offers sharing of the hardware resources through virtualization for executing services [5].

The main motive is to make resources such as storage, network and servers readily available and accessible by the operating systems. Cloud computing has several types which enable it to deliver its functions [5]. These types' incudes; Public Cloud, Private Cloud, Community Cloud and Hybrid Cloud. Examples of Cloud Computing includes; E-mail, Google Drive, Virtual Office, Google App and Dropbox. Some of the benefits of cloud computing include; Cloud computing reduces IT infrastructure cost of the company, Cloud computing promotes the concept of virtualization, which enables server and storage devices to be utilized across an organization, Cloud computing makes maintenance of software and hardware easier as the installation is not required on each end user's computer.

B. Mobile Computing Technologies

Mobile Computing technology allows transmission of data, audio-video, a voice through any wired or wireless network-enabled device without having to connect to a particular physical location (Kumar, 2016). Mobile computing has led to an increase of portable computing devices and the desire to connect to the internet without having to re-connect to a fixed location, thereby increasing the popularity of mobile computing. The use of mobile computing has increased tremendously due to current advances in mobile computing that includes GPS, GPRS, Long Term Evolution (LTE), 3G, 4G and Wi-Max have become very popular. [5].

Among the main IT trends in 2019, there is the long-awaited launch of 5G mobile devices. The networks of the new generation have been tested, and the first 5G-ready smartphones are available on the market. This will introduce new standard promises to bring broadband download speeds over mobile networks and to provide 10x faster internet services than 4G. However, the use of new generation networks is much wider. 5G will provide the impetus for the further development of the Internet of Things, self-driving cars, virtual and augmented reality, robotic surgery, drone delivery, just to mention a few [8].
Mobile Computing Devices that aid in enabling the service includes; Smart Phones, Personal Digital Assistants (PDAs), Laptops, and Wearable Devices like Google Glass, Apple smartwatch, head-mounted display are examples of wearable devices. The advancement in mobile computing has realised several advantages and disadvantages, which includes: Increased Productivity due to its effectiveness and efficiency.

Fig. 2 Mobile-Computing Devices

Source: [3]

Fig. 3 Social Media Source: [5].

Time-saving since there is no need for travelling schedules to locate network, flexible since no user is restricted to work in a given location, source of entertainment since most gadgets are used for a variety of entertainment purposes [5]. However, mobile computing has their own limitations, too, which includes; in-security Issues and connection barriers.

C. Social Media

Today, most nations' media is considered as the fourth estate or fourth pillar of democracy due to its growth and increased use as a communication tool. These days this fourth estate of media is supported by social media [5]. Social media has become commonplace to discuss all issues that existed in society today. Social media is playing a major role in integrating the world. Social media is also making its contribution to making this world a better place to live by raising issues of social importance. Advances in information technology are changing all aspects of doing things, and social media platforms have become major tools in the growth of business marketing [5].

The widespread use of these social media platforms by consumers and businesses all over the world motivates business people to market their products on social media platforms. Social media is a powerful tool for advertisement and marketing. Almost all business organizations are using social media to connect with their customers and serve in a better way. Social media also help customers to give reviews and feedback regarding some products that help the new customers to know about the product and help the company to know the views of the customers regarding some product. Social media has emerged from being a cyber world geek buzz to a massive platform for professionals, entrepreneurs, businesses and organizations that seek greater identification and recognition at a very low price [5].

Increased use of social media has been attributed to various Benefits such as Online Advertisement and Marketing. There is no need for any geographical boundaries. It is used globally without any restrictions, and there is immediate feedback for the two parties who are interacting. Figure 3.0 shows some of the image logos for common social media platforms**.**

D. Big Data

The technologies that are related to big data will continue rising in importance in 2018. Due to its great return on investment, impact speed and measurability, digital marketing are now more popular as compared to traditional marketing [9].. This means that big data is now applied to big business as many of the digital marketing campaigns can rely on the huge data quantities to ensure effectiveness and a greater reach. This is why companies are now relying on data management to ensure conversions from online connections [9].

E. User Interface

The user interface is one area that has undergone a massive revolution since the touch screen was introduced. The capability of the touchscreen has revolutionized how the end-users are able to interact with the application. With the touchscreen capability, the way users are able to interact with the application. Users are now able to interact freely with what is being displayed without the need for an intermediate device such as a mouse [9].

F. Data Analytics

The field of analytics has grown many folds in recent years. Analytics is a process that helps in discovering the informational patterns with data. The field of analytics is a combination of statistics, computer programming and operations research. The field of analytics has shown growth in the field of data analytics, predictive analytics and social analytics. Data analytics is a tool used to support the decision-making process. It converts raw data into meaningful information. Predictive analytics is a tool used to predict future events based on current and historical information. Social media analytics is a tool used by companies to understand and accommodate customer needs. Every changing field of information technology has seen great advancement and changes in the last decade. In addition, from the emerging trend, it can be concluded that its influence on business is ever-growing, and it will help companies to serve customers better [10].

G. Internet of Things (IOT)

The Internet of Things (IoT) is a network of interrelated physical computing devices, digital and

mechanical machines, animals, objects, or people that are assigned with unique identifiers and the ability to exchange data over the network without any human to a computer or human-to-human interaction. A thing in the internet of things (IoT) refers to a large number of computing devices that can be a biochip transponder in a farm animal, an automobile with a built-in sensor to alert the driver about some problematic situation and a person with a heart monitor implant. These types of devices are capable of collecting data through sensors and exchanging this data between devices over the network anonymously [5]. When IoT is augmented with actuators and sensors, the technology becomes more powerful and can handle a variety of tasks. Applications of IoT include building management, energy management, healthcare management, transportation management, environment management etc.

III. RECENT EVOLVING TECHNOLOGIES

In this paper, it is important to note that some technologies are still in the process of adoption due to their challenges in development. Full implementation of such technologies will take some time, depending on the user's feedback. The following technologies are evolving and are not fully adopted.

A. Quantum Computing

You may be surprised, but the performance of traditional computers is rather slow. Information technology trends in 2019 say that the next generation of computers will be quantum computers. They are actively maturing now and are going to significantly surpass their ancestors. Quantum computing is a completely new way of transmitting and processing data based on the phenomena of quantum mechanics. Traditional computers use binary code (a bit) to handle information. The bit has two basic states, zero and one, and can only be in one of them. As for the quantum computer, it uses qubits that are based on the principle of superposition. The qubit also has two basic states: zero and one. However, due to superposition, it can combine values and be in all these states at the same time [9].

Such parallelism of quantum computing helps find the solution directly, without the necessity to check all the possible variants of the system states. In addition, a quantum-computing device does not need huge computational capacity and large amounts of RAM. Imagine: it needs only 100 qubits to calculate a system of 100 particles, whereas a binary system requires trillions of trillions of bits. Developers have already learned to build quantum-computing applications and will strive for their further development and widespread adoption [9].

B. Block-chain Evolution

Block-chain technology should undoubtedly be included in the list of tech trends 2019 since it has been rapidly expanding for the last few months and still has huge potential. Though most people associate blockchain with cryptocurrencies only, the Technology can be successfully incorporated into many other crypto-unrelated fields. The year 2019 will be devoted to the creation of the blockchain industrial image and its separation from bitcoin and other cryptocurrencies. We will probably witness blockchain convergence with other technologies such as IoT, machine learning and fog computing. As a result, new practical use cases will be represented, and the demand for blockchain experts will increase [11].

C. Use of Drones Technology

All lists of the latest trends in information technology probably include discussions about drones. For a couple of years, the creation and usage of drones have grown into an entire industry — the so-called UAV (unmanned air vehicle) or UAS (unmanned air systems) industry [11].. It is developing at an amazing rate. Autonomous aircraft are widely used in farming, military surveillance, accident monitoring and other areas. In the coming year, the drone industry will see increasing investment. More and more drone delivery systems will grow into commercial projects worldwide. Actually, NASA is going to complete the Unmanned Aerial System Traffic Management (UTM) to manage drone traffic in the skies.

D. Cybersecurity and Artificial Intelligence

Cyber security is becoming essential to everyday life and business, yet it is increasingly hard to manage due to the many-exhibited challenges. Exploits have become extremely sophisticated, and it is hard for IT experts to control the attacks brought about by cyber-insecurities. Pure automation no longer suffices, and AI is required to enhance data analytics and automated scripts. It is expected that humans will still be in the loop of taking actions; hence, the relationship to ethics. However, AI itself is not immune to cyberattacks. To manage and control these challenges affecting the two technologies, there is a need to make Artificial Intelligence/Deep Learning (AI/DL) techniques more robust in the presence of adversarial traffic in any application area. This is expected to be implemented in the near future [11]

E. Virtual Reality

Technology that includes virtual reality is becoming prevalent. The software of virtual reality is making many industries prepared for various scenarios before entering them. The medical profession is projected to use virtual reality for some treatments and interactions with patients in the coming years [11]. Virtual training sessions for companies can cut costs, fill in the need for personnel, and increase education. According to Gartner (2019), by the year 2023, virtual simulations for selected patients with specific illnesses will reduce emergency room visits in America by 20 million. These simulations will have intelligence capabilities, so virtual-reality care can still provide patients with proper attention (Gartner 2019).

IV. INFORMATION TECHNOLOGY TRENDS WAY FORWARD FRAMEWORK

The information technology trends way forward framework has been developed from the related research to

show how the trending technologies and evolving technologies will realise the way forward for the Information Technology experts. Figure1 shows the framework with the three elements.

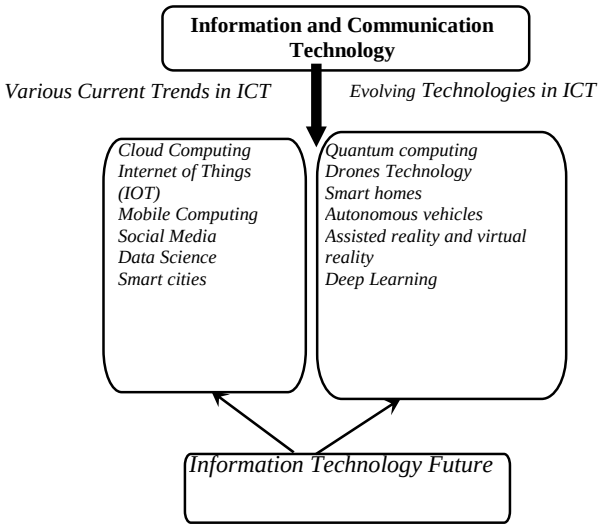

Fig. 1 Information technology trends way forward framework source: developed from related research Work

V. INFORMATION TECHNOLOGY EXPERTS WAY-FORWARD

The future of IT experts role is driven by the rapid growth in Technology exhibited by the various trends as discussed in this paper. However, the use of new generation networks is much wider. 5G will provide the impetus for the further development of the Internet of Things, self-driving cars, virtual and augmented reality, robotic surgery, drone delivery, just to mention a few.

The latest information technology trends we have discussed in this paper show that the coming years will bring new breakthroughs and big changes in IT. There will be a total increase in the growth of ICT by the Emerging Trends on businesses and the government whereby it is predicted that the Technology will contribute to the growth since both businesses and the governments will be affected positively by ICT in the next four years as shown in Figure 2.

Technology	***Business % Impact***	***Government % Impact***
Machine Learning	Business 92%	Govt. 90%
Internet of Things –	Business 91%	Govt. 88%
Block Chain	Business 90%	Govt. 82%
Quantum Computing	Business 85%	Govt. 80%
3D Printing	Business 83%	Govt. 80%
Robotics	Business 81%	Govt. 72%
Biometrics	Business 80 %	Govt. 82%
Augmented Reality (AR)	Business 80%	Govt. 77%
Artificial Intelligence	Business 79%	Govt. 75%
Virtual Intelligence	Business 79%	Govt. 75%
Virtual Reality (VR)	Business 76%	Govt. 74%
Virtual Reality (VR)	Business 76%	Govt. 74%
Autonomous Vehicles	Business 70%	Govt. 63%

Fig.2 ICT Technological growth impact source: derived from related literature

VI. CONCLUSION

This paper presents a detailed discussion on the various emerging trends in information technology that is growing very rapidly. The way forward for the information technology experts is a key issue since they are the drivers of Technology and have to be aware and advised. Technological advancements such as cloud computing, mobile computing, social media and the Internet of things are discussed. Cloud Computing provides us with a way of sharing hardware and software resources as a service over the internet. Mobile computing enables people to access data and information anytime and at any place without any need to connect to a particular physical location. Social media is providing new means to connect to people all over the world and making this world a very small place to know each other. Social media provides a new trend to do marketing and advertising as compared with traditional media, and almost all type of businesses are making their presence over social media to connect with their customers. Internet of Things (IoT) enables computing devices chips to embed with various types of real-life objects and transfer data among these objects through the existed network infrastructure. The future of IT experts role is driven by the rapid growth in Technology exhibited by the various trends as discussed in this paper.

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