CLOUD COMPUTING AND INDUSTRIES TRANSFORMATION

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Introduction

Data nowadays is an essential resource same as oil, as the UK mathematician Clive Humby is saying it "Data is the new oil" **(Humby, 2006).** Meaning that data is the new fuel that gives the power for organizations to modernize and develop, in a world that is moving with the speed of light. The introduction of cloud computing was the key and the way to the transformation.

Looking at the cloud, which is what we observe in the sky, hear about in our day-to-day conversations, and interact with in all technologies nowadays. The cloud referred to here is the user interaction and experience with IT services and applications. It enables the access of resources faster and makes it more agile leading to the increase in the pace of innovation. This is because as we referred to the analogy of the cars and airplanes and the limitation of transportation prior to these inventions that are now considered as the nature of our lives, same goes with Cloud computing.

Prior to cloud computing, IT resources were limited, expensive, are present at only one location and the manageability was by each organizations' IT team, which is one of the major challenges that the cloud computing solved and presented. Cloud computing is the virtual platform that allows the access and retrieval of data through the utilization of servers, databases, virtual storage, software, and networks making a pool of resources that are being provided over the internet. This creates a new era of technology where data is not only accessible but instantly from anywhere around the globe, manageability is done by the cloud provider eliminating the headache of manageability that the organization used to do making them focus on other business aspects and reducing costs by providing storage services in many possible ways. In other words, it is not transferring something from one place to another, it is making the availability of everything everywhere possible in diverse ways and forms.

Cloud computing includes different types of environments, they are the private cloud, public cloud, hybrid cloud and multi cloud **(Srivastava & Khan, 2018).**

- **Private clouds**: are the cloud environments that are secure networks being implemented and maintained by an organization for its own use. The data stored on private clouds are usually sensitive and needs to be protected from unauthorized access. This may include having physical access to the datacenter by the company.

- **Public cloud**: is where multiple customers make use of services provided by the cloud's provider over the internet and the customers does not manage the underlying resources or even have physical access to the facility, for example well-known public cloud providers.

- **Hybrid cloud**: is the grouping of two distinct cloud infrastructures with each remaining its own unique entity.

- **Multi-cloud**: is the way of using multiple cloud's types, it is the combination of services and resources from both on-premises and public clouds, to share similar organizations' concerns.

The above-mentioned cloud environment's types are all that can constitute an industries cloud storage environment depending on the business's needs. There are different cloud service models as well that a user can provision in their environment.

Cloud service models are the services that the cloud can provide.

They are as follows:

- **Infrastructure as a Service (Iaas)**: IaaS is the cloud service that provides fundamental resources such as compute, network, and storage, where the consumer has access to these resources and the provider maintains the control of the underlying infrastructure and while the consumer manages the operating system and applications that are deployed within this service.

- **Platform as a Service (PaaS)**: The PaaS is the cloud model same as the IaaS model but adding to the provider's management the operating system layer as well while consumer takes care of their own applications.

- **Software as a Service (SaaS)**: SaaS is the cloud service model where the provider provides and manages all the services, and the consumer only have access to the applications deployed by the provider over the internet.

Simply cloud computing provides web-based IT services to vast number of industries.

Talking about industries, we may think of Business, in general, healthcare, education and AI. They all benefit from the new era of this transformation. Taking Business in general initially since it is the core and base for any organization, what is being considered and the related aspects in selecting Cloud Computing services will be discussed. In addition, healthcare where massive patients' records, the need to treat documents with high care, speed, and accessibility of these records. All the before mentioned pillars comes with challenges such as the privacy and security challenges, type of cloud that is used and the service reliability. Moving on to education and the benefit of using the cloud where it can help institutions with a tight IT budget to operate well as mentioned before, lifting all the management overheads by using one of the cloud services. In addition, how the virtualization and sharing of resources will help in the scalability and meeting the corporate objectives for the institutions and universities. Artificial intelligence (AI) plays a big role in cloud computing, it is the technology where massive power and data storage are being well considered and accounted for, now cloud computing is being equipped and providing the needs for organizations by AI integration across the whole globe, and this is to highlight the huge market it brings with.

In this article different industries that are mentioned will be discussed and how the impact of the Cloud on them changes these industries to the better and unlocks new market, where development of the products and services will be enhanced and observed accordingly.

Cloud computing positive impacts and challenges from business perspective.

Cloud computing is quickly becoming the go-to technology for businesses of all sizes **(Ahmad Dar, 2018).** It has many advantages over traditional computing models, such as increased agility and scalability. Because of this, cloud solutions have become essential to the modern business.

Many Businesses including Small, Medium and Enterprise are migrating to Cloud Computing for so many reasons such as the need for improved IT performance, reduced costs, and the ability to scale quickly to meet business needs.

Cloud technology gives companies the ability to quickly adapt to changing market conditions and take advantage of new opportunities that come along.

Even though cloud computing is bringing benefits to the business it also brings challenges too.

Let us figure out together what are the main benefits and challenges in business migration to Cloud systems.
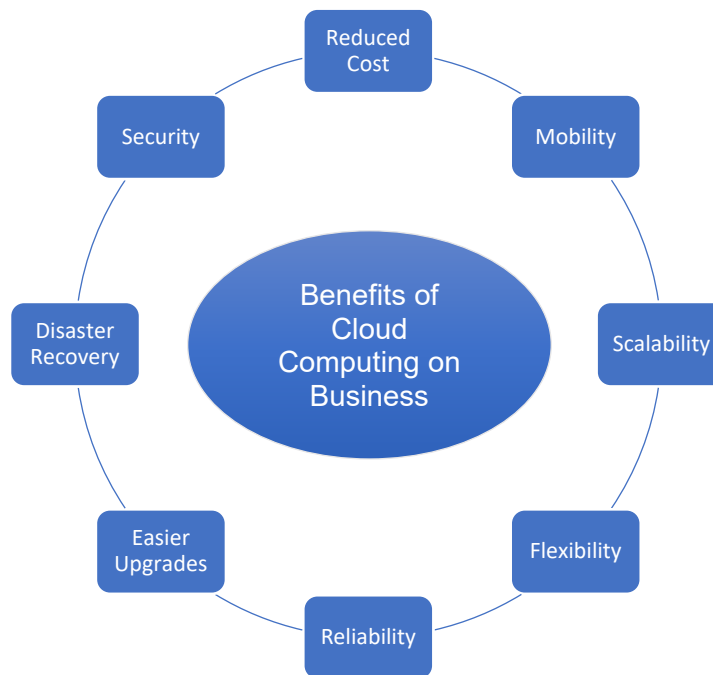
Positive impacts of cloud computing on business organization

Cloud computing has become a vital part of business organizations today. Companies prefer to use the services offered by the cloud rather than building their own infrastructure. This is due to the fact the cloud offers a wide range of advantages for businesses. Here are some of the most important advantages of using the cloud.

- **Reduced Cost:** a major advantage of cloud computing is that it eliminates the need to install and maintain expensive hardware and software in-house. This reduces the cost and allows companies to make better use of their financial resources. By reducing the reliance on hardware, cloud storage can also help companies save money by reducing power consumption and other overhead costs **(Huth & Cebula, 2011; Ahmad Dar, 2018).**

- **Mobility**: which allows employees to access company data and applications from anywhere. This makes it easier for them to stay productive even when they are not at the office.
  In addition, it also makes communication between team members much easier and more efficient. They can use cloud-based collaboration tools to share files and make updates in real time no matter where they are located.
  This allows employees to work more efficiently and collaborate with each other more effectively.

- **Scalability**: a huge benefit of the Cloud Technology, the ability to scale up or down quickly and easily as your company's needs change **(Opara-Martins et al., 2016; Khazaei et al., 2013; Ahmad Dar, 2018).**

- **Flexibility:** Unlike traditional server rooms, which are limited to specific hardware configurations, the cloud allows you to choose from a wide range of different services to meet the customer's needs.

- **Reliability:** It gives the companies assurance that their data is always safe since it can be accessed from anywhere in the world at any time. They can also create multiple backups of the data in the cloud so that it is always protected from loss.

- **Easier upgrades**: which is one of the main reasons why companies choose to use cloud services instead of building their own infrastructure. The cloud providers take care of the upgrades and take care of all the heavy lifting required to keep the system up and running smoothly. This allows businesses to focus on growing their business without having to worry about the IT-related issues **(Ahmad Dar, 2018).**

- **Disaster Recovery:** which helps businesses avoid data loss in the event of a natural disaster or power outage. Data stored in the cloud is automatically backed up and can be restored whenever needed **(*Cloud computing challenges* 2018).**

- **Security:** With the massive amount of data being processed daily, businesses need to be extra careful about how their data is being handled. Cloud computing provides businesses with the ability to store and process their sensitive information in a secure environment. Using cloud service providers ensures that your data remains confidential by minimizing the chances of external threats such as hacking or data theft.

Figure 1.1

Benefits of Cloud Computing on Business

Note. Looking at all aspects of Cloud Computing benefits' that the business take advantage of

The positive impact of cloud computing on business organization has been immense over the past decade. However, to take full advantage of these benefits, companies need to be prepared to adopt new technologies and learn how to manage their security effectively. As the Cloud Computing brings a lot to the table for business, it still brings some challenges too.

Open challenges in cloud migration

When a business organization takes the decision to migrate to cloud services it faces a few challenges that need to be addressed. These challenges may seem daunting at first, but if the right steps are taken to address them early in the migration process, they can be overcome with minimal disruption to the business and without jeopardizing the success of the project.

Let us explore these challenges and how to overcome them:

- **Vendor Lock-in:** Customers who wants to change the vendor should make sure that new vendor is capable to integrate the existing infrastructure with the new cloud environment without any data loss or disruption in existing services.

- **Security:** keeping business and client data safe is one of the most important issues for businesses to consider when migrating to the cloud.

- **Sensitive Data:** Sensitive data must be always protected during the process of migration to cloud services.

- **Portability:** The main challenge is that the application must migrate easily from one system to another. the application should be portable from any platform or operating system to another platform. and this portability must be retained even after the migration is complete and is hard to be achieved.

- **Interoperability:** One of the initial concerns when it comes to migrating to the cloud is the issue of interoperability. Many businesses that decide to migrate their systems to cloud-based services will be using a number of different applications to perform a range of different tasks in their business. If the applications used are not compatible with the cloud infrastructure being used, the migration can be much more complicated than it needs to be and cause a significant amount of disruption to the day-to-day operation of the business. that is why interoperability needs to be taken into consideration throughout the migration process.

- **Organizational Aspects:** One of the main concerns that needs to be taken into consideration is that change is not always easy for business organizations, especially when they involve a major shift in the way that they work and the IT systems they use to run their operations.

Figure 1.2

Challenges of Cloud Computing on Business
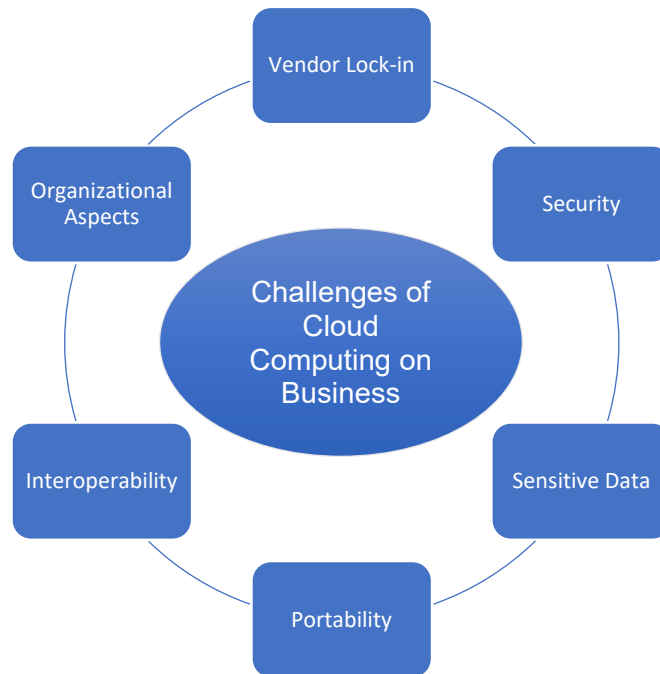
Note. Looking at all aspects of the Cloud Computing challenges that faces the business.

Solutions to overcome these Cloud Computing challenges.

After taking an idea of the benefits and challenges of the cloud computing to business let us investigate what needs to be done to overcome these challenges.

- **Proper cloud provider selection and the Use the services of Security Service Providers:** Cloud computing service providers should be selected wisely, as the wrong choice can lead to security leaks and customer data breaches, leading to major loss of reputation as well as financial consequences. Companies need to review their SLAs in detail to ensure that the service provider offers adequate service levels in terms of data protection and security.

- **Using Encryption and Multi-factor authentication:** to make sure data is secure in the cloud. the next step is to ensure that the cloud environment is monitored constantly to prevent any kind of security breach.

- **Alternate backups:** With cloud solutions, it is important to have an alternate backup in case the cloud provider has a problem or goes down.

- **Investing in education:** Companies should educate their employees about the opportunities created by the cloud and its impacts on business processes and workflows. Investing in employee training is an effective way to foster a culture change within the company toward being more agile and responsive to the needs of its customers **(Almisha & Youssef, 2014).**

Cloud Computing and its impact on Educational Institutions

There is no doubt that the cloud had a profound impact on our lives and work. But what about the impact of cloud computing on educational institutions?

Let us look at some of the ways in which the cloud has impacted education and how it will continue to influence the next generation of students.

Cloud applications have changed the teaching paradigm for institutions of higher learning, enabling them to provide their students and faculty with more flexibility and more educational resources than ever before.

We will discuss the impact of cloud computing on educational institutions, as well as identify the key factors that make cloud computing attractive to the education scene as a whole. As a demonstration of the importance of private cloud computing in education, a case study of University Sains Malaysia **(Al-Rousan & Al Ese, 2015),** Malaysia, demonstrated how important it is. It showed how cloud resources were found to provide flexibility for students and staff with ease of access, enabling them to collaborate within and among research groups in a more effective and efficient manner.

It has been proven that cloud computing is a very attractive technology for academic institutions because of its numerous advantages. As a result of cloud computing, academic institutions can focus more on teaching and research activities rather than worrying about complicated IT arrangements and software systems that require complex management. **(Khazaei et al., 2013)**
According to Patent WO2013115488, titled "Smart Education System and Method Using Cloud Computing-Based N screen" **(Kim),** IT complexity can be reduced by cloud computing.

In addition, cloud solutions can be employed to support cooperative learning and socially oriented theories of learning. This will make collaboration within and between the research groups more effective by allowing all researchers access to a common set of tools for managing information and communicating knowledge across disciplines. **(Singh et al., 2011)**

Let us examine the benefits and challenges of cloud computing for educational institutions.

Challenges of Using Cloud Computing in Academic Institutions

There are several challenges of using cloud computing in academic institutions, including the following:

- **Security issues:** There are concerns that the data stored in the cloud may not be secure enough. There are also concerns that cloud computing services may be vulnerable to cyberattacks.

- **Privacy issues:** There are concerns that the cloud computing service providers may have access to the data and use it for some other purposes.

- **Lack of control:** There is no control over where your data is stored or how it will be used.

- **Loss of data:** There is no guarantee that the data stored in the cloud will not be lost or corrupted.

- **Cost:** The cost of using cloud computing is generally higher than using traditional methods.

- **Not all applications run in cloud:** Not all applications can run in the cloud, and some applications may need additional modifications to work properly with a cloud computing service.

- **Speed of internet affecting the work:** The speed and stability of the internet connection you have may affect how fast your work is completed.

- **Academic institution support:** Many academic institutions do not support cloud computing. Some schools prohibit their students from using cloud-based applications, while others have set up policies that require professors to approve all student use of cloud computing services.

Benefits of using cloud computing in academic institutions

- **Access to applications from anywhere:** Cloud computing allows you to access your applications from any device. You do not have to worry about purchasing new hardware or installing software on multiple computers. Instead, you can simply log onto the cloud and retrieve what you need.

- **Support for teaching and learning:** Cloud computing can be used to support teaching and learning. It can improve the quality of teaching by providing students with access to a wide range of resources, including up-to-date software programs. Cloud computing also allows students and teachers to collaborate on projects by sharing files and other information via a secure network connection.

- **Cost savings:** Cloud computing can be an effective way to improve the efficiency and reduce costs of a school. Cloud computing can provide schools with significant cost savings when it comes to infrastructure and hardware purchases, allowing them to invest more in their students.

- **All time access to infrastructure and content:** Cloud computing enables students, faculty, and staff to access their data from any location at any time. This eliminates the need for an individual to be physically present to access their resources. The ability to access information from anywhere opens opportunities for collaboration with colleagues around the world.

- **High performance:** Cloud computing provides high performance at a fraction of the cost. Instead of purchasing expensive hardware and software, academic institutions can use cloud computing to access powerful servers located in data centers. This allows you to run your applications without having to worry about the infrastructure or maintenance costs.

- **Increased openness of students to new technologies:** The use of cloud computing in academic institutions can increase the openness of students to new technologies. This will help them develop skills they can use in their future careers, as well as enable them to take advantage of the latest innovations in technology.

Where does AI appear in the cloud computing service?

AI is the technology that simulates human intelligence by machines especially computer systems that perceive data and information and acts to it accordingly to provide reliable and efficient results. It is being nowadays said after the technological advances that Artificial intelligence succeeds when human intelligence fails **(Apo, 2021).**

Since AI is being integrated with many other industries and have a transforming impact on them, it was being highlighted by **(Apo, 2021)** how the integration of AI with Cloud Computing provides benefits to the organization. Not only adding to the business but moreover, turning it into a smart industry, which is in this case the educational organizations. The study that was being carried resulted in a noticeable increase in the efficiencies, operational services and eventually the overall experience will be enhanced.

The integration of AI and cloud computing is a next-level business transformation opportunity, converting it from a normal to a dynamic smart organization and this requires IT to be technologically dynamic as well to provide better applications and services to the business and the public.

Healthcare: challenges and opportunities in cloud computing

Challenges

Healthcare, as mentioned faces challenges in providing correct medical documents based on much research where errors are being found **(Miracle A & Chinaza Adaobi, 2019; Griebel et al., 2015)**. This is due to lack of good communication and access being limited to such files. This is where cloud computing becomes useful providing a potential way to improve healthcare performance, increase service delivery and provide more space for research and development **(Hein, 2021).**

Opportunities

Taking the radiological field as an example, where cloud computing is implemented, it enabled the medical practitioners, hospitals, and pharmaceutical businesses to collaborate and be able to access the patient data seamlessly providing an accurate and efficient service. One of the proposed ideas was to link sensors with medical devices using a cloud system to compile and store patients' data for sharing and accessibility that is all being done automatically. It was not only implemented with processing of multimodal signals but other services as well when it was proposed by Nkosi and Mekuria **(Nkosi & Mekuria, 2010),** which uses the "Dhatri" cloud effort **(Ali et al., 2018)** that allowed wireless technology and cloud computing accessibility by practitioners to allow patients' data access from anywhere. As well as the Greek National Health service made a trial with connecting the emergency medical system with patients' data which resulted in an immediate access for the medical crew and being able to access patients' data by using all the devices with a low-cost expenditure.

As mentioned, healthcare sector includes pharmaceutical businesses, insurance companies, laboratories, and hospitals, and they all now rely heavily on big data to improve business performance and development. A main reason for cloud computing business transformation is the big data analytics where hardcopy papers are being replaced with electronic healthcare records (EHRs) to be able to process and extract the needed information from this data present. Examples of such records are DNA sequencing, analyzing illness trends and the molecular structure of a potential medicine. This created the need of integrating machine learning and artificial intelligence capabilities by the cloud computing providers which resulted in new findings and results **(Rashid & Chaturvedi, 2019).**

Although healthcare in cloud computing is not a straightforward procedure but a guarantee for meaningful usage within the business (hospitals, pharmaceutical companies, and clinics) is valid by considering critical aspects and designing with the correct Cloud Computing Services CCS. The adoption of the cloud computing concepts in such facilities is usually concerned with the IT expenditures and being integrated to the cloud cuts huge IT management and infrastructure costs. Not only focusing on managements but security as well, makes organizations bound to governmental standards, sharing data in a timely manner, precise and accurate data, all together with keeping patients' information confidential **(Ahuja et al., 2012).**

Security

Security is a main concern when it comes to confidential data being shared on the cloud, which is why based on several research consumers are mainly concerned about the security and privacy of the documents shared and accessed by many customers and try to always avoid any security and privacy breaches **(Ashtari et al., 2015).** This what made the cloud providers offer Security as a Service option to satisfy the security concerns by providing a cost-effective token key and hosted security services to their customers.

Additionally, security and privacy does not only rely on tokens but others such as, data management, access control and secure storage **(Ahuja et al., 2012).** Since cloud computing depends on multi-domains meaning that each domain has its own set of security, rules, and procedures, privacy, and trust requirements in addition to the ability to use variety of mechanisms, interfaces, and semantics.

Case study: Chelsea and Westminster Hospital (London)

Transformation project

A small and medium sized enterprise (SME) Scottish software development and cloud provider company called Flexiant played an important role in a UK-funded health project (e-health) by assisting Napier university at Edinburgh and its partners, all being done at London's Chelsea and Westminster Hospital **(Sultan, 2014).** This was a 2-year project that started in 2009 and was funded by the UK's Technology Strategy Board (TSB). The Napier University along with several partners bid and been able to take the e-health project successfully which is specifically the Data Capture and Auto Identification Reference – DACAR. The first e-health cloud prototype that was adopted in Europe was the DACAR platform.

What is DACAR

DACAR is a platform that consists of several software components and services **(Fan et al., 2011).** It focuses and addresses all the common e-health application requirements which are authentication, authorization, data capture and persistence, integrity, confidentiality, and audit trail. Practically DACAR is indeed a PaaS cloud infrastructure that provides the tools to facilitate the integration, development, and deployment of a cloud e-health SaaS solution. A host is needed to be able make this e-health service available and to work, therefore an IaaS cloud platform will be the host. The Data Capture and Auto Identification Reference (DACAR) platform consists of three main layers.

Top layer:

Firstly, it consists of data buckets (patient's related data) supporting reading, writing and deletion for long-term preservation of data.

Secondly, identity mapping service, which facilitates the data of the "user" and "object" for example patient or medical device data. Their identities are being abstracted to provide security and are hidden by the DACAR platform. It gets only revealed to authorized individuals, roles, and services.

An access control service allows patients only to create and edit sharing policies and allows them to be in control using the DACAR platform.

Lastly an Audit Trail service that gathers logs from applications to show who was the active users and what operations the user carried during a certain time.

Middle layer:

The middle layer of the platform is the Single Point of Contact (SPoC). A mediator that is used to meet the authorization requirement of the user using security tokens that is protected by the SPoC's digital signature.

Bottom layer:

The authentication, data integrity and confidentiality part that was mentioned in a previous section is being accounted for using this bottom layer through the Security and Confidentiality mechanism. Since a cloud platform needed to run this project and what was needed is the IaaS platform the project's lead partner from Napier University asked Flexiant to provide the platform and they responded with the "Flexiant Cloud Orchestrator" (an IaaS public cloud solution). This allowed the DACAR platform to software's' different elements to run on different Virtual Machines (VMs).

Figure 2

DACAR platform
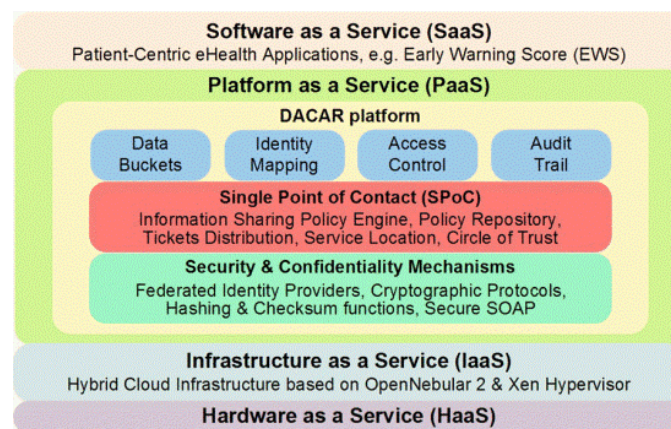
Note. Service and platform layers show the components of a DACAR platform conceptual structure by **(Fan et al., 2011).**

Project into action

What was proposed and how this project will be put into action in addition to how it enhances the services the organizations provide along with introducing the ease of use for individuals either patients or practitioners is what the director of support at Flexiant commented on:

"When we came on-board for this project, the remit was to allow for remote monitoring of patients at their homes and within the hospital and the collection of various measurements for example: blood pressure, heart rate, etc. These measurements were to be captured remotely and then communicated to a central platform. The system allows patients' data buckets to be also accessed not only by the people in the hospital but also by people such as GPs and patients' trusted family members." **(Sultan, 2014, p. 180)**

He also commented on the usefulness of this way of capturing data by the patient's consultants:

"When the patient goes to the consultant up flashes a bar chart or a set of graphs that can show all the measurements that have been captured; for example, data that has been captured over the last six months, overall on a very easy to read interface. The consultant can look at the screen and says to the patient "ah ok hang on a minute, on a Tuesday night on such and such date and time you were having mega spikes of blood pressure. What were you doing? Were you going out running, exercising, or were you watching TV"?

The director volunteered to test the e-health platform. Where a simulator interface was implemented and released in August 2011 to provide the data captured of dummy patients. He took the initiative to test this system prior to the simulation and his feedback was:

"Before the simulator was implemented, I tried this system at home on myself. I have a couple of medical conditions, so I used that as a guinea pig sort of scenario to try and capture the data and see how it looks. I was able to access my data, which was saved in a patient bucket, and I had shared my data with my consultant. The feedback was superb. It was brilliant. It really was. At the click of a button consultants can see what happened to patients over the last six months or so; what their blood pressure was on a continuous basis, what their weight was or any of these other things. Before a patient turns up for his or her appointment, the consultant can spend 60 seconds looking at such data to get a quick picture of that patient's recent history." **(Sultan, 2014, p. 180)**

Now raising the issue of privacy and ethics of sharing this information that was highlighted by Flexiant's director:

"Then we came on to ethics. To whom does that patient's data belong? Surely it belongs to the patient. Everyone has a different opinion on it and being a patient myself, I have an online access to my data. You know, what makes my life so much easier in my ability to handle my own medical conditions because I can see what is going on rather than wait two weeks for blood tests. If I got blood tested today, later on tonight in my patient view (on a web page) I will be able to go in and see the result. I can alter anything that I need to alter or ask for treatment. I can manage my own condition in a much more proactive way." **(Sultan, 2014, p. 181)**

One of the interesting features this service can provide is that thresholds can be set, for example heartbeat rate or blood pressure can have a limit where exceeding this value an alert can be shared with specific people for example family so they can be alerted and act instantly and go check their conditions.

Although this e-health platform proved success it was not released to be used by the hospital. The director of support of Flexiant offered a free license to use their cloud platform for free but one of the project's leading figures from Napier university advised in many emails back and forth that this project was not intended to be rolled out and the hospital was just a project's trial organization and no real patients' data were collected. He further advised that releasing this project will require extensive ethics process where the patient's as well will be in the picture and involved **(Chelsea and Westminster Hospital, 2011).**

Another say that was provided by the director of Flexiant around this debate is that coming across an article by the Telegraph **(Warman, 2011)** there was a huge debate and mixed reactions from the public and maybe he thought that is one reason why the hospital took this decision and not to go further with the project although they got a free IaaS cloud platform license offer.

After the success of DACAR and its progress in making patients' and consultants' life easier as stated in the test carried by the director of support for Flexiant, team member from Napier university stated and confirmed that further funding to a follow-up project is secured and being under investigations to integrate and enhance UK primary care, secondary care and the "assisted living" needs. Furthermore, it was advised that the Scottish Enterprise was helping to start a company to support the commercializing of the e-health software products. The Scottish Enterprise relates to the Scottish government, encourages innovative ideas, and puts investments in them.

Figure 3

Data flow graphical chart
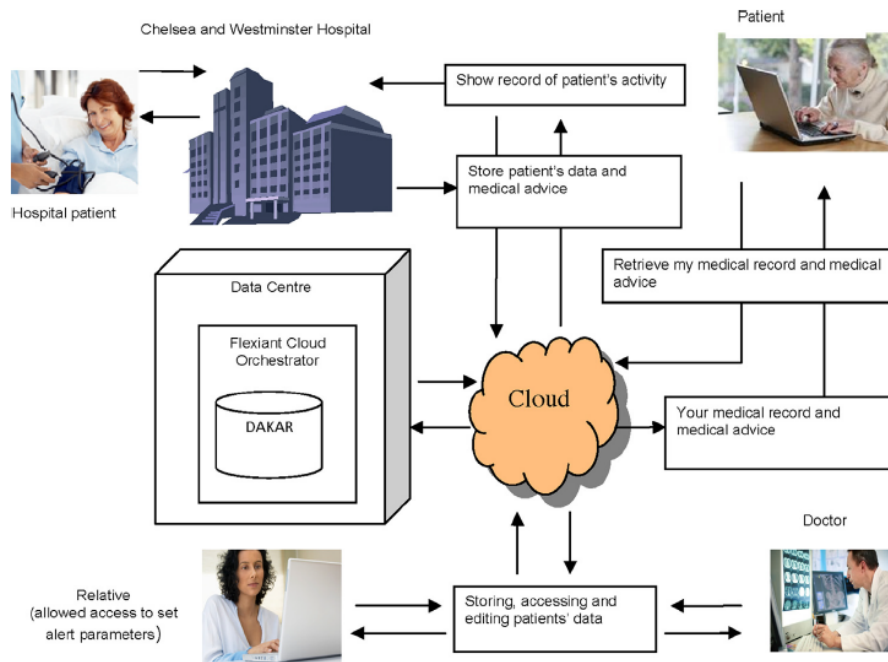
Note. How data flows generated by the pilot e-Health system at Chelsea and Westminster hospital (London) by **(Sultan, 2014).**

Conclusion

Cloud Computing offers immense potential to organizations who want to outsource certain functions or tasks and gain efficiencies while retaining control of their data. It unlocks the door of accessing data and services by providing needed resources at anytime from anywhere in the world.

It is one of the most compelling ways for many organizations to improve their IT Infrastructure and manage their increasing workloads and costs.

Today, almost every organization as it was proposed in the healthcare and education verticals are using some form of cloud computing strategy in addition to integrating the AI technology to better enhance and provide next-level of technological advances – whether it is in a pilot project or full production deployment. In fact, according to a research survey conducted by IDC in 2015, nearly 80% of organizations have already deployed at least one cloud-based service in their IT infrastructure.

Organizations see the value in using cloud solutions to improve efficiency and competitiveness while also reducing costs.

Organizations should be fully aware of the benefits and challenges offered by Cloud Computing and the solutions available for addressing those challenges to carefully evaluate the value of Cloud Computing to their businesses and organizations.

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