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EVERYTHING AS A SERVICE (XAAS): A REVIEW

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Abstract:-The Information and Communication Technology (ICT) and its applications in the IT services industry have paved as a very viable platform for various innovative products offering and contemporary out of the mark business practices. One of such examples is cloud computing services with the help of which, organizations find themselves on greater ease and with more degree of freedom as far as collaborative work is concerned. This paper tries to explore the contemporary cloud service delivery modes available as product offerings for IT service consumers both from IT and ancillary industries.

Keywords: SaaS, PaaS, IaaS, CaaS, DBaaS, BpaaS, MaaS, XaaS, HuaaS, HaaS, Sustainability, ICT C7.

1.INTRODUCTION

1.1.Concept definition:

The recent developments in the field of cloud computing have put the organizations and the marketers into a major discussion that how competence can be increased using cloud and how a better market coverage practice can be exercised. With these discussions, the utility oriented transformations have occurred and some new forms of cloud based services emerged. Earlier these were in the basic delivery modes i.e. Software as a Service (SaaS), Platform as a Service (PaaS) and Infrastructure as a Service (IaaS). However, the enhanced demands provoked service providers to broaden and differentiate the delivery modes in order to synchronize the offerings with the demands of the consumers for better market coverage. The adoption of cloud became prominent because of its virtualization and remote data generation and transfer capabilities. Indirectly, it helped organizations in focusing the resource optimization, thus adopting the sustainable development practice. Because of diverse and custom needs of consumers, the term 'XaaS' emerged and still in development phase. If we talk about its definition, Khadilkar, Warrier, and Bhargava (2013) defined XaaS as "Everything as a Service,". Before that, Grigoriu (2009) had used the term 'XaaS', to collectively address the types of available services delivery modes. It is an emerging business model which is inclusive of everything as far as technology services are concerned and can be delivered as a service utility. In other words, XaaS refers to alone or a combination of SaaS, Infrastructure as a Service (IaaS), Platform as a Service (PaaS), Communications as a Service (CaaS) or Monitoring as a Service (MaaS), as depicted in Figure 1 (Khadilkar et al., 2013).

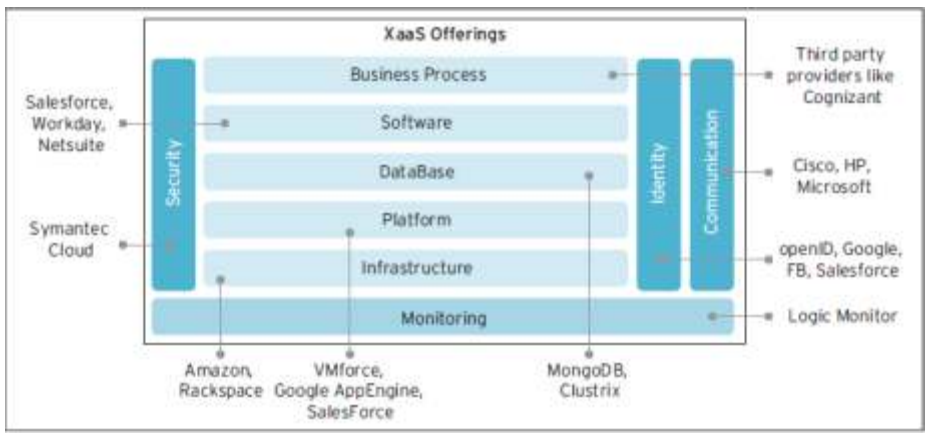

Figure 1 : SaaS (Source: Khadilkar et. al., 2013)

Organizations which have adopted (or in the process of adoption) XaaS, have realized that the capabilities needed to conquer the market with XaaS are different from the savors of traditional business practices. The challenges before those organizations are not only the inculcation of complexities of new service delivery forms but also the establishment of synchronization among the third-party-driven processes, innovations and operational cost shifting (which is incurred in the form of pay-per-use basis.)

1.2.Applicability

Most enterprises are concerned about the hefty cost of computing whether it is for data centers, for business applications or for any other utility software services. In these situations, increasing Total Cost of Ownership (TCO) by solely owning a computational setup to aid the business output is not a wise decision and that too when it is available on rent with flexible pricing or payment terms. Hence a number of such related problems provoked the organizations to adopt the services model because of its ease of access, quality and cost advantage. Moreover, with the adoption of this model threat of technology obsolescence is no more a headache for the consumer organizations. These services are bundled with subscription or use based packages which allow consumers to resurrect IT investments as expenditures, other to this, there exist no cost. These flexible use based computing service business models are one of the most prominent reasons responsible for triggering the adoption of XaaS (Khadilkar et al., 2013). To it, a different perspective is also observed i.e. Internet of Things (IoT) which means the connectivity to the internet anywhere by any means (i.e. device). Today it has gone beyond, by carrying almost resources to the internet with no offline lag or dependency. Therefore sometimes, it also seems an enhanced version as well as the integral part of the cloud utility. Nevertheless, amidst all these facets, the XaaS has the key characteristics like high scalability, multi-tenancy, online and automated provisioning, device independence, location independence, term-based billing or pay as you go models (Khadilkar et al., 2013). These versatile characteristics give the organization a wider space for making the decision regarding the adoption of selective or complete cloud service adoption which ultimately help organizations in achieving competitive advantage.

1.3.Types of cloud deployment models contributing XaaS

Like the definitions of the cloud concept, the classification of the cloud services also has ambiguity and vague line of distinction. However, the cloud deployment model types include public, private, hybrid and community clouds.

Private Cloud- Private cloud as the name suggests is the cloud service which is exclusive to the

organization (Jansen & Grance, 2011). There is no sharing of benefits to external parties or even business partners (contract specific). Literature shows an imprecise demarcation of the private, public or community clouds as authors defined it as per their specific perspectives i.e. some have elaborated it as an independent entity and some as a part of their module (Chang, Wills, & De Roure, 2010). It has also been referred as an In-House private cloud which does not have data security and data loss concern. According to Grigoriu (2009) considering Service Oriented Architecture (SOA), organizations such as Amazon, Google, Salesforce, Microsoft etc. have come up with various user specific exclusive computing models. Therefore the crux is that when cloud services are designed to give benefit to exclusive party or the organization, it is known as private cloud.

Public Cloud- Unlike private cloud, public clouds are meant for everybody i.e. for the use of all the stakeholders. According to Zadirakaa and Kudina (2013) the public cloud is one in which resources are the property of service provider. Public cloud computing is a standard model of cloud services in which services are free over internet infrastructure with or without the subscription. The ownership goes to the service provider. In it, the application data and other information are stored on distant servers, irrespective of location and services and accessed through a client (a browser). The advantage of this model lies as flexibility of expansion i.e. IT resources can be scaled as per the need with ease (Zabalza, Rio-Belver, Cilleruelo, Garechana, & Gavilanes, 2012). It is growing so fast as compared to other modes that according to a forecast, the enterprise cloud spending will be around $207 billion by 2016 (Gartner, 2012b).

Community Cloud- According to Cavalcante et al. (2014) the community cloud is the name for shared cloud infrastructure to the member(s) of the organizations and is supported to (sometimes by) a specific community that has some common interests with regards to IT services. The interests may pertain to mission, security requirements, policy and compliance considerations etc (Bartfai-Walcott, Boss, Dawson, & Rick, 2014). It may be managed by the organizations of the same community (Jadeja & Modi, 2012) or by a third party and may exist on-premise or off-premise. The community cloud has several advantages as compared to other models. The first benefit is that the setup cost is more economical as it may be scattered through the whole community members. Second is, that the synchronized benefit such as Just-in-time production and replenishment can be exercised more effectively with least degree of information polishing. The last is that maintenance and control can be handled by third party for more efficiency and performance (Goyal, 2014).

Hybrid Cloud- As far as nature is concerned, hybrid clouds are more complex. This is because those are made up of two or more clouds (private, community or public). In these type of models each member remain a unique identity but is accountable to others regarding other contributions through standardized or proprietary technology which facilitates applications and data portability among them (Jansen & Grance, 2011). Hybrid Clouds provide a leverage for in house applications to the organization and that too with an increased tolerance and scalability of cloud based services (Goyal, 2014).

The concurrent growth of cloud concepts and its subsequent delivery modes have provoked service providers to realize the immense potential of the new market as it is expected to grow about $207 billion by 2016 (Gartner, 2012b). Thus it is obvious that down the line, cloud based offerings will be more specialized and differentiated. This is good but we should not forget the principle of sustainability as well. Although inception of cloud along with other assort of Information and Communication Technology (ICT) comes up with the ideology of cutting the energy waste and carbon footprint, a closer care needs to be taken on the initial basis in order to stop the future problems. Additionally due to rapid growth there are, new service delivery modes emerging day by day, as an offering, therefore amidst different cloud service deployment models across industries, the emergent question to be answered is that- What diverse mix of cloud services or XaaS offerings is available across industries and organizational levels.

2.RESEARCH APPROACH

Since the research question is communicating an exploration of a real world situation the nature of the research design involved is exploratory. In order to answer the emerged research question, the sections below find integrative literature review as a basis to support the exploratory research. The data sources taken for the literature includes the official websites, white papers, reports, books, insights, press releases, news communications and scholarly articles. This exploration will help researchers as well as practitioners in assessing and alignment of the girth of cloud services for better policy development and decision making.

3.SERVICE MODELS AVAILABLE AS CLOUD

There are mainly three types of cloud service models which were initially in practice. These are Software as a Service (SaaS), Infrastructure as a Service (IaaS) and Platform as a Service (PaaS) (KPMG, 2012). The diverse acceptance and rapid growth of ICT applications have led the emergence of various derived service models. A few names of such models are CaaS, MaaS, BPaaS etc. and have been discussed below in detail.

3.1.Software as a Service (SaaS)

SaaS means 'software in a cloud' (Reese, 2009). In it, the consumer can use the provider's applications running on a cloud infrastructure. The applications are accessible from various client devices through a thin client interface such as a web browser (e.g., web-based email). The consumers have nothing to do with cloud infrastructure including network, servers, operating systems, storage, or even individual application capabilities, inclusive of personalized configuration settings (Mell & Grance, 2009). The economical and powerful processors bundled with Software as a Service (SaaS) architecture facilitate high end computing. The broadening network bandwidth and more reliable and flexible network connections have facilitated users to enjoy subscription based high quality services from data and software (Wang, Wang, Ren, Cao, & Lou, 2012). The underlying applications running in the cloud are located in the SaaS layer. Either PaaS layer can be used by the developers to develop and run the applications or directly the IaaS infrastructure layer (Lenk, Klems, Nimis, Tai, & Sandholm, 2009). Considering the provider's margin of profit, this model supplies the software provider with an uninterrupted flow of revenues, which might be more fruitful for the long run. To take some concurrent examples Salesforce, Google Apps and Customer Relationships Management (CRM Microsoft) system exist in the trade. In addition, cloud applications can be composed and bundled as an ancillary service from other cloud services offered by external cloud systems (under the heads of Service Oriented Architecture (SOA)). For example, a payroll management solution may use another accounting SaaS to calculate the tax levied for the employees of the organization without the implementation of this service within the payroll software. Therefore, the solutions targeted to be developed in higher layers of the cloud architecture are simpler to develop and have a shorter delivery time for the market. Although in the implementation of SaaS one of the big challenges are the integration of the legacy systems and data migration. At some levels this serves as a reason for slow adoption but this is not good enough to deny the immense potential of the cloud services. Therefore, to give it a push, cloud applications' providers need to consider the customer specific concerns, particularly of end users regarding security and safety of data in the cloud, user specific authentication and authorization, delivery and performance, backup, recovery and reliable SLAs for their cloud applications. Lastly the model of subscription which is widely used pricing model for SaaS. The reason is the available capability for the users to predict and plan their consumption and expenses of using the cloud applications. Although some authors argued that it lacks the accuracy of charging the users for what they actually have used. (Youseff, Butrico, & Da Silva, 2008). The SaaS model incorporates the number of unique characteristics: sharing of access, systematic support, latest technological features and no hidden costs and compactness at the user end (Goyal, 2014).

3.2.Infrastructure as a Service (IaaS)

According to Gartner, Infrastructure as a Service (IaaS) is a standardized, highly automated

offering, where compute resources, complemented by storage and networking capabilities are owned and hosted by a service provider and offered to customer on-demand. Customers are able to use it as per their need through a thin client or web based interface. It acts as a console for the entire organizational environment (Gartner, 2014b). According to another definition of IaaS, it is very simple as a practice to define. It is like one rents the cloud infrastructure i.e. servers, storage and networking- on demand, in a pay-as-you-go model (IBM, 2014). Thus IaaS is a cloud service model in which users are facilitated by deployment of hardware related computing resources in the form of a utility or more precise a service. This model provides greater extent of feasibility by managing to expand or reduce the physical resources in a very short period (Zabalza et al., 2012). It may be referred as utility computing data services providing on demand server resources. To take some examples HP Adaptive Infrastructure as a Service, Rackspace, Amazon E2C & S3 are a few of them. The typical characteristics of IaaS model are specific resource availability, flexibility, traffic shifting or cloudbursting to alternate resources and scalability of infrastructure (CII-PwC, 2010).

3.3.Platform as a Service (PaaS)

A Platform as a Service (PaaS) is a cloud service model, which usually finds its place between the SaaS layer at the upside and IaaS layer at the lower side of the cloud architecture. It can be defined as a group of numerous infrastructure services, which includes application platform, integration, business process management and database services. In other words, it is a capability provided to consumers to create and deploy other cloud based applications. It is done using programming languages, libraries, services, and tools available in the cloud. Microsoft Azure, Salesforce and Google's App Engine are typical examples of PaaS. These utilities are rich in developing facilities which are used to create, test and deploy different products without the ownership of infrastructure (CEET, 2013). Therefore the clients will be free from buying the license and installing the software and hardware (Jadeja & Modi, 2012). However, the generally talked PaaS concept is nothing but a focused insight of application PaaS (aPaaS) as the representative of the whole category (Gartner, 2014c). In this regard, the best example is of 'Salesforce' which has been actively adopted by medium and large scale players (Salesforce, 2014). The PaaS models are further classified into three classes as Raw Compute Platforms like Amazon Web Services, Web Application PaaS like Google App Engine and Business Application PaaS like Force.com (KPMG, 2012). The PaaS characteristics are, dedicated environment for development, testing, and production, flexible i.e. Pay-as-you-go model, Scalability etc. along with concerns like code & data privacy, security and scalability (CII-PwC, 2010)

3.4.Communication as a Service (CaaS)

It means communication through the cloud. The services may include video-audio conferencing, VoIP or internet telephony and other derived benefits like instant messaging etc. Since inception of cloud, these services are now available through common gateway which is owned by an individual organization (private cloud) or a group of organizations (public or community cloud) when taken in the context of cloud services then, termed as Communication as a Service (CaaS). In it the service sustainability and quality is the responsibility of the cloud controller. The cutting edge of using CaaS is the leverage of choosing the selective benefit, pay according to the usage and ease of access. The modern CaaS is a step towards value creation in the field of communication industry. To gain the competitive edge several factors are needed which are based on experiences of organization(s) in the market. These factors are sharing of ideas, simplicity and recognition and relationship building with long term partners (Huawei, 2014).

3.5.Monitoring as a Service (MaaS)

It refers to control of access, retrieval and exchange of information in a cloud environment i.e. distinct cloud service layers, security and communication protocols. Monitoring as a Service (MaaS) is one of the service models or a utility comprising anything as a service (XaaS). It is a framework that facilitates the deployment of monitoring functionalities for the services of cloud model, for example optimum state monitoring of the systems. In other words, it helps in tracking the

states of application, network system instances etc (Janssen, 2014c). The MaaS is under consideration because installing discrete on-premise point solution to monitor each distinct system and environment is costly, inefficient and ultimately ineffective. Because of much complex nature of relationships in modern dynamic IT environments it is pragmatic to have a unified view of all the infrastructure that a business depends on, irrespective of their functionality in private, public, remotely held environments, enterprise data centers or any combination there off (Fujitsu, 2014). The MaaS avails a comprehensive performance insight of various setups and the systems' states which are needed by organization to ensure the optimal performance of IT operation in business services. When equipped with competent technologies, it caters the user through unified interface to track all the vital resources a business relies on. The benefits and capabilities a good MaaS can offer, are server monitoring, device monitoring, website availability monitoring, cloud service monitoring, database monitoring, application monitoring, network monitoring, file system monitoring. The MaaS providers offer basic monitoring schemes such as state monitoring which has become the most widely used feature i.e. the overall monitoring of a component in relation to a set metric or standard. In state monitoring, particular aspects of a component are constantly evaluated and results are usually interpreted for ad hoc decisions or periodically updated as a report. For example, the overall timeout requests measured in a period of a time might be evaluated to see if this deviates from what's considered an acceptable value (Fujitsu, 2014).

3.6.Hardware as a Service (HaaS)

Hardware as a Service (HaaS) can be inferred as the managed services in which the computing power is leased from a service provider. It is similar to other service-based models in some aspects like users renting rather than ownership of provider's technological assets (Janssen, 2014b). The HaaS service provider operates, manages and upgrades the related hardware for its consumers for the whole duration of the leasing contract. It is very much significant for the enterprise users as they are not required to invest for the ownership and management of the data centers. Meanwhile, HaaS providers have the dedicated technical expertise and comparatively more cost-effective infrastructure to serve for systems. Service Level Agreements (SLAs) in this model are stricter because enterprise users have predefined business workloads and require strict performance at the time of operations. The HaaS providers earn benefits by materializing the economies of scales by building huge data center infrastructures with compact and heavy performance floor spaces, power, cooling assortments as well as operational and management expertise. HaaS providers need to take care of number of challenges both technical and behavioral in managing different service offerings. The major challenges include efficiency, speed and ease of customization. Other challenges include scheduling, data center management and customary power-consumption optimizations (Youseff et al., 2008). Considering the future, HaaS is in infancy and still emerging. It is an area which if controlled and mastered, may put the organizations aside from competition. An entire IT infrastructure for couple of monthly figures is a composition proposed and is easy for potential customers to understand and adopt. If backed up by financing and operational supports the practitioner can achieve an unmatched winning position (Calonico, 2013).

3.7.Humans as a Service (HuaaS)

Considering the cloud architecture, the Humans as a Service (HuaaS) is the top layer. It helps in the involvement of human intelligence into the cloud service offerings (Liu, 2011, pp. 32). It is then, a clear depiction that the cloud services paradigm is not confined to IT services boundaries but can also go beyond it, to include service provided by human beings as resources. Since human capabilities are not limited to a systematic and definite performance, sometimes there excellence can be integrated as resource. Those activities, in which creativity is involved such as design and translation services, these assets could be panacea in order to deliver the competitive edge solution. Considering the cloud architecture in the HuaaS layer, one of the prominent practices is crowdsourcing where numbers of people contribute to the tasks performed inline of customer's agenda. A specific example of crowdsourcing services is the Amazon's Mechanical Turk which is a platform where highly specific tasks can be assigned to interested resources and honoured in terms of

little payments. In other words it is like a marketplace for crowdsourced offerings. Thus a crowdsourced task require no initial expertise in order to complete the available tasks as there is a potentially large workforce to respond in line of the posted demands. Through this all people can be benefitted, though it is confined to some countries only. If we talk about the cost structure in any business process service it goes about 70 to 80 percent (Figure 2).

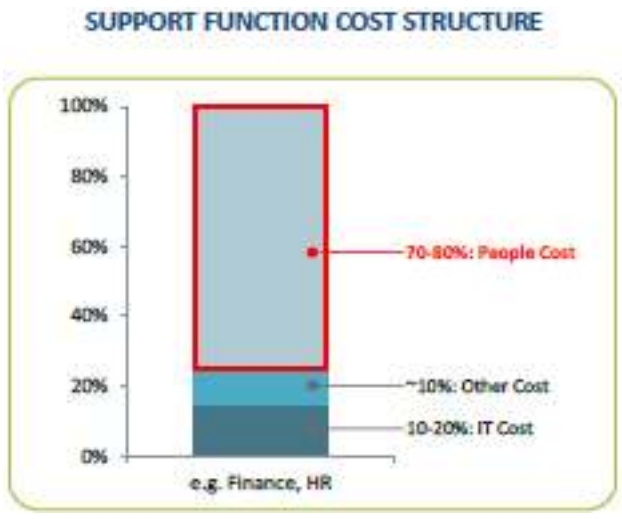

Figure 2: Cloud cost structure for a bps (source : Meixner (2013))

We have another way to look at it as the act of various tasks which are outsourced to various people of a large group or community openly. For example, an organization which invites people to help in capturing, systematizing or analyzing its massive chunk of data (Meixner, 2013).

3.8.Desktop as a Service (DaaS)

Desktop as a Service (DaaS) is a cloud service which involves hosting of virtual desktop infrastructure (VDI) by the service provider. In this delivery model, the back end responsibilities of data storage, backup, security and upgrades are managed by the service provider by copying of user specific data from virtual desktops during logon/logoff irrespective of devise and network. It is beneficial for small and mid size organizations in which the organizations are interested in using the virtual desktop infrastructure but find it a cost booster in terms of in-house installations (Botelho, 2013). In answering why DaaS, the drives of Bring Your Own Device (BYOD) initiatives comes in role, through which the greater flexibility was sought in terms of mobility networks and devices. To do that, the organizations required strong infrastructural backup in the form of physical data center infrastructures to deliver virtual desktops and got failed, due to high cost involved in the ownership. Thus the services part came into consideration through which users could get the benefits of desktop virtualisation, without the worries of performance issues, SLAs, security and backups, as it all belonged to the service provider. The DaaS services provide the benefits like desktop and apps as a cloud utility and are easy in deployment, less expensive, higher in performance, flexible and secure (Desktone, 2014). Down the line, the desktop hosting has moved beyond VDIs i.e. towards the differentiated services due to severe competition in the basic cloud service domain. Some examples of differentiated services are Citrix's hosted services which is bundled as hosted desktops, hosted applications or hosted workspaces, customizable security levels and policies, data storage services, mobile device management and simple user self-service which had enhanced features like single sign-on across all services, multi devices support and enhanced roaming and many more. These effort helped service providers in delivering delight to their customers along with basic deliverables like secure access (Citrix, 2014). The other example is of Dell's DaaS services (as Workspace as a

Service) which is a Cloud-based desktop virtualisation and help organizations in simplifying the deployment and improve business outcomes. It provides benefits like simplified and faster desktop environment deployment, pre-engineered and end-to-end solutions to cater the diverse organizational needs and also facilitates the multi device leverage in order to access the VDI (Dell, 2014).

3.9.Data Storage as a Service (DSaaS)

In today's data driven world where the daily data creation is phenomenal, the storage of data is a big concern. Thus the Data Storage as a Service (DSaaS) comes in role. Data Storage as a Service is a cloud service in which an organization rents its storage space to the users. That is the reason, the secondary storage spaces are being marketed as a cloud offering in which the key benefit is the cost savings as compared to own physical saving spaces. In this process an organization signs a Service Level Agreement (SLA) wherein the storage service provider agrees to rent space on cost per memory unit stored and cost per data transfer basis. In case of data loss, the network administrator would facilitate the data through DSaaS provider. DSaaS is beneficial for small and average sized organizations where ownership cost to physical storage or the technical talent is infeasible to afford. In parallel, it is also a good way of disaster recovery (Bigelow, 2009). Thus an organization availing DSaaS can enjoy benefits like lower storage costs, industry savings, rapid deployment, scalability, efficient backups (CSC, 2014). One of the real time examples is Amazon S3, which is storage in regard to the Internet. It is available in the form of web-services interface through which the storage and retrieval of data is executed irrespective of space and time over the web. It makes the developer able to access the scalable, reliable, secure, fast, inexpensive infrastructure as in case of Amazon which is used by Amazon itself to host and manage its global websites. The service aims to maximize benefits of scale and to pass those benefits on to developers (Amazon, 2014).

3.10.Database Management as a Service (DBaaS)

From the customers or developer sight, the Database as a Service (DBaaS) is a service which comes with the database management support without observing the traditional support needed at the developer's end i.e. the developers availing this service need not to be a database experts neither they need to hire a related talent to manage the database. This service makes an impact by not affecting the developer's work in any manner i.e. in the case of back-up crash or the server failure. From a service provider's perspective, this is the service which needs a high degree of automation along with batch wise scheduling of the key time-based activities like backing up and scaling. This may result in confinement of database services to a limited number of connections in order to provide Quality of Service as per the SLA. The other important tasks to be cared are the configuration and alignment of scheduled functions through application programming interfaces (APIs). Thus to be of quality, the database service must be able to facilitate the data transfer instantly because of quality of service reasons or some other. Additionally it needs to be elastic in terms of scalability. In it the data virtualisation practices make cloud databases to be able to provide the services with ease of pricing and management to the customers (ScaleDB, 2014). Another example is of the Oracle Database as a Service which can be accessed through dedicated network connections, or as a full development and deployment platform in the form of cloud services. It is offered with an option of single schema based service or fully configured database instance (Oracle, 2014).

3.11.Education and Learning as a Service (ELaaS)

Education and Learning as a Service (ELaaS) is not an exclusive cloud concept but a use based derived concept emphasizing on educational use and learning dimensions through cloud services. That is the reason it seems rational for an organization to use cloud environment for education and learning IT activities (in particular) for enhanced learning scenarios (Vouk et al., 2013) in the case of budgetary limitations. Therefore Alabbadi (2011) proposed a new cloud computing formation model known as the Complete Cloud Computing Formations (C3F). According to this model, in educational and learning organizations, the classification of IT related activities is done on the basis of two criteria i.e. mission criticality and sensitivity. Each class is then

mapped into ELaaS Quadrant which serves as a framework for ELaaS (Alabbadi, 2011).

3.12.Network as a Service (NaaS)

Network as a Service (NaaS) is a business model in which network services are available over the internet on time based subscription basis. To avail the service the basic requirements are subscription with the service provider for NaaS, and internet connection and a computer. It is beneficial because like other cloud services, it saves cost and related human engagement when managed on-premise. In this case it becomes another utility like electricity or water and all the complexities remain at service provider's end. Although it is not a new concept however the modern deployment like other cloud services has been questioned as it depends upon the guarantee of the service provider. The other issues are honouring of Service Level Agreements (SLAs) and data compliances issues (Rouse, 2013). In case of communication services providers, the NaaS model facilitates the assets and activities like context, communications, commerce and control to external businesses and partners using web-based Application Programme Interfaces (APIs). In a bit detail, the Communication means voice calling, conferencing, messaging and multimedia services. Commerce refers to the enablement of monetary transactions like payments, subscriptions and settlements. Context reflects the information like profile, capabilities, location, data connection type, device capabilities etc and Control is associated with functions like security, Quality of Service (QoS) and policy. Sometimes to provide users, a rich context, service providers combine the offerings with other internal and external services such as monitoring service or business intelligence service etc. through composite APIs. Thus NaaS availing organizations are entitled for the benefits like productivity and efficiency gains, more intelligent interaction with customers, multi device payment channels and enriched information which helps in taking more intelligent business decisions (Aepona, 2014).

3.13.Sensing as a Service (S2aaS)

The concept of Sensing as a Service (S2aaS) refers to the sensing service requests from different locations through the deployment of multiple sensing servers. When a user raises or demands a sensing request through a web server from distant device which could be cellular phone or a tablet or a computer, the same gets forwarded to a sensing server which routes the request to a mobile phones subset in that specific area or the area of interest. Thus the sequential sensing task gets fulfilled through these devices or cellular phones. The required data then be collected by a distant sensing server, stored in the database and fetched to the demanding user (Sheng, Xiao, Tang, & Xue, 2012).

3.14.Business Process as a Service (BPaaS)

Business Process as a Service (BPaaS) means a specialized group of task to be delivered in the form of service. Gartner defines Business Process as a Service (BPaaS) as the delivery of Business Process Outsourcing (BPO) services that are sourced from the cloud and constructed for multi-tenancy. In cloud atmosphere, the degree of services automation is more and the labor pool allocation is not exclusively dedicated as per the client requirement. There are use based pricing model and the access facilitated is through Internet-based technologies (Gartner, 2014a). For the success of this concept in today's dynamic world, organizations need to support standardized and multi-client facet of service delivery and from the service providers end, they need to share the generated benefits, enhance workbench capabilities and more crucially need to dissolve the data security challenges (Meixner, 2013). Since inception of cloud services like PaaS, IaaS and IT as a Service (ITaaS), vendors are engaged in putting bunch of services which will result into complete automation process. For an example, we can take transactions management of an organization where vendors could pitch the complete care of performance and delivery by cloud hosted networks (Janssen, 2014a). This area is so vast that a release of Garter (Mr. Gordon) says, "Business process as a service (BPaaS) still accounts for the vast majority of cloud spending by enterprises, but other areas such as PaaS, SaaS and IaaS are growing faster,"(Gartner, 2012b). It is the largest segment because of the inculcation of cloud advertising aspect as a sub segment. It has been forecasted that through

2016, cloud advertising will contribute about 47 percent of total public cloud services spending (Gartner, 2012a).

3.15.Content as a Service (C2aaS)

Content as a Service (C2aaS) refers to the service which has content that can be delivered as a web based utility rather than a traditional flat piece of content which is generally used for execution on an exclusive platform. The hosting of content can be anywhere. The need of concept of C2aaS got boosted from the gap of tracking learning experience by Learning Management Systems (LMS), LMS adoption, external URL and cross domain scripting resolution, use of SOAP, REST, JSON, SCORM (on various platforms) and lastly the enablement of paid subscription services (USADLI, 2014).

3.16.Commerce as a Service (C3aaS)

In this kind of service model, the offering is the 'electronic commerce platform' as a cloud solution. The contemporary example could be the IBM's WebSphere Commerce Platform. The Commerce as a Service model helps the organizations in winning cost effective via the cloud hosted solution domains. The availed benefits of these models are low cost, competitive edge towards solutions, security, reliability and round the clock support (Tryzens, 2014). Another example to consider is the SuiteCommerce solution which provides the multi device support thus facilitating ease of access anytime, anywhere.

Additionally the benefit of optimised experience can be enjoyed periodically. Thus an eCommerce platform enriches the users with the benefits like device-optimised online transactions, multiutility or rich service platform and is feasible for all scale of customers i.e. small, medium or large (Netsuite, 2014).

3.17.Compiler as a Service (C4aaS)

Compiler as a Service (C4aaS) is a service technology in which the support is offered in the form of advance compilation services. One concurrent example is the "Roslyn" Compiler as a Service technology by Microsoft. This is a future project and to make it functional, already present compilers of C# and VB will be re-architected to be served as "Compiler as a Service" (C4aaS) utility. The work is in process, once done, the compiler will be available through application programming interface (API) form. In other words, it may be taken as a replacement of VB & C# compilers along with supported Integrated Development Environments. This technology will help developers to reach to the compiler directly and allows prompt information compilation with modern detection algorithms and obviously with greater cost and resource efficiency (Foley, 2013)

3.18.ITMaaS (IT Management as a Service)

This is a more holistic terminology and includes the framework of MaaS. The concurrent example includes Fujitsu's IT Management as a Service (ITMaaS) suite which has one of its elements as Monitoring as a Service (MaaS) and has further subsets of SaaS-based applications. ITMaaS, as the name suggests, facilitates the users with the infrastructure, application monitoring and service desk capabilities which are generally needed in order to establish and ensure an efficient and cost-effective IT Management operation. Sometimes it may include additional cloud based products as a value addition. In short the values communicated by this service to users are faster deployment, reduced costs and optimized service levels by getting timely feedback and other information (Fujitsu, 2014).

3.19.Backend-as-a-Service (BaaS)

Backend as a service (Baas) is a derived cloud service model which allows an agile platform for web and mobile app developers with benefit of linking their work with backend cloud storage along with the features such as user management, push notifications, and integration with social networking services. It ultimately minimises the risk of data loss (Naik, Ajay, & Kolhatkar, 2013).

3.20.High Performance Computing as a Service (HPCaaS)

HPCaaS is the acronym of High Performance Computing as a Service and reflects the ability of superfast and complex Computing Services as a utility. These services provide a comparatively rigid support for the services which involve high calculations like predictive modelling, mapping, graphic designing, weather forecast and VFX etc. Its objective is to reduce the latency, enhance promptness between the connected systems and resources and to optimize the data throughput too. To do this, the utmost necessary things are the alignment and closeness of the instances belonging to the cloud infrastructure (Baun, Kunze, Nimis, & Tai, 2011).

3.21.Landscape as a Service (LaaS)

When several independent components like application servers, webservers or database servers which are exclusively distributed through different servers, aggregated into a logical grouping, then these are referred to as a Virtual Landscape. These, when isolated through sandboxes, make users able to deploy new landscapes which results in tremendous time and cost savings (fluid-Operations, 2014). Complex software with no or only limited multi-tenancy support, such as SAP R3, are offered through LaaS (Baun et al., 2011).

3.22.Privacy as a Service (PasS or Security and Privacy as a Service (SPaaS))

Privacy as a Service (PasS or SPaaS) is a group of security protocols through which the privacy and legal compliance of user data can be exercised in cloud service architectures. It involves the secure storage of information with the help of tamper-proof technology of coprocessors. This technology supports the physical and logical protection by creating a secure domain in the computing cloud. Its central goal is to minimize the risk about user's control in managing the privacy. It also provides a feedback related to privacy process which makes aware about the past actions taken and the possible risks which may focus their sensitive information.

3.23.API as a Service (APIaaS)

APIaaS which has a full form as 'API as a Service', where API stands for the 'Application Programme Interface'. These are fully managed solutions which permit organization in exposing necessary information. The term fully managed means turnkey i.e. pre built, hosted and integrated. Earlier organizations marketed solutions in the name of API management tool but couldn't get enough attraction of the customers. After being bundled with cloud models, product came as API as a Service, which is quite popular and adopted. The thing which makes this concept more attractive is its ability to make money from the existing information. This goal can be achieved through many ways with distinct value propositions from others. Traditional organizations too have high-value information assets however the path to monetise is vague. If this, the organizations follow a "fail fast, cheap" strategy which let the organizations be versed (through pilot studies) about the new model's success or failure. APIaaS is also paves the same route of monetizing pilots because it sets-in readily and unobtrusively, along with the constant appeal to developers and out of box thinkers with numerous new Apps. The successful execution of these efforts results in painless and potentially profitable outcomes (Panagos, 2014).

3.24.Test environment as a Service (TEaaS)

Also known as 'on demand test environment', which supports a cloud modelled delivery service for the feasibility and performance testing of the new software and environments, where the other software and data are centrally hosted though cloud and accessed via a thin client based internet utility like a browser (Grossman, 2012).

Along with the above services, there are plenty of derived services which are taking shape and may be a prominent aspect in the near future. To name a few of such services are Machining as a Service (MaaS) (Li & Mehnen, 2013), Assembly as a Service (Li & Mehnen, 2013) etc.

4.CONCLUSION

The enormously increasing ranges of cloud services, which have resulted to XaaS

terminology, are at the center of attraction of ICT industry offerings. These offerings are assumed to have a cut back in the consumption of natural resources in order to optimize the consumption of natural and man-made resources inside a business organization. But as a matter of fact, due to these offerings the bandwidth spectrum and the number of devices now become more important than the dedicated servers and other utilities. That is the reason, a sustainable development centric insight or observation is needed in order to ensure sustainable consumption and production, despite of the carbon and energy reduction benefits provided by the adoption of cloud services (Accenture-WSP, 2010). With the help of this paper, the authors tried to put some light on the rapid differentiation of cloud services which can currently be observed. If, the sustainable facet not taken into consideration, this will violate the ICT C7 application guidelines (which talks about the use of ICT to promote sustainable development and monitoring systems of electronic environments in public domain, thus ultimately helping governments in framing national e-strategy) and despite of making customer's profit, it may result in suboptimum performance and thus exploitation of the resources.

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