HARNESSING KNOWLEDGE MANAGEMENT SYSTEMS (KMS) IN THE ERA OF CLOUD COMPUTING (CC): A NEW HORIZON FOR ORGANIZATIONS AND THE APPROACH OF LEADING SERVICE PROVIDERS

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Cloud
Computing


KNOWLEDGE

INTRODUCTION

- As companies and business have become more global the need to integrate disparate systems into enterprise-wide KM systems has increased that allow differing levels of access around the clock (Lee, et al, 2002).

- When retrieval, storage, strategic use of data, data analytics, and new forms of artificial intelligence arise, questions about the factors influencing superior data, information, and knowledge use and management prompt the examination of variables that play a critical role in KM implementation in organizations.

INTRODUCTORY QUESTIONS;

- What is your data/information storage choice?
- What are the limitations, if any, with your storage adoption?
- How time versus use of information affects your ability to make decisions?

ABSTRACT

Technological advances in the fields of information and communication have been, increasingly, reshaping the range of information systems, affecting the data management processing, use, and accessibility, and impacting the knowledge management systems in an unimaginable scale. Developers and consumers of information seek the most efficient platform for solid infrastructure in offering web-based services, on demand, to theirs end users anywhere, anytime in a growing digital workspace that is user centred and that benefits from the paradigm of cloud computing.

Organizations are facing challenges in information and knowledge management that include, but are not limited, to data management: retrieval, processing, storage, and security, to mention a few. Numerous information systems seem to present the most effective format for data management, protection and sharing, including on premise solutions and on cloud based options: public, private, hybrid, in some cases with scalability issues, as an example. The well documented shift from on-premises storage to cloud based services results from the incredible volume of data collected and processed daily in organizational operations and systems vulnerability, storing capacity issues, and challenges in migration and compliance.

This paper investigates the principles of clouding computing and its impact to knowledge management process in organizations. It brings a literature review and the analysis of some real case of companies users and or developers of cloud computing services, concluding that there are unquestionable benefits of cloud computing (CC) and that an effective combination of an information architecture plan, business strategy, and solid information infrastructure platform aligned with management support will contribute to a successful KMS process in organizations.

Keywords:
Cloud Computing, Knowledge Management Systems, KMS; Competitive Advantage, Organizational Strategy; KaaS.

RESEARCH DESIGN/THEORETICAL FRAMEWORK

An extensive literature review focusing on cloud computing and knowledge management systems were conducted in order to cover the principles of knowledge management and cloud computing and some of the challenges and opportunities for organizations. Scientific journals, as such as International Journal of Innovation, Management and Technology, Journal of Knowledge Management, International Journal of Information Management, and Applied Mechanicals and Materials. In addition, Youtube, video sharing platform, and the **NIT, National Institute of Standards and Technology** were utilized as source of information for user cases of cloud computing and the official report from the U**. S Department of Commerce on Standards for Cloud Computing.**

RESEARCH DESIGN

The selection of the cloud computing services companies included in this study resulted from a research aiming at identifying the top cloud storage applications in the market

1)free services to users,

2)top companies developing and providing cloud computing services in all three models: private, public, hybrid.

The included companies are top leaders in cloud computing in the current market.

FLASH DRIVE

Memory Flash

RAM MEMORY

SD

CDS

DVS

Storage information. Volatile memory for CPU (Central Processing Unit)

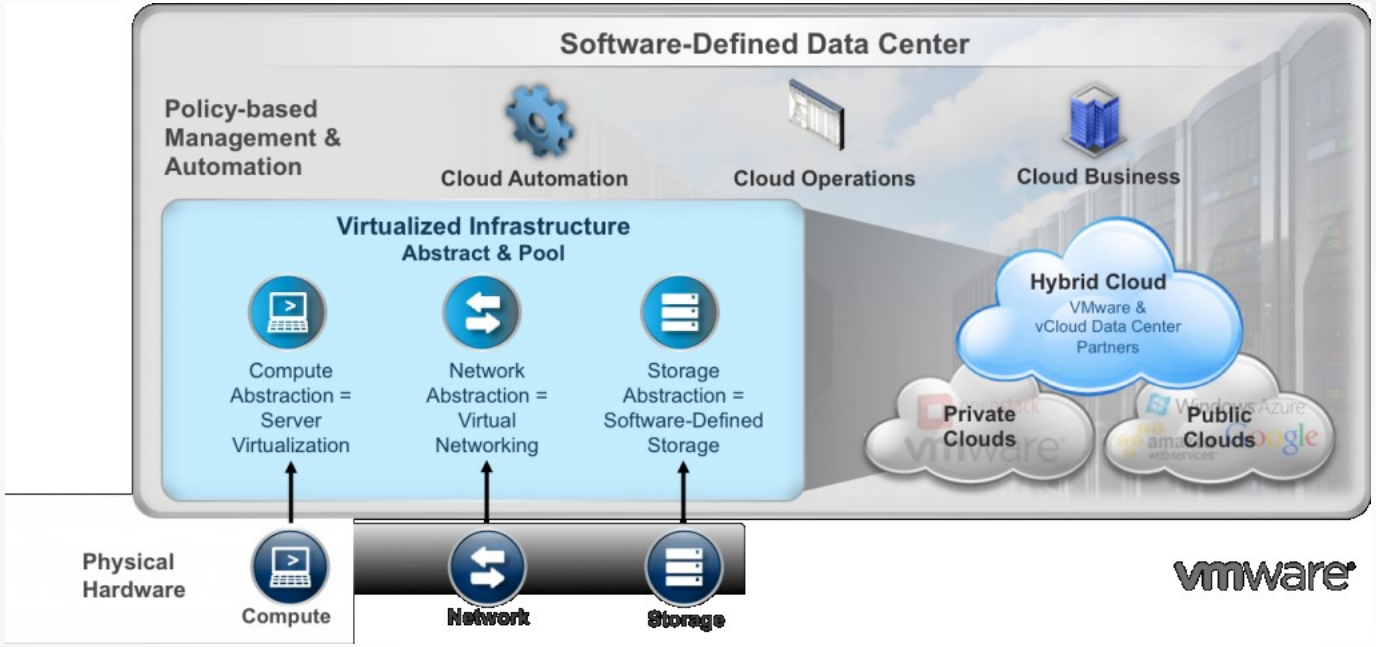
DATA CENTER

Building or dedicated space

used to house computers!

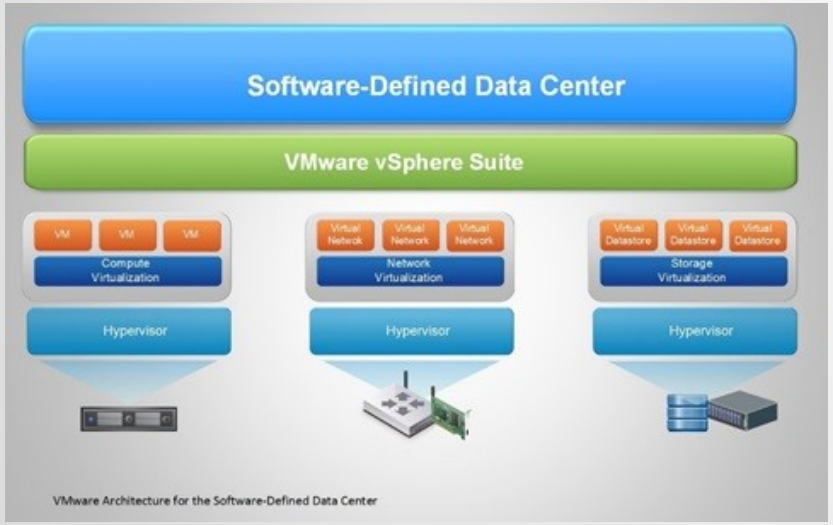
SDDC

Virtualization concept



Abstraction

Pooling



Automation of data center,

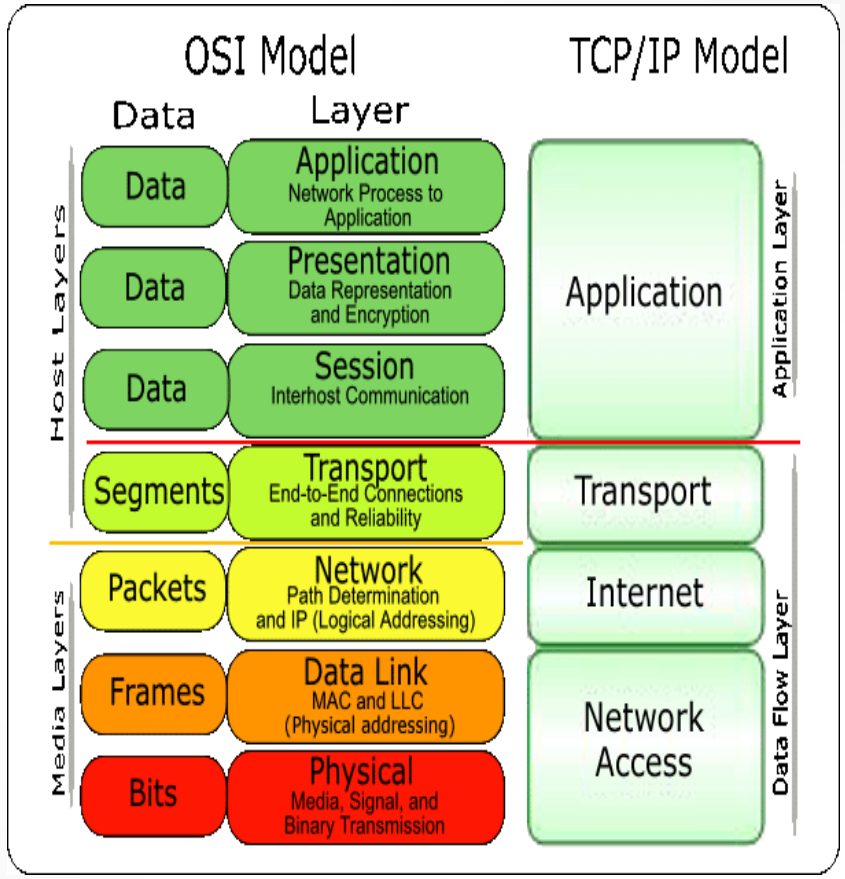
resources and services to achieve

IT as service.

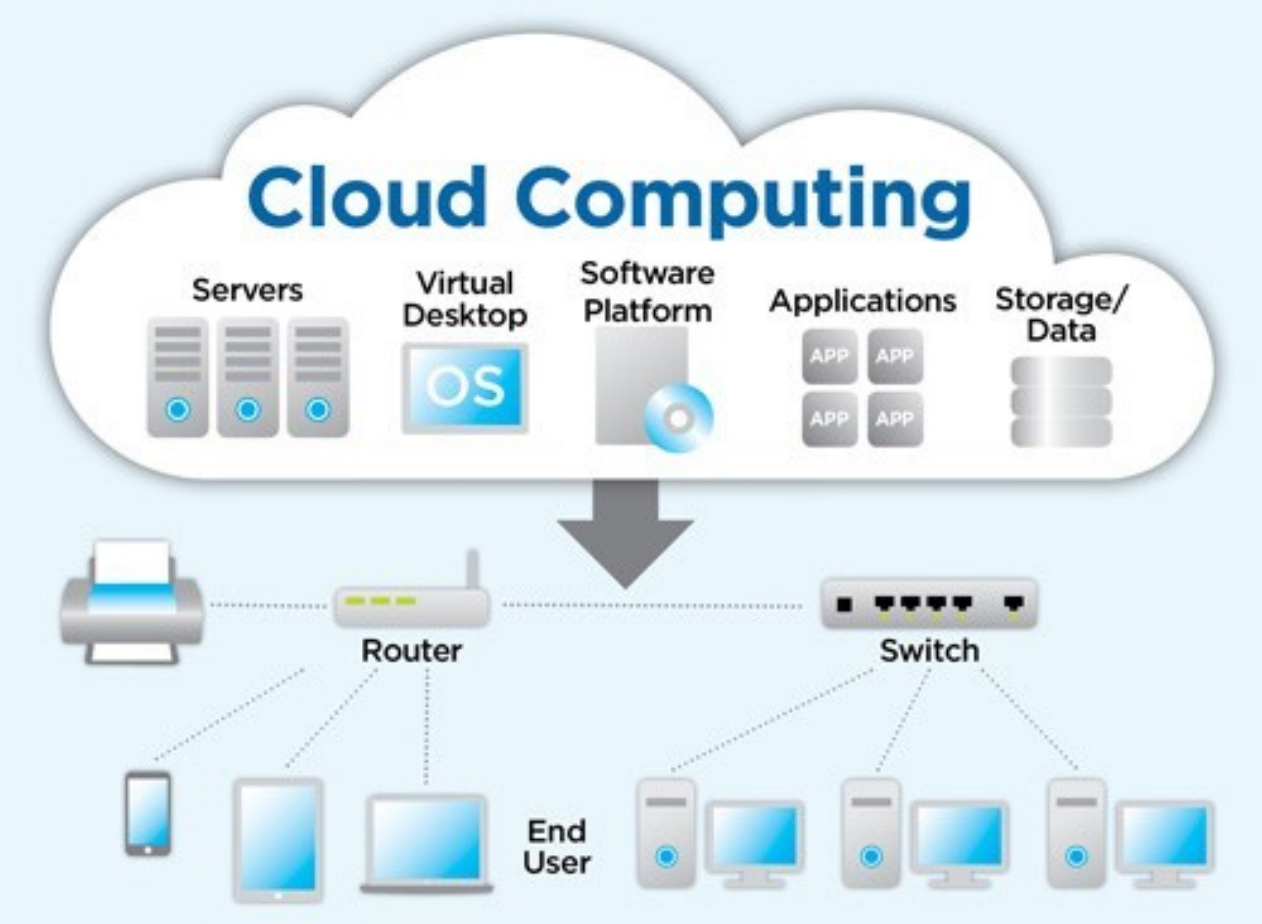
IOS LAYERS INFRASTRUCTURE

OSI (Open Source Interconnection) 7 Layer Model

Layer	Application/Example		Central Device/ Protocols			DOD4 Model
Application (7) Serves as the window for users and application processes to access the network services.	**End User layer** Program that opens what was sent or creates what is to be sent Resource sharing • Remote file access • Remote printer access • Directory services • Network management		**User Applications** SMTP		GATEWAY Can be used on all layers	Process
Presentation (6) Formats the data to be presented to the Application layer. It can be viewed as the "Translator" for the network.	**Syntax layer** encrypt & decrypt (if needed) Character code translation • Data conversion • Data compression • Data encryption • **Character Set Translation**		JPEG/ASCII EBDIC/TIFF/GIF PICT			
Session (5) Allows session establishment between processes running on different stations.	**Synch & send to ports** (logical ports) Session establishment, maintenance and termination • Session support - perform security, name recognition, logging, etc.		**Logical Ports** RPC/SQL/NFS NetBIOS names			
Transport (4) Ensures that messages are delivered error-free, in sequence, and with no losses or duplications.	**TCP** Host to Host, Flow Control Message segmentation • Message acknowledgement • Message traffic control • Session multiplexing	PACKET FILTERING	TCP/SPX/UDP			Host to Host
Network (3) Controls the operations of the subnet, deciding which physical path the data takes.	**Packets** ("letter", contains IP address) Routing • Subnet traffic control • Frame fragmentation • Logical-physical address mapping • Subnet usage accounting		**Routers** IP/IPX/ICMP			Internet
Data Link (2) Provides error-free transfer of data frames from one node to another over the Physical layer.	**Frames** ("envelopes", contains MAC address) [NIC card — Switch — NIC card] (end to end) Establishes & terminates the logical link between nodes • Frame traffic control • Frame sequencing • Frame acknowledgment • Frame delimiting • Frame error checking • Media access control		**Switch Bridge WAP** PPP/SLIP	Land Based Layers		Network
Physical (1) Concerned with the transmission and reception of the unstructured raw bit stream over the physical medium.	**Physical structure** Cables, hubs, etc. Data Encoding • Physical medium attachment • Transmission technique - Baseband or Broadband • Physical medium transmission Bits & Volts		**Hub**			



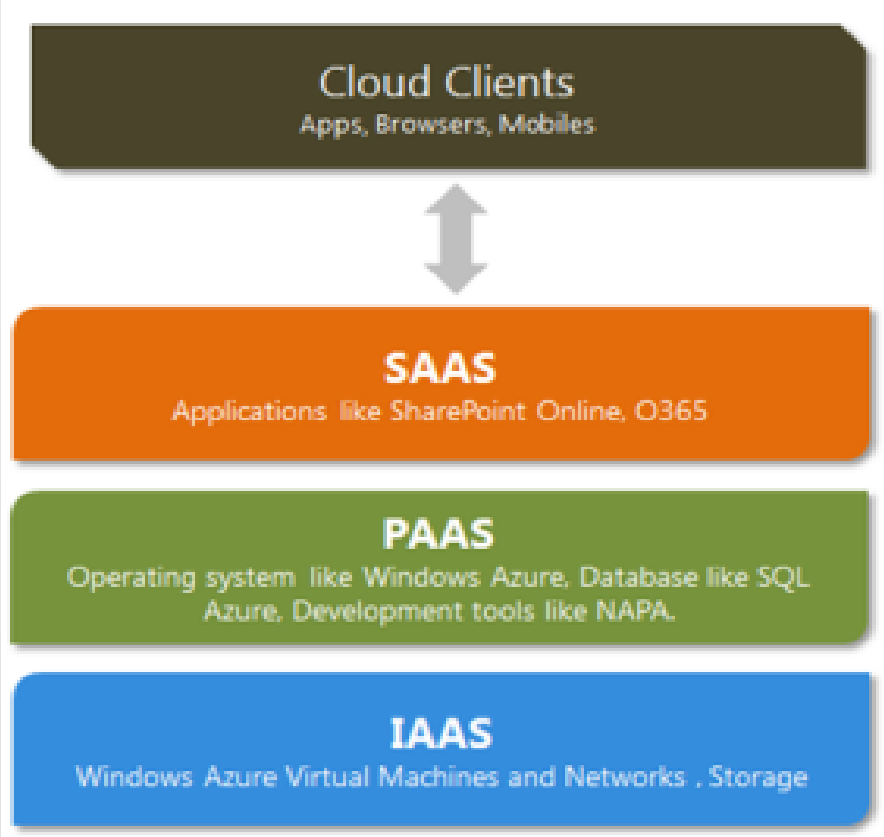
CLOUD COMPUTING STRUCTURE



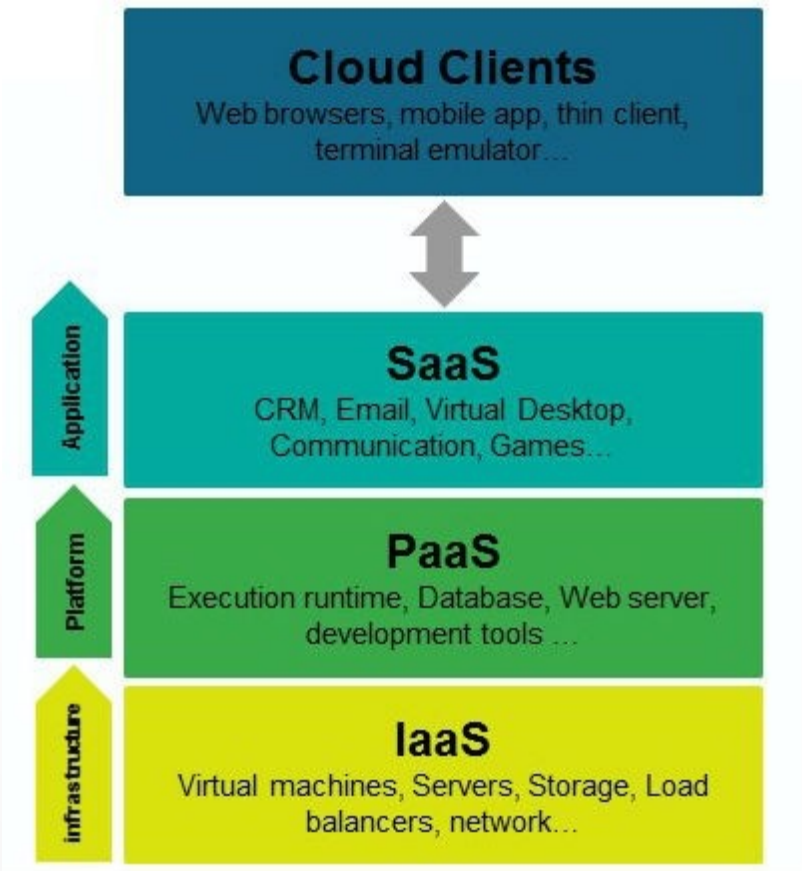
CLOUD COMPUTING MODELS

The authors state that the CC model is composed of five essential characteristics, three service models, and four deployment models. In the NIST report, the authors list the essential characteristics of cloud computing as follows:

- **On-demand self-service.** A consumer can unilaterally provision computing capabilities, such as server time and network storage, as needed automatically without requiring human interaction with each service's provider.
- **Broad network access.** Capabilities are available over the network and accessed through standard mechanisms that promote use by heterogeneous thin or thick client platforms (e.g., mobile phones, laptops, and PDAs).
- **Resource pooling.** The provider's computing resources are pooled to serve multiple consumers using a multi-tenant model, with different physical and virtual resources dynamically assigned and reassigned according to consumer demand.
- **Rapid elasticity.** Capabilities can be rapidly and elastically provisioned, in some cases automatically, to quickly scale out and rapidly released to quickly scale in. To the consumer, the capabilities available for provisioning often appear to be unlimited and can be purchased in any quantity at any time.
- **Measured Service.** Cloud systems automatically control and optimize resource use by leveraging a metering capability at some level of abstraction appropriate to the type of service (e.g., storage, processing, bandwidth, and active user accounts).



Cloud Computing Service Model (Singh, 2017)



NIST CLOUD COMPUTING SERVICE MODELS

Cloud Software as a Service (SaaS). The capability provided to the consumer is to 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 consumer does not manage or control the underlying cloud infrastructure including network, servers, operating systems, storage, or even individual application capabilities, with the possible exception of limited user-specific application configuration settings.

NIST CLOUD COMPUTING SERVICE MODELS

Cloud Platform as a Service (PaaS). The capability provided to the consumer is to deploy onto the cloud infrastructure consumer-created or acquired applications created using programming languages and tools supported by the provider. The consumer does not manage or control the underlying cloud infrastructure including network, servers, operating systems, or storage, but has control over the deployed applications and possibly application hosting environment configurations.

NIST CLOUD COMPUTING SERVICE MODELS

Cloud Infrastructure as a Service (IaaS). The capability provided to the consumer is to provision processing, storage, networks, and other fundamental computing resources where the consumer is able to deploy and run arbitrary software, which can include operating systems and applications. The consumer does not manage or control the underlying cloud infrastructure but has control over operating systems, storage, deployed applications, and possibly limited control of select networking components (e.g., host firewalls).

The NIST also lists three Deployment Models which are relevant in how an organization may choose to implement their cloud knowledge management solution. Each deployment model has differing implications for a company's security risk and privacy concerns regarding their intellectual property.

Private cloud. The cloud infrastructure is operated solely for an organization. It may be managed by the organization or a third party and may exist on premise or off premise. Community cloud. The cloud infrastructure is shared by several organizations and supports a specific community that has shared concerns (e.g., mission, security requirements, policy, and compliance considerations). It may be managed by the organizations or a third party and may exist on premise or off premise.

Public cloud. The cloud infrastructure is made available to the general public or a large industry group and is owned by an organization selling cloud services.

Hybrid cloud. The cloud infrastructure is a composition of two or more clouds (private, community, or public) that remain unique entities but are bound together by standardized or proprietary technology that enables data and application portability (e.g., cloud bursting for load-balancing between clouds). (Mell, Grance, 2011, p.3).

Due to these essential characteristics, its relatively low cost, and its potential to create competitive advantage, Cloud Computing has become one of the fastest growing technology segments in the Information Technology industry, due, in part, to the ability to provide organizations with a central location from which they can manage all their data, information, and better manage the knowledge resources while at the same time providing a platform for on-demand access to those resources. Cloud computing has become a vital innovation in many segments of the business world, and several experts in the field of Knowledge Management (KM) have suggested that there is a strong relationship between innovation and Knowledge Management (Rafiq, Bashar, & Shaikh, 2015) and cloud computing services. The strong connection between these two fields, the intersection of Knowledge Management and Cloud Computing has resulted in significant developments of operations that have influenced organizations and the business strategies that guide them.

Knowledge Management Systems (KMS) and Cloud Computing can provide organizations with technological solutions to their KM issues and help create competitive advantage. It is will utilize the Cloud Computing infrastructure to strategically manage KM processes, tools and technologies towards superior data management processes and business outcomes.

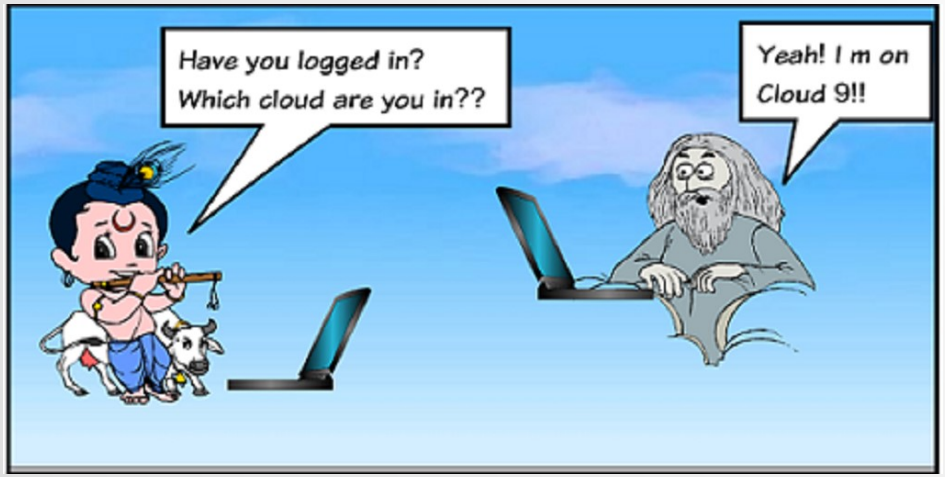
The technological advances surrounding the use of Cloud Computing compels organizations to strategically adopt cloud-based services, IaaS, PaaS, SaaS leading to what many authors define as KaaS, Knowledge as a Service, aiming at superior organizational data storage, processing, and knowledge assets strategies.

Cloud knowledge management system infrastructure can be designed to provide different level of services, standalone or a combination depending on business needs. For example, if an organization needs to store and provide knowledge to its users that is solely textual or visual, that can be done as Knowledge Management-as-a-service platform, but if a knowledge system needs to provide certain application and tools as part of the knowledge distribution that will require (PaaS) platform-as-a-service framework.

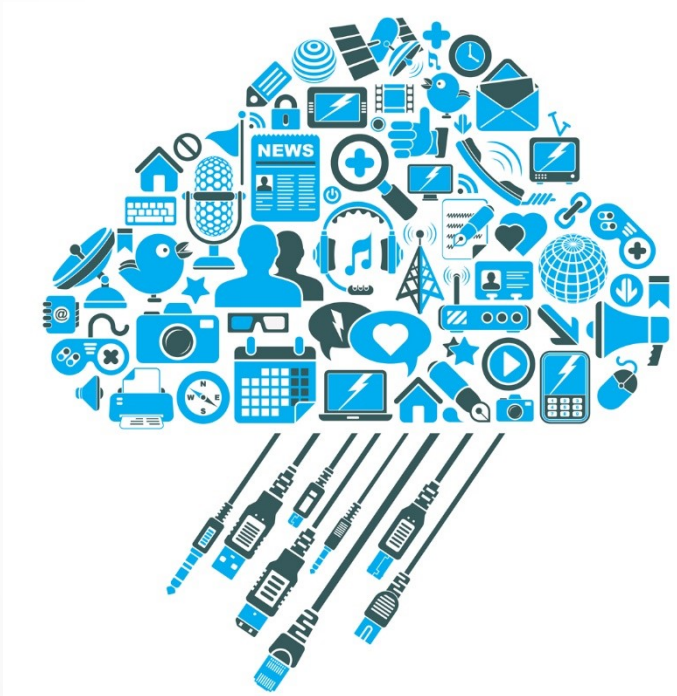
"Cloud Computing is an SOA [Service Oriented Architecture] concept, where customers may lease combinations of various levels of Cloud services" (Mohamed & Pillutla, 2014, p.360). Designing a cost effective, suitable and efficient cloud knowledge management system also takes into consideration an organization's current and future knowledge management needs.

Using the Cloud services ensures that the right information is accessible and delivered to the individuals outside of the traditional format presenting a desirable level of:

- **flexibility,**
- **accessibility,**
- **safety,**
- **and collaboration.**



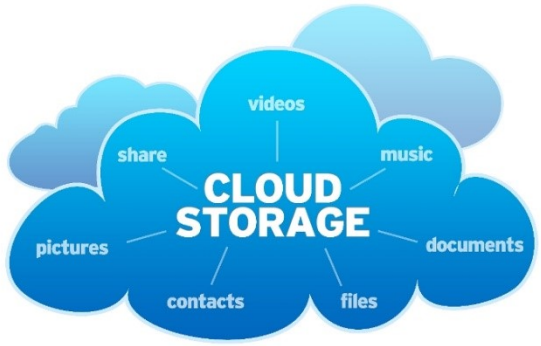
Based on Sultan (2013): "Traditional in-house content management and database access products were too difficult and complicated to deploy and administer and too inflexible to meet the fluctuating needs of corporate end-users and executives" (p. 169).



Cloud technologies allows for greater collaboration amongst employees, as users can contribute from remote locations saving time and money to organizations. This emerging needs for remote work and digital access to data and information naturally contributes to the increase of digital access and the consolidation of digital workspace, prompting companies of several segments to become more and more flexible in allowing its employees, and customers, in many cases, at the same time that their prioritize and safeguard information infrastructure and cybersecurity.

Traditional KMS also has the additional overhead issues of administering the environments such as storage, security and access, and performance which cloud helps to minimize.

Rafiq et all (2018) supports that: “the very nature of KM demonstrates its dependency on Information and Communications Technology (ICT) and therefore the trends in KM are correlated to the trends in ICTs” (p.1). The authors continue by stating that: “ICT has been the driver of KM and any innovation in ICTs were easily adapted in KM” (Rafiq et all, 2018, p.1).



Cloud Computing
leading service providers

The cloud-based services that offers pay-as-you-go style pricing allows users to pay according to theirs' needs and better evaluate costs benefits. There are, however, numerous free clouding services available for individuals' users in need of limited usage capacity. Some of the most popular nowadays are widely used for their ability to offer the largest free cloud storage surpassing, in some cases, 15 GB, those include, but are not limited, to:

- **Google (Google Drive, Google Photos, Google Sync);**
- **Amazon, Apple (iCloud);**
- **FreeFileSync;**
- **Box;**
- **iCloud;**
- **Dropbox;**
- **Microsoft OneDrive,**
- **Mediafire.**

Cloud Computing : Terminology

Service	Service Definition	Examples
IAAS	IAAS is "Infrastructure As A Service". Here you are provided the physical infrastructure (server , storage , Network, etc) by a vendor which you can access over internet and use to install your software , build or deploy your applications.	Amazon Rackspace TATA Comm. Netmagic
PAAS	PAAS is "Platform As A Service". Here a server along with a software environment(e.g Database , web server, etc) is provided. You can use the environment to build your applications and deploy it for use by your organization.	MS Azure Google Apps Orange Scape AppPoint
SAAS	SAAS is "Software As A Service". In this you have the complete application for a given purpose (CRM , payroll ,etc) which you use with/without customization.	Google Apps Salesforce TCS, Wipro, Synage

Global Focus

India Focus

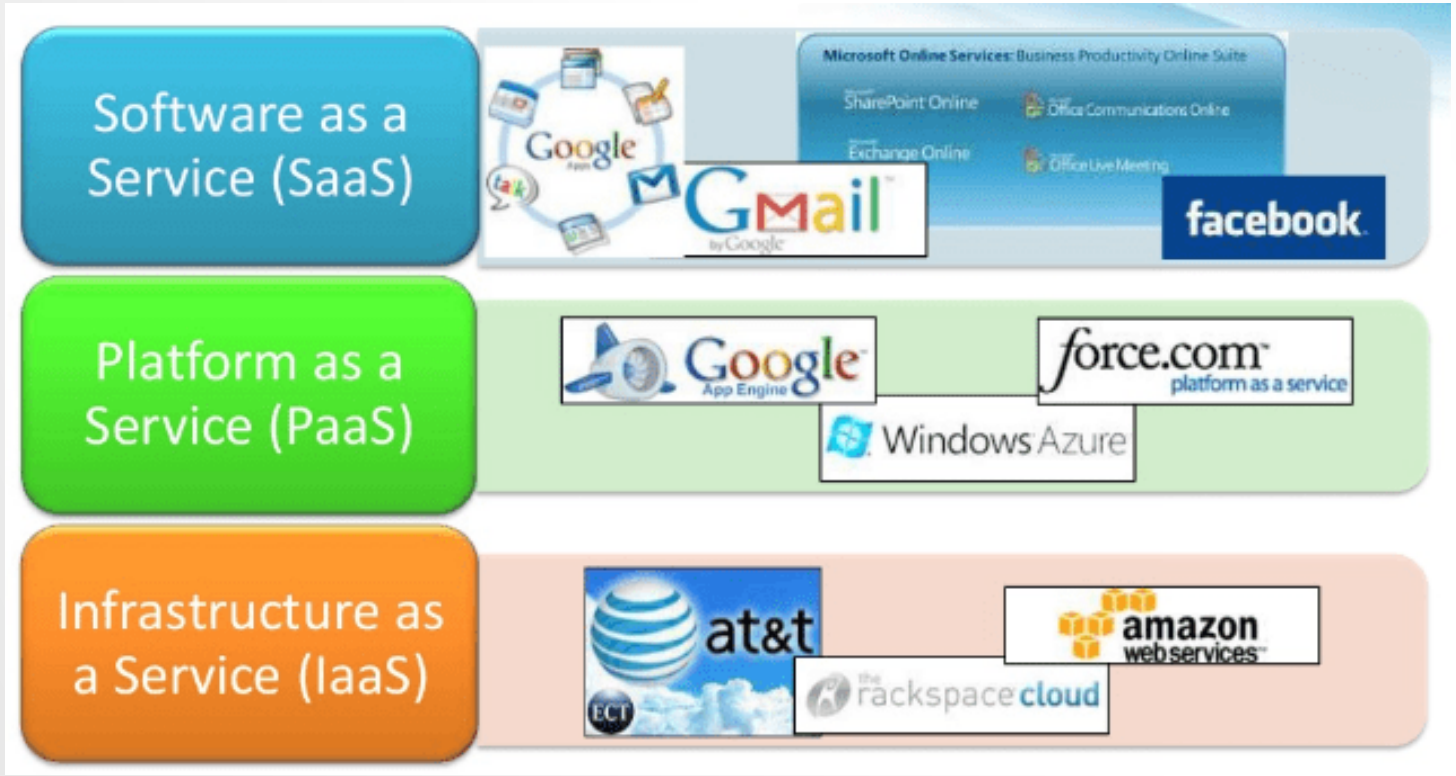
Clozon Technologies

Trusted Partner For Cloud Services

Some of these companies offer a wide range of infrastructure services with paid private cloud services designed to provide a high level of infrastructure and reliable platform that will offer services on demand and better address the individual and/or organization's storage needs, a good example is the **AWS, Amazon.**

In terms of private or hybrid cloud services, VMware is a good option for many companies worldwide. Packages of products can be acquired through partners who are specialized and, many times, certified in **VMware** solutions and in most cases will provide a consulting service assessing the information systems' needs and better address the companies' infrastructural technological deficiencies and issues. **Microsoft Azure** is another example of cloud service that can be implemented in an environment beyond of windows server virtual machines.

Citrix appears as a powerful cloud solutions for digital workspace offering private and hybrid cloud services as well. Citrix promises to “simplify the delivery and management of Citrix technologies” (Citrix, 2018, n.p) aiming at helping with data management both on-premises and 100% on the cloud.


Software as a Service (SaaS)
Platform as a Service (PaaS)
Infrastructure as a Service (IaaS)
Google
Gmail
by Google
Microsoft Online Services: Business Productivity Online Suite
SharePoint Online
Office Communications Online
Exchange Online
Office Live Meeting
facebook
Google App Engine
force.com
platform as a service
Windows Azure
at&t
amazon web services
rackspace cloud

Cloud technologies allows for greater collaboration amongst employees, as users can contribute from remote locations saving time and money to organizations. This emerging needs for remote work and digital access to data and information naturally contributes to the increase of digital access and the consolidation of digital workspace, prompting companies of several segments to become more and more flexible in allowing its employees, and customers, in many cases, at the same time that their prioritize and safeguard information infrastructure and cybersecurity.

KAAS PLATFORM

The KaaS platforms through the use of mobile devices has made previously cumbersome processes easy to learn and use.

“With the aid of cloud computing, knowledge can be converted into an asset which acts as a stimulant for innovations and research” (Dave, et al, 2013, p. 621).

When this is applied to SMEs, for example, it helps level the playing field and encourages quicker adoption of KMS initiatives.

CHALLENGES WITH CLOUD AND THE KAAS

There are always privacy concerns when it comes to anything related to the Internet, this is especially true in a knowledge management situation:

- privacy,
- copyrights,
- knowledge reliability and
- cyber security issues are some examples.

The choice to adopt a cloud-based platform in organizations for knowledge management system has as key component the focus on data security. Data security is a term that can be used to cover confidentiality, availability, authenticity, authorization, and other aspects of data that would be stored in the cloud. An important aspect of organizations is the investigation of the location of data storage. Some documents may have geographic storage requirements, and the cloud service provider should be able to tell whether their storage location meets these requirements or not (Dave et al, 2013).

CONCLUSIONS

It concludes that developers with innovative ideas and competitive strategies will rely on applications delivered over the internet as they approach innovation, agility and competitiveness.

The findings of this study demonstrates that organizations are being strongly affected by information and data overload, creating a significant demand for information systems that will addresses issues with data protection, storage, retrieval, and security.

The cloud computing is the new revolutionary solution for data –including big data- management and, therefore, KM, whether on premises or on the cloud, the virtualization is presented as alternative solution in some cases.

There are indicators signaling that variable management might have a strong correlation with the knowledge management use in organizations and the type of systems for knowledge sharing.

The KaaS platforms through the use of mobile devices has made previously cumbersome processes easy to learn and use. “With the aid of cloud computing, knowledge can be converted into an asset which acts as a stimulant for innovations and research” (Dave, et al, 2013, p. 621).

When this is applied to SMEs, for example, it helps level the playing field and encourages quicker adoption of KMS initiatives.

The information industry as the push from massive-parallel processing (MPP) to Hadoop cluster processing is becoming prevalent and organizations have long utilized MPP for their data-processing needs.

Cloud computing will give companies the ability to forego the need for bearing the large, immediate financial burden of purchasing and maintaining large servers (software and hardware) for data processing and, instead, pay a fixed subscription for external data management. For small-to-medium sized organizations, the draw to cloud service providers can be even more enticing, as those costs disproportionately affect them over their larger counterparts due to financial restraints.

While lowering infrastructure cost is a significant benefit to cloud computing, perhaps its greatest asset to organizations is its scalability. With a third party bearing the financial burden of hardware, there is no longer the need for organizations to have to ensure they have the necessary technology to accommodate the requirements that the next evolutionary step in KMS software will bring as it transitions into processing unstructured data, as their cloud service providers will have to adapt to stay relevant within their industry.

CONCLUSIONS

- Cloud computing in knowledge management systems offers great advantages in knowledge sharing as well as economic benefits such as cost reduction and lower operating expenditure, but it is still a relatively new technology that is going through its evolutionary cycle. This technology in its current state has already changed the way knowledge is disseminated across the worldwide. It also increases challenges in data management and infrastructure platform.

- Knowledge is more accessible and affordable than ever before, and its misuse is now costing companies and individuals' financial burden. This virtual platform of CC for KM Sharing encourages global collaboration and innovation from a larger audience that can retrieve and contribute knowledge at the same time. The advancement in technology has given knowledge management a whole new perspective.

CONCLUSIONS

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There are challenges in adopting this technology, but these can be overcome by enthusiasm and vision of the greater benefits. The successful KM in a cloud computing environment which are related to a few factors, including the size of the organization, the type of industry, and most importantly the

DATA SOLUTION MANAGEMENT

Companies using online storage to accelerate business! Data storage solution There is no one size fits all! Storage Management > Structure or unstructured data

1 Know your Data

2 Don’t neglect Structure and unstructed (Semi structure)data

3 Compliance Needs

4 Data Retention Policy

5 Solution MUST fit data

6 Know your Cloud

7 Know your storage provider

8 Make Data Secure

9 Avoid Redundant Data

10 Good DRP

LIMITATIONS OF THE STUDY AND RECOMMENDATION FOR FUTURE RESEARCH

Future studies should focus on

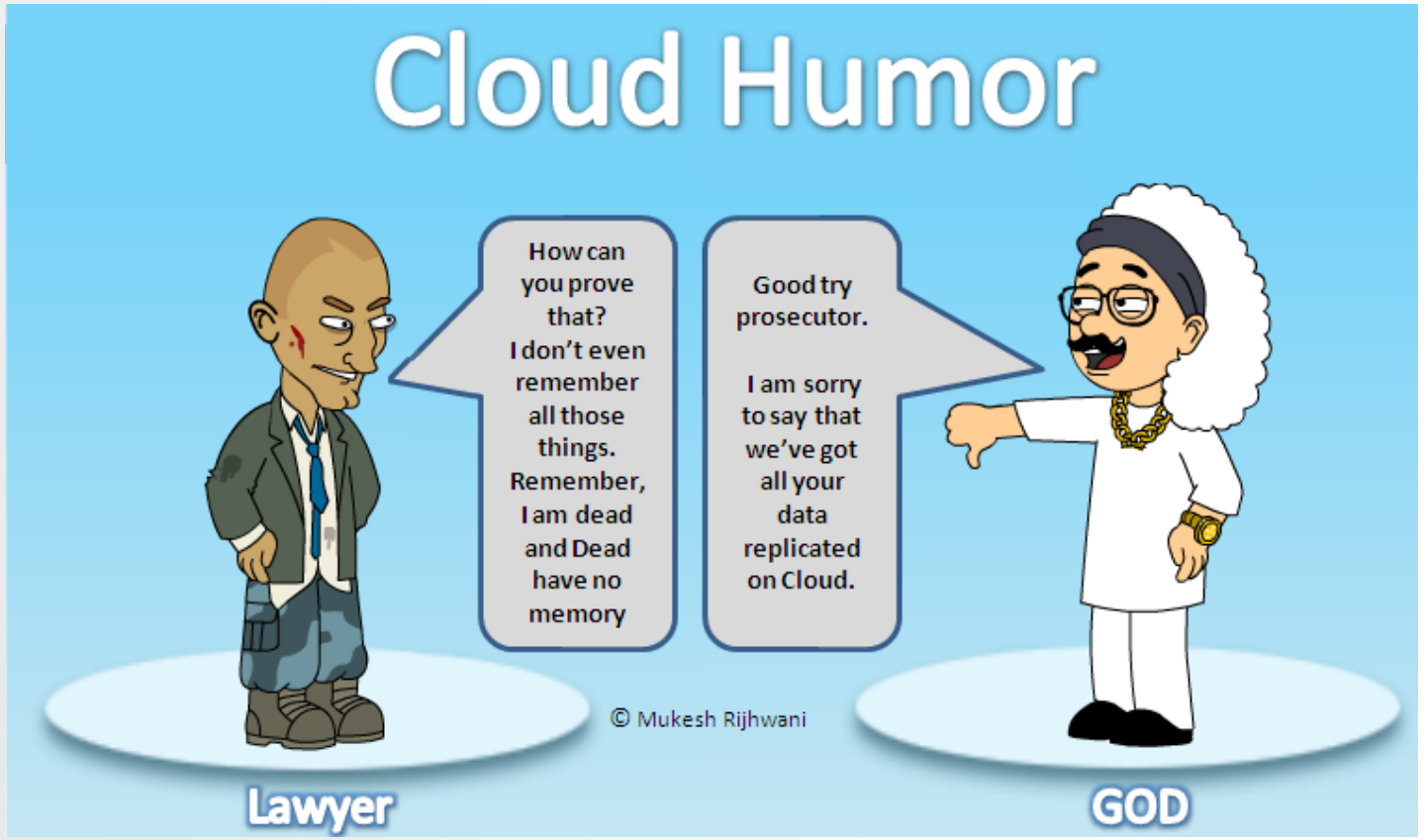
1) Mapping the top free clouding computing services providers storage capacity, tools, and performance, investigating users response and satisfaction;

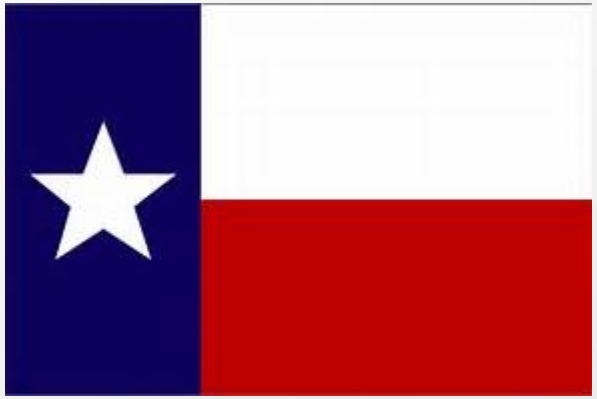
2) Investigate the motivation of organizations adopting private and hybrid clouding services

3) Challenges in Cloud computing for KM in organizations: factors interfering with knowledge sharing and use.

With regards to the operational impact of CC in business and how harnessing solid KM practices can eliminate disruptive systems and create a highly innovative organization, it is suggested that a thoroughly research is conducted examining this correlation of both KM and CC on a practical level, perhaps through quantitative and qualitative methodological approaches and case studies. What is next for CC and where does KM fits in the revolutionary process of data management and analytics towards designing innovative and competitive organizational behaviours?


WHO WANTS TO SHARE KNOWLEDGE WITH ME VIA OUR NEW INTRA-NET COLLABORATION SOFTWARE?
www.dilbert.com scottadams@aol.com
YOU DON'T HAVE ANY KNOWLEDGE TO SHARE.
OUCH.
IT HURTS BECAUSE IT'S TRUE.
© 2000 United Feature Syndicate, Inc.
6/13/00
I'M HOARDING MY KNOWLEDGE IN CASE I EVER NEED IT.


Cloud Humor
How can you prove that? I don't even remember all those things. Remember, I am dead and Dead have no memory
Good try prosecutor.
I am sorry to say that we've got all your data replicated on Cloud.
© Mukesh Rijhwani
Lawyer
GOD



THANK Y'ALL!

Questions?

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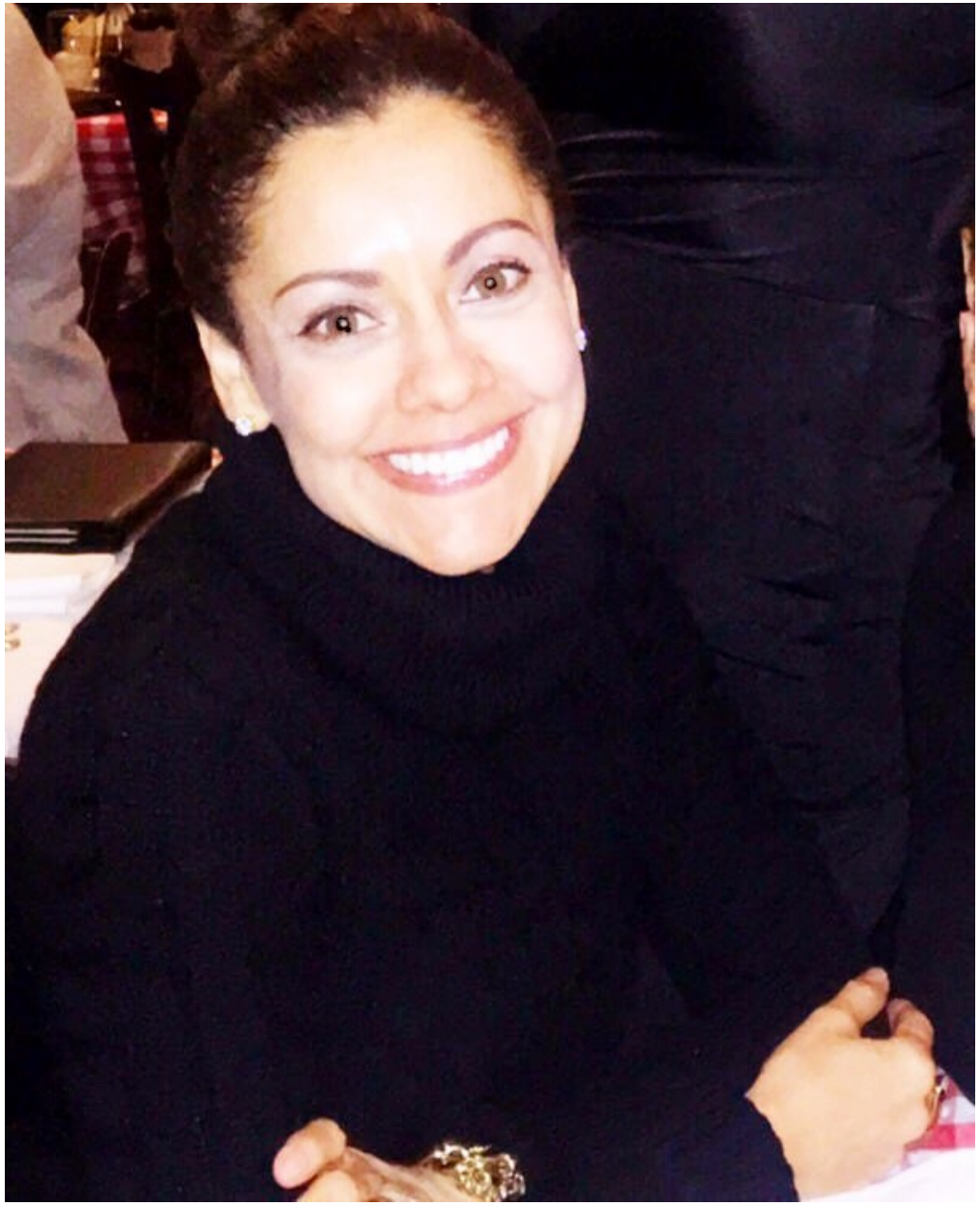

- Crowdsourcing can additionally help build and maintain relevant content keeping information fresh and removing irrelevant data as conditions and knowledge changes over time.

"Crowdsourcing is the practice of obtaining needed services, ideas, or content by soliciting contributions from a large group of people, and especially from and online community" (Wu, Wenbo, 2014).

INTRODUCTION

As companies and business have become more global the need to integrate disparate systems into enterprise-wide KM systems has increased that allow differing levels of access around the clock (Lee, et al, 2002).

Abdulla, Eri, and Talib (2011) note that Knowledge as a Service "(KaaS) is an emerging concept that integrates knowledge management (KM), a knowledge organization, and knowledge markets." They further state that KaaS "provides content-based (data, information, knowledge) as organizational outputs (e.g., advice, answers, facilitation), to meet personal or external user wants or needs." (p. 1).

When retrieval, storage, strategic use of data, data analytics, and new forms of artificial intelligence arise, questions about the factors influencing superior data, information, and knowledge use and management prompt the examination of variables that play a critical role in KM implementation in organizations.