Cloud Computing and Knowledge Management as a Service: A Collaborative Approach to Harness and Manage the Plethora of Knowledge

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Abstract - The advent of cloud computing has opened up numerous avenues which were not explored or harnessed in the best possible manner. Knowledge management is one of such fields. In order to identify, create, store, represent or disseminate knowledge, the existing tools, technologies or methodologies have not been able to achieve what an organization always desires for its progress. The under-utilized intellectual capital is not even accounted for properly due to improper implementation of knowledge management methodologies. The implementation and maintenance costs also play a major role in the unacceptability of the techniques at a vast scale. In order to implement cloud computing successfully, a wide range of knowledge and its simultaneous dexterous management is also a prerequisite. Enterprises, whether business or service, need to adopt such strategies, guidelines, and structures that implement this combo in an effectual manner. This paper discusses the different aspects like reasons for under-utilization of organizational knowledge, the intersecting issues of cloud computing and knowledge management, impact of cloud computing on knowledge management, benefits of Knowledge Management-as-a-service and major players in market providing Knowledge Management-as-a-service.

Index Terms – Cloud Computing, Knowledge Management, Knowledge Management-as-a-Service.

1. INTRODUCTION

Cloud computing has been in the market for quite some time. With the concept slowly settling in the world, the emergence or recognition of new cloud resources is making it much more viable as compared to that in the past. With the evolvement of the market, it is imminent to properly identify the available resources, and categorize the components of cloud computing according to the newly discovered patterns. Cloud computing when used, does not only have a higher impact on the technology; it greatly affects the people also.

Cloud computing describes the development of many existing technologies and approaches to computing into something different. Cloud separates application and information resources from the underlying infrastructure, and the mechanisms used to deliver them.

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Cloud enhances collaboration, agility, scaling, and availability, and provides the potential for cost reduction through optimized and efficient computing. More specifically, cloud describes the use of a collection of services, applications, information, and infrastructure comprised of pools of computation, network, information, and storage resources. These components can be rapidly orchestrated, provisioned, implemented and decommissioned, and scaled up or down; providing for an on-demand utility-like model of allocation and consumption [1].

Service delivery models of cloud computing are increasing day by day. With the popularization of a few categories like Storage-as-a-service, software-as-a-service, Platform-as-a-Service, Database-as-a-service, Information-as-a-service, and Management-as-a-service, the attention has been shifted to one of the most important aspect of any organization, i.e. knowledge management.

Knowledge Management is a scientific process that initiates its working by amassing knowledge (both tacit and explicit), filtering it, structuring or restructuring it, storing and finally disseminating it. The dissemination process of the already stored knowledge is again very crucial, as it should also be in such a manner that

- The access to knowledge is timely, accurate and easy.
- The accessed knowledge aids adequately in decision making, and
- The available knowledge facilitates in creation or generation of new knowledge. [2]

A successful knowledge management strategy must address four key areas:

- knowledge management strategy as a core focus and competency,
- flexible structure for knowledge creation and dissemination,
- technology and processes, and
- skilled knowledgeable workers [3].

Knowledge management adds transparency to an otherwise opaque backdrop of the issues encompassing cloud computing because it provides the solution to the problems of the oversimplification, incompletion and inadequacy of information. The need for knowledge management also arises because the processes, tools & technologies involved and adopted should be evolved and refined keeping in view the opportunities that cloud computing is offering.

2. REASONS FOR UNDER-UTILIZATION OF ORGANIZATIONAL KNOWLEDGE

Two reasons have been the core for the under-utilization of the organizational knowledge:

- The principal reason is the reluctance of the employees to divulge the tacit knowledge. An employee sees it either as a threat (because he fears losing his job on the grounds of competition), or finds the sharing of information a time-consuming and mundane work for which he does not gain any incentive.
- Secondly, most of the organizations lack the proper modus operandi, framework, tools and technologies to amass the freely flowing intellectual capital, which goes unused and totally wasted. The acknowledgement of the wasted capital and timely investment in accumulating this asset and there after proper utilization for decision making is not yet achieved on a large scale.

3. CLOUD COMPUTING AND KNOWLEDGE MANAGEMENT: THE INTERSECTING ISSUES

As technology changes, however, the need for a clear and definitive knowledge management is increasing. The increase in adoption of mobile devices, cloud computing, and virtual workplace only makes knowledge management more important [4].

The deployment and consumption modalities of cloud should be thought of not only within the context of 'internal' vs. 'external' as they relate to the physical location of assets, resources, and information; but also by whom they are being consumed by; and who is responsible for their governance, security, and compliance with policies and standards.

The risk for knowledge management-as-a-service also depends upon:

- The types of assets, resources, and information being managed
- Who manages them and how
- Which controls are selected and how they are integrated
- Compliance issues [5].

Key issues regarding data lifecycle security in the cloud with reference to knowledge management-as-a-service include the following:

- **Data security.** Confidentiality, Integrity, Availability, Authenticity, Authorization, Authentication, and Non-Repudiation.
- **Location of the data.** There must be assurance that the data, including all of its copies and backups, is stored only in geographic locations permitted by contract, SLA, and/or regulation.
- **Data remanance or persistence.** Techniques for completely and effectively locating data in the cloud, erasing/destroying data, and assuring the data has been completely removed or rendered unrecoverable must be available and used when required.
- **Data backup and recovery schemes for recovery and restoration.** Data must be available and data backup and recovery schemes for the cloud must be in place and effective in order to prevent data loss, unwanted data overwrite, and destruction.

- **Data discovery.** As the legal system continues to focus on electronic discovery, cloud service providers and data owners will need to focus on discovering data and assuring legal and regulatory authorities that all data requested has been retrieved.
- **Data aggregation and inference.** Practices must be in play to assure the data owner and data stakeholders that the data is protected from subtle "breach" when data is commingled and/or aggregated, thus revealing protected information (e.g., medical records containing names and medical information mixed with anonymous data but containing the same "crossover field") [1].

4. IMPACT OF CLOUD COMPUTING ON KNOWLEDGE MANAGEMENT

Cloud services are increasingly being used for the purpose of knowledge management because of the following reasons:

- Technological advancement related to ubiquitous high-speed internet connectivity
- Shrinking cost of data-storage,
- The propagation of smart mobile devices at electric speed around the world

These factors have helped in fulfilling the pre-requisite of simple, cost-effective and flexible information. The use of smart phones and tablets demonstrates the potential of cloud computing to empower the users with sophisticated and high-powered yet uncomplicated and easy-to-use computer applications and information, which was otherwise not so easy to access.

It is rare today to find a user who is not aware of Google and the data and information that lays only a few clicks away. Faced with this ever-growing repository of knowledge, organizations struggle to provide the right solution to customers faster than they can find it on the Internet. A few aspects of the Google-effect can leave organizations vulnerable. The source of information found on the Internet must be carefully evaluated by the user to ensure that it can support decision-making. Dissemination of corporate knowledge is slow and often does not meet the needs of the user population. It is important for corporations to develop a knowledge management strategy that responds to user needs in a timely and efficient manner – that takes information and data real time and provides that information and data in the right context from a trusted source – the corporation [4].

The cloud magnification effect has been felt as discussed below:

- Maintaining freedom of information: when internet communications were shut down during unrest in Egypt, a team of international companies combined cloud services and social networking to connect in-country mobile phone networks to deliver text messages internationally via Twitter, in just a couple of days [6].
- Broadening frontiers of transformation: the continuously falling costs of computing, data transmission and storage are

constantly broadening the opportunity for cloud services to transform businesses and business models

- Enabling social networking: it's important to note that the entire social networking phenomenon is enabled by cloud computing. It is believed that the eventual impact of social networking on businesses and the related improvement in productivity will be profound.
- Accelerating technology transitions: one big difference between the successful introduction of tablet computers in 2010 from earlier failed attempts is that cloud-based services are available today to do the background computation, storage and other "heavy lifting" that make tablet computers useful tools [5].

5. BENEFITS OF CLOUD COMPUTING FOR KNOWLEDGE MANAGEMENT PERSPECTIVE

Keeping in view, the knowledge management process, the following requirements can be catered efficiently with cloud computing:

- Cloud computing greatly reduces the technology related costs. Synergies are created through reduction in computing resources, time and modelling process. The large and variable storage needs for maintaining huge knowledge management systems can be accomplished by the use of cloud storage models.
- It provides access to variety of services to the users.
- It opens gates to several options for the knowledge users, earlier unknown to them.
- Cloud computing is an effective way to streamline the knowledge and make it readily available also.
- It accelerates the development and acquiescence of the competencies and capabilities of knowledge works in any organization.
- It extends the use of open-source services and shared developments across the globe.
- It reduces the activities and costs related to management of infrastructure.
- The work structure is changing these days, where requirement of access to information could be anywhere and at anytime. Cloud resources are the best answer to such indispensability.
- Through cloud computing, one can gain faster access to technology and the process of knowledge management becomes more connected and collaborative, as the structure is framed on highly scalable and reliable web oriented architecture.
- It improves access to data that corroborates the decision-making process and consolidates the studies & research processes. Latest project status, innovative ideas, new experiences and finest practices can thus be shared within an enterprise. It even motivates the employees for bringing forth creative strategies while carrying out the regular work, and enjoying it as well.
- It enhances awareness about the processes as the experiences are gained in different regions, sectors & fields of the world.

- Search patterns in knowledge management systems may vary and may experience sudden fluctuations and hiccups and can be better managed with an elastic/scalable computing model.
- Majority of knowledge management activities are generic in nature for which SaaS applications may be provided.
- Enterprises refrain from employing knowledge management tools and techniques primarily due to the cost incurred, but with cloud computing, pay-as-you-go concept can help solve this problem, as the required and limited services or resources are available at hand.
- Access to knowledge can be allowed on the basis of user's permission level.
- With the aid of cloud computing, knowledge can be converted into an asset which acts as a stimulant for innovations and research.

6. MAJOR PLAYERS IN MARKET PROVIDING KNOWLEDGE MANAGEMENT AS A SERVICE

Cloud based services, in context to the knowledge management platform are increasing day by day. Many players have entered the arena, and are providing assorted services. A few are discussed as follows:

Salesforce Knowledge Management as a Service

Knowledge management software as a service from salesforce.com makes it easy to capture, review, catalog, and access information, so agents can find what they need when they need it. Knowledge management system by Salesforce includes these key features:

- A solution encyclopedia
- A private and public knowledge base
- Intuitive browsing and searching
- Solution administration
- Solution workflow
- Multilingual solutions
- Suggested solutions
- Solution ratings [7].

BMC Knowledge Management as a Service

BMC provides a powerful knowledge content search engine that not only helps service desk analysts find solutions to incidents, but also provides users with access to resources for resolving their own issues. BMC Knowledge Management as a Service is part of the BMC Remedy IT Service Management Suite. This offering delivers cloud-enabled service desk, self-service, inventory, and basic knowledge management capabilities hosted on the Cloud Platform [8].

Office 365 and SharePoint Online

Office 365 allows with anywhere access to email, web conferencing, documents, and calendars. It includes business-class security. Office 365 provides easy-to-use, cloud-based management tools in a single location. Through the administration user interface IT staff can set up new user accounts, control access to features, and see the status of all Office 365 services and tools in real time.

Microsoft SharePoint Online, which is part of the Office 365 offering, provides out-of-the-box facilities for implementing

Knowledge Management as a Service for most enterprise needs. Microsoft SharePoint Server technology delivered as an online service makes the power of the cloud work for the organization. SharePoint Online helps in creating sites to share documents and information with colleagues and customers [9].

Igloo Software

Igloo is a web-based platform for collaborating at work. It's a digital workplace that enables to share files, find answers, solve problems, locate information and expertise and tap into the collective knowledge of customers, partners and peers, virtually anywhere.

- Communicate with integrated messaging, presence & status
- Share, organize & manage documents & multimedia
- Collaborate through blogs, forums, wikis, polls and events
- Build rich user profiles to locate expertise & knowledge
- Find what you need faster through activity streams & search [10].

SpringCM Solutions

SpringCM offers powerful content cloud services platform available for businesses today. The service provided makes it easy to share documents, collaborate around content, streamline business processes, and deliver better business outcomes. A broad range of information - from content management, document and file sharing to collaboration, automated workflows, and cloud technology - in a wide range of formats are provided [11].

7. CONCLUSION

The adoption of cloud computing through knowledge management route will enable organizations to gain velocity with respect to information technology and to cater according to the continuously changing requirements of the market. It will empower not only the enterprises but also all the key participants.

Cloud providers must ensure that the information security systems they provide are responsive to customer requirements and the data, both primary and secondary, must be preserved as authentic and reliable. Expansion and up gradation is imperative for cloud computing because if such an improvement is done in procedures or techniques or policies even for one customer then it is going to be advantageous for others as well.

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