DOI: 10.7763/IPEDR. 2012. V54. 12

Building Blocks of the Mobile Enterprise

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Abstract. The paper discusses the convergence of four major ICT advancements - big data (information), social collaboration, mobile applications and cloud computing – into an evolutionary form of the contemporary enterprise, known as the mobile enterprise. The characteristics and functions of each of these components are presented, as well as the growing relationships among them. The need for the emergence of the mobile enterprise is justified as a natural process of its development. The SoMoCloTH solution is given as a working solution of the analysed concept.

Keywords: mobile enterprise, information, social computing, mobile computing, cloud computing

1. Introduction

Recently four major topics have been identified in the area of ICT application in business – big data, social collaboration, mobile applications and cloud computing [1]. They are shaping not only the way business and ICT mutually operate, but they are also affecting the future of management solutions. During the next decade the process of sharing and developing ideas will be dramatically accelerated by the advance and enhancement of these technologies that have a major influence on the way products and services are designed and brought to market. They transform the way people interact and help solve problems. Obviously there is a need for new technological and business models that will encompass all these four segments into a solid entity to enable efficient use of up-to-date ICT achievements.

The purpose of the paper is to analyze the convergence of four major ICT advancements - big data (information), social collaboration, mobile applications and cloud computing – into an evolutionary form of the contemporary enterprise, known as the mobile enterprise.

2. Building Blocks of the Mobile Enterprise

Research over the past several years has identified the independent evolution of four powerful forces - social, mobile, cloud and information [2]. As a result of consumerization and the ubiquity of connected smart devices, people's behavior has caused a convergence of these forces. Their existing architectures are becoming obsolete. The social media, cloud computing, mobile technology and large information volumes are converging to form a “nexus of forces” that will build upon and transform user behavior, creating business opportunities as it grows according to a report from IT research firm Gartner [3]. In the Nexus of Forces, information is the context for delivering enhanced social and mobile experiences. Mobile devices are a platform for effective social networking and new ways of work. Social links people to their work and each other in new and unexpected ways. Cloud enables delivery of information and functionality to users and systems (Fig.1). The forces of the Nexus are intertwined to create a user-driven ecosystem of modern computing [4].

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Fig. 1: Building blocks of the Mobile Enterprise (Source: Gartner, June 2012).

The concept of Information known as Big data is not only managing large volumes of data, but also controlling the velocity and variety of data that exists nowadays. It is expected data will continue to grow exponentially in future. Velocity defines the speed with which customers and employees expect information to be available to them and how fast they are able to generate and consume data. Variety deals with the type of data (structured or unstructured data, data captured from social media sites, machine data, etc.) and how this information could be used to obtain competitive advantage. Multiple systems, including content management, data warehouses, data marts and specialized file systems tied together with data services and metadata are becoming enterprise data warehouse. The ability to extract data from different sources to perform a specific task and the ability to provide information in real-time with the right context is essential. Information is stored everywhere. Social, mobile and cloud make information accessible, shareable and consumable at anytime and anywhere. The knowledge to capture the right information and utilize the smaller subsets applicable to a specific company, a product and customers, at a specific point in time, will be critical to new opportunities and for avoiding risks. Businesses produce and use data more than ever before. On the other hand business cycles are growing shorter and shorter, making it necessary to monitor the stream of new and existing business data and process it quickly enough to make critical decisions. The term "big data" is to describe new technologies and techniques that can handle an order of magnitude or two more data than enterprises are today. Big data offers the promise of better ROI on valuable enterprise datasets while being able to tackle entirely new business problems that were previously impossible to solve with existing techniques [2].

A social networking service is an online service, platform, or site that focuses on facilitating the building of social networks or social relations among people who, for example, share interests, activities, backgrounds, or real-life connections. A social network service consists of a representation of each user (often a profile), his/her social links, and a variety of additional services. Most social network services are web-based and provide means for users to interact over the Internet, such as e-mail and instant messaging. Online community services are sometimes considered as a social network service, though in a broader sense, social network service usually means an individual-centered service whereas online community services are group-centered. Social networking sites allow users to share ideas, activities, events, and interests within their individual networks [5].

Social media has already surpassed that workhorse of the modern enterprise, e-mail. Increasingly, the world is using social networks and other social media-based services to stay in touch, communicate, and collaborate [2]. The Social function is one of the most compelling examples of how consumerization drives ICT practices. It includes personal activities of sharing comments, links and recommendations with friends. Social networking account for 22% of all time spent online [6]. Real business is taking place today in public and private social networks. It has developed far beyond using LinkedIn for recruiting or Facebook for consumer marketing outreach. The benefits accrue quickly from being able to communicate and collaborate easily with extended networks of employees, partners, customers, across internal and external social networks. Consumer vendors have been quick to see the influence of users sharing recommendations on what to buy. Social technologies both drive and depend on the other three Nexus forces [3]:

- Social provides an important need for mobility: Accessing social networks is one of the primary uses of mobile devices and social interactions have much more value when they are possible wherever the user is located.
- Social depends on cloud for scale and access: Social networks benefit from scale, the kind of scale that is really only practical through cloud deployment.
- Social feeds and depends on deep analysis: Social interactions provide a rich source of information about connections, preferences and intentions. As social networks get larger, participants need better tools to be able to manage the growing number of interactions, which drives the need for deeper social analytics.

Mining social media networks for data around customers habits is a huge opportunity. Successful organizations are starting to leverage this information to listen to their customers and engage with them in a more appropriate and interactive way. Government agencies, manufacturers, vendors regard social media sites as a new channel to engage and interact with their customers. Incorporating social media information when collaborating with both internal employees and external customers and partners is an essential element in resolving any business problem. A consumer information is already easily available to organizations to leverage that will allow them to make more informed decisions to better serve their customers.

Mobile computing is human–computer interaction by which a computer is expected to be transported during normal usage. Mobile computing involves mobile communication, mobile hardware, and mobile software. Communication issues include ad-hoc and infrastructure networks as well as communication properties, protocols, data formats and concrete technologies. Hardware includes mobile devices or device components. Mobile software deals with the characteristics and requirements of mobile applications [7].

Only within U.S.A. smartphone possess 40% of the mobile market [8]. People want the ability to expand the use of their mobile devices. Easy access to premium payments and coverage information, as well as mobile friendly websites can be a great way to satisfy existing needs and to develop new business.

Mobile access gives the user complete accessibility. Users can interact with participants in the case and access the case directly from a mobile device, table or desktop. Mobile devices have differing operating systems, differing screen sizes, differing attributes, such as GPS.

One of the biggest issues in mobile application development is how to build mobile apps that are applicable to many mobile devices [9]. This issue is being escalated with the advent of bring your own device (BYOD), a policy that many organizations favored. Developing a mobile app that runs on many devices provides the cross-platform capability to make more mobile apps available to users, but it creates a lot of work for developers. Mobile cloud computing can be viewed as a cloud infrastructure enhanced to provide a mobile ecosystem for mobile apps and to allow access to business apps from mobile devices. The data processing and the data storage happen outside the mobile device, and results are displayed through the mobile device screen or speakers. In addition to simplifying the development of mobile apps for many mobile devices, there are other advantages to running mobile apps on a mobile cloud [2, 9]:

- Mobile devices can be allowed access to powerful, back-end business apps, if sufficient security is provided.
- More mobile apps can be made available to a broader audience.
- Multiple security apps that check mobile device security can be run on the mobile cloud, providing much broader and more comprehensive security checking for mobile devices.
- Running mobile apps on a mobile cloud makes many more apps available for organization users.
- Use of the mobile cloud allows mobile devices to be included in the centralized security scheme of the cloud.

Mobile computing does not stand alone as an isolated phenomenon - Devices will come and go faster all the time. New form factors will emerge. People will interact with multiple screens working in concert. Sensor data will transparently enhance the experience, integrating the virtual and physical worlds contextually. The information gathered in this immersive world will have tremendous value. Ultimately, the lasting relationship will be between a user and a cloud-based ecosystem [4].

Cloud computing is the use of computing resources (hardware and software) that are delivered as a service over a network (typically the Internet). The name comes from the use of a cloud-shaped symbol as an abstraction for the complex infrastructure it contains in system diagrams. Cloud computing entrusts remote services with a user's data, software and computation [10]. According to the National Institute of Science and Technology - "Cloud computing is a model for enabling convenient, on-demand network access to a shared pool of configurable computing resources (e.g., networks, servers, storage, applications, and services) that can be rapidly provisioned and released with minimal management effort or service provider interaction. This cloud model promotes availability and is composed of five essential characteristics, three service models, and four deployment models."[11]

Cloud computing represents the binding substance for all the forces of the Nexus [4]. This is the model for delivery of whatever computing resources are needed and for activities that grow out of such delivery. Without cloud computing, social interactions would not to happen, mobile access would fail to be able to connect to a wide variety of data and functions, and information still would be stuck inside internal systems. Many cloud services have become so inexpensive or even free that users try out multiple services before picking the one they like the most. Utilizing these cloud services also has benefits to companies as well. They drive down costs, create greater focus on core business and increase deployment speed [12]. There is a natural tendency for combining social media, mobile computing and cloud computing [13]:

- Cloud offers the promise of faster development and delivery of services. It provides for cost savings and faster iteration of new delivery services. Cloud computing seamlessly deliver services to multiple end-points such as tablets and PCs.
- Cloud Computing could guarantee mobile delivery of enterprise email, calendar and other critical applications is a basic necessity.
- Social collaboration is best conducted by Cloud computing – blogs, wikis, file sharing, and social document collaboration create great opportunities for productivity.

While currently there are no specific technological solutions to the Mobile Enterprise concept, the Aberdeen group has named the convergence of the social, mobile and Cloud infrastructure as SoMoClo^{TM} [14]. The SoMoClo combines technology infrastructure decisions into an unified model and repositions IT as a factor of the business future (Fig.2). It offers a strategic IT roadmap, in which the Social, Mobile and Cloud functions represent an unified construct [15]:

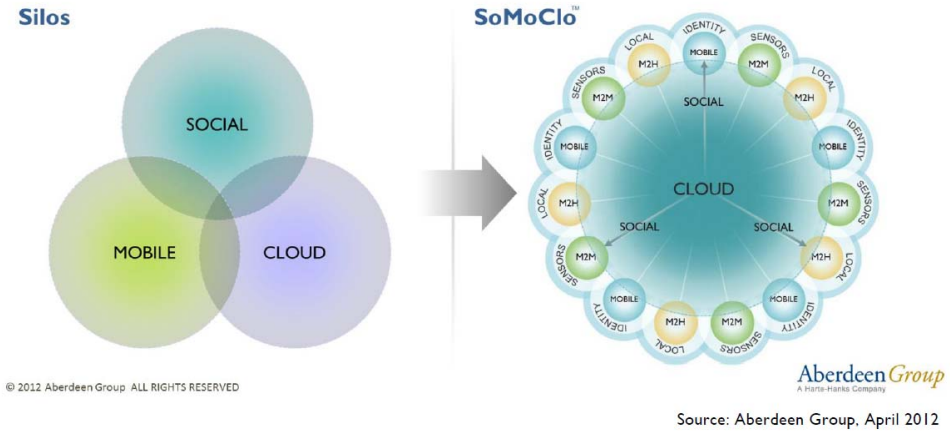

Fig. 2: Convergence of the building blocks into the SoMoClo^{TM}.

SoMoClo stands for social, mobile and cloud **[**16**].** The term was invented to express the conversion of those 3 hot topics into one IT construct. According to Aberdeen [17], SoMoClo presents a strategic roadmap for the enterprise companies - where cloud is the core, mobility is the edge, and social provides the connection through the cloud between mobile endpoints and people. SoMoClo is yet another symptom of the consumerization of IT society is experiencing today.

3. Conclusions

A lot of people are already using their own personal devices for work or regard their corporate device as their personal one. People are using modern apps that are designed to sync over the cloud, share content with social networks, and of course, run on mobile devices. The cloud + mobile + social combination is disrupting business models and changing human behavior at a fundamental level. Therefore enterprise companies should move faster to adopt the conversion of cloud computing, social collaboration, mobile applications and information into the mobile enterprise pattern which will be cost-effective, easier to maintain, and flexible new business model, satisfying the needs of any size and type of enterprise.

4. Acknowledgments

The authors express their gratitude to the Science Fund of the University of National and World Economy, Sofia, Bulgaria for financial support under the Grant NI 21.03-44/2009, titled "Methodology for Business Information Support in the Conditions of Global Economic and Financial Crisis by the Cloud Computing Technology".

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