Investigation of mobile Knowledge Management: Developing and Integrating Enterprise App Store with existing Knowledge Management System

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ABSTRACT

Globalization and the rise of mobile technologies have significantly increased the mobile workforce in organizations. Enterprise App Store (EAS) is a rising phenomenon to harness mobile technologies for achieving enterprise solutions. These solutions are largely diversified and lack focus to address specific business areas. The concept of mobile knowledge management (mKM) is still in its infancy. This paper suggests a framework to realize the development and integration of an EAS to existing KM strategies of the organization. Service oriented architecture (SOA) concepts are utilized in developing and integrating mobile applications. It is also suggested to introduce formal governance structure for the integrated system. The benefits of the suggested framework are enhanced flexibility, efficiency, effectiveness, ubiquity and connectivity to the organizational KM endeavours. The paper concludes with some recommendations for the EAS development, discussion about present challenges and future of the mobile application development.

Keywords

Mobile application, Enterprise Application Store (EAS), Mobile Knowledge Management (mKM), Enterprise mobility, mobile learning.

1. INTRODUCTION

There has been a growing acceptance of mobile computing potential in organizations over the world. But, the efforts remains segregated and largely lack focus on specific challenges. Knowledge management (KM) is one such area, which can be radically revamped by the application of mobile technologies in organizations. The organizations that value knowledge and related activities will hugely benefit from strategically deploying mobile solutions to their existing KM strategies.

Merrill Lynch was facing troubles in training their workforce which were spread over different business units all over the globe [16]. In response to this, Merrill Lynch launched training programs via Blackberry devices. The organization aimed at enabling learning during downtime and in smaller bursts, at the convenience of the user. As a result of this initiative, the organization found increased competency scores, timely completion of training and shorter learning curve for their employees. Moreover, the organization conducted a survey among its employees which reflected that mobile training was convenient, better supported the learning objectives, and more

satisfactory. With the increasing number of mobile devices in companies like Merrill Lynch, the potential of mobile learning is definitely very high.

Apple's senior vice president of Worldwide Product Marketing was quoted as saying "With more than 10 billion apps downloaded in just two and a half years—a staggering seven billion apps in the last year alone—the App Store has surpassed our wildest dreams" [8]. This provides a glimpse of the popularity and the immense potential of mobile applications. The exponential growth in mobile technology in the recent times has encouraged the organizations to take a more strategic approach towards mobility for their business. Globalization has resulted in a significant increase in the mobile workforce of organizations [2].

A large number of educational institutes have introduced m-learning or mobile learning [6]. The concept is still in its infancy but the initial responses are widely positive. It is up to the teachers to realize the academic potential of these tools. Clearly, there is an outright necessity for the corporations to assimilate their efforts and seize the opportunity offered by mobile devices as potential learning instrument.

2. LITERATURE REVIEW

2.1 Enterprise Mobility

Sorensen and Al-Taitoon [14] refer to enterprise mobility as the close physical connection between information and communication technology and the users in an organizational perspective.

Mobile devices are certainly capable of improving the members' efficiency of the organization (Basole 2005; Rodina and Zeimpekis, 2003). They are playing an important role in ubiquitous learning setup. However, there is less research in this field and their potential in context of ubiquitous learning is yet to be fully realized [13]. The concept of a mobile phone has radically changed over the last few years. Initially, the concept of a mobile device, which enabled the users to make voice calls, was an achievement in itself. Since then, this device has grown in capability, features and style. The recent generation of smartphones host a variety of features. Earlier, most of the features were targeted towards entertainment. But recently, a distinct generation of business smartphones has emerged that promises features like email, internet and document processing.

Besides smartphones, a plethora of other mobile devices such as tablets, PDA and other hand held devices have come into the picture. These devices feature increasingly big screen sizes

while maintaining the sleekness of the device. Moreover, the ability to connect wirelessly via third generation networks has dramatically improved the usability of mobile devices. As a result, modern user has numerous options of mobile devices suiting their individual requirements.

Sybase [17] acknowledges the strong presence of mobile devices in an organizational set-up and the organizational necessity of embracing its potential in future. Motorola [7] emphasizes on developing unified enterprise mobility for reduced cost of ownership for wireless network infrastructure and the ability to utilize all mobile resources in the organization.

Scornavacca and Barnes [11] have identified efficiency, ubiquity, flexibility and connectivity as some of the attractive features of the mobile devices from an organizational perspective.

- Efficiency: Mobile applications usually require less intervention and supervision. This automation increases the efficiency of the organization promoting mobile learning.

- Ubiquity: The mobility or 'anywhere, anytime solution' makes mobile applications a ubiquitous platform.

- Flexibility: The portability and adaptability of the mobile devices presents them as more flexible solutions.

- Connectivity: The transmission and reception of data wirelessly enhances the connectivity options of the mobile devices.

2.2 Mobile Applications

A key feature of mobile devices is their application hosting capabilities. These applications use the device's resources to provide an array of (entertainment, utility, business, etc.)

functionalities. These applications are mainly dependant on the operating system of the device. The majority of the market share of operating system is divided between Apple's iPhone OS, Android and Symbian. Table 1 illustrates the market share of different mobile operating systems in 2010-11 [4].

Table 1: Market share of different mobile operating systems in 2010-11

Operating System	2Q11 Units	2Q11 Market Share (%)	2Q10 Units	2Q10 Market Share (%)
Android	46,775.9	43.4	10,652.7	17.2
Symbian	23,853.2	22.1	25,386.8	40.9
iOS	19,628.8	18.2	8,743.0	14.1
Research In Motion	12,652.3	11.7	11,628.8	18.7
Bada	2,055.8	1.9	577.0	0.9
Microsoft	1,723.8	1.6	3,058.8	4.9
Others	1,050.6	1.0	2,010.9	3.2
Total	**107,740.4**	**100.0**	**62,058.1**	**100.0**

Table 2 displays some popular applications on Android and RIM platform related to education and business. These applications are widely diverse and lack the focus to cater the needs of an organization. However, these individual applications are popular due to their excellent learning potential, navigation features and multimedia abilities.

Table 2: Some learning applications on Android and RIM platform

Platform	Existing learning applications	Description
Android	Math Workout	Take part in this daily mental ritual. Downloaded by over 2.4 million players! Your brain will love Math Workout.
	Medscape (Medical)	Medscape from WebMD is the most comprehensive, free medical app available for healthcare professionals.
	Tourist: Language learn and speak	Translated useful phrases for you to learn or use in foreign countries. This application helps you get around in a foreign country.
	EBay App	Simple, convenient, and easy-to-use, the eBay Android app makes buying and selling on eBay fast and fun!
RIM	StockPulse - Stock and Equity Tracker for BlackBerry PlayBook	StockPulse is your perfect companion for keeping track of your stocks and investment portfolio on your BlackBerry® PlayBook™. StockPulse is suited for both basic users and advanced market analysts who would like technical insights

	Learning To-Go Accounting and Finance for Managers	It provides a completely user-controlled educational experience, incorporating full course material book , interactive flashcards and comprehensive self-tests in one innovative, integrated app.

These applications, although not developed from an organizational usage perspective, are very popular in the respective application stores. Organizations like Merrill Lynch are already concentrating on promoting mobile learning through Blackberry devices [16]. The increasing recognition of mobile learning in organizations suggests a promising future for mobile applications.

2.3 Integration of Audio Visual Techniques

A mobile application has a specific purpose. It can be developed as a distinct piece of utility software. But, the thoughtful integration of multimedia features often plays a key role in their success in any category. Even the serious purpose of education and business can be achieved by using apt audio visual techniques in the application. Animation and simulation are yet other powerful tools to stimulate the end user. Therefore, promoting the artistic aesthetics of the application could be the most vital part of their development. It could decide their acceptance and response among the end users.

2.4 Mobile Applications for Knowledge Management

The participation of mobile workforce in knowledge acquisition and dissemination practices has added an important dimension to KM practices of organizations. It ensures optimum participation of employees and increased collaboration among them to provide relevant learning solutions.

Folorunso et al. [3] have suggested that the focus of mobile knowledge management (mKM) is on "seamless integration of mobile work into the corporate knowledge management control loop, especially where knowledge is associated while performing tasks, tasks necessitate out-of-office work, and tasks necessitate communication".

One of the important characteristics of mKM, which differentiates it from traditional knowledge management, is the location-related context of the user [5]. If an employee has a customer centric role, she would most likely want to deal with customer centric information.

The concept of mKM is at a very earlier stage of development. During the course of its development, many of its existing components will change. But, on the other hand, mKM has a potential to change the existing arena of knowledge management itself.

3. PROPOSED FRAMEWORK

The aim of this study is to explore the potential of mobile applications in organizational learning context. The proposed framework is based on the integration of an enterprise application store that is focussed on organizational learning along with existing KM systems. It is suggested to develop

organization wide application store for mobile devices in order to promote a mobile edutainment system.

3.1 Enterprise Application Store (EAS)

The proposed framework will involve the concept of an organization wide online application store. Organizations like GetJar and AppCentral have already started exploring the market for custom enterprise app solutions [15]. Severance [12] emphasizes the potential of developing app stores for educational purposes. The EAS will host a series of applications targeted to improve organizational learning. These applications would aim to encourage knowledge sharing while improving the user experience. The whole idea is to make learning a ubiquitous and enjoyable activity. Figure 1 represents the interaction of EAS with various stakeholders via role based user interface. It ensures effective and secured bilateral interaction of various parties with EAS to enrich and strengthen EAS as well as learn from it.
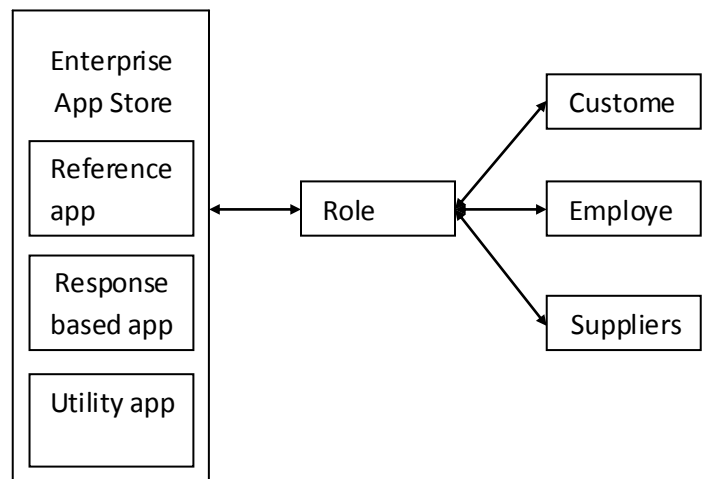

Fig. 1: Schematic of various stakeholders interacting with a functional EAS via role based UI

Service-oriented architecture (SOA) is one of the most popular upcoming concepts used in mobile application integration. Service reusability, loose coupling and interoperability are some of the features that make SOA an excellent choice for mobile application development and integration. EAS utilizes the core SOA paradigm of service registry, service provider and service requestor [10]. In this case, the role based UI acts as the service registry, EAS as service provider and different stakeholders as service requestors.

In context of enterprise application, these stores will have broadly three types of applications to promote organizational learning:

- **Reference app:** These applications will act as sources of references for the employees. They will be developed from existing information resources, industrial best practices and coded knowledge inside the organization. These would be static applications that would depend on periodic revision for future updates.

- **Response based app:** These applications will dynamically collect information from employees, customers, suppliers and other relevant stakeholders to update the existing knowledge of the organization. These applications would often need an active internet connection in order to gather dynamic responses.

- **Utility app:** These apps would act as facilitators of organizational learning process. In spite of directly contributing to the organizational learning, they act as tools for facilitating the learning process.

3.2 Store Management

The proposed enterprise store will have a governance model called store management. This management will facilitate smooth interaction of various stakeholders and enterprise app store. Zyngier and Burstein [20] have explored the role of KM governance in KM strategies. KM governance was found to have a positive effect in the implementation of KM strategies. However, there has to be an alignment between KM and the organizational value and strategy. There should also be regular audit of the KM practices to keep a check on the system. The store management will ensure that the app store is operating in alignment to organizational vision and objectives. Yang [18] argues that knowledge sharing has a positive relationship with governance mechanisms in organizations.
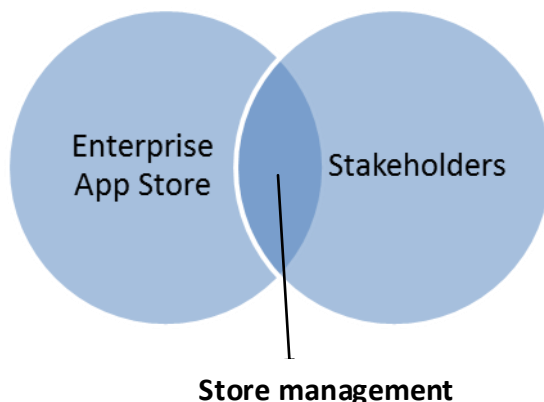

Store management

Fig. 2: Representation of store management as interface between stakeholders and EAS

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The proposed enterprise store would have a role-based access decided by the management. The store management will ensure the apt categorization and maintenance of various apps in the store. Figure2 shows the role of store management as a facilitator for effective interaction between EAS and various stakeholders of the organization.

The store management should encourage employees' participation in application development. It is critical to endorse employees' insights while developing specific solutions to real time organizational learning problems.

3.3 Mobile Application Development

While keeping the knowledge content same, an application with greater multimedia appeal may prove to be more engaging for its users. At the same time, the use of multimedia features should not be high enough to distract its users or immensely tax the hardware of the device. As a result, those applications that have a balanced use of multimedia tools may prove to be more engaging and hence will contribute more to the learning of its users. Moreover, a smart designer can find his ways to deliver the content effectively without necessarily using excessive system resources. It would be of prime importance to value organizational objectives while designing mobile applications. Hence, application design is the most crucial factor in the application development stage of our framework.

While there are a large number of applications available for different mobile platforms, the volume of relevant applications identified for development by an organization for their internal use would be significantly less. Therefore, actual development or formal coding would not be a daunting task and will need a leaner workforce. Knowledge managers should work with expert designers to get their message delivered in a concise, precise, interesting and orderly fashion.

3.4 EAS Integration with KM

Researchers believe that mobile learning might be the next evolution in education [1, 9]. The increasing existence of enterprise mobility concept has added to the necessity of introducing mobile learning with conventional KM strategies.

Zuga et al. [19] suggest that mobile learning should be a 'part of a blend'. That is, it should be used in collaboration with other learning activities. The proposed framework places EAS with existing KM systems to provide more agility and mobility to the existing system. This system provides a more robust platform to address the issues of organizational learning. Figure 3 illustrates how EAS interacts with existing KM system. Mobile devices based on their network privileges then access the store. The existing KM system includes the various business processes, knowledge bases and information technology components. EAS contain different categories of apps and utilize network connectivity option for application management and distribution. Mobile devices can further interact with EAS based on role based access system. The benefits of this suggested framework is enhanced flexibility, efficiency, effectiveness, ubiquity and connectivity to the organizational KM endeavours. It also ensures better life style by providing 'anytime, anywhere' solutions to the learning organization
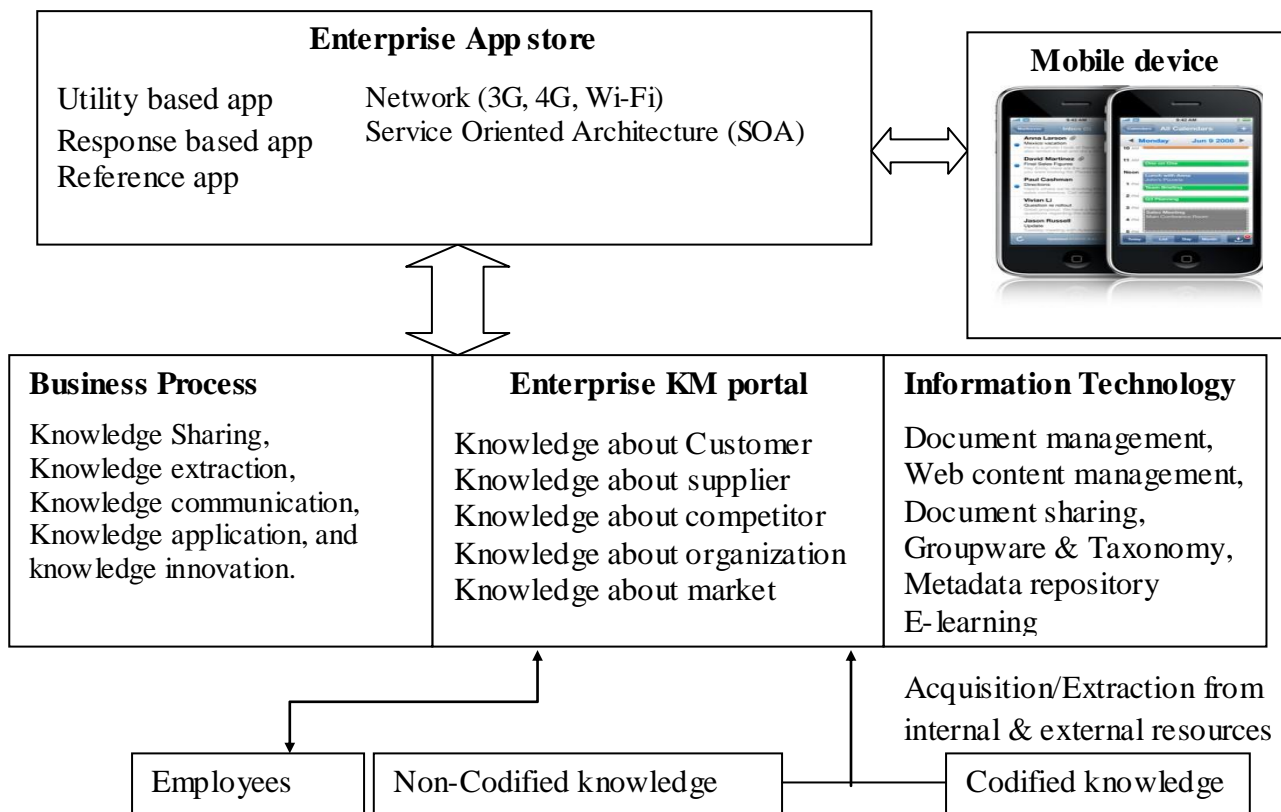
Fig.3: Schematic of EAS integration with existing KM system

4. CONCLUSION

This paper suggests the active incorporation of mobile solutions to strengthen the existing KM strategies of an organization. It further emphasizes on the development of an enterprise application store which would cater to the knowledge related activities in different categories. A formal store management is proposed in order to ensure smooth interaction of users and the store and encourage stakeholders to actively participate in shaping the store's activities. Finally, it is advised that this store is to be used in collaboration with the existing KM system. It is, by no means, a total replacement for the organizational KM activities.

The organizations can either outsource or undertake the application development process themselves. But, it is recommended that the organizations should gradually own the process of application development as it gives them better control over applications to confirm by the organizational objectives.

One of the prominent challenges in EAS development is security due to application distribution in mobile devices. Adequate caution has to be taken while providing company specific and sensitive information for mobile applications. Fragmentation of mobile platforms is yet another challenge is yet another problem for application development. Moreover, restricted development platforms further enhance the difficulties of realizing the full potential of mobile applications. It is, therefore, suggested that organizations should focus and encourage the application development on open ended platforms to gain better control over their stores. These limitations will diminish if companies start considering strategic mobile solutions for their business. The future of mobile learning will certainly provide radical improvements to the organizations that are willing to embrace new technologies.

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