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The Pathway to Enterprise Mobile Readiness: Analysis of Perceptions, Pressures, Preparedness, and Progression

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ABSTRACT

Ubiquitous computing is becoming a reality around us through the combination of personal mobile device proliferation and pervasive computing technologies. The objective of this qualitative *research in progress* is to understand challenges organizations face from the evolutionary nature of mobile computing and uncover how they “get ready” to meet the mobile needs of their stakeholders. Grounded in evolutionary theory, the current research explores perceptions of mobile computing, and the pressures, preparations, and progression of enterprise mobile readiness (EMR) in the context of higher education. Preliminary findings show that decoupled structure and resistance by gatekeepers are key challenges to EMR. Additionally, IS providers have given little thought about how to benchmark their EMR efforts. This research contributes to the extant literature and helps fill an important gap in mobile research at the organizational level.

Keywords

Emerging technologies, organizational change, enterprise mobile readiness, mobility, mobile computing

INTRODUCTION

Today’s business and personal spaces are seeing an explosive proliferation of mobile devices. According to a recent Gartner report, worldwide smartphone sales reached 149 million units in the fourth quarter of 2011, a 47.3 percent increase from the fourth quarter of 2010 (Gartner 2012). Additionally, BI Intelligence reported that mobile tablet sales will reach over 450 million units by 2015 and grow at a 50% compound annual growth rate over the next few years due to both falling prices and market penetration in the enterprise and education sectors (Gobry 2012). Ubiquitous computing is becoming a reality around us through the combination of mobile and pervasive computing technologies (Lyytinen and Yoo 2002; Rosenbush, Crockett, Palmeri, and Burrows 2003). Mobile information technology (IT) services are quickly being adopted at both personal and organizational levels due to the improvements in data processing capabilities of these mobile devices (Kim, Yang, and Ahn 2009). In addition, businesses and organizations are seeing the value opportunities of mobility (Barnes and Huff 2003; Clarke III 2001; Yuan and Zhang 2003). As these mobile technologies and services continue to integrate, users are taking advantage of and connecting to them through smaller and smaller mobile devices such as smartphones and tablets.

This emerging mobile phenomenon has started a movement across small and medium-sized businesses (SMBs) and other enterprise organizations known as Bring Your Own Device (BYOD). In this context, BYOD basically means that the organizational worker brings their personal mobile device (a non-organization issued device) into the work environment to use in completion of their work-related duties. A recent survey found that over 25% of enterprises and SMBs worldwide have embraced BYOD and that number is rapidly trending upwards (Citrix 2011). BYOD is creating a unique set of challenges for IT professionals (Oppliger 2011), specifically in the numerous spillover effects of having these mobile technologies in the hands of members within an organization. For example, as individuals become used to the benefits and conveniences of mobile devices in their personal lives, certain service-level expectations are assumed as these same devices are carried into an organization. Beyond simple wireless internet and email access, those that carry these devices are beginning to have the expectation of using them to complete their daily work quickly, efficiently, from anywhere, and in the manner they choose (Davis 2002; March, Hevner, and Ram 2000; Perry, O’hara, Sellen, Brown, and Harper 2001). IT professionals must now begin to “get ready” by preparing for, adjusting to, and coping with these changing expectations. Therefore, this research focuses on examining an enterprise’s pathway to preparing for its stakeholders’ evolving mobile computing (MC) needs. We refer to this process of sensing, coping and adjusting to its stakeholders’ MC needs as enterprise mobile readiness (EMR).

Broadly speaking, the objective of this *research in progress* is to create a better understanding of the challenges an organization faces due to the evolutionary nature of the IT computing landscape and to uncover how it prepares, i.e., “gets ready,” to meet the evolving computing needs of its stakeholders. In this work, the new technological imperative, i.e., shifts in the enterprise’s computing needs, is viewed as a cause of organizational change (Markus and Robey 1988). Therefore, this research analyzes an enterprise’s mobile readiness as an organizational change management process of preparing to adjust and cope with this new technological imperative. To scope this work, we investigate the phenomenon of EMR within the confines of higher education organizations. Specifically, we examine how increasing pressures for MC are causing information system (IS) professionals within the organization to think about and carry out change in regards to the proliferation of mobile devices.

BACKGROUND

Surprisingly, there is no consensus definition of “mobility” (Hoehle and Scornavacca 2008) in the existing mobile literature. We found the characterization of *MC* and *mobility* to be diverse and multifaceted. For example, Basole (2004) points out that often times, “the term ‘mobile’ is used in place of ‘wireless’ and ‘portable’” and demonstrates the many ways people use the word. Perry et al. (2001) define mobility as “access anytime, and anywhere” while Zhang and Yuan (2002) see it as not being forced to be hardwired. Kristoffersen and Ljungberg (2000) characterize mobility in a tripartite fashion: *travelling*, *visiting*, and *wandering*. Travellers move from point A to point B, visitors are anchored to a fixed position at a desk, and wanderers move about in a localized area. These three categories define how a worker might use a mobile technology and link their geographical position to their mobility. For example, a smartphone or tablet would be useful in all three categories, a portable device such as a laptop could be used in either travelling or visiting, and a desktop is only feasible for use in a visiting situation. Kakihara and Sørensen (2002) portray mobility as not simply linked to human movement, but to the interactions in which they participate. These interactions are also categorized in three dimensions of mobility: *spatiality*, or the geographical “where” of humans, objects, symbols, images, and voice; *temporality*, or the “when” of interactions that take place in clock-time and social-time; and *contextuality*, or the way the interactions take place in human circumstances and social networks. Tamminen et al. (2004) see mobile technology as allowing the day’s various activities be carried out on the move. Hoehle and Scornavacca’s (2008) qualitative study with six mobile technology experts resulted in the development of a characteristics list of mobile IS. The expert’s perceptions of a mobile IS included the descriptors *portable*, *multi-functional*, *personal*, *always on*, *secure*, *expensive*, and *bounded by hardware*. Interestingly, they found that the experts diverged in opinion on whether mobility was geo-spatially defined, or if it had something to do with the technology of mobile devices (Hoehle and Scornavacca 2008).

While mobile research is a topic of interest in the IS field, particularly as a personal consumer technology (Barnes, Scornavacca, and Innes 2006; Sørensen, Al-Taitoon, Kietzmann, Pica, Wiredu, Elaluf-Calderwood, Boateng, Kakihara, and Gibson 2008), less analysis has been done at the enterprise level (Basole 2007; Scornavacca 2008). Gebauer and Shaw (2004) presented work on how mobile business applications need to complement the existing IS within an organization. Further work by Gebauer (2008) found that mobile technologies can have a substantial impact on both job performance and personal lives of users and that they need to be accessible across an array of different use-situations. However, Junglas et al. (2008) found that the ability to do location-insensitive tasks, such as browsing for information or writing an email, in a mobile environment doesn’t necessarily provide a performance increase over the traditional desktop situation. Gebauer et al. (2010) explored how a mobile IS can be designed for managerial processes and laid out several propositions on how it can create success in an organization depending on the task, the technology, and the mobile use context. Henfridsson and Lindgren’s (2010) recent work on the development of mobile and temporarily interconnected systems pointed out that user involvement is a key element when creating useful systems for organizations. Kim et al. (2009) conducted a case study of the mandatory implementation of mobile devices in the Korean Postal Services. The study found that information quality, system quality, and perceived usefulness of the device were important factors when determining user satisfaction and successful use. Tarasewich et al.’s (2008) work looked at some of the potential issues that manifest themselves when a mobile device operates as both a personal device and work asset (e.g. security of private information). They examined both personal and organizational perspectives of mobile use, and provided strategies for making decisions about the design and implementation of mobile work in organizations. Scornavacca (2008) examined wireless business applications in New Zealand through the lens of Barnes’ (2004) Mobile Enterprise Model (MEM). The Barnes (2004) MEM is a three pronged template that depicts the potential of mobile applications in the business enterprise. The three prongs are as follows: *mobility* is the level of “geographic independence” of the enterprise worker, i.e., their independence relies on the level of mobile data they have access to; *process* is a description of how the enterprise worker’s task processes change as a result of the mobile application; *market* encapsulates the “value proposition” created when services, products, and customer relationships found in the business arena are altered due to mobile applications (Scornavacca 2008).

As summarized above, the extant literature predominately focuses on how mobile technologies are designed, introduced, and implemented at the enterprise level. There is limited work where the processes of readying IT services for mobile use are explored. This assertion is supported by Basole's (2004) assessment where he states that before an organization can implement a mobile strategy, understanding if they are ready is an important first step. He called on researchers to look at EMR across four areas: *organization, process, technology, and environment*. To date, we believe no one has specifically looked at the EMR process from an organizational level of analysis. As this study begins an examination of Basole's (2004) four contexts, we believe it will also begin to fill that gap in literature.

RESEARCH QUESTIONS

In this exploratory work, we will examine how higher education institutions are coping with emerging MC needs at the enterprise level. Our investigation looks to further clarify the multifaceted characterization of MC as we compare what IT workers in the field perceive it to be with the extant literature. We also look to uncover the pressures brought to bear on the enterprise from its stakeholders concerning access to mobile services, and how they are preparing to cope with these pressures. Finally, we will look for signposts that indicate that the organization is making progress towards meeting the mobile readiness challenge.

Specifically, we address the following four research questions to examine the state of an enterprise's mobile readiness. We refer to these as 4Ps of Enterprise Mobile Readiness.

RQ1: *How is MC perceived by IT service providers?*

RQ2: *What are the pressures and/or challenges to enterprise mobile readiness?*

RQ3: *How does the enterprise prepare for mobile readiness?*

RQ4: *How does the enterprise know that it is progressing towards mobile readiness?*

THEORY

We ground our investigation of this phenomenon through the theoretical lens of organizational change management. Specifically, we borrow from evolutionary theory, a theory from biology most noted for its Darwinian ties. In the context of the organization, evolutionary theory describes the small and consistent improvements or incremental steps taken that gradually produce change in the whole. A majority of organizational changes are considered *evolutionary*, as resistance to *revolutionary* change is strong (Burke 2007). Weick and Quinn (1999) refer to continuous change as "the idea that small continuous adjustments created simultaneously across units, can cumulate and create substantial change. That scenario presumes tightly coupled interdependencies." As with the biological theory, organizational evolutionary theory allows for change to occur according to a continuous sequence of variation, selection, and retention among units vying for organization resources (Van de Ven and Poole 1995). Variations are the innovative forms that organizations take on, and can come into existence through random chance (Aldrich 1979; Campbell 1969). As organizational units vary, and then choose to retain their individual changes, change occurs at the macro level. In addition, when viewed through a Lamarckian lens (Hodgson and Knudsen 2006), organizational traits are picked up through social learning and imitation within a generation (Van de Ven and Poole 1995). We apply this theoretical perspective to map out the technological evolution of an enterprise in terms of its entrance into and progression towards MC. More specifically, we use this theory to describe how organizations are first making sense of the shifts in the computing needs of their stakeholders and gradually recognizing the pressures and resolving and addressing the challenges incrementally to prepare for the changing expectations brought about by this technological imperative.

METHODS

Sampling and Data Collections: We chose the context of our research, higher education, for several reasons. First, universities are beginning to direct their attention towards MC needs and thus provide an excellent research bed for examining the concept of readiness (Kirchick 2011); second, the nature of the stakeholders creates pressure for mobile readiness, e.g., universities have large student bodies that use mobile devices extensively (Ziegler 2010), active alumni that want to stay connected, and highly mobile research faculty if the institution is in an isolated location; finally, EMR generates enormous benefits that universities have not fully exploited such as engaging with the student body where they are (the mobile space), providing current and valuable information (such as grades, schedules, financial aid data, and safety alerts), and managing the institution's brand reputation (Kirchick 2011).

We conducted data collection within three different institutions. All were located within the northwest region of the U.S., two schools being land grant institutions, and the third a branch campus of an aforementioned school. In addition, a fourth

“subunit” of one of the land grant institutions, which acts as an independent body, was also visited for data collection. This subunit is so diverse in mission and infrastructure from its parent unit, it could be considered as a fourth institution.

Within these institutions, we targeted IS workers as our interview subjects. A stratified sampling scheme was used, where the IS workers performing various IT roles (i.e. strata) were selected. The participants ranged in position (within their respective units and institutions) from executive management, down through departmental managers, and on to the line workers and support staff. We believe these are the appropriate subjects since they are the ones dealing with the challenges of making mobile services available to their various stakeholders (which include students, staff, faculty, alumni, and even their communities and/or government agencies) and wrestling with the changes that must take place within their units and overall organization. By utilizing the stratified sampling approach, we were able to capture a broader and a more comprehensive view of the phenomenon.

The initial contacts for this study were determined by speaking with a senior IS manager in one of the larger units of a targeted institution. Further contacts were developed using a snowball strategy (Noy 2008). Once a planned interview with a contact was completed, the subject was asked for recommendations on other contacts that might have further insight on the topic at hand. The suggested individuals were then contacted for interviews. We strove to interview as many people as possible across the institutions, so we followed this snowball process until we felt that a saturation point had been reached in our data collection.

We conducted 20 semi-structured interviews with IS workers in early 2012. Before performing the interviews, we sent our script to two qualitative experts¹ who reviewed and gave feedback to strengthen the script. Following that feedback, a pilot interview was conducted to further refine the interview guide. Once interviews began, this same written script was used as a guide. Follow-up and “in the moment” questions were asked depending on the role of the individual and the picture being painted during the interview session. Subjects that were interviewed later in the overall process were occasionally asked unscripted questions based on knowledge and understanding gained in earlier interviews. Each of the interviews lasted between 30 and 70 minutes, although some interviews lasted longer than others depending on the rapport that was developed between the interviewer and interviewee.

The interviews script was designed to address the four research questions to uncover the situation regarding mobile readiness in the interviewee’s unit, as well as that of the overall institution (from their perspective). We also strove to understand their emotional reaction to the topic, hoping to gain a clearer perception of what their rationale was for having mobile services delivered by their unit. Through these interviews, we endeavored to jointly construct meaning with our subjects (Fontana and Frey 2000; Sarker and Lee 2006; Silverman 2006) and come to a clear understanding of the state of mobile readiness within the institutions under examination. Before ending an interview session, all interviewees were asked for any documents or other artifacts that could help inform our understanding and provide greater context (Walsham 2006). The majority of the interviews were conducted with the subjects in their “natural settings,” (Creswell 1994; Denzin and Lincoln 1994) either in their offices or nearby conference rooms. A few interviews were conducted in restaurants or other informal meeting areas. All interviews were digitally recorded and then transcribed for accuracy in recounting the content of the session.

Determining the appropriate sample size is an important part of planning a qualitative study, and the literature offers many guidelines (Bernard 2000; Bertaux 1981; Creswell 1998; Kuzel 1992; Morse 1994). For the present research, we followed the guidelines set forth by Guest et al. (2006) in determining how many subjects were needed before ending our interview process. In their study involving 60 in-depth interviews across two countries, saturation of data collection was achieved with just 12 subject cases. Mason (2010) points out that saturation, or the point where no new information is being uncovered in which the researcher can develop upon (Glaser and Strauss 1967), should be the guiding principle in qualitative data collection. We observed in our study that as we interviewed with more and more subjects, certain themes began to emerge in common threads. We therefore felt that we had reached the saturation point in our data collection with the 20 interviews that were conducted. Happily, Green and Thorogood (2004) also found “little that is ‘new’ comes out of transcripts after you have interviewed 20 or so people.”

Coding and Analysis: Currently, we are working through the interview data. Nvivo software is being used to code and analyze the data guided by the four research questions posited above. More specifically, we are coding the data to capture the

¹ We have purposely not mentioned the names of these two experts during this review process; we will acknowledge them upon acceptance of this manuscript

four Ps (*perceptions* about the emerging technological phenomenon, i.e., MC; what *pressures* are they facing due to this new technological imperative; how are they *preparing* for this technological imperative; how are they assessing the enterprise's *progress* toward meeting this new technological imperative) that characterizes an organization's pathway to EMR.

PRELIMINARY RESULTS AND CONCLUSION

As this is a work in progress, data analysis is not yet complete, but we can share some preliminary insights about our research questions (completed analysis will be ready for presentation at the conference).

As far as *perceptions* of MC is concerned, preliminary analysis suggests the dominate view by IS providers is any work related activities away from their primary workspace is considered MC. Flexibility to work in the car, a hotel, or in an airplane was highlighted as mobility in terms of computing.

When responding to questions of *pressures* and challenges, interviewees responded with several expected issues such as resource constraints, lack of skill and need for training, security concerns, and vendor issues. Two challenges were unexpected, specific to the context, and likely the hardest to address. The first is the decoupled nature of university units. As Weick and Quinn (1999) predicted, loosely coupled subunits hamper macro change. As recounted by one interviewee:

"You've got however many colleges and however many IT organizations within each college and then a central IT that coordinates with all of them, and that's...a lot of people with a lot of different missions. Some people don't care about it...it has no impact on what they're doing...at least they think it doesn't. And so they don't get on board, and if you can't get key people on board, well it takes a lot longer to move that ship"

Second, resistance to change by key IT gatekeepers surfaced as a major challenge. Another interview revealed the following:

"We've got a lot of very senior...level IT folks throughout the whole university that have been around on this campus for 20-30 years and this is a different way of thinking, virtualization/mobilization is a totally different way of thinking and a way to wrap your brain around delivering services. So people that have a hard time rationalizing with it or understanding its need...move slower by nature, they move slower so they can catch up and try to understand it as they are deploying it."

We view Gersick's (1991) exploration of the punctuated equilibrium paradigm potentially germane to our study. Punctuated equilibrium portrays the organization as fairly stable in its *deep structure* (steady state). Long periods of incremental, evolutionary adjustments maintain *equilibrium* (Wake, Roth, and Wake 1983). At some point, radical change is needed to disrupt the equilibrium and change the deep structure. It seems a "re-evolutionary" perspective presented by (Deeg 2009), that conceptualizes the delicate interaction between evolutionary (structural) and revolutionary (political) processes might be in play. Therefore, we posit that a mix of both evolutionary and *revolutionary* theory may be needed to better understand the process of change in our context.

We were met with a variety of responses to the *preparation* question, but the design and development of an effective mobile strategy at the enterprise level was common. Our sense is that preparation must be strategic in nature and driven by key stakeholders of the institution.

Finally, when asked about measuring *progress* toward EMR, we felt interviewees had not thought about it very much. 'Use' of mobile services seemed to be a mutual way to gauge advancement. We believe IT service providers, at all levels, are narrowly thinking about benchmarking EMR, or not considering it at all.

We believe that further, systematic analysis of our interview data will reveal further insights and generate future directions for research.

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