

The New Enterprise Mobility: Seizing the Opportunities and Challenges in Corporate Mobile IT

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ABSTRACT

A new generation of mobile IT is driving new thinking and innovation in most areas of organizations and is challenging corporate IT. From a “computing” perspective, this second-generation enterprise mobility (SGEM), such as smartphones and media tablets, enables pervasiveness, much more intuitive computing, and contextual intelligence. This changes what can be done with IT in enterprises and creates new challenges for IT departments. Based on three group interviews and twelve individual interviews including data from 31 corporations, we explore how corporations are responding to SGEM. Based on this data, we derive three opportunities and four challenges. The synthesis of the results reveals that SGEM has changed employee expectations for professional IT and led to fundamental issues concerning the role and objectives of corporate IT departments. The results contribute to a more holistic picture of corporate usage of SGEM and illustrate how the new perception of IT is challenging common practice.

Keywords

Corporate IT, Mobile Computing, Opportunities and Challenges, Role of IT, Smartphone, Tablet Computer.

INTRODUCTION

Today, corporations face unceasing and increasingly rapid IT innovation, which challenges in particular the IT departments of large organizations. One of the currently most discussed innovations in corporate IT is mobile IT (Cearley and Claunch 2012; Frost & Sullivan 2011; Jones 2013; The Economist 2012), which encompasses all kinds of highly portable computer devices, such as tablet computer or smartphones. Starting with remarkable improvements in the hardware capabilities of these devices, mobile IT affects all layers of digital technology – including the content, service, network and device layer (Yoo et al. 2010) – by enabling various innovations and technological changes (Yoo 2010). These changes are substantial. In the *content layer*, mobile IT now offers more capabilities than ever for storing and consuming any kind of multimedia content. This is evidenced by 600 million mobile YouTube (2012) video views per day, or the fact that Apple is now the number 1 music retailer in the US, outpacing Wal-Mart (Galante 2012). Remarkable improvements are also evident in the *service layer*, as mobile IT now offers an extensive range of application functionality that serves the user for almost any propose. Facts concerning applications for mobile devices are testimony to this: For example, IDC reports that in 2010, more than 300.000 mobile applications were downloaded 10.9 billion times (IDC 2010) and Gartner forecasted that total sales for mobile applications would overtake those of business intelligence software in 2011 and enterprise resource planning (ERP) software in 2013 (Finley 2011). The *network layer*, so far one of the mayor limitations of mobile IT, has also made remarkable improvements; wireless high-speed internet access is now available in most areas of the world and for 2011, the International Telecommunication Union reported 1.2 billion active mobile broadband subscriptions worldwide (ITU 2011). This opens up new market opportunities, as in many parts of the world – especially in emerging markets – mobile IT is often the only available technology that supports Internet access. And finally, innovation is also not stagnant on the *device layer*: There is a

growing number of new kinds of devices which offer intuitive and mostly restriction-free access to services and content with an ever-increasing quality and functionality, coupled with decreasing prices for such devices (Harris et al. 2012; Pitt et al. 2011). These changes are evident and fundamental. In the context of corporate IT, we therefore label this new generation as second-generation enterprise mobility (SGEM), which is the focus of our study.

Such wide-reaching technological developments influence organizations (Gillespie 2007; Klein and Sorra 1996; Rogers 1995) and create a need for corporations to respond effectively to these changes and to exploit the emerging opportunities. Concerning this challenge of responding to SGEM, research can improve the adoption process of SGEM by acting as a facilitator for knowledge transfer and support practice by deriving insights from empirical studies. From an academic perspective, such issues are also valuable and contribute new insights from the latest industry practice to academic discourse. We therefore adopt an explorative research approach and examine, on a large scale, how corporations are actually reacting to SGEM by summarizing opportunities and challenges derived from industry practice. Based on three expert group interviews with CIOs, and an additional twelve interviews with C-Levels from multinational corporations, we consider the following research question related to corporate IT: What opportunities and challenges do IT departments in corporations experience with SGEM?

The remainder of the paper is organized as follows. Section 2 gives an introduction to the theory by defining SGEM. Section 3 discusses the methodological approach and describes the sample. Section 4 reports on the results and describes the identified opportunities and challenges. Section 5 discusses the results and implications for theory and practice, as well as the limitations of the study.

THEORETICAL BACKGROUND

So far, mobile IT has been defined by the distinction between portable and non-portable computer devices (Kristoffersen and Ljungberg 1999). This definition is sufficient for the first generation of mobile IT innovation witnessed in the early 2000s, but nowadays the portability of computer devices is only one aspect that sets mobile IT apart from conventional IT. The features of mobile IT now include additional aspects such as improved human-computer interaction, data visualization methods, usability and a remarkable market penetration, which offers corporations a new communication and distribution channel for products and services (Pitt et al. 2011; Stieglitz and Brockmann 2012). We use the term SGEM to refer to this new generation of mobile IT and its usage in the context of corporate IT.

To frame the research, we define SGEM by three characteristics which we derive from the theory of ubiquitous computing (Lyytinen and Yoo 2002; Weiser 1991, 1999). One aspect of ubiquitous computing is a superior usability and an intuitive human-computer interaction. This is evident for SGEM, as the intuitiveness relating to such devices has increased to a level at which even people who are generally uncomfortable with computers are able to interact with media tablets without prior training. If we compare this kind of usability and intuitive usage with PDAs or tablet computers from the early 2000s, the distinction becomes clear (Pitt et al. 2011). This increased usability enables also a better integration into the context, providing computer support in situations where computers had before been perceived as distracting and inappropriate (such as in a sales talk or counseling interview). We call this intuitive computing.

A second characteristic is the market penetration of such devices. These new devices are a market success – especially compared with their predecessors – and have reached such a high diffusion rate that they are now pretty much available to anyone. Along with the market penetration, the portability of the devices has also increased and led to a situation where SGEM is with us anywhere, and anytime (Harris et al. 2012). These developments led to a new dimension of connectivity (Dery and MacCormick 2012), which we call pervasiveness.

Another distinction can be made in terms of the functionality of the hardware (Jonsson et al. 2010; Pitt et al. 2010). SGEM devices possess a range of sensors that enable contextual intelligence (the devices relate to their environment, like context-aware applications, automated capture or sensitive and responsive computer environments). This aspect of ubiquitous computing is frequently mentioned by various different authors (Begole 2011; Jonsson et al. 2008) and termed contextual intelligence.

By comparing these characteristics with devices that corporations recognize as the driving force of mobile IT innovation (Harris et al. 2012), namely novel smartphones, such as the iPhone or Android devices, and media tablets, such as the iPad or certain Android tablets, it can be recognized that these devices conform well to the characteristics of ubiquitous computing:

1. Intuitive computing: Mobile IT devices support an intuitive and accessible computing experience. These devices can be seamlessly integrated into a conversation and enhance, it rather than detract from it.
2. Pervasiveness: Mobile IT devices are highly portable, allow continuous connectivity – and thus a constant data and application consistency, and are available to pretty much anyone, anywhere, and anytime. This not only leads to a

better reachability of existing customers, but also to the possibility to reach new customers (e.g. in emerging markets).

3. Contextual intelligence: Mobile IT devices can interact with and react to the environment, due to sensory input such as location, acceleration, light conditions, user identification and so forth.

We use these three characteristics to define SGEM. These three characteristics also set the scope of the research, as the article covers only technology that conforms to all of these three characteristics (such as smartphones and media tablets). Regarding the research question, we further need to define the terms “opportunity” and “challenge”. Opportunities refer to fields of application where the adoption of SGEM leads to a relative business advantage compared to other solutions (Porter and Millar 1985). In this process of gaining a relative business advantage due to technology adoption, the objective is to replace existing systems with a superior one. Such adoption processes are always challenging for organizations (Rogers 1995). However, regardless of whether a corporation exploits such opportunities, technological innovation is an external influence that is inevitably challenging (Gillespie 2007; Klein and Sorra 1996; Rogers 1995). We therefore define a challenge as a need for a change in approach or action, created by the emergence of SGEM.

METHOD

Our research follows a socio-materialistic approach (Leonardi 2012; Orlikowski 2009) to gain a complete view of the challenges and opportunities associated with SGEM. By following this approach, we ensure gaining a complete view and preventing a blind spot due to focusing exclusively on technology issues. Therefore, we decided to use qualitative data to capture “the voice” of the participants and conducted three expert group interviews and twelve telephone interviews. While the individual interviews followed a very structured approach, the expert group interviews were conducted as moderated roundtable discussions to foster an exchange of experiences. By combining these two approaches we ensured to capture issues that would maybe not have been revealed by a too stringent and structured approach. Concerning the participants, we invited only CIOs or officers in charge of mobility solutions as we assume that they have a complete view of the challenges and opportunities the associated organization experiences with SGEM. To have a comparable sample, the study focuses on large corporations and we therefore gathered data from 31 multinational corporations with more than one million dollars in revenue and more than three thousand employees. All corporations in the sample are publicly traded companies from a variety of industries that operate globally. The sample includes organizations from the following industries: financial services (26 %), logistics (13 %), IT (13 %), food (13 %), heavy industry (13 %), manufacturing (10 %), electronic industry (6 %), and others (6 %). The three expert group interviews were held in 2012 and attended by CIOs from multinational corporations in Europe and the US. The interviews were moderated roundtable discussions and lasted five to six hours. For the analysis, the discussions were audio-recorded and then transcribed.

In addition, we conducted twelve interviews with CIOs or officers in charge of mobility solutions of multinational corporations from Germany, Austria and Switzerland that employ SGEM devices in different areas of their corporation. The data collection primarily comprised in-depth telephone interviews conducted in 2011 (June-December). The interviews lasted an average of about 100 minutes and were audio-recorded and transcribed. We followed a semi-structured questionnaire that covered the following areas with respect to the solutions of interest: strategic reasons, benefits of the solution, organizational issues, and strategic and technological challenges. The analysis followed the approach recommended by Miles and Huberman (1994) for qualitative content analysis. Based on the transcripts, two of the authors independently identified issues that the corporations in the sample are experiencing with SGEM. The issues had to apply to the definition of SGEM given in section 2. After collecting material on the issues, the authors independently categorized them into two categories: opportunities and challenges for corporate IT. In a series of three workshops, the authors jointly synthesized and categorized the data, yielding three opportunities and four challenges.

RESULTS

In this section, we describe the opportunities and challenges identified in the course of the analysis. Empirical evidence is presented as direct quotations on a given issue. We identified three generic opportunities concerning sales, service, and internal efficiency and four challenges for corporate IT, including the usability vs. security challenge, innovation management, software development style, and staffing.

Opportunities

In general, all organizations in our sample reported at least one benefit they experience with SGEM. In the following section, we describe three generic opportunities which we derived from our data. These opportunities are likely to apply to any industry and any organization.

Sales

Several corporations report that the integration of SGEM into sales activities created value for them. Common examples are media tablet solutions that introduce computer-support to face-to-face conversations. In conversations, media tablets are experienced as an appropriate device for enabling computer support, in contrast to common IT devices, such as laptops or desktop computers. One company reports that so far, they had a guideline for their field staff not to use laptop computers in interviews or talks, as they create a barrier between them and the client:

“Why tablets? We have this guideline for our consultants, which says that it is not ideal to use a laptop. If you open the laptop it creates a psychological wall between the consultant and the client” (Head of Sales, Swiss banking company).

However, computers can support such activities with additional information or the possibility to visualize different outcome scenarios. Through using media tablets, corporations can overcome these limitations and use software applications to support their staff in such activities. For example, the sales and consulting personnel of a bank uses a media tablet solution to communicate their offers to clients. These offers are complex and highly customizable financial services, which are intangible and hard to communicate to clients. Media tablets are now used during the client meetings and the service can be customized to the customer’s needs with results depicted onscreen. In addition, SGEM offers organizations an additional communication channel. For example, the Eaton Corporation now offers resellers and end-customers a media tablet application that gives them full access to the extensive product portfolio of the company, and support for cross references for some thousand specific technical elements. Before, this was only possible for associated consulting experts. However, due to the possibility of providing enhanced users-services for SGEM, this service now is publically available. By opening up this comprehensive database to customers and making it available in a user-friendly and intuitive way, the corporation achieved additional purchases:

“Imagine a pump that goes in a John Deere tractor, or a Boeing 737. It has all kinds of configurations. [...] We search them in the app and boom! ‘This is the pump you need,’ from thousands of different types of pumps. And we’ve made it before. We make it at this plant, and the lead time is this. Here’s the engineering drawing. Here’s the data that goes with it in an e-mail. Now the customer embeds it into his system. He sees it. ‘I can use that.’ This cycle time used to take weeks, and we’ve shrunk it down to a couple of hours. We had an engineer in a design session do a product cross-reference right there, and he made a \$470,000 initial sales deal. It would have never happened without the app” (CIO, Industrial Sector – IT, Eaton Corporation).

Service

The *pervasiveness* and *intuitiveness* of SGEM has also led to additional customer self-service options. Due to the increased pervasiveness of SGEM, new opportunities for self-service processes are enabled. One example is the application provided by an insurance company that allows clients to report claim cases (e.g. car accidents). The client is guided through the claim report process and additional information, such as photos and location, are added to the report. The report is then submitted electronically via the application. In addition, the application provides clients with safety instructions and other useful information in accident cases. The process is digitalized and no paperwork is needed. Thus, service availability is increased and the insurance company achieves an increased information quality for the claim evaluation process. These novel self-service options that SGEM enable are of particular interest for insurance companies:

“In 5 to 10 years, when the technology is further improved, we will have the opportunity to provide our customers with an App which will enable them to scan their home and automatically receive a customized offer.” (Director, Swiss insurance company)

Mobile applications are also employed to outsource a complete process to the customer. Airlines, for example, now provide customers with applications allowing them to search for flight offers, book flights, make mobile check-ins with seat reservation, and save the boarding pass on their mobile device. Such self-service options for clients reduce paperwork, decrease points of contact, and save time for customers, as they no longer have to queue at a counter.

Internal Efficiency

Pervasiveness is also capitalized in tasks that require employees to travel. Such tasks can be effectively supported and enhanced with additional information offered by SGEM devices. Standard corporate approval processes for employee requests are simpler, quicker, and more efficient. Business cases of even higher impact include advanced computer-support for activities at construction sites, for inspections of industrial facilities, for job navigation or stock-updates in rural areas. For example, media tablet usage created efficiency gains on the construction site of an airport in Qatar:

“It’s a huge open space. We put in our own Wi-Fi throughout the construction site, and launched an iPad-based inspection app for the people in the field. We measured a 3- to 5-fold gain on daily productivity for people who had the app” (CIO, Bechtel Corporation).

A comparable example can be given for the inspection of industrial facilities:

“We program operators’ routine duties into their mobile devices, including checklists for procedures. Every procedure in our complex facilities has to be done exactly right. We saw work force productivity go up by a factor of two, but for us the greater benefit is the assurance that our procedures are done right, to make sure we don’t have a catastrophic failure” (CIO, Chevron Global Upstream).

Other benefits include increased information quality about the inventory of stores in rural areas, for example the solution used by Holcim’s India sales force:

“Every day they go to the dealer, and they enter into their phones how many bags of cement are there, from us and from our competitors, as well as the respective prices. The data get sent centrally for analysis. And our margin has gone up 10 percent, because we have the relevant market intelligence by knowing the development of volume and price” (CIO, Holcim).

Challenges For Corporate IT

Along with the benefits and possibilities of SGEM, corporations also experience challenges that call for new approaches to address and benefit from the emergence of this new technological generation.

Usability vs. Security Challenges

SGEM have reached almost everyone, regardless of demographics. This means that when SGEM devices are not supported or allowed at work, people will enjoy using them anyway in their personal lives. The convenience of applications used in private lives therefore creates expectations for professional applications. Hence, experiences with IT in personal life also form the reference point for experiences with IT in work life (Ip Kwai Fun 2010). CIOs experience this as a spill-over effect between professional and private life and perceive this as challenging:

“The trend is really coming from consumer IT—people do something at home, then they bring it to work, and they bring expectations of what it should be” (CIO, Holcim).

This conforms to the spill-over theory which predicts that experiences in personal or family life positively or negatively spill-over to work life and vice versa (Grzywacz and Marks 1999). Employees expect corporate IT applications to be as convenient as the consumer applications they use in their spare time:

“There is an expectation that it should be just as easy for people to access and use corporate information from a mobile device as it is for them in their personal lives” (CIO, Eastman Chemical Company).

But achieving comparable usability is only one aspect. Corporations often experience usability as a trade-off with security. Hence, CIOs face the challenge of balancing productivity, ease-of-use, and security:

“[...] as a corporate entity, we value our intellectual property, [...] we try to balance this dynamic between productivity and security” (CIO, Eastman Chemical Company).

The core challenge is to ensure data security and to define appropriate policies while exploiting the usability of consumer applications. IT departments therefore have to achieve both objectives: increased usability and ensured security. While several corporations report that they already integrate SGEM devices into the corporate IT infrastructure, issues remain in reconsidering existing and introducing new policies and governance models. These policies and models are needed to ensure a secure and stable operation, while adapting existing and prospective software applications to a competitive level of usability.

Innovation Management

These competing demands of usability and security have led to a situation where IT departments are viewed as an obstacle to innovation:

“Sometimes we were our own worst enemy, because all we started with was ‘No’ with respect to security every time anybody talked to us. They got tired of it and started finding other ways to go about it” (CIO, Bechtel).

But innovation enabled by SGEM occurs in nearly all parts of organizations. The different departments strive to employ these devices and often start projects independently from one another. Executives describe this as a quite unstructured and unorganized process with implications for long-term operability. The challenge for IT departments is to manage these projects and ensure a certain level of credibility as a facilitator for innovation:

“In talking with our customers, we find that frequently IT is not in the discussion relative to app development, mobile or social applications. These are being developed in the business units, with some third party. Often they’re coming out of the marketing department working with media firms who have gone into the IT space. What’s concerning is, ‘Are these groups taking responsibility for the operations, and ensuring that this is all going to work and be secure?’ And the answer is usually not” (VP of Strategy and Product Line Management, CompuWare).

This requires a change in how IT departments interact with the business units. The challenge for corporate IT is therefore to manage these innovation projects and bundle the efforts without slowing down the process:

“[...] we’re trying to push IT people into the business units, because when you are stuck in the back office, you can’t know everything about what the company is doing. You’ll be missing the innovation engine, which is the most important part, and which we believe will come from the business, not from IT” (CIO, Nestlé).

Software Development Style

To satisfy the expectations of the business units, IT departments see themselves also challenged by a new paradigm of software development. While conventional software development is very structured and organized, application development for SGEM is agile and fast. These are two different worlds of software development: the twice-a-year software upgrade release, with its lengthy and graduated testing cycles vs. the mobile applications developed within weeks and updates on-demand. This has led to a situation where corporate IT finds itself in competition with third party software developers from the consumer application market. This challenge is, for example, manifested in the approach of some IT departments to establish a second track for software development:

“We set up our own mobile application development organization to compete with the third parties that the business units go to. We’re saying, ‘Let us be one of those. Let us compete for the same business, but on their terms, not as an IT group. If you need it in three weeks, we will have it to you in three weeks. We scrapped our old development methodologies because they’re just too big and too cumbersome and take too long” (CIO, Bechtel).

Staffing

Adapting to these new expectations on usability and software development cycles also creates staffing problems. The challenge is that usually the right talent is still absent within IT. This starts with the right skill-set to develop user-friendly applications:

“[To develop a] total[ly] different UI, that is totally intuitive to our employee, [...] a whole different skill-set for IT [is needed]. So you have to really take a step back and say, [...] Intuitiveness is a very important component, and the UI may not be the same on your mobile devices” (CIO, Time Warner Cable).

In addition, IT employees not only need an understanding of IT, but also of the business activities IT should support. CIOs realized this challenge and recognize that they have to redefine their role profiles:

“We hire folks that fit very well into an ERP organization. ERP is important, but it’s not what differentiates performance for us. So after looking at that, we’re hiring dual-degree people who can apply technology to the business problems we’re facing. We have a large IT organization that’s perfectly suited for the problems we’ve had over the last decade. But when you look at the problems we’re going to have in the next decade, we don’t have the skills that we need” (CIO, Chevron Global Upstream).

IMPLICATIONS AND DISCUSSION

The results reveal that SGEM creates several opportunities for corporations to achieve relative advantages. However, to obtain such advantages, corporations face a series of challenges. Even when corporations are not exploiting these opportunities, SGEM creates additional needs to respond, as these new technologies are so invasive that they change the perception of what IT should look like and what to expect from an application. This is evident from the sample data and also supported by a recent study (Harris et al. 2012), which showed that employees and business units are not satisfied anymore with the established standards in professional computing. This challenges IT departments, which are expected to ensure efficient operations, but also to support the business units in a more dynamic and innovative way to facilitate their projects and activities. These objectives are perceived as competing, and most IT departments focus on operations, not on innovation. This need for a balanced role of IT departments, of being on the one hand operational and on the other hand, innovation-focused is also evident in initial approaches to overcoming the new challenges created by SGEM. For example, one approach is the definition of core services where operations are ensured, and a flexible boundary where innovation is facilitated. Through this approach, the IT department maintains core services and grants access to additional services:

“We call it ‘solid core and flexible boundary,’ [...] the flexible boundary includes devices. That also means security moves away from the endpoint and becomes data-centric in the core. The key thing is to find the right balance, and that border between solid core and flexible boundary is not cast in stone. It’s not going to stand for 10 years unchanged” (CIO, Hilti).

Therefore, a key challenge for IT departments is to find the right balance. This implies that besides the technological challenges (acquiring new skills etc.), especially organizational change and change in the culture of IT departments is needed to fulfill the new requirements. The extent of this change is captured in the following statement, which illustrates the competing forces of IT standardization and the demand for flexibility:

“Over the past 20 years, we’ve invested in developing a very robust core of standard business processes, and our strategy is to maintain the value that we get from that standardized core. We won’t relent on that, but we will allow extreme flexibility on the fringe in how to access information from that core and how to execute business processes, whether that is from an iPhone, an iPad or maybe eventually an Android device. To standardize at the boundary is just not going to happen” (CIO, Eastman Chemical Company).

Therefore, these new expectations of IT require IT departments to restructure and rethink the existing approaches and role of IT within the organization. In the academic literature, this issue is part of the research stream on IT alignment (Oh and Pinsonneault 2007), but the objective of IT alignment is limited to aligning IT objectives with the business objectives of the organization. However, our results suggest that SGEM requires IT alignment to go even further than just aligning the objectives. IT departments are now required to collaborate much more closely with business units and not only aligning the objectives, but go further and be a part of the business objectives. This also challenges the established typologies of IS strategies, like that of Chen et al. (2010), which suggests that an organization’s IS strategy falls into one of three categories: IS innovator, IS conservative, or is simply undefined. Reflecting on the results, we suggest that successful IS strategies require balancing the two extremes of IS innovator and IS conservative and adopting both objectives. A first move into this direction is indicated with the approach of a flexible boundary and solid core. It can be argued that with this approach, the IT department is split into one unit that follows an IS innovator strategy and a second unit that follows an IS conservative strategy. However, further research is needed on this issue. But based on the results, we propose the hypothesis that IS strategies will need to apply both objectives – IS conservative and IS innovator – to satisfy employee expectations.

This also has managerial implications, as the results reveal that IT departments are currently under pressure to adapt to the new expectations concerning the role of IT in the organizations. We believe that IT departments need to be aware that ensuring operations alone will not satisfy the organization’s needs for IT in the future. We recommend considering a new strategic positioning of IT departments to fulfill both roles, ensuring operations and facilitating innovation. This will require new capabilities in IT departments, demanding a broader business understanding and sometimes hiring new people.

However, this study is subject to several limitations. As we follow an explorative approach, we do not test for any relationships or causalities. The work contributes to existing theories on IT strategy, but still needs further empirical validation. Beyond the gathered qualitative data, we recommend that future research collect quantitative data too and apply a longitudinal research approach.

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