Mobile Devices in Corporate Environment in the Context of the BYOD Trend

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Abstract
The aim of this text is to give readers insight on the possibilities of mobile devices and related technologies in the corporate sphere in the Context of the BYOD Trend. Within the text, the reader will learn of the definition of the BYOD trend, mobile devices, methods and the state of their implementation in organizations, the types of applications within these devices related and especially benefit of their use in the corporate environment.

Keywords: mobile device, BYOD, mobile application, corporate, iOS, Android, Windows Phone, OTA, groupware, ERP

Introduction
Mobile information and communication technology, as well as mobile devices and applications based on them, are one of the most visible and fastest-growing areas, which has an undeniable impact not only in the field of science as such, but also in areas related to other business activities, such as management, marketing, human resources and the like. Thanks to these factors, the importance of the use of mobile devices in corporate environment keeps growing across various sectors and industries.

Mobile Devices
While most definitions of mobile devices are phrased in a relatively broad manner, such as: "A small self-powered portable electronic wireless device with various applications. Often equipped with a touch screen and/or a miniature keyboard." In other words, we could easily fit a small ultrabook or a subnotebook into such a definition. For the purposes of this study, however, this definition will be more specific, and we will only consider such devices as a smartphone, phablet or tablet.

BYOD
Bring Your Own Device is a new trend in the penetration of mobile devices into the corporate environment. Simply put, it lies in the integration of private mobile devices, brought by employees into the information system of their employer. It should be noted that it is unlike the classical scheme of introduction of new technologies within the enterprise information system - a step that's planned and decided by the in-house IT department in collaboration with senior management and other concerned departments of the organization.

In the case of BYOD, however, it is different. It is the pressure exerted by employees, which leads organizations and competent IT departments to take the step.

BYOD itself is not as new a concept as it might seem. For example, Cisco in the past allowed its employees to bring their own laptop and use it to work within the corporate environment. These employees were provided with only minimal or virtually no IT support, which positively reflected in the fact that IT department was not unnecessarily overloaded by requests. Along the line, one of the negatives of today's BYOD trend is the overloading of internal IT departments by overuse of technical support for private mobile devices of the employees. A considerable role in it is also played by a great diversity of different platforms that these devices use. Ultimately, this leads to an increase in costs associated with the use of internal IT services.

The above-mentioned issue of administration of these devices, however, is not by far the only negative trend of BYOD. Another, equally serious factor is the issue of safety, not only in terms of more complicated setup and administration of security policies across the organization, but also in terms of potential leakage of corporate data from the devices protected by property rights of users, which ultimately involves other expenditures incurred in the management of the organization. It should also be noted that the costs of the introduction of BYOD increase because of the wish of employees to have their costs paid - costs associated with the use of their private devices, such as fees for their telephone and data services, after-warranty service etc.

Besides the already mentioned downsides, is also necessary to mention certain positive elements that this trend brings to the organization. These are savings associated with the acquisition of these devices and their subsequent reporting in the company's assets, or their subsequent disposal. Another, certainly not insignificant contribution of BYOD, is a greater flexibility and mobility of employees, which is then reflected in the overall effectiveness of their work performed. In a way, BYOD can also raise the attractiveness in the eyes of potential employees.

Within the contemporary BYOD, we can see a certain discontinuity in the onset of this trend, which comes in certain waves, always initiated by the existence of a specific catalyst. For example, in the first wave that happened more than a year ago, the catalyst identified was the smart phone iPhone by Apple. It is interesting that those who helped spread BYOD within the so-called first wave, were the corporate managers themselves, since they considered iPhone to be a reasonably sophisticated, easy to use and stylish tool.

Another wave of BYOD is coming at the moment with the mass use of tablets and smartphones, especially those with Android operating system, which has, in version 4.4 KitKat respectively 5.0/1 Lollipop, already become fully operational in the corporate environment. It is also worth mentioning that today, in contrast to the first wave, the propagators of BYOD trend are also the employees themselves.

Figure 1: BYOD on top of expectations Hype Curve Gartner in the horizon 2-5 years
[source: Gartner http://www.gartner.com]

In terms of future predictions in this area, it is very difficult to come to a conclusion. What is clear is that this trend will continue for a certain time, however, in what form and if at all we will see it in the future is not very clear at this point. It is in fact also very likely that could follow a similar path as the post-PC did, meaning this might only be a certain fashion bandwagon off which we'll get once a new fashion wave appears.

Mobile Technologies in Corporate Environment and BYOD
Similarly, just like elsewhere in the developed parts of the world, our country follows the mobile trend. Mobile devices, as well as solutions built on them, are starting to gain increasing importance especially in the corporate environment. Results of a research of views among ICT directors in the EMEA region conducted by Deloitte support this stance and speak clearly in favor of mobile technology. One of the questions was: "Which of the following technology areas will have a significant impact on your business in the next two years?" In 75% of cases, the interviewed Business Informatics directors (CIO) stated mobile technology. When asked to provide the order of the level of their current investments in this area of business informatics, the answers went as follows: 41% High investment, 39% Medium investment and only 20% Low investment, which was very closely behind analytical / BI subregion.
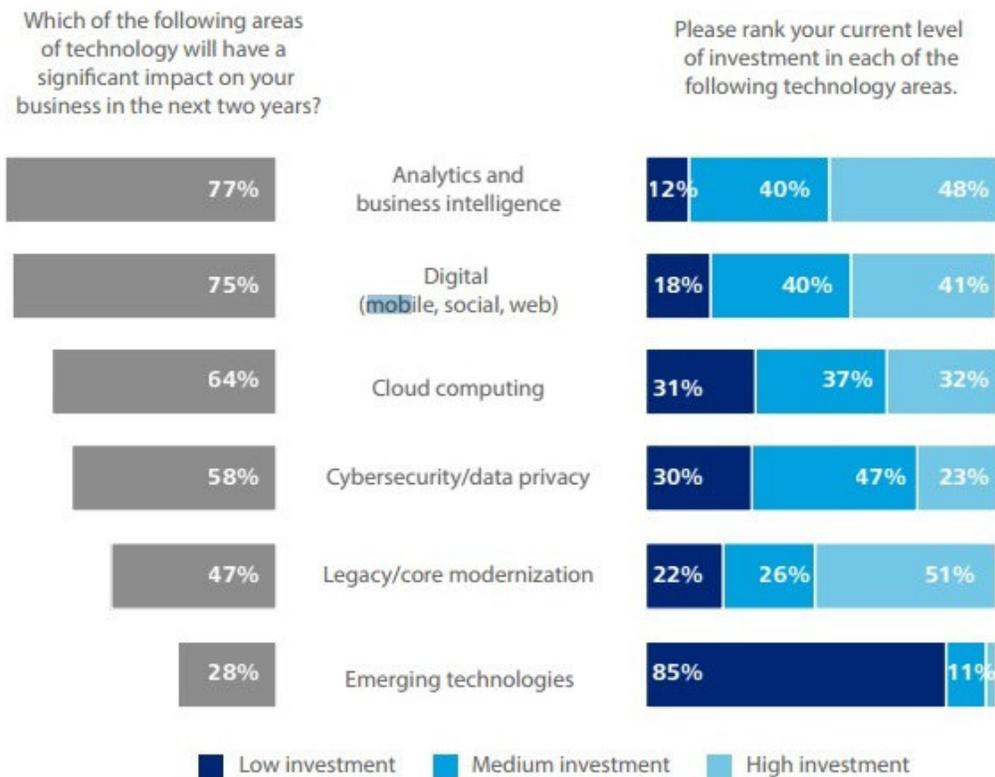
Figure 2: The structure of investments in technology and its future impact
[Source:http://www2.deloitte.com/content/dam/Deloitte/cz/Documents/survey/CIO_Survey_2015_EN.pdf]

From the above results of the surveys, we may conclude a constantly growing and increasingly important trend to acquire the use of mobile devices in the corporate sphere. Although it is not explicitly mentioned in the aforementioned survey, it should be noted that many companies now, under the growing influence of mobile ICT in corporate IS, enable (whether officially or not) integration of these devices into enterprise IS in the form of BYOD, which of course entails certain security risks.

According to a survey conducted by INSIDE.cz, which was focused on the area of BYOD in the enterprise sector, the respondents answered the question "At what stage is your organization's support of the BYOD phenomenon?" as follows - 35% of respondents from among CIOs of large corporations stated that they actively support BYOD and have a set of policies and rules connected to it. 20% of the respondents said that they officially tolerate it, 10% tolerate it unofficially, 30% are considering its support in the future, and only 5% is not considering any form of acceptance of the concept.
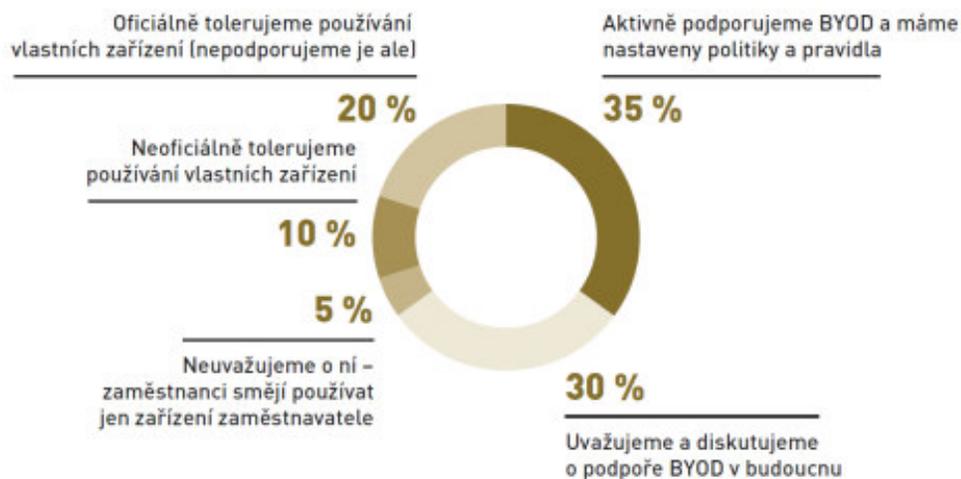
Figure 3: The results of research in support of BYOD
[Source: http://www.businessinfo.cz/cs/clanky/byt-ci-nebyt-byod-67764.html]

To the question "Who in your organization primarily promotes the support of BYOD?" most respondents stated that it was the employees (i.e. bottom to top implementation of BYOD). In the second place, the answer was IT departments (i.e. top to bottom implementation of BYOD), followed management and external agents.

When it comes to the planned support of mobile devices platforms within BYOD, the most frequently mentioned was Google's Android, closely followed by Apple's iOS and finally, after a noticeable gap, Microsoft's Windows OS.

Figure 4: Results of survey on group promoting BYOD approach in organization
[Source: http://www.businessinfo.cz/cs/clanky/byt-ci-nebyt-byod-67764.html]

Here it should be noted that despite the very frequented use of mobile devices in the corporate sector, the focus on their safety is not nearly as significant. As the Cisco Systems' survey results clearly show, only 73% of the surveyed IT professionals confirmed the existence of special security policies, while 39% of them confirmed the use of special security policies for all mobile devices, 21% for visitors only, and only 13% of them confirmed the use for private employees' devices.
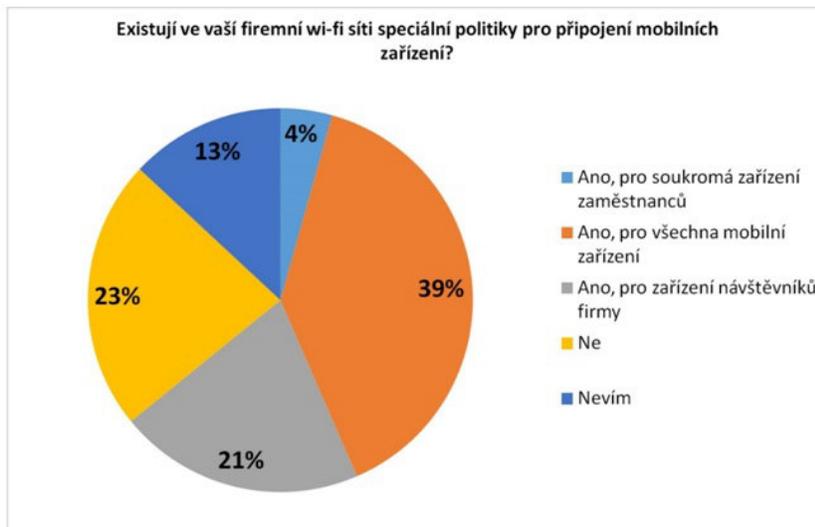
Figure 5: A survey about the existence of special policies for mobile devices within the corporate wi-fi access
[Source: http://www.cisco.com/web/CZ/about/news/2014/20140709.html/]

According to Morgan Stanley Research, the mass use of mobile devices in the corporate environment overtook the use of PC back in 2014. This is also linked to the increasing deployment and use of mobile applications in the support of business processes.
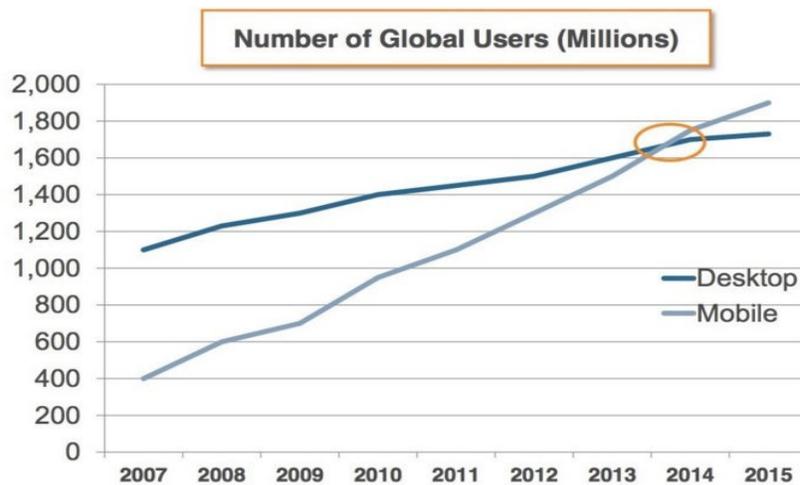

Figure 6: The global number of user desktops and mobile devices
[Source:https://bestmobileapplicationdevelopmentcompany.wordpress.com/]

Another factor that affects this is a general trend among users to prefer mobile applications to responsive mobile sites.

Mobile Applications
At this point, it would be useful to define what we actually mean by the term "mobile applications". A mobile application can be defined as a kind of a software product designed to be deployed, operated and controlled conveniently through either a single mobile device or a group of devices.

In terms of the degree of integration with the mobile device, mobile applications can be subsequently divided into:

- Native applications–integrated to the highest possible extent with hardware, system resources and ergonomics of the mobile device. This type of applications uses the maximum of the offered hardware and software functionality of the mobile device, and can, to a limited extent, function in the absence of Internet connection.

- Web applications –these represent the so-called "thin client " analogy well known in the PC world, the difference being that the user interface has been significantly modified in order to accent ergonomic possibilities of the device. Typically, there is a complete absence of integration with hardware and system resources of the mobile device. To start and run a proper functioning of this type of application, Internet connectivity is essential, while its quality proportionally affects functioning of these applications.

- Hybrid applications - these applications are essentially based on the thin client again like in the case of web applications, with the difference that these applications are capable of limited access to hardware and system resources of the mobile device. The level of integration of this type of application with a mobile device can be as high as the degree of integration of the mobile web browser, through which the application is run. To start and run a proper functioning of this type of application, once again, Internet connectivity is necessary, while its quality proportionally affects the functioning of these applications.

As previously mentioned, mobile technologies and business processes support solutions based on them, are successfully being used by many companies today. Moreover, a significant number of other companies are planning on making this step or the least considering the possibility. It should be mentioned here that even the vast majority of predictions of future developments in this field suggests that this generally is the right decision.
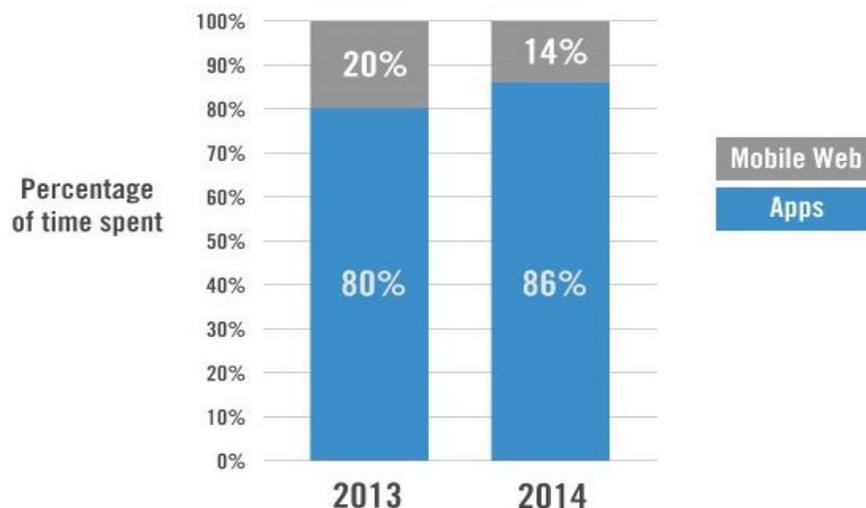

Figure 7: Graph demonstrating the growing trend of using mobile applications to the detriment of the Mobile Web
[Source:http://flurrymobile.tumblr.com/post/115191864580/apps-solidify-leadership-six-years-into-the-mobile]

This of course brings us to ponder why the corporations themselves have an interest in using these technologies, and what is their motive to adopt these technologies.

The answer is, of course, obvious. The objective is gaining a competitive advantage through these technologies, especially in the form of efficient, mobile technologies supported business processes. Let's take a closer look at what advantages and positives the use of mobile devices can offer to the companies.

Benefits of Using Mobile Technology in Corporate Environment
There is no doubt that proper use of mobile technologies contributes considerably to increase of corporate productivity. This is achieved through better functioning business processes supported by these technologies. Improving of productivity is the main motivation for corporations to implement or adopt these technologies. In practice, this often means enabling employees, who participate in the business process that we want to streamline, to use mobile devices equipped with the appropriate mobile applications for selected or all activities which they previously conducted using a standard non-mobile computer technology. It should be noted that the scope and suitability of the use of mobile devices depends on the type of business processes and the nature of activities. Moreover, the introduction of a mobile technology what may cause some of the previously carried out activities to be discontinued completely, while others may be newly accrued. Generally, however, it can be said that the trend of integration of mobile technologies, or mobile devices with installed mobile applications in them, help to make the individual business processes simpler and thus reduce variety of sub-activities within business processes.

Today, we can find many types of mobile applications in the corporate environment. Among the most frequently used, without a doubt, belongs the e-mail client, web browser, mapping and navigation applications or applications serving for contact management and time management.

Communication via e-mail is currently among the most popular ways of written communication in the corporate sphere. With the development of asymmetric cryptography and the use of electronic signatures based on it, electronic e-mail almost completely replaced regular mail communication. Relatively recently, it was only possible to use electronic mail almost exclusively from devices such as PC (desktop or laptop), thus the mobility of this service was significantly limited. Today, however, the situation is vastly different. E-mail client supporting secure communication protocols and cryptographic functions as well as digital signature, is a common part of application software of today's mobile devices. Intuitive controlling together with appropriately designed user interface, which accentuates the ergonomic specifics of working with mobile devices, have made the devices very flexible, convenient and easy to use. This has caused majority of users to prefer mobile devices to PC devices.

Another essential and very frequently used application on mobile devices, just like on PC, is the web browser. Mobile web browser significantly contributes to increase in productivity and efficiency by allowing its users (company employees) to be very flexible when accessing web-stored information, web services, corporate intranet or web interface of hardware devices in the corporate network. Another very important factor is the fact that mobile web browser serves as an environment for starting and operating the above-mentioned web-based mobile applications.

Furthermore, unlike web browser used via PC, the mobile web browser is more closely tied to hardware and system resources of the mobile device, which is subsequently projected into its enhanced functionality. This

can particularly be the use of various hardware sensors (e.g. gyroscope, accelerometer) and modules (e.g. GPS, camera) implemented in mobile devices. Based on information collected from these sensors and modules, a web browser or an application running in it, can then, for example, adjust formatting of the displayed content or offer personalized content depending on geographic location, etc.

Mapping and navigation mobile applications are a vital element for corporate employees who move frequently in the field, outside corporate buildings or precincts, especially in remote locations. Using mobile maps, whether online or maps stored on your mobile in combination with navigation capabilities, these users can easily and optimally plan and execute their business trips and use corporate resources effectively, which is then reflected positively in the increase in the productivity of both individual employees and the company as a whole. Another area is represented by business users of mobile devices with cartographic and navigation applications installed on them on the, whose main task is surveying and mapping activity. In such case, the use of mobile devices and the aforementioned applications is, compared to "normal" employees, pushed even further both in the direction of sophistication and importance in the context of business processes supported by these technologies.

Tools for managing contacts and time are equally important application features of mobile devices. Before the advent of today's mobile devices, such as smartphones or tablets, PC and their portable parallels to them (laptops, notebooks) were used for these purposes, supplemented subsequently by a dedicated hand held devices such as electronic diaries and organizers, later on by PDAs or so-called communicators, which can be considered the direct predecessor of today's mobile devices. Today's mobile devices bring a whole new dimension of use into this area thanks to their which their convergence and permanent Internet connection based on interoperability.

Current mobile devices have sophisticated applications for contact and time management. A locally stored database of contacts on a device can be extremely extensive, whether in the number of contacts, or attributes attached to them. Mobile applications working with such database offer a fairly extensive range of functionalities including interconnection with other mobile applications on the device, sophisticated search and online / OTA synchronization with contact database on a corporate server (in case of a shared contact database), or simply just a workstation of the user.

Similarly, mobile calendar and time management applications allow the user to be very flexible in inserting new events, highlighting them according to their type, and also interconnecting them with other applications on the mobile device. One of the biggest advantages is the possibility of online / OTA sharing and data synchronization with enterprise groupware servers, and through them, with other interconnected employees. All this in real time, which in turn leads to optimal use of the available working time of employees and by extension, to increase of efficiency and productivity of the organization as a whole.

Besides the above-mentioned, most commonly used groups of applications and services, one of other benefits of today's mobile devices is their ability to work with documents very effectively. Today, thanks to both a massive increase in performance as well as ever-growing screen size and resolution of these devices, their functionality is not anymore limited to a mere "emergency" view of documents with very few editing options. On the contrary, it offers relatively sophisticated tools that enable extensive editing and possibly the entire creation, just as we know it from the PC world. In some cases, the creation and editing of documents has stepped even further in the direction of using content generated through integrated hardware sensors and

modules of the mobile device (e.g. photos from the camera complemented by GPS location data directly embedded into a document created or edited on the mobile device).

Such files, created or modified on a mobile device, can be stored directly in its memory and hence allow the user to access them at all times or share them immediately and easily via cloud-based storage servers, DMS servers, e-mail or other online / OTA synchronization tools either with business partners and other employees, or within its own IT equipment ecosystem.

Among others very common ways to use mobile devices in the corporate environment, we could mention their ability to of access enterprise information systems (ERP, CRM, SCM, BI, etc.). This is then reflected mainly in speed, but also in flexibility of accessing and sharing information and problem solving at different levels of corporate governance, which in turn contributes to a higher efficiency in functioning of the organization as a whole.

Conclusion

Mobile information and communication technology has found wide application not only in our daily lives but also the very corporate environment. And here, especially along with the related new trends play increasingly an important and unmistakable role within enterprise information systems. It's always important to remember that the main factors of success of these technologies consist primarily in a meaningful and rational manner of their implementation and management. If these conditions will be met, then it is more than likely that mobile information and communication technologies will contribute to more efficient functioning of the organization as a whole.

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