
Does the iPad Add Value to Business Environments?

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CHI'12, May 5–10, 2012, Austin, Texas, USA.

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Abstract

Mobile tablets like the iPad recently had a huge success in the consumer market. This generates the demand to use them productively in business environments. The underlying case study evaluates the introduction of iPads at an applied research company. The study gives evidence that the iPad adds value to this particular business environment especially in terms of productivity and joy of use. A detailed composition of benefits and drawbacks shows major factors that have to be considered when thinking about introducing and integrating iPads to a business environment.

Author Keywords

Mobile; Tablet; Business; Case Study; Joy of Use; Productivity

ACM Classification Keywords

H.5.2 [Information Interfaces and Presentation]: User Interfaces - Evaluation/methodology;

Introduction and Related Work

Without doubt, mobile tablets like the iPad add value to the private and personal life of many users. Many of them claim that mobile tablets as well add value to business environments. Many press releases (e.g., [9], [15], [18]), especially from tablet vendors [13], claim

that tablets can be productively used in the business environment, but statistically valid data on that objective is often sparse. Therefore we set up a field study to investigate the suitability of iPads (benefits, drawbacks, and influence on work productivity) in practical use in our company.

When introducing new technologies into a business context, two issues must be addressed: 1) how the technology is introduced into the company and 2) which effect the new technology has on a company's business outcome (organizational level) and which effect it has on the employee's behavior and experience (personal level).

Regarding the first issue, introducing the technology globally into our company was not the main objective of this study. It should furthermore be seen as a study showing benefits and drawbacks of iPad usage from a user's perspective.

The second issue is of great relevance for our study. Especially because the technology is rather new in contrast to [16] and appropriate usage scenarios are not yet known. Therefore we focused on usage observations, productivity and joy of use.

According to Kempplä and Lönnqvist [14] productivity can be defined simply as output divided by input that is used to generate that output. In our study we measured productivity by setting it equal to subjective work efficiency as our major output.

In the literature one can find several theories and descriptions on how employee's emotions can influence critical organizational outcomes such as e.g. job

performance and turnover (e.g. [2]). These explanations mainly remain on an organizational level, but some studies include an in-depth analysis. According to the Gallup study [11], a high subjective wellbeing promotes good working results and affects positively the quality of the work done. In their meta-analysis, they analyzed the relationship between employee workplace wellbeing and business-units outcomes. Findings of their study are that "materials and equipment have relationships to basic outcomes, such as customer satisfaction - loyalty and employee turnover - retention, which are outcomes that ultimately influence larger business outcomes like profitability." This relationship is according to [11] generalizable across organizations.

Also the user experience (UX) of business services and devices can influence the result of an employee's work. Hassenzahl [10] defines UX as "a momentary, primarily evaluative feeling (good-bad) while interacting with a product or service. By that, UX shifts attention from the products and materials (i.e., content, function, presentation, interaction) to humans and feeling – the subjective side of product use." In a study of Nass et al. [17], performed in a call center context, the call center agents who used a specific designed software with a high UX achieved a higher level of customer satisfaction compared to the control group (call agents with traditional/conventional software). This result confirms the findings of [11] and interlinks the specifically designed software as relevant working equipment to business outcome. In a study of Kim et al. [12] performed in the context of mobile devices, a larger screen-size was a key indicator to greater enjoyment. On the other hand a smaller device comes along with a perceived increase of mobility.

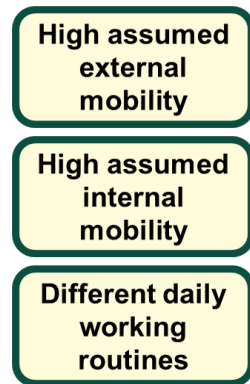


Figure 1. User roles

Budiu and Nielsen [3] stated the iPad is mostly used for media consumption and not for productive work. But this doesn't explicitly exclude that it cannot be used at all in a productive way. Several other sources indicate that mobile devices can be used productive in a business context:

Gruhn and Köhler [8] analyzed and enhanced business processes and IT-systems for potential mobile workforce automation especially for business to employee applications. Enhancing mobile workflows can add a significant value to the overall business outcome. Unfortunately they didn't show it on a concrete practical study. Atkins et al. [1] developed an example, where mobile technology could be used effective in a business context where response time of feedback was crucial to the customer.

Geyer and Felske [7] showed factors that organizations have to consider when introducing iPads into the workspace. They pointed out that the technical integration is not trivial but that there is potential for enterprises to add value to their business by the use of mobile devices. Again, no usage observation from an end user perspective is available.

Especially knowledge worker and managers spend a lot of their daytime with communication via Email. Franssila [6] presented that mobile email is a performance driver for business users using a mobile phone.

To conclude our literature survey, business outcome can be improved by 1) being more productive e.g. working faster, 2) producing qualitative better work, and 3) a positive effect on staff retention, e.g. resulting

through the usage of appropriate and nice equipment. Our research question is then: Does the iPad contribute to one of these? And furthermore, does the iPad contribute to one of these in a business environment?

We first describe our study and then show positive and negative findings, their interpretation and limitations of the study. The last chapter concludes the paper and answers the question: "Does the iPad add value to business environments?"

Study Goals

Our main research goal was to analyze the influence of mobile tablets using the example of the iPad to the business environment of our company. The iPad was chosen, because when conducting the study, Android tablets were not yet available and appropriate Windows 7 tablets providing a comparable touch interface regarding user experience as the iPad were also not available. Therefore our main research question was how productivity will change after introducing the iPad into daily working routines. The second research question dealt with the usage duration; we suppose that usage duration will decrease over time, because the users will find out which usage scenarios fit best to their working style. As a third research question, we estimated that the iPad will have a positive effect on the overall joy of use of our participants. Additionally, the collection of subjective data on using the iPad in a business environment, e.g. benefits and drawbacks of iPad usage, is a major part of our study. The following chapter gives a description of the study, including participants, used material, study structure, and data analysis.

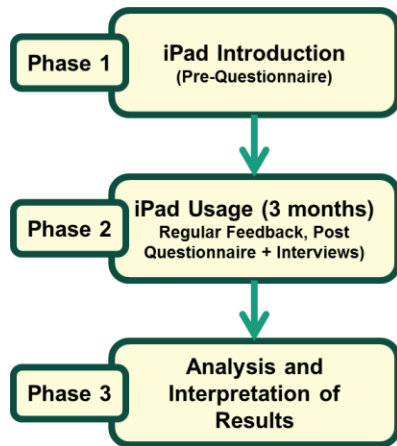


Figure 2. Study overview

- Prototyping/ Sketching
- Internet Usage
- Presenting
- Remote Desktop Access
- Reading Scientific Literature
- Document Review
- Svn Access
- Personal Information Management
- Intranet Usage
- Note Taking
- Printing
- Navigation
- Self-Organization
- Remote Mail Access

Figure 3. Usage scenarios

Description of the Study

Participants

In total, 12 employees (11 male, 1 female) of the company at an average age of 31.54 years ($SD=4.48$ years) took part in this case study. 11 of them have a higher educational degree, such as Master of Science or PhD, one person has a bachelor degree. Participation took place on a voluntary basis; also participation could be refused at any point in time without any disadvantages for the employee. The authors of the study are also employees of the company but no study participants. According to their daily working routines, the participants were structured into three groups (see **Figure 1**) and described each of them with the use of personas [4]. All significant roles in our company were included in the study: Role 1 “high assumed external mobility” (top/middle management as well as business area managers) has the following main tasks: project management, consulting, project acquisition and executive functions. 7 employees belong to this group. The tasks of role 2 (5 employees) “high assumed internal mobility” (e.g. IT service personnel) include project management, executive functions and research. 6 persons are performing as role 3 “different daily working routines” (project managers and operative project members) have to deal with project work, research, and project acquisition. Employees take over different roles at the same time in the company.

Material

All iPads had been pre-configured to use the already existing personal exchange mail accounts. Furthermore, connectivity to the company’s wireless network and vpn-connection on demand was pre-configured. Apart from that, the iPads had been in delivery status, meaning no apps preinstalled and not connected to

iTunes. Participants were free to choose their own iTunes account or to use one of the companies’ accounts. 10 of the participants used the iPad 1 (6 with 3G/4 without 3G), 2 participants used the iPad 2 (both with 3G).

Study structure

The study consists of three phases (see **Figure 2**).

Phase 1: Within a kickoff meeting, the iPads were handed over to the participants with a short introduction to the study (e.g., duration of the study, duties of the participants like answering online questionnaires), the iPad itself, and proposed *usage scenarios* (see **Figure 3**). Also information about the integration of the iPad into the institute’s technical infrastructure and the resulting legal framework of usage within the business and the private context was given. 12 specific usage scenarios (see **Figure 3**) were presented to the participants to give them ideas which tasks might be supported by the iPad. These usage scenarios derived from analyzing daily working routines of the different roles. They were described in a way that the participants knew what they might do with the iPad but not exactly how and with which app. The participants should only get a notion which business processes might be supported by the iPad. Therefore a number of apps that might fulfill the scenarios were proposed so that the participants had to choose on their own *if* and *how* to perform the usage scenario. Participants have also been encouraged to find additional scenarios supporting their actual business processes. Due to that 14 usage scenarios were available at the end of the study.



Figure 4. Tag cloud settings

Furthermore the use of the iPad for private purposes was explicitly allowed. Additionally a short introduction to the iPad itself was given, explaining very briefly basic usage elements (e.g. button, multitouch) and setup procedures with iTunes. Phase 1 resumed with a pre-questionnaire to describe e.g., participants previous experiences in usage of mobile devices.

In **phase 2**, the participants used the iPad in their daily work whereby they were encouraged to use the iPad in private context also. Regular feedback was weekly collected via online-questionnaires (twelve measurement points in total; approx. 10 to 20 minutes to fill in). The questionnaires focused on the subjective assessment of constructs to analyze the value of mobile tablets in a business environment. These constructs include perceived productivity with the facets subjective work efficiency and self-organization, perceived mobility, and fun of use. Therefore these facets were translated into statements the participants could rate on a 5-point-Likert scale. With the use of online questionnaires, we are able to 1) match single measurements for one participant to attain personal time series, 2) to control the return of questionnaires, 3) to give participants the possibility to answer the questionnaire independently of their presence at the working site, e.g. when a participant is on a business trip or attends a conference abroad, and 4) to attain quantitative data. Additionally, we support these quantitative measurements by qualitative data gained from face to face interviews. These interviews with the participants were conducted individually in order to get a more holistic view on the iPad usage in business and private context. A one hour structured interview was conducted after 2 months of iPad usage with open questions regarding benefits and drawbacks as well as

other factors (e.g. role suitability, demands of the users, improvement potential) of iPad usage in the different possible usage scenarios. Moreover, the participants provided further information on using the iPad during informal conversation or while troubleshooting on issues they had while using the iPad. Phase 2 ended with a last subsuming post-questionnaire. In total, the data collection took 3 months (starting March 24th 2011).

Phase 3 resumes the study and contains the analysis of quantitative and qualitative data and interpretation of the results.

Data analysis

Data analysis was done both for quantitative and qualitative data, with an emphasis on the last mentioned.

Qualitative statements provided by the participants were categorized after the study was finished. The qualitative data is visualized in tag clouds (see example in **Figure 4**). Tag clouds were chosen over tables to visually show the reader on a glance items mentioned more often in comparison to items mentioned rather sparsely. There are five types of letter settings for the tag cloud visualized in **Figure 4**: the largest and boldest items have been mentioned more than 20 times (20+), the second largest and bold items have been mentioned 15-20 times, the third largest and medium bold items have been mentioned 10-14 times, the fourth largest items have been mentioned 5-9 times and the smallest and thinnest items have been mentioned 1-4 times. Because of the study design that allowed the participants to mention their perceptions on a weekly basis, it was possible to mention topics more

than one time. All statements were included in the analysis, because the more often a topic was mentioned, the more important it was to the participants. Statements were structured into the following categories: benefits of iPad usage with the subcategories functional and usage benefits, technical benefits, and social benefits, and drawbacks of iPad usage with the subcategories usage of the iPad, functional issues, place and context of use, technical issues, and social issues.

Study Findings

This chapter describes the results of the study. They are structured into benefits of iPad usage, drawbacks of iPad usage, usage duration, findings related to productivity and findings related to joy of use.

Benefits of iPad Usage

Benefits of iPad usage are divided into functional and usage benefits, technical benefits, and social benefits. Focusing on improving the company's business environment, joy of use and productivity have been under special investigation and are described in more detail in the following chapter.

FUNCTIONAL AND USAGE BENEFITS

The most important benefit in the category functional and usage benefits (see **Figure 5**), as our participants discovered is joy of use. Every participant reported an increase in joy of use at work at least once. Regarding other functional and usage benefits it seems obvious that they are all contributing to joy of use and the overall satisfaction of the employee. Participants reported that they feel honored to be selected as participants, and therefore being able to use an iPad in their daily work. The usage of the device was perceived

as fancy, having a positive user experience, intuitive usage, and even the keyboard usability was reported as better than expected.

A further general benefit reported is increased mobility which covers both, internal and external mobility. Typical usage scenarios have been iPad usage in meeting rooms, in colleagues' offices, during travel to and from a customer appointment, and at the customer's side. Increased mobility covers especially personal information management and internet access in general when not being in the office.

Note taking was also perceived as a huge benefit meaning both typed notes and handwritten notes. It definitely belongs on the personal preference which way of note taking is chosen by the participants, but all participants reported that they expected to substitute their analog notepad with the iPad. Using different notes apps, participants were able to structure notes in different notebooks, to search and browse their notes in an efficient and usable way. But the major reason for pronouncing note taking as one of the major benefits reported was that the participants have all their notes always with them.

At our study, personal information management (PIM) covers reading, writing, and the administration of Email, contacts, calendar appointments, and task management. In particular, participants receiving a massive amount of Emails per day benefit, because they are usually able to respond quicker and organize themselves more efficiently. They are able to do PIM whenever there is a minute of time during or between meetings even when being out of office. Comparing to having a smartphone, Emails can be answered and

organized quicker and with a significant higher user experience. For example, one participant reported that “typing Emails with more than two sentences is a mess on the smartphone, but can be done efficiently on the iPad”.

Benefits in this category of a middle impact are internet browsing, document reading and prototyping on the iPad. According to the participants, the main benefit of internet browsing is quick information retrieval. Document reading is reported as more comfortable in ways of reading comfort than on a laptop or desktop PC, and of course there is no need for carrying paper documents with them. Prototyping directly on the iPad enabled participants to quickly sketch ideas and to design full prototypes directly on the intended output device as well as being able to perform instant user tests easily.

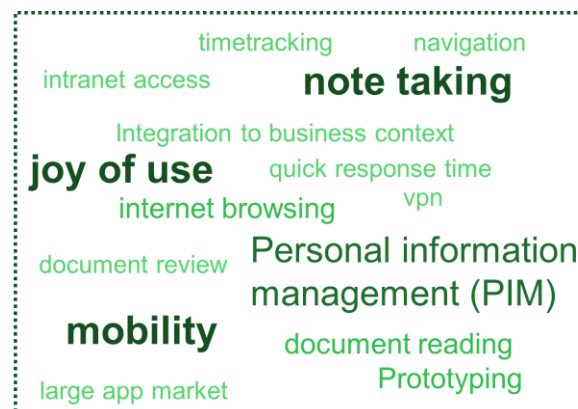


Figure 5. Functional and usage benefits

Other benefits that have been reported less than five times are:

- Time tracking for supporting project management
- Being able to navigate with the iPad in a situation where no other device was available
- Intranet access from anywhere via vpn connection
- Seamless integration into the business context
- Performing “digital” document reviews via handwriting
- vpn access more comfortable and quicker than on the available company laptop
- Having a quicker response time for answering mails as consequence of increased mobility
- Large app market offering a large amount of apps that are often free of charge

TECHNICAL BENEFITS

In comparison to functional and usage benefits, technical benefits (see **Figure 6**) depend more on hardware features of the iPad. Nevertheless, they also have a huge impact on joy of use and productivity. Mobility is listed in this category again, because it belongs to both categories.

Besides mobility, the instant-on feature of the iPad which enables user to immediately perform tasks with the iPad was reported as a killer feature. Fast device access provides a benefit in almost every situation (e.g. quick mail access) the tablet is used.

Furthermore, low noise, light weight construction and the size of the iPad was reported as a benefit multiple

times. On the one hand, participants perceived the larger screen size in comparison to other mobile device as benefit and on the other hand, participants perceived low noise and lightweight construction in comparison to their existing laptop as benefit.

Other benefits that have been reported less than five times are:

- Just being able to use a stylus on the iPad
- The iPad extends existing equipment in a beneficial way
- Use of the iPad as additional extended desktop screen
- The iPad can be used as data storage device
- Long battery capacity

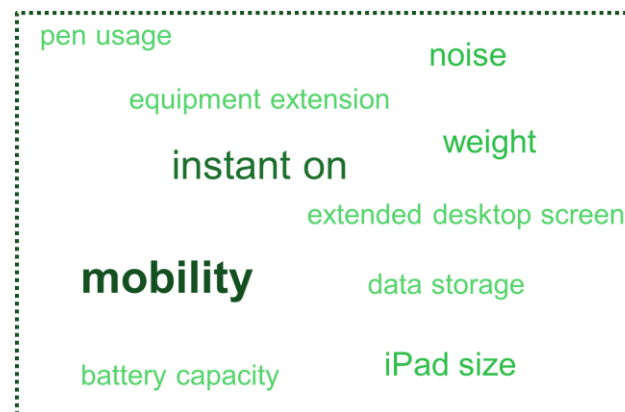


Figure 6. Technical benefits

SOCIAL BENEFITS

Social benefits (see **Figure 7**) occur due to just “owning” an iPad and are not necessary related to any particular usage scenario of the device.

First of all, the mobile tablet is a very discrete device, using it during a meeting instead of a laptop enables better collaboration because there is no barrier between the persons in front of a display. It is beneficial that the device is lying on the desk like a pad of paper. Participants also reported that they feel more comfortable being able to browse content or getting information on the iPad unobtrusively. If a meeting is about multiple topics and participants do not have to be focused on the topic the whole time, they reported that it is easier for them to perform other time-critical tasks without disturbing the meeting participants.

In general, we observed that the personal image of the participants as well as the corporate image increased due to the usage of the iPad. Participants reported that they were proud using the iPad, which increases their attachment to the company. It was also seen as a status symbol and they often compared it to having a company car. In addition, representation in front of the customer changed. Especially, during project acquisition participants perceived that customers recognized the iPad usage as a sign for being innovative. While offering software engineering services around mobile business applications, it is a huge benefit to actually show the customer somehow knowledge about the technology on basis of a daily usage. Participants reported that as one of the key factors for project acquisition in the mobile domain.

With one exception, participants thoroughly perceived the shift of work into the private environment as a benefit. Employees were able to quickly access work email and information occasionally while being at home before and after work (e.g. while watching TV), on vacation or ill. By this the amount of mails to deal with when coming back to work could be reduced. They also reported to be able to react on important things without really interrupting their off-work time.

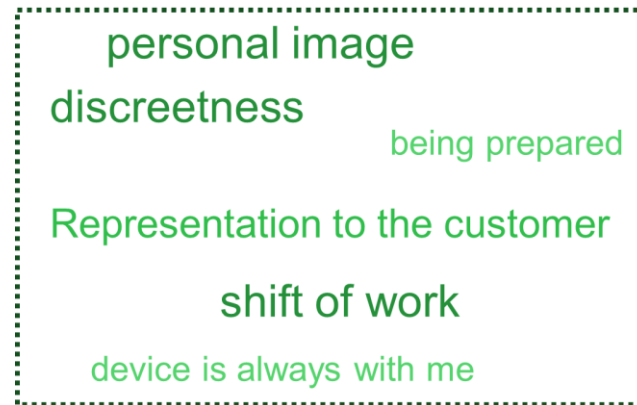


Figure 7. Social benefits

Other social benefits are:

- Being prepared, when coming to the office, because of quick mail checks in the morning at home or on the way to work.
- “The device is always with me” - statement indicates that participants felt convenient to have all their work information with them just in case they have to react on something.

PRIVATE BENEFITS

Although the paper focusses on business benefits of iPad usage, we also want to show the main private benefits (see **Figure 8**) of iPad usage reported by our participants. Having private benefits due to corporate devices definitely strengthens the employee attachment to his company.

Private benefits are:

- Quick internet access from anywhere for information retrieval and entertainment
- Couch surfing for easy IT usage while being relaxed
- Game and app entertainment
- Video entertainment
- Usage of special news reading apps

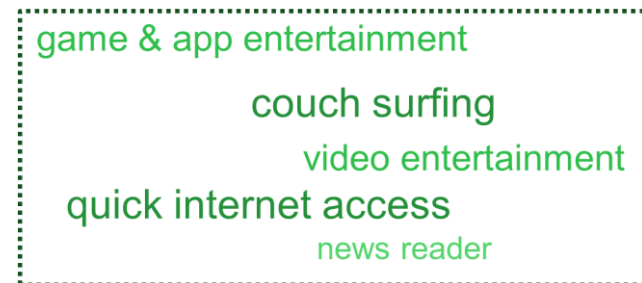


Figure 8. Private benefits

Drawbacks of iPad usage

General drawbacks of using the iPad can be divided into six categories: usage of the iPad, functional issues, place and context of use, technical issues, and social issues.

USAGE ISSUES

According to the study's participants, the most significant issue on iPad usage is the bad user experience provided by lots of apps that can be used in a business environment. Almost every user in the study reported that as a critical point. Especially making notes was a very critical point on that – users expected that the iPad might substitute their paper notebook in an easy way and not that much trouble and need for trial and error of different notes apps. Furthermore, true integration into the existing infrastructure of our company was lacking. As we are mainly working in a windows based environment, the usage of comparable apps on the iPad was aligned with a huge discrepancy from what the participants were used to work with.

Figure 9 shows a all mentioned drawbacks regarding the usage of the iPad in a business environment depending on the participants' statements in the online questionnaires and interviews.

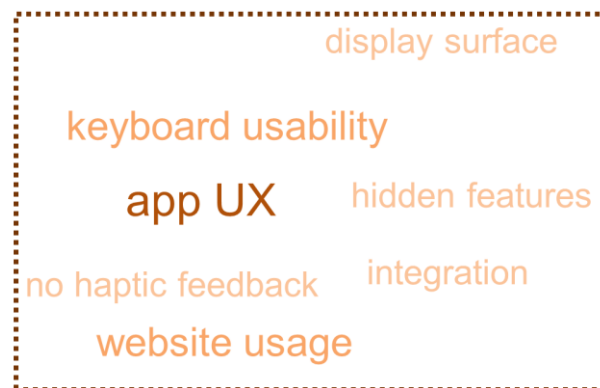


Figure 9. Usage issues

Further drawbacks are:

- No haptic feedback of the device
- Reflective display surface
- Hidden feature phenomenon, meaning that it is often not obvious how to use the iPad

FUNCTIONAL ISSUES

As working in a business environment has to be productive, of course functional issues (see **Figure 10**) are as important as usage issues. First of all, all participants argued about functional range of available apps. Usually, apps only realize a small clear scope of functionality, focusing on the actual need of mobile support. Nevertheless, users in a business context expect a functional range that is similar to what they are used to from their matching desktop applications. So we experienced, that especially mail and calendar usage was not appropriate to fulfill the intended tasks like e.g. arrangements of dates and view availability of potential participants of a meeting. Although there are plenty of apps available that claim to realize productive work with MS Office applications, this is a major lack of the iPad. As MS Office is the de facto standard in the business environment in Western Europe, it was absolutely mandatory for participants to view, create, and edit office documents on the iPad without completely destroying the layout of the document. A further demand of participants was to have true interoperability of apps that goes beyond copy & paste of text blocks.

Further drawbacks are:

- Many mail attachments cannot be opened

- The iPad does not offer support for the company's project management environment, which is a mandatory task for some participants
- No true multitasking possible
- Apps supporting relevant business processes (e.g. project acquisition) are not available



Figure 10. Functional issues

PLACE AND CONTEXT OF USE

When talking about HCI, context and place of use is always one of the most important influencing factors. The study showed that there is no additional value of using the iPad in the office as a device that extends the functionality of the already available laptop or desktop PC at the moment. In case your working role affords to often carry larger objects, a tablet like the iPad is definitely not the first choice. Participants in the study representing the IT-service department liked the idea of having a mobile device with them, but the iPad wasn't suitable because they were not able to put it into their pocket. They reported that they switched to smaller smart phones after the study, because

introducing the iPad to them generated a demand of having apps and services available while being mobile inside the company building - only the size of the device matters.

TECHNICAL ISSUES

When first thinking about introducing iPads to a business environment, we expected to have technical issues (see **Figure 11**). Fortunately it turned out, that integration into the existing infrastructure from a network point of use was better than expected. In the beginning of our study, using vpn on the iPad to connect with the companies exchange server was a huge issue. Participants complained that vpn connection wasn't able at all or connects only once within 10 minutes, for example. Availability of vpn changed during the study due to an iOS update and complaints were reduced significantly at the end of the study. In the last weeks of the study, there have only been complaints about the duration of the vpn connection - participants argued that the vpn connection often timed out after several minutes which is very annoying when performing tasks like browsing for information. Second major technical issue was the problem with synchronizing. This particularly includes password synchronization on password change in one of the systems, synchronization with exchange mail server, and synchronization of task management apps.

Although none of the user explicitly mentioned data security as an issue, it is a major concern depending on company policy and data criticality in projects with non-disclosure agreements. Speaking from a user's point of view, security is not perceived as a drawback when using an iPad. In addition very few participants

complained that they have to use and carry an adapter for VGA output.



Figure 11. Technical issues

SOCIAL AND NON-CATEGORIZED ISSUES

Apple first introduced the iPad as a device that should be used via touch and not with an input device like e.g. a pen. In contrary, we discovered in our study, that participants had a strong desire to have a pen for making textual notes. This drawback was negotiated by providing pens for each participant in week 5 of the study. Another major point were constraints due to company policy like the participants were not allowed to enable push notifications, could not use print functionality as well as remote apps and were not able to access a network file system. Our study showed that working activities shifted a lot towards private context only because employees were able to access emails easily from their home environment. This shift was perceived negatively by only one participant.

Figure 12 also shows further issues regarding social and other areas:

- Being constantly available for working issues
- Shift of work into private life

- The iPad is not a full business device and only an add-on (the expectation of one participant was that the iPad could substitute a full desktop PC or notebook)
- Risk of distraction during meeting is too high
- Privacy issues because it is too easy to be observed while using the device



Figure 12. Social and non-categorized issues

Usage Duration

For each week, participants were asked to rate their usage duration for both work and private usage on a daily basis. In **Figure 13**, an average duration for each week for all 12 participants is displayed (note y-axis is not evenly distributed). As we can see, mean usage duration in the working context is longer than in the private context. Only at t5 and t7, private usage slightly exceeds the usage duration during work. At t5 and t7 there was public holiday and Easter, therefore, some of the participants have been on vacation. Furthermore we can see that the average usage duration decreases over time and reaches an average duration of about 30 minutes per day for both, working and private use of the iPad.

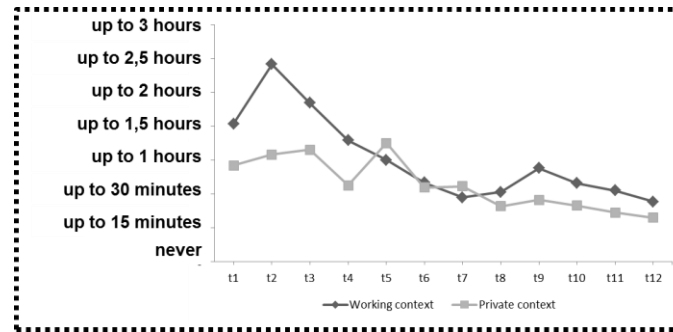


Figure 13. Average usage duration

Productivity

According to [14], participants were asked to rate their own productivity for each week (*"Please rate your productivity at work for this week on a scale from 5=very high to 1=very low"*). The average values (see **Figure 14**) stay rather constant over time on a positive level. Again, we can see a reduction at t7, because of vacation time at Easter.

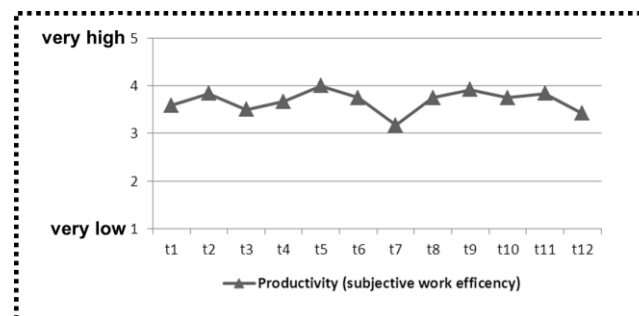


Figure 14. Average subjective productivity at work

Joy of Use

To analyze the affective reaction generated by the iPad usage, we asked the participants to rate statements, such as *"the usage of the iPad gives me fun"* on a 5-point-Likert scale (5=fully agree, 1=fully disagree).

Figure 15 shows the development over the 3 month-period. The average agreement to that statement falls off after the first 3 weeks of usage and remains fairly stable just below 4 (=somewhat agree).

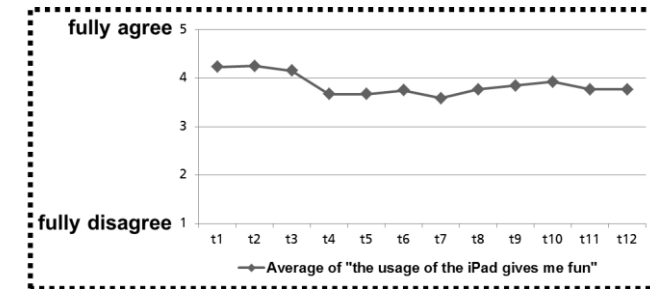


Figure 15. Average joy of use reporting

Interpretation

Comprising the findings of the study, we conclude that the iPad added value to the business of our company. In contrary to our research hypotheses, productivity did not increase during the study but was constantly at a high level. As expected, usage duration decreased during the study, but the perceived productivity stayed on a constant high level. Participants reported that this was due to exploring features of the iPad during the first weeks of the study. The overall joy of use scale also showed that the iPad was perceived as a device that is enjoyed by our participants. Mainly the qualitative measurements showed that the benefits of

iPad usage exceed the mentioned usage drawbacks by number of entities and frequency.

Investigations showed, that especially executive employees reported larger benefit of using the iPad. Creating a wow-effect at the customers' site through the use of innovative mobile devices especially creates a benefit when selling mobile services. Expertise in the mobile domain is more creditable transferable that way. In addition the study showed, that there is no difference between internal and external mobility. Role profiles that are described by a large amount of short time meeting in different in house locations reported more flexibility due to the iPad usage.

Limitations of the Study

A first limitation of the study is the small number of subjects. Usually a larger group of participants is necessary to gain statistically valid data. In this study the costs of the iPad had to be counterbalanced to the added value of each additional participant. So we decided to have a small group of participants we can accompany and interview much more closely than a larger group even over a longer period of time. By combining repeated measurements with in-depth interviews, we were able to catch a deep insight into the users' thoughts and wishes about iPad usage.

To cover all previously defined roles, participants could not be chosen randomly from the company's employees to take part in the study. The selection of participants was done in conjunction of the study responsible and enterprise management. It is possible that the selection of the participants has a systematic, but unknown, influence on the study results. Over time, control of changes of the role of the selected participants was not

possible. During the study, only one person explicitly changed their role by being promoted to department head which had no effect on his tasks performed with the iPad.

Another limiting factor is the absence of an imaginable control group. Normally the control group design is used to point out the effect of the treatment, in our case adding the iPad to the daily work and private life. We considered implementing a control group, but considering the fact, that the control group - employees in the same company or even the same department - would not receive the iPad but have to fill out questionnaires on a weekly basis could have e.g. led to envy between colleagues undermining our study and even the working climate.

Threats to the internal validity of the study relate mainly to the longitudinal design: during the study it is likely that the participants mature and gain experience and knowledge which can influence their subjective ratings in the questionnaires. In the case of variables related to assess the usage of the iPad this maturation is desired. Whereas regarding the participant's productivity, there is no control of external changing habits and approaches to deal with personal workload and therefore how the subjective rating of productivity is thereby affected. Also effects of history (what happens during the study period), e.g. changes in the institutes infrastructure (e.g. improvement of vpn connectivity), are not in control and can influence the results. Due to the fact, that the study was performed in a rather specific business environment with a small number of participants, the transfer or the study results might be limited.

Conclusion

With our study we showed, that introducing iPads into the business environment is perceived as a benefit from a user's point of view. Increased joy of use, productivity, image and staff retention are just few but valuable benefits. Nevertheless a general conclusion that the iPad adds value to all business environments is not possible. For our company the iPad definitely added value to our business in terms of supporting the mobility working habits for some roles. We think that a thorough investigation of employees' roles is necessary to decide if the iPad or any other tablet PC supports employees in their work. Based on our observations we can conclude that in general the higher internal and external mobility is given, the more potential for productive use of iPads is given.

In addition, iPad usage is very individual in terms of technology adaption and specific to certain roles in the enterprise. To really gain a more significant benefit for the business environment, the enterprise has not just to introduce iPads but to provide enterprise individual apps which support exactly those tasks that need mobile support. Therefore enterprises need to discover business processes that are valuable enough to support them with customized apps. In our case, we assume that the iPad cannot replace the existing it-infrastructure but extend it.

A significant improvement potential regarding our study, is a better integration into the existing software environment, which definitely is being interoperable with Microsoft Windows based products. Future work needs to analyze this results compared to state of the art Google Android and upcoming Windows 8 tablets.

Acknowledgements

The work presented in this paper was performed in the context of the Software-Cluster project EMERGENT (www.software-cluster.org). It was partially funded by the German Federal Ministry of Education and Research (BMBF) under grant no. "01IC10S01".

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