



# **INTERACTION DESIGN IN THE POST-PC ERA**

Using Tablet Devices

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## **ABSTRACT**

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This thesis looks at interaction design, tablet computers, the tasks of an interaction designer, changes in interaction design in 2013–2015, and some other implementations for interaction design.

It turns out that to do interaction design in the post-PC era, one actually needs to use a personal computer, despite this thesis being entirely written on a tablet device, which was the starting point for this thesis. It explores the positives and negatives of tablet computers with a retrospective conclusion on the subject.

The main topic of this thesis is interaction design, which is defined and explored through surveys and interviews that guide the exploration on whether the work has changed. In addition, more unusual forms of interaction design in community management and the gaming experience are investigated. There are additionally proposals and conclusions of interest to anyone in the interaction design field and beyond.

The key research questions answered are: What tasks does an interaction designer do? What tools does an interaction designer use to do his/her work? How could the work of an interaction designer be improved? Could tablet devices help improve the work of an interaction designer?

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Key words: interaction design, tablet computers, post-pc era, technology, prototyping

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## 1 INTRODUCTION

Do you really need a desktop or laptop computer anymore? Or would just a tablet be enough? This was the initial question that set this thesis in motion, but what does this have to do with interaction design? Well it is a field that is always changing, with technology, and tablet computers are one of the most widely accepted new pieces of technology to emerge in the last five years. Well in reality they are not fundamentally new but their success on the consumer market is new. When starting to look into writing this thesis I quickly realised I needed to focus on one specific area. Having focused my studies in the direction of interaction design it was a simple decision to take it as a use case. So from that I wondered would an interaction designer be able to use solely a tablet computer in their work. I will touch on this further now, and at times during the thesis, and on completion look to determine its success.

Interaction designer, the main topic for this thesis, can mean many things. It could be a person working on a website, application, game or other types of mediums. The key common goals however are in brainstorming, developing concepts, user interface design, presenting ideas to clients, making prototypes and user testing. So let's broadly consider is a tablet capable of doing any of these tasks.

For brainstorming there are both note taking and more visually orientated mind map producing apps to choose from. Personally comfortable working with text I have stuck to Notes but if you like traditional sticky notes then there are colourful alternatives and ones that have better sharing options. These possibilities have clearly progressed and now in 2015 there are apps that easily share and allow collaboration of notes. For the really visually orientated drawing apps could potentially turn the tablet into a digital sketchbook for artists and a key tool for visual designers. There are even some Bluetooth 4.0 device add ons to enable pressure sensitive drawing like is possible with graphics tablets connected to desktop computers. There are also apps focused on colour and coming up with colour schemes.

I am personally looking to concept, prototype, present and ultimately user test in a streamlined way that combines them into the same method. For example currently Keynotes is capable of displaying ideas, doing wireframes and of course presenting these to

clients. One possible way to link all 4 stages would be to work in HTML. Where then the concepts, wireframes and presentations could become interactive prototypes. There are apps that could be used for this purpose with FTP connectivity and file editing. There are however more advanced code editors available.

One problem I have had limiting the research on tablets is not being able to test apps due to many not being free. Therefore this has restricted me to purchasing only those apps that I can afford and wish to use myself. This has blocked a lot of research on the Samsung Galaxy Tab as it is not my own device and so it makes no sense to be investing in these apps. Tablets are clearly very versatile devices and for many individuals, and specific tasks, they are more than capable of fulfilling them. It just depends on that individual and their needs as to if it is possible, fast enough compared to other computer devices and the way they would like to work.

As you will see in surveys carried out in this thesis interaction designers fairly unanimously rejected the idea of using solely tablet devices and so the direction of this thesis is actually different from the original question. Rather than tablets being the focus it was clear that it would be much more fruitful to focus on what an interaction designer does, as it is too advanced for a mere tablet, and look at the actual devices and methods they use instead. As a side point however this thesis will be entirely done using a tablet device, assuming that is possible. The required structure, layout, writing and presentation style of using Tampere University of Applied Sciences' thesis template on a tablet provides a challenge in itself. I can already see inconsistencies in fonts, the title page and no easy way to do a dynamic table of contents page. So writing this thesis only using a tablet device acts as one way to test the device capabilities.

Following this introduction, as I write the bulk of this thesis, interviews and surveys with interaction designers will show what tools they currently use and the typical workflow. Additionally it may be possible to identify key areas that could be improved and focus on the most important aspects of my findings.

## 1.1 Why interaction design?

The main reasons for choosing interaction design are that it involves people and, more specifically, an exploration of peoples' ways of thinking and psychology in a context of technology. I've always been interested in technology and liked to think and consider why people do things. This is a key aspect of an interaction designer's work to understand the user and their needs. Also as it is a vast field that can be applied to many industries, where a service is required. That goes from application, to games and onto even the social spectrum of social media. In my studies I hadn't found a specific area such as graphic design or production that I liked best. Instead I'd dipped into game design, web design and even programming. Rather than specialising in any area it gave me a general understanding of these, and other, areas that could be used overall to design the interactions needed by a user. And so that is where this thesis really starts. Immediately after this introduction I will look at what interaction design really is.

## 1.2 Research questions

Without really realising it the thesis I embarked on turned out to be much more focussed on carrying out independent research, and the opportunity to redo that research over a year later, than I had expected. This part of the introduction sets out the main research questions that I aimed to answer in this thesis.

Firstly I need to verify the viewpoints outlined in the next section of the thesis to answer what does an interaction designer do and what do they use to do it. One assessment criteria for theses relates to providing something beneficial for the actual industry it focuses on. So could there perhaps be a way to suggest how interaction designers may be able to improve their work? Then of course there is the side point about tablet devices and the best way to consider how an interaction designer's work could be improved. Perhaps tablet devices could be part of that answer. Looking at it this way there seem to be four clear questions to look at:

What tasks does an interaction designer do?

What tools does an interaction designer use to do his/her work?

How could the work of an interaction designer be improved?

Could tablet devices help improve the work of an interaction designer?

### **1.3 Outline of thesis**

This thesis is split up into the following sections:

#### **Introduction**

This section highlights where the idea for this thesis originated, what research will be looked at and layout what will be in the thesis. It also briefly looks at the capabilities of tablet devices.

#### **What is interaction design?**

To answer this question the history of interaction design is considered, the topic is defined and job prospects are considered. This will act to focus on the key attributes that make up interaction design, in theory, and conclude by specifying the methods of research.

#### **Research**

This section forms the main bulk of the thesis and has two clear parts to it. Surveys and interviews carried out in 2013 and then surveys in 2015 with a comparison of the results. Interaction design tasks, equipment and methods are looked at and it's questioned how they could be improved.

#### **Proposals and conclusions**

Finally the thesis is concluded by speculating on some ways interaction design could move forward as well as summarising what has been found out from the research. Also a final retrospective on using tablet devices.



## 2 WHAT IS INTERACTION DESIGN, REALLY?

There's no better way to find out than asking interaction designers themselves. Therefore the main research carried out in this thesis includes the findings of an online survey and four, hour long, interviews with professionals working as interaction designers. The main aim was to find out their needs, how they currently work, how they would like to work in the future and their views on tablet devices so as to answer the research questions.

First though, let's look literally at the words interaction and design themselves. Interaction is defined as reciprocal action or influence (Oxford Dictionaries, n.d.a), which seems simple enough. In that when an action occurs by one party there is a response from another. Defining design appears a bit more complicated, even though it's a word we no doubt use regularly. The basis of its definition contains something being planned before it is produced. That can however take many forms including the look, function, workings and arrangement of features for something (Oxford Dictionaries n.d.b). Therefore designing could involve deciding how something looks, what it does, how it does that and how different parts of it are correspondingly positioned. If we combine those definitions then it would amount to interaction design being the planning of how an action, that gains a response from another entity, will look, what it will do, how it will do that and how those actions are arranged. That's quite a mouthful, extremely confusing and could be applied to almost anything.

Definitions of interaction design, in reality, appear to refer to more fundamentally digital and technology related fields of interaction design. For example "the design of how a user communicates, or interacts, with a computer. Interaction designers focus on the flow of interaction, the dialog between person and computer, how input relates to output, stimulus-response compatibility, and feedback mechanisms" (Usability First n.d.). In my mind this is limiting and restrictive. Instead everything we use involves interaction design (Banga 2014, 25) and so there could be lots to gain from using interaction design outside of the digital world as well as considering the design of ordinary products to improve your own design skills.

Interaction design (IxD) is all about the ease and intuitiveness of interacting with a product, and when done correctly, it results in products that just work. It focuses almost exclusively on designing the interactivity and behaviour of how people use a product in a given context" (Klimczak 2013). This, in contrast to the more specific tasks I described, focuses on a more abstract description of interaction design. Others define it as the practice of designing interactive digital products, environments, systems, and services. (Cooper, Reimann, Cronin & Noessel 2014). Then another way to look at it is as the shaping of use-orientated qualities of a digital artefact for one or more clients (Stolterman 2007, 2). All interestingly refer to digital which, like I mentioned before, feels a bit restrictive and interaction design is well beyond that. Afterall a person's experience is not digital. But that is just a brief look at some different definitions of interaction design. Let's look into the past to be able to move forward and highlight the most important parts of what interaction design is.

## 2.1 History

The term interaction design is said to be coined by Bill Moggridge and Bill Verplank in the mid-1980s (Wikipedia n.d.) and the Carnegie Mellon University was one of the first to offer an interaction design masters degree in 1994 (Carnegie Mellon Design n.d.). Originally the program focused on screen interfaces for computer applications and websites but the boundaries between hardware and software, device and user, have blurred considerably. On the contrary however you can say the history of interaction design really began with the invention of the computer. Although the term did not exist then there had to be a means through which human operators could input information and the computers could output results of the computations. This took the form of punch cards and primitive printouts or blinking lights. (Interaction Design AU n.d.)

Marc Rettig (2004) divides the history of interaction design into six stages, from designing to make operating a machine possible to designing to make a system that adapts to its users possible. The current stage of interaction design according to Rettig is designing interfaces to enable connecting between users: instead of designing for interaction between a user and a computer, the machine is more and more in the role of an intermediary between people. Rettig also talked about a future stage of interaction design that we are starting to see glimpses of (2004) being about to "dynamically enable" things. (Kuikkaniemi 2008). For example music or video switching from one device to another

when we move from using one to another. This can somewhat be seen on video streaming services where by the video continues from the same point when opening on another device. It's not quite what was meant but it's moving in that direction.

## 2.2 Jobs

The roles I see an interaction designer performing include concept design, user experience design, user interface design, prototyping, user testing, further development and revision. But what do they do in practice? Perhaps looking at job descriptions for interaction designers and jobs that are available will help here.

"In an interaction designer role, you'll tackle complex tasks and transform them into intuitive, accessible and easy-to-use designs for billions of people around the world" (Google 2014). This shows there is a lot of responsibility and complexity in the work as well as an ultimately influential role in the life of many people. "Create, present, and deliver user flows, wireframes, prototypes and mockups, to effectively communicate interaction, user experience, and design ideas" (Velocify 2015). That example is very similar to the roles mentioned at the beginning of this section. The job clearly also requires people skills as "this person will work both independently and with other team members to design, innovative, easy-to-use websites, web applications, mobile apps and desktop applications" (ThoughtLab 2015). Also it shows that a range of platforms are designed for and so an understanding of the different technologies will be required. This was echoed by saying you must "have a passion to stay up-to-date with current trends in design and technology" (Serious Marketing Communication 2015)

One interesting observation when looking through job listings is the differences between different countries. Although in the USA there are a number of job titles listed as interaction designer, this did not appear to be so common elsewhere. Instead the jobs matching an interaction designer's description were more likely to be along the lines of "Digital Designer", "UX Designer" and "UI Designer" by being either a more general description or focusing on specific aspects of interaction design.

The digital designer description may, in that way, reach outside of the boundaries of interaction design. For example one asked to "produce designs for a variety of digital

projects linked with one of our high profile clients – a major international pharmaceutical company. You will create eye-catching designs for websites, intranet sites, virtual events and print campaigns" (One Two Four 2015). This was an important point to see that as an interaction designer there is the opportunity to work with a wide range of clients on a wide range of mediums. It did however focus more on visual design rather than interaction design. Of course the visual design has a massive impact on interaction design and it may not be expected that all interaction designers have the skills to produce high quality visual design. In contrast another "Digital Designer" role stated that "not only will you be helping to design amazing user experiences you'll be helping to bring them to life across Mobile, Desktop and Tablet" (Serious Marketing Communication 2015) which is definitely the interaction design side of things. Interestingly that role included the need for php and css skills so there may be a trend of needing to do work outside of the interaction designer's typical job description. This may just be a reflection that people often do work that is outside of their job description, or a particular attribute of interaction design itself.

Whilst looking at the job descriptions other common task requirements that came up were user experience design, wireframing, writing design specifications, web design, maintain client relationships, user flows, storyboarding, prototypes, user interface design, responsive design and user testing. It's clear that in an interaction designer's work you need to be versatile and capable of taking on many different roles to be successful. Some job listings even went on to state an "ability to cope with stress" (Fjord 2015) is needed, suggesting that this is a potentially stressful profession.

### **2.3 The keys to interaction design**

Even if it may be stressful it's clear that interaction design is ambitious and rewarding. The goal is to design a service for, potentially, millions of people and what may be high profile clients. This means you yourself have to be able to interact well with others and empathise with the end user. These human skills are contradictively influenced by technology. Technology that you have to understand and yet is always changing. You really have to be a digital designer of user interaction. There also appear to be key areas to what makes a successful interaction designer. The concepting stage where ideas are found and considered. Interface design where the idea is structured in a way the user

will be able to optimally use as well as providing the instructions for this interface to be made. Then in refining these ideas and design you need to successfully prototype and user test. The latter can give you actual views from end users rather than having to rely fully on empathy and research.

A primary conflict in the theory of interaction design is one of it being purely a technology orientated field, or not. Right now it may be. But the future dictates it won't be. As technology and its boundaries with people and nature blur even further it cannot be a simply technological field and the interaction design required will always be dependent on the humans it is being designed for. That is why the more open definitions to interaction design where it can be applied to areas other than just technological ones make more sense, in theory anyway.

### 3 METHODS OF RESEARCH

The best way of answering the research questions is no doubt surveys and interviews where it would be possible to see how many interaction designers actually do the tasks suggested, what tools they use and what they would like improved. Then we'll be able to find out how the people who know first hand about interaction design see the field.

The first research question was simply to find out what interaction designers do. Therefore the ideal way to find that out is to ask interaction designers. To get a range of views and some substantial data within a realistic time frame a survey will be carried out online asking relevant questions. Additionally to gain a more in depth answer to this question some face to face interviews will also be done with interaction designers. The answers to this will be found mainly under the interaction design tasks headings (see 4.1.2, 4.2.8 and 4.3.2).

Secondly is what tools does an interaction designer use to do their work? This will also be answered through surveys and interviews to get objective viewpoints from a range of interaction designers. The answer to this will be found mainly under the headings relating to equipment (see 4.1.3, 4.2.5 and 4.3.3), hardware (see 4.1.4 and 4.2.6) and software (see 4.1.5 and 4.2.7).

A more involved question is how could an interaction designer's work be improved? This is mainly answered in the Proposals and Conclusions section (see chapter 5). The answers will be a culmination of the theory on interaction design, the answers in surveys and interviews as well as my own personal experience and opinions.

Finally the question "could tablet devices help improve an interaction designer's work?" is mainly answered by interaction designer's themselves in the interview section (see 4.2). This is once again to maintain objectivity and rely on those with first hand knowledge of the subject and technology. The latter is checked by asking about their usage of tablet devices.

In considering the key aspects of interaction design there was a rough order of what must be done to succeed as an interaction designer involving concepting, interface de-

sign, prototyping and testing. This raises the question, what is an interaction designer's workflow? Therefore this has been included in the interview questions (see 4.2.10) so as to add more depth in trying to answer the first research question, what does an interaction designer do?

See appendix 1 for full survey questions.

## **4 RESEARCH**

### **4.1 Survey findings 2013**

LinkedIn proved to be an excellent tool to find people to answer the survey. Simply by posting in the Interaction Design Association group, which has over 78,000 members, it was possible to get over 35 responses in less than a week. This is not a particularly high amount when it comes to proving the statistical confidence of the survey (Van Bennekom n.d.). With the intention to find out a rough guide of what kind of tasks interaction designers do and what tools they use to do them it may not be an issue. However the number of responses may not be critically high enough to reliably represent the situation for a majority of interaction designers. With this in mind these findings should be used as a guide to interaction design trends rather than definitive norms. Survey responses were received between April and May 2013.

#### **4.1.1 General findings**

Firstly it must be pointed out that there is an unfortunate gender bias in the results with 63% percent of respondents identifying themselves as male. The average size of the organisation being worked for was 7148 with 66% of the organisations having 500 or less employees and 72% having 1000 or less. The average number of years experience as interaction designers for those surveyed was 6.25 years. With interaction design having been established only a few decades ago it may be expected that very few surveyed (17%) had over 11 years experience and the bulk of those surveyed (57%) had less than 6 years experience. Most importantly these general findings show that the survey wasn't only answered by males, they work in a wide range of sizes of organisation (self employed all the way up to and above 10,000) as well as both inexperienced and experienced interaction designers have answered this survey.



### **4.1.2 Interaction design tasks**

Four main areas of interaction design that I have identified in concepting, interface design, prototyping and testing proved to be reflected in the results of the survey. 91% answered they carry out concepting, then 89% responded with interface design and prototyping. Slightly less so for testing with 80% which may reflect a train of thought that it is difficult to objectively test your own designs and so perhaps there is a choice to have others report findings. Later interviews should help to understand this further. For concepting, interface design and prototyping it's clear they're very much requirements for being able to make something and focus on the details like an interaction designer does (California College of Arts 2011). Other responses included 9% for both research and actually implementing designs. Also graphic design was mentioned by 3%. There was likewise 14% of respondents that carried out tasks not mentioned, so far, illustrating how interaction design is a vast and varied field.

When asking which tasks they would like most to be improved there was a clear trend in the results. 40% felt prototyping could be improved whereas only 9% expressed the same view for testing, 3% for interface design and nobody felt their concepting process needed to be improved. The second most requested was to improve the way their work is documented (14%), which isn't explicit to interaction design and there were other similar areas such as communication, research and sketching (all 6%). This suggests the area most suitable for new services or improved working methods would be prototyping and then other general skills that are important to many fields of work.

### **4.1.3 Equipment in general**

Despite interaction design being seen as a very much digitally orientated field, it turned out that 66% of those surveyed rely heavily on pen and paper in their work flow. Also nearly half said they use whiteboards and post-it notes. Perhaps this is simply down to being familiar with those tools or maybe there are not comparatively efficient enough tools to make notes, remember ideas and communicate with team members. On the other hand it is more likely to be making the best of both worlds, as is suggested by the responses coming up about hardware used.

#### **4.1.4 Hardware**

Every single respondent answered that they use a computer of some form in their work, although only 2% (excluding tablet computers) were touch screens. This undoubtedly shows the combination of computers and other tools used. Responses suggest 89% use laptops and 40% desktop computers. 31% mentioned using recording devices such as sound or video recorders, presumably for user testing. 20% graphic tablet users suggest a fair chunk of interaction designers use graphic design skills, despite only 3% highlighting that as an explicit task they do. As mentioned before some wish to improve drawing skills so maybe they do not see their graphic design skills up to the standard of working as a graphic designer and simply find the graphic tablet as the most efficient method of input for their concepting or interface design. Other hardware included projectors, cameras and mobile phones.

#### **4.1.5 Software**

A majority (over 70%) of interaction designers surveyed responded that they use text, image editing, vector based graphics and presentation software. This highlights a visual and communicative nature to the surveyed professionals' work. 60% mentioned diagramming software, presumably key to interface design and prototyping. However the substantial amount of respondents, who wished to see an improvement producing prototypes, suggests these diagramming applications may not be fulfilling the task as well as they would like. 46% using html editors suggests another possible way prototyping may be carried out. Of course implementations may be websites so this would make sense. Other software highlighted includes spreadsheets (14%), video or audio editing (9%) and dedicated prototyping tools (only 6%). Interestingly not even a third of those using video or audio recorders actually edit the material, perhaps highlighting its usage for testing rather than presentations or prototyping. Finally, when you add the suggested need for prototyping tools to the minimal usage of dedicated prototyping tools, the need for improving prototyping may certainly be in prototyping apps, if the survey results reflect a wider scope of interaction designers than just those surveyed.

#### **4.1.6 Tablet devices**

Not even half of those surveyed stated that they use tablet devices for their work. This either suggests there is room to benefit from using tablet devices more, or the tablet devices are not needed or efficient enough for their work flow. The actual number, 43%, is substantial however and represents well how an interaction designer has to adapt to new technology quickly. That seems like a fairly high adoption rate for tablet computers having been in the mass market for only 3 years, as the assumption would be that work tools change at a slower rate than individually. This is reflected by 91% having used tablet computers and 63% owning a tablet device themselves. Asking their opinions on typing on tablet devices showed a mixed response with 31% being classed neutral. However, with 40% responding negatively to the experience of typing on a tablet, it suggests over 70% of interaction designers surveyed are not convinced by typing on a tablet device and maybe a key obstacle for their usage. The interviews with interaction designers brings some more understanding as to the reasons behind this negative response.

#### **4.2 Interview findings**

The main intentions of interviewing some interaction designers was to look for possible differences to the survey findings, explore the work flow of interaction designers, gain more in depth opinions on tablet computers, for interaction designers, and look for possible ideas for how interaction designers could benefit from tablet devices in their work. Four interviews, roughly an hour long, were carried out between February and April in 2013. LinkedIn was once again useful for finding interaction designers to meet and two of the interviews were with members of the Interaction Design Group Helsinki. The other two interviewees were based locally to myself and suggested by contacts here in Tampere. Therefore it needs to be taken into account that it is a minimal number of interviewees, as well as centred on Finland and may not represent interaction designers on a wider scale. The interviewees were from small to medium size businesses and they generally had nearly ten years experience or more. Please note that although these interview findings are presented after the above survey results, most of the survey responses were recorded after these interviews. The survey was also analysed after all the inter-

views took place so the survey could not have influenced the interviews. A lot of the questions asked in the interviews were the same as the survey.

See appendix 2 for full interview questions.

#### **4.2.1 Tablet computers**

Carrying out these interviews brought an immediate awareness that the starting point for this thesis, working only on tablet devices, has heavy challenges and good reasoning against it. For example those interviewed also gave negative feedback on typing, sitting speed and efficiency issues as well as needing more practice. They unanimously revealed their opinion that it would not be possible to work entirely on a tablet device, with enough efficiency, to do their job. One key problem seen by many is one of accuracy as say wireframes should be accurate and consistent. Keyboard shortcuts, alignment of objects, visible tools and viewing more than one piece of work at once highlighted the shortcomings of a tablet device. The small screen doesn't allow for displaying multiple documents at once, nor a workable overview of the project with enough details.

#### **4.2.2 How can an interaction designer benefit from using a tablet device?**

Interviewees highlighted customer interaction as a key way their work could benefit from using a tablet. For example presenting designs and prototypes, in meetings, helps the customer understand the specifics and gives them something in their hands to experience it more than just sending a document ever would. Also it can mean not needing to print or reprint work. This is likely to save time and improved understanding from the customer as well as feedback may yield better results.

#### **4.2.3 Positives of tablet computers**

The most frequently mentioned benefit of tablet devices by those interviewed was being mobile and incorporating everything into one device. Being mobile brings a freedom to create and convenience not to carry a large bag around or be in a specific location. By

being one device it was suggested that everything is always in a digital form and both the design and outcome are on the same object. Other benefits mentioned included how easy it is to enjoy entertainment and be social on a tablet device. Likewise, a move away from paper was seen as a positive by some.

#### **4.2.4 Negatives of tablet computers**

As mentioned previously, those interviewed highlighted the small screen size as a drawback of tablet computers. Interviewees also questioned the addictive nature of tablets, the dumbed down functionality and saw compatibility of apps as a downside. The touch screen input was met with both negative and positive feedback, although, when discussing the negatives, typing not being efficient enough, lacking accuracy and not being able to draw well enough using it, were all brought up.

#### **4.2.5 Equipment in general**

The interaction designers interviewed also revealed they use pen and paper a lot like those surveyed. It was suggested post-it notes and a pen is the most efficient way to process ideas quickly and efficiently. That along with whiteboards and so backing up the survey results as well as adding some understanding as to why. Perplexedly, when discussing note taking, all revealed to often digitising those notes through software such as PowerPoint, Evernote, spreadsheets, text editors and Outlook. These suggest automating that process may make their work more efficient.

#### **4.2.6 Hardware**

All interviewed use primarily laptop computers and, all but one, with an external monitor. This was perhaps something missing from the survey results. It may have been an oversight due to the multiple choice nature of the survey. An external monitor is likely to be easy to forget when suggesting other hardware used, especially when it is fairly mandatory for a desktop computer. Therefore it may be the case that an external monitor is used by many of the laptop using interaction designers. The reason for this is clear

when discussing tablet computers, where the lack of screen space leads to inefficiency. None of them use touch screen laptops or monitors and the point was made that using a touch screen device requires you to cover up your working area with your hands. That suggests there is an argument for it being a less efficient working method than mouse and keyboard. Other hardware mentioned included projector, cameras, printers and mobile devices. The latter, specific mobile devices like phones and tablets, being required by most of those interviewed for testing.

#### **4.2.7 Software**

Like in the survey findings most of the interviewees use text, image, vector graphics and presentation software. Half of those interviewed use HTML editors and spreadsheet software. Other software mentioned included the likes of Azure, Axure, Visio, Qt Creator and Omnigraffle. Interestingly one interviewee noted to having tried a lot of software designed for interaction designers but having yet to find a dedicated application with enough benefits to switch to. The interaction designer also went on to suggest that working prototypes may provide justifiable advantages. This supports the survey findings that there's a potential need for prototyping tools in the case of interaction design.

#### **4.2.8 Interaction design tasks**

Concepting and interface design were tasks mentioned by all interviewed. Prototyping as well but to a lesser extent and there was a consensus by some that they would like more prototyping and testing to be done. Not all of those interviewed carry out testing. For example some plan testing but do not participate themselves. Other tasks mentioned by some but not all interviewed included copywriting, communications, visual design, information architecture, research, workshops and management. Once again highlighting a diverse nature of an interaction designer's work.

#### 4.2.9 How could interaction design tasks be improved?

In the survey results it was very clear that prototyping was the number one priority for respondents but in the interviews less so. Along with prototyping, interviewees especially wished for improvements in interface design as well as the overall working process. This may or may not suggest that the survey results under emphasised the need for improving tasks other than prototyping. Other aspects mentioned were documentation, testing, research and working with clients.

The ways mentioned to improve interface design and prototyping seemed to correspond to each other and made me wonder more if the solution is combining the two. Take the issues with interface design for instance. They included being difficult to illustrate gestures and actions not clearly represented in a static diagram. This would be solved if the design itself automatically, or quickly, formed the prototype. One interaction designer wished exactly for this and another used the term wireframe prototype. So to produce a wireframe that could easily be made into a prototype, could be the answer. Another improvement to interface design mentioned would be to make it easier to maintain them. For example, a design that has ten screens takes a lot of time to modify any small details that are common to all screens. If the interface designed was already a working prototype the elements that were the same would automatically be updated and so avoid that extra work. One solution to this could be resolved by altering the entire working process so that you could combine the interface design with coding early and iterate those prototypes into a finished product.

There were differences in opinion however and some felt a wireframe prototype is not enough on its own. For example when discussing improving documentation, other than wishing to lessen the usage of paper, it was suggested that the client needs different specifications to those implementing the project. This of course could be eradicated, however, if the implementation was parallel to the design and produced iteratively. Some interviewed hoped there would be more testing, like I mentioned when discussing the survey results, but testing carried out by people outside of those designing it. Another thought testing and research could be improved with voice recording and automated conversion to text documents. Finally a last suggestion was that all graphics should nowadays be vector graphics requiring more computing power but delivering far more

flexibility to ultimately benefit the end result and however that may change. Vector graphics also allows scaling to any size screen which is increasingly important.

#### **4.2.10 Interaction design workflow**

One key area discussed in the interviews, that was not in the survey, was work flow. Each interviewee described their work flow and, although different people work optimally in different ways, there are some general similarities and assumptions we can make about an interaction designer's workflow. It has also been an area some interaction designers surveyed or interviewed wished to improve so perhaps it's possible to suggest how.

From the interaction designers interviewed the similarities were that each project would start with a brief or kick-off. That would follow with what I'll refer to as an acceptance stage where preliminary work would set out what is going to be done and this would be verified or accepted with the team and client. Once accepted further research may or may not be carried out and actual design, specification, collaboration with graphic designers and implementers would be carried out. During all of this there should be regular feedback and communication with the client. Improvements based on testing and the collaboration with client, graphic designers and implementers would be made until the final design is complete.

#### **4.2.11 How do iterations fit in?**

In the initial description of the work flow the interviewees all mentioned improving designs through iterations. One went a step further to say there are two ways they may work, the second being an agile method of jumping straight into designing the product, through making it, and iterating all the way through from the very beginning. What fascinated me the most was the contradictory impression I got of the work flows described. In that, at face value, they were, other than for one designer, a waterfall process where one step leads to another. However once the direction for the project had been agreed, a number of the interviewees described multiple iterations and collaboration with client, graphic designers and implementers, more akin to an agile process. In fact much more



what is described as a post-pc workflow (Clarke 2012) where there is combined and iterative development.

Many of those interviewed mentioned static representations of their work such as wireframes instead of interactive wireframes, or starting to build prototypes early on that would result in usable assets, rather than fixed wireframes of specifications. The static representations adhere more to the waterfall method and some of those interviewed said they didn't get much involvement with the product once complete. It would be beneficial, they said, to have further iterations with the interaction designer involved, once the product has been released and real users give feedback.

Now that the survey and interviews are complete it is time to decide where to concentrate the final parts of this thesis. Perhaps I should concentrate on interaction design using post-pc devices or look at concept and user experience design. With regards to concepting and designing my so far preferred tool (PowerPoint/Keynotes) allows for some limited linear interaction but that's nowhere near the capability of what may be possible, nor what the interaction designers seem to desire, according to the surveys and interviews. So perhaps I need to investigate the tools used and make proposals from there.

However, at this point in writing this thesis I started full time work as Community Manager at Kyy Games and was unable to continue with the thesis as planned. This has given me an opportunity to look at the time period from 2013, to now in 2015. To take advantage of this situation I have decided to question, has an interaction designer's work changed between 2013 and 2015? To do this I redistributed the survey.

### **4.3 Survey findings 2015**

To keep changes to the variables, of the survey, to a minimum I relaunched the same survey, as in 2013, to the same LinkedIn community in the Interaction Design Association group. The only difference was adding two questions to the end. One asking how has their job has changed over the past year and the other asking did they answer the

survey previously. Now of course on one hand this was not allowing for any improvements to the survey. For example, giving more concrete options for tasks to gain a wider confirmation of what interaction designers responded, would have been beneficial. However when aiming to compare the results from two separate years keeping everything else the same seemed the safest option. The survey responses were received mainly during the last week of January 2015 and was almost identical in number to previously, with 37 respondents. This should again give a reasonable guide to interaction trends rather than definitive norms.

#### **4.3.1 General findings**

Pleasingly there does not look to be any gender bias in this survey with around 40% each, identifying to be male or female respectively. 8% of the respondents were unsure had they completed the survey previously, therefore most respondents were new to the survey. This means that not only does the results give an idea as to what has changed, it could be combined to expand the understanding of interaction design overall. The average size of the organisations the surveyed work in was nearly 25,000, although 70% of respondents were from organisations with between 11 and 50 employees. This suggests the average is heavily skewed by some responses by people from extremely large organisations. On average those surveyed have 7 years of experience as an interaction designer. Alternatively though, 57% of those surveyed have 5 years or less experience.

#### **4.3.2 Interaction design tasks**

Nearly all interaction designers surveyed, between 92-95% responded that they carry out concepting, interface design and prototyping tasks. Slightly less so with regards to testing (85%). Research was also mentioned by 11% of respondents. Out of these tasks the ones respondents would most like to improve were prototyping (27%) and research (14%). Otherwise there was a fairly low number of responses spread out between the following tasks: communication (11%), testing (8%), concepting (8%), interface design (5%) and documentation (5%).

TABLE 1. What tasks does an interaction designer do?

Task	%
Concepting	93
Interface design	90
Prototyping	92
Testing	83

(2013 and 2015 surveys combined)

### 4.3.3 Equipment

Although all respondents use computers 62% revealed they use pen and paper, 65% whiteboard and 57% post-it notes. A majority of those surveyed (92%) use laptops compared to much lower percentages of desktop computer users (38%). 22% say they use sound recorders, 19% video recorders and 14% drawing tablets. As for software, over 80% of the respondents said they use image editors and vector based graphics. This was much more than presentation software (62%), diagramming software (57%), text editors (54%), html editors (38%), prototyping (22%) and spreadsheets (3%).

TABLE 2. What other equipment does an interaction designer use?

Task	%
Pen and paper	64
Whiteboard	60
Post-it notes	51
Other	60

(2013 and 2015 surveys combined)

### 4.3.4 Tablet Computers

27% of the interaction designers surveyed said they use tablet computers for their work despite 78% saying they own a tablet. This heavily suggests that those surveyed use tablet computers for entertainment rather than work. Nearly 70% of those surveyed were not convinced by typing on tablet computers, with 32% giving negative opinions.

#### 4.4 How has interaction design change?

Looking purely at the basic survey data from 2013 and 2015 we can say how the interaction designers surveyed are different. Generally there's one year more experience, which would be expected a year or so on, and there's no longer a gender bias. There were far more surveyed from smaller organisations with 50 or less employees and the average organisation size has gone up. Also from those surveyed, the main tasks they do have stayed around the same whereas the desire to improve prototyping has reduced 13%. This data is not necessarily a representation of interaction designers on a whole, due to the number surveyed. However, with regards to prototyping it would make sense as the usage of dedicated prototyping software has also risen 16%. That may potentially suggest interaction designers are more satisfied with prototyping tools and there has been work done to solve the need for dedicated prototyping tools identified in 2013. More of those surveyed appear to be using video or sound recording than previously. As for tablet computers the usage by interaction designers surveyed has gone down 16%. This may represent the product having matured after 5 years and usage having focused more on entertainment after initial experimentation.

Survey responses, to the question asking how has their job changed over the past year, are much more subjective. Some say yes, some say no, some are responding a certain way due to personal situation and others were not so sure. In hindsight the question should have had the person surveyed rate how much different things are now and my own statistical analysis will not be as accurate. 84% of the respondents indicated that their job has in some way changed. The most prevalent area that I could detect was technology (30%). Despite the limitations to this data it is fairly safe to say that technology has changed for interaction designers as the field is always moving forward with new devices, for example smart watches, and even if the tools they use to work haven't changed, the technology they are designing for has. This was echoed in Dan Saffer's opening presentation at D3 (2011), which highlighted how the post-pc era is in everything and anything. For this thesis I've focused more on a small aspect of that in tablet computers. Looking at interaction design for the next most changed areas, the surveyed suggestions included having less time for work (11%), more jobs or work available (8%) and moving towards a more agile workflow (8%). With only 8% saying it hasn't changed at all we can see that many aspects have changed but in this research cannot

definitively say which represents interaction design as a whole, other than technology. More user orientated design, flow, less development, better tools, more research and more concepting were the other possible changes in the results of the survey.

What about the four interaction designers I had in depth interviews with? Perhaps they can help identify which of these changes have been more prominent. To do this I sent transcripts of their interviews to them and asked what has changed. Similarly to the surveys it appears that the main changes have occurred individually rather than overall for interaction design. For example moving onto a new project or job entirely has brought the main changes. This represents the project based nature of an interaction designer's work and the evolving technology. As for more specific changes from 2013 to 2015, for those interviews, there were similar aspects mentioned as in the survey. Like more user orientated design with flows, different tools, agile development and tighter deadlines. It is possible then, that there has been some movement towards agile development, less wireframes, and the perception is that work is needing to be done more quickly.

#### **4.4.1 Prototyping**

With prototyping being the task with highest number of requests when both the survey results are combined (33%) it is no doubt worth considering further. Just think in 2013 it was observed that creating solutions for prototyping could be the most needed way to improve the tasks of interaction designers. The key word there is "need" and it brings me to something drummed into me when studying (2010) and working (2013) at the New Factory. The use of the NABC. Where you identify a need and then develop a product that meets that need (Demola & Protomo 2010, 2013). From the research in this thesis there may have been a need to improve prototyping, in 2013, that could have been worked to and met. It feels like a missed opportunity, but for others it may not have been. With the desire, of those surveyed, to improve prototyping having dropped 13% and the number using dedicated prototyping software rising, it is entirely possible that others have done that and met that need. Which really would be a fascinating confirmation of the NABC model, referred to as a methodology to develop a quantitative value proposition — the first step in value creation (SRI 2006)

#### 4.4.2 Tools

Now there are too many tools out there to try them all and this thesis shouldn't become a marketing review for various services out there. So instead of doing that I wondered what prototyping tools are available for me now on a tablet device. Is there possibly something there that would bring a notable benefit for interaction designers? The applications mentioned by interaction designers either in surveys or interviews included a wide number of prototyping apps. Unfortunately there was a big problem with them all. They were all for usage on a desktop computer. Perhaps this isn't surprising as we have already observed that interaction designers use mainly laptop or desktop computers in their work. So what is there? For iOS anyway, the nearest tools available were quick ways to make paper prototypes. What you could do is use images of your design and link them using selected areas. Basically this means you can make a paper prototype into an on tablet prototype. In theory if you're using another app to design the wireframes you can make quite an effective wireframe prototype for initial user testing. The drawback is you still have to design every screen and link them together. It is a step in the right direction and certainly gives a way to quickly digitise sketches, that many interaction designers make, contact them and share it with others. To me that may certainly be a worthwhile proposal to help interaction designers. It does mean though that if interaction designers did wish to work solely on a tablet computer there may not currently be any dedicated prototyping tools. Perhaps there is still room for rethinking prototyping with a tablet app.

## 5 PROPOSALS AND CONCLUSIONS

One initial goal for this thesis was to propose possible solutions as to how interaction designers could benefit from using tablet devices in their work flow. The idea was to then re-interview interaction designers to gain their feedback on the ideas. Now that the direction of this work has moved to observing the change over time of an interaction designer's work and other areas, it has been decided not to focus on this. However whilst interviewing interaction designers and analysing the data, ideas have of course come up. So it is certainly worthwhile continuing to expand a bit on those ideas just so they maybe of use to others, especially interaction design professionals.

### 5.1 The value of one device and cloud services

One interviewee revealed that it was important to them to keep notes in Microsoft Outlook, because they save automatically, and then also regularly emails photographs of whiteboard notes to him/herself. This highlighted for me that keeping things in one place is important. So in this case those e-mails, notes and then communication needed to be in Outlook. One strength that the iPad in theory can benefit from is that the input, output and computing is all in the one device. Perhaps using the all in one mobile device to take notes, communicate, photograph notes and ultimately synchronise with any other devices needed in the work flow.

Synchronise is the key to ensuring that everything is available in the one place, that you are at that current time, by ensuring everything is available to all the device you use. Cloud services complement this and are an intrinsic part of the tablet computing experience. As I write this thesis now it is immediately being saved to Google Drive, a cloud service. This is of course more an advantage of cloud services than tablet computers but certainly highlights the advantages of digital devices compared to the good old pen and paper that a majority of interaction designers reported that they use for note taking. Ultimately these designs need to be digitised so working straight to a tablet device is theoretically as plausible as pen and paper. However, that is limited by personal preferences. The thought patterns and space to be able to realise the correct design solutions may not work for an individual working on a tablet computer.

## **5.2 Always a student**

Recently in Aamulehti (Kalliosaari 2015) it was headline news that the ICT industry is undertaking a damning generation change. This alluded to developments that ICT professionals now have to retrain regularly or they will not be able to continue their job. This is due to technology developing quickly, new devices like iPad appearing and clients' needs changing. So this potentially makes tablet computers a prime example in this case. Firstly interaction designers have had to adapt their designs for tablet devices and secondly, it may not be long before tablet devices are not the current technology being used. That gives a possibly finite life span for aspects of what's written here, primarily relating to tablet devices. By observing the changes over a year for interaction designers we can appreciate this. Looking specifically at tablet devices is something that may not have much longevity as new devices appear.

What if there was a way to teach individuals how to adapt to the new technologies? An essential app or service that continually brings little titbits that an ICT professional must learn? Is it just too specific and varying for different ICT professionals? There are so many different jobs, different languages (when it comes to a programmer's work) and different purposes that can't be catered for. However this thesis focuses on interaction designers. Perhaps that would be a specific enough area to have a service that would continually update these professionals with the information they need. If not which part of interaction design could be focused on to do so? Areas in this thesis could certainly be considered.

## **5.3 Interaction design in community management and gaming?**

Having moved into the game industry and applying my skills to community management it has of course, without consciously thinking about it, been dealing with micro interaction design problems when testing, planning community events and producing content. For example when there was a limited availability beta for Cabals: Magic & Battle Cards it was required to restrict access somehow. Using the community forum, as



it is familiar to the players, it was possible to either setup a group or make the beta password protected. It's a harder task for the user to input a new password than it is to use their usual login for the forum. Therefore a group was used to give current Cabals Community members access to the beta and it also brings new users to the forum that want to take part in the beta. This takes into account the bigger picture of building the community at the same time. Much like it has come up that an interaction designer, through the client, takes into account the business side of a project. This becomes even more prevalent in game design where in app purchases are available as all of those interactions lead directly to investing in that game or not.

Elsewhere in the community an aspect of gaming is how players interact with each other. An in game chat and friend list not only acts to allow the players to communicate but improves the users flow when wishing to compete against each other. For example it is easier and quicker to be able to directly challenge a friend from your friend list than create, share outside of the game and type in a code to play against each other. Likewise basic principles such as minimising clicks have come up in improving the first impression of a game and its tutorial. These kinds of design improvements have been possible to give feedback on through testing.

Maintaining a community as a whole provides a whole series of interaction design problems in everything you do and is a bit like how an interaction designer's work varies from project to project and is imminently post-pc. Every post or status update is intended to interact with the players and improve their experience of the game, but also the marketing of the game. For example mentioning the game involved to give a direct link to it or selecting the right tags to help new players find the game. Also how different channels require content to be optimised differently. It of course goes a step further when the community is being introduced as part of the game experience. In *Knights of Pen & Paper 2* for example a Twitter feed is to be displayed in game as a newspaper. However the intention is to create a loop with the game and community. Where by users' own content will be selected to show in that Twitter feed. Therefore bringing new players into the game, bringing current players back to the game as well as putting content from the game into the community. An interaction cycle that I've been working on as we speak. Perhaps by the time this thesis is published it will be possible to see how well that interaction design solution has worked.

## 5.4 Using tablet devices, a retrospective

Would writing this thesis on a desktop computer have been quicker and more efficient than doing the entire process on a tablet device? From this experience and the feedback from professional interaction designers it's probably true that it would have been quicker and more efficient using a laptop or desktop computer. Using an iPad, due to the size of screen and operating system, is a very one dimensional process. One app is visible on screen at a time and it takes a different, more challenging thought process both visually and by having to use one's memory more. This is due to not being able to view more than one source of information side by side and having to remember what you would normally just glance across the screen to see on a desktop.

Has it been possible to complete the thesis using entirely a tablet device? Yes, It has, although a number of tricks and workarounds have had to be found. For example web services can be quite limited when using a "mobile version" on a tablet device. Therefore different browsers have been used for different tasks and apps have had to be found to enable certain tools. That isn't to say there wouldn't have been trouble on a desktop but the list in the appendix of apps used demonstrates how it may have been more efficient to be using a desktop. It's clear web design for tablets hasn't entirely matured yet as it is still a current problem of iPad usage. Many sites direct to mobile versions on tablet, which wastes the additional screen space available compared to mobile phones. When designing it may be best to avoid forcing certain versions of the website on tablet users as if you remove functionality to make it easier to use on a tablet it more often than not causes a problem from my experience. The original site is often preferable over the responsively designed site and so there should always be a way to override it even if only one feature is removed. Please note that when using web sources as references I have tried to link to the full website not the mobile address often being viewed on a tablet device.

One aspect that has made doing this theses more accessible to tablet is the increase in e-books. Through the university library it is possible to find, search within and read a wide range of resources that would have once required hours of scouring and reading at the library. Unfortunately this great possibility also highlighted some more shortcomings of tablet devices, well at least the one I am using. Due to the ways to read these e-

books being web based they are preliminarily designed to use a desktop browser. This makes them awkward to navigate on a tablet and when leaving the book for any amount of time you can be signed out of the service, therefore losing your place in the book. This perhaps is down to the design of the ebook delivery system and reader rather than tablets.

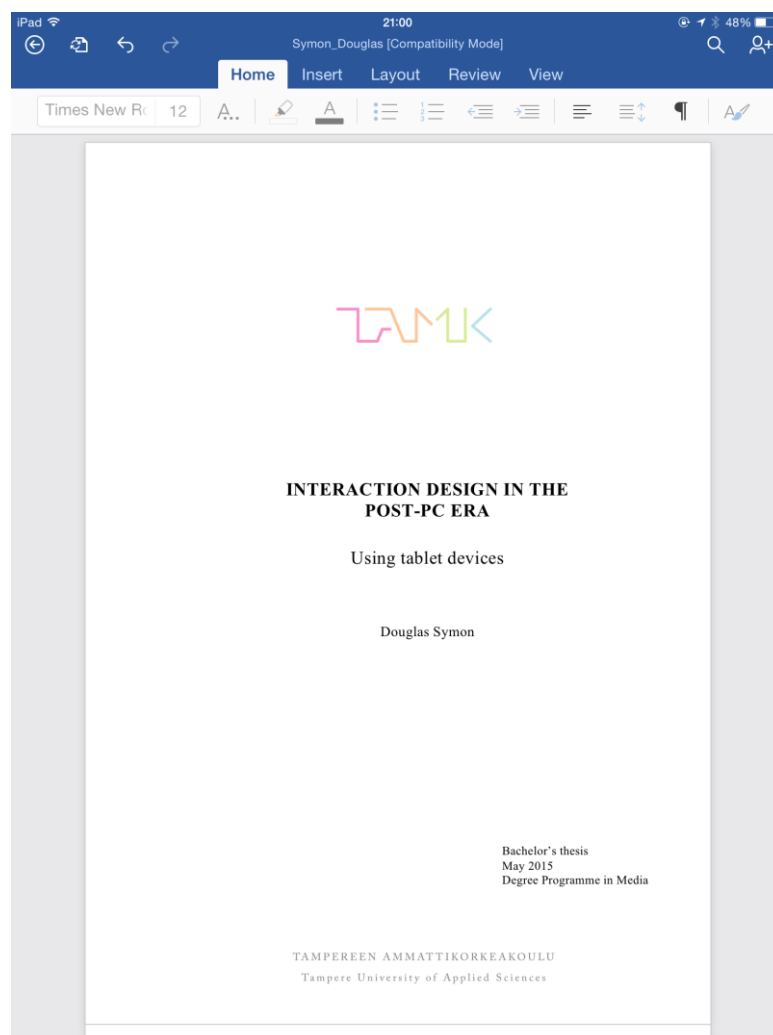
Due to always touching a tablet computer with your fingers one drawback is that the iPad screen is always getting dirty. In certain lighting environments this can be a problem for visibility and maybe a question for hygiene. Another basic drawback is one's posture when using a tablet. Generally you will be looking downwards over the tablet which may result in neck problems. On the other hand adding an external display allows you to work in the recommended posture for using a computer (Online Degrees n.d.). Alternatively the tablet device could be mounted at eye level to counteract that. Typing at eye level may or may not be an ideal way to work. Assumably it would be tiring on the arms. Especially as we find it most comfortable to type in a horizontal position. On the other hand it is easier to be mobile, stand up and move around when using the device so there may be health benefits in that way.

Carrying out the analysis of the survey results was clearly a much more time consuming task using just a tablet device than using a desktop computer. Switching between spreadsheets is slow and it is not currently possible to view them side by side. Also the virtual keyboard takes up a lot of space making it fiddly to input data whilst observing previous data. Inputting formulas to analyse the data was also more challenging. For example referencing the correct cell needed to be done through typing the exact cell reference as opposed to just pressing the cell required like you would do when clicking on a desktop computer. Likewise when comparing written data it was not possible to view them side by side and so you had to keep switching back and forth and remember the differences or similarities rather than quickly glancing between the two.

Something fascinating is the introduction of Windows tablets with full variants of the Windows 8 operating system on them. This blurs the lines of what a tablet computer is even further where for example iOS devices behave often more like a large mobile device where as those devices perform more like a laptop or desktop computer without the mouse and keyboard. This represents an interesting circle where tablet computers originally failed for trying to be too much like a desktop computer are now being accepted as

the market of tablet computers has now been established. It shows that ultimately an interaction designer's work may not fail or succeed only on the design but also marketing and the situation of the market a commercial product is to be used.

Overall the sheer amount of apps I've had to use to find my way through producing this thesis shows how it's not been as simple a task as it perhaps should have be. Some if not all of the apps include: Interview Assistant by DIGI117 LTD. Keynote, Mail, Calendar and Safari by Apple. Google's Mail, Drive, Docs, Sheets and Chrome. Microsoft Word, iCab Mobile, Evernote, SpyderGallery and Puffin Browser.



PICTURE 1. Screenshot of thesis in Microsoft Word using iPad

## 5.5 Improving this thesis, a retrospective

It would certainly have been more efficient to complete this thesis using a desktop or laptop computer rather than tablet and may have been conducive to an overall more substantial and interesting thesis. When thinking about the interviews carried out it may have in fact been more productive to have done group interviews where interaction designer's could have discussed the field and found more in depth answers to the questions presented. Also survey questions could have been constructed to give numerical data, through questions with scaled answers, to make analysis more efficient and more reliable. So that's this thesis. What about interaction design?

## 5.6 How could interaction design be improved?

One angle that could be transposed to any kind of project in any field is one of adopting agile methods rather than waterfall ones. In the case of an interaction designer working with graphic designers and implementers from the beginning rather than setting out specifications first. Also once the release and updates of the product, assuming it is realistic for the specific product, could be factored in as part of the interaction designer's workflow rather than after their job has been done. This would mean further iterations to the design and implemented product based on user feedback and further collaboration with client, graphic designer and implementers. What is meant by this is that either a digital product could be released earlier and actually planned to be improved in stages with regular updates and revisions to the product. Or the interaction designer would always be able to revise designs dependent on direct user feedback from testing prototypes earlier and continue once it has been produced.

It also makes me realise perhaps why our Demola mobile challenge 2010 concept (CalQuest) was successful. We basically just made initial designs with agile working methods from a raw idea. Although obviously from a designer's point of view a more simple and more efficient method would be preferable, such as automatic prototypes from wireframes, as fighting with the basics of implementation can be very difficult and time consuming, taking away from your role itself as a designer. On the other hand it can give ready made elements to be implemented immediately, saving work for the implementors. However, overall if you do not have the skills to do that well, it may be

more detrimental than beneficial. So I would conclude it's best to leave that to the implementers and concentrate on collaborating with them in a quick and efficient way.

For a simple design example to illustrate this it's worth thinking about the design needed for an application's icon. That would definitely benefit from an iterative design process. From working in the game industry it's possible to see that an icon is needed from the first point the application is tested. But usually it is just left to the default icon and towards the end of the project, when it is needed in a waterfall method, an icon is produced. However it would be much better to design an icon that very first time the application is made. Then every time it is subsequently built, to test the next version of the application, the icon should be improved and iterated upon. This benefits also in a way that you can get more user feedback on the icon as it is an explicitly important aspect of how well a game sells in stores. It is like the cover of a book. It stands out and gets your attention and is the difference between if you consider buying the game or not. So without very much extra time at each stage it would be possible to reach a much better end results for the icon. This is likely to be the same for many parts of interaction design projects.

One aspect that could be benefitted from would be an automatic digitisation of notes made and ideas that are created. It's clear from the research that a lot of time is potentially wasted by converting notes and ideas on paper into a digital form.

Overall, I am probably not personally knowledgeable enough to decide really how interaction design could be improved. So let's leave it with how interaction designers have suggested it could be improved. Firstly prototyping should be improved. It's clear communication with teams and clients heavily impacts the success of a project and should always be worked on. Research gives more basis for designs rather than relying on the interaction designer's empathy and user testing can remove that need entirely. Improving these and incorporating it all in an agile process of iteration, may be the way to tackle the ever changing technology and user demands on interaction design, added to by everything that is here, and yet to come, in the post-pc era.

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## APPENDICES

### Appendix 1. Survey questions

Roughly how many people work at your organisation? (This means the company overall but feel free to state also the size of your department)

How many years experience do you have working as an interaction designer?(employed experience as interaction designer)

What software do you use to do your job?

- ☐ Text editor (e.g. TextEdit, Microsoft Word)
- ☐ Presentation software (e.g. PowerPoint, Keynote)
- ☐ Image editing software (e.g. Photos, Photoshop)
- ☐ HTML editor (e.g. Dreamweaver)
- ☐ Vector based graphic software (e.g. Illustrator)
- ☐ Other

What hardware do you use to do your job?

- ☐ Desktop Computer
- ☐ Laptop Computer
- ☐ Tablet Computer
- ☐ Drawing Tablet
- ☐ Sound Recorder
- ☐ Video Recorder
- ☐ Other

If you use a desktop or laptop computer does it have a touch screen interface?

- ☐ Yes
- ☐ No

What tasks do you do as an interaction designer?

- ☐ Concepting
- ☐ Interface design
- ☐ Prototyping

☐ User Testing

☐ Other

What else do you use during your work? (e.g. whiteboard, post it notes, notepad, anything you can think of)

Which task would you most like to see an improvement in the tools or way of working?

Why? (would you most like to see an improvement in that tool or way of working)

Have you used a tablet device? (if so please state which)

Do you own a tablet device? (if so please state which)

How do you find typing on a tablet device?

How could you (or do you) benefit from using a tablet device in your work?

Please recommend any resources for interaction designers to learn and improve their work

(e.g. Websites, books, communities)

Gender (So as to avoid avoid gender bias)

See appendix 2 for questions added to 2015 survey.

## Appendix 2. Survey questions added in 2015

Did you answer this survey previously (in 2013)?

☐ Yes

☐ No

In your opinion how has your work changed over the past year?

### Appendix 3. Interview questions

Roughly how many people work at your organisation?

How many years experience do you have as an interaction designer?

Software. What software do you use to do your job?

What hardware do you use to do your job?

Touch Screen. If you use a desktop or laptop computer does it have a touch screen interface?

What else do you use during your work? (e.g. whiteboard, post it notes, notepad, anything you can think of)

How do you keep notes, remember and keep track of ideas?

What tasks do you do as an interaction designer?

Workflow. Take me through your typical work flow from beginning to end?

Which task would you most like to see an improvement in the tools or way of working and why?

Is there something (a task or function) you would like to be able to do in your work that you cannot currently do?

Have you used a tablet device (if so please state which)?

Do you own a tablet device (if so please state which)?

How do you find typing on a tablet device?

Do you think you could work entirely on a tablet device?

How could you (or do you) benefit from using a tablet device in your work?

What is your view on the usability of tablet computers?

Can you name three benefits of using a tablet computer?

Can you name three drawbacks of using a tablet computer?

What is your view on a tablet devices role and impact on your work?

How do you collaborate with your colleagues?

How do you make prototypes?

How do you carry out user testing?

Please recommend any resources for interaction designers to learn and improve their work (e.g. Websites, books, communities)

