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IDEATION AND DESIGN OF NOVEL IPAD APPS: A DESIGN EDUCATION CASE STUDY

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ABSTRACT
This paper describes and demonstrates teaching methods and results from a seminar on multi-touch software applications for Tablet-PCs like the Apple iPad of the HP Slate. Starting point for the ideation process is the novel multi-touch interaction technique and the different context of use of these mobile devices. The seminar covers the work process from ideation and concept development to design, and ends with non-functional prototypes as final results. The challenge posed by a big group of students with divers backgrounds was met by novel creativity techniques. Methods based on storytelling and approaches known from interaction and software design. Creativity techniques were used in order to generate a huge number of ideas in the limited time given. Concept development was based on a storytelling approach, ensuring a user-centred view. Finally different types of prototypes are discussed: interactive prototypes simulating the application, and film-based prototypes not only showing the applications interface but also users, their context, social interaction and the use process.

Keywords: Ideation, creativity, user centred, storytelling, multi-touch, tablet-PC, interaction

1 INTRODUCTION

There are two major factors driving innovation in the domain of tablet-PCs applications: the *multi-touch* interaction technique on one hand and the different *context of use* on the other. In traditional product design most of the times the functions of a product seem to be given. Therefore the designer can start with problem solving and finding solutions in an early stage of the process. Often the design problems to be solved are defined by tradition, for instance in the case of furniture or mechanical and electric tools like power drills, shavers, cars etc. The functional scope of these products has apparently not changed too much in recent decades, nor did the surrounding conditions for design solutions. The functionality of other – more innovative – products often is being defined by business strategy or marketing, again leaving the designer with the task of solving problems that have been defined by someone else. In software application design there is only little functionality defined by tradition. Especially when developing innovative apps for new devices like an Apple iPad there is hardly any tradition to build upon. Therefore the design process has to begin with the very question of what the functions of the new product should be, or rather what *a user* would want to do with it. To put it short: Whereas traditional product design (too) often starts with the question "*How* do we…?", design of interactive products must first answer the question "What do we…?".

2 ANTICIPATING EMERGING TYPICAL APPLICATION TYPES

An analysis of major factors that drive future multi-touch software products was used as a general frameset for the seminar. These driving factors were found in the new specific device size, the novel interaction technique and the different context of use. The combination of these factors will lead to new media formats, new product and application types and services. In only a few years from today these applications will be considered typical for Tablet-PCs. The goal of the seminar was to anticipate this development. Or to speak in Alan Kay's words: *To predict the future by inventing it*.

2.1 A New Type of Device

Multi-touch devices are not entirely new. There have been first experimental systems as early as 1982 [1]. The very first multi-touch systems were big, immobile, expensive and located in computer science research labs. Multi-touch tables became a lot cheaper after 2005 with Jeff Han's internal reflection

technology [2]. Subsequently multi-touch tables could be found in public places like exhibitions and trade fairs and became more accessible for a broader public for the first time. But while impressingly demonstrating the potential of the novel "fingers-only" approach, multi-touch interaction was still far from being integrated into everyday products and everyday live. This changed rapidly with the introduction of the Apple iPhone in 2007. In the last quarter of 2010 smartphones outsold PCs for the first time ever [3]. Small touchscreen devices have become an “any time and any place”-phenomenon. Between these big immobile multi-touch tables and the small touch controlled phones a new type of gadget emerged just recently: So-called Tablet-PCs like Apple’s iPad and the HP Slate. With a size comparable to small laptops they are mobile but will never be as omnipresent like pocket-sized mobile phones.

2.2 A New Type of Interaction

Multi-touch interaction technique is based on direct manipulation of screen objects without any (artificial) input device. The type of input device always had an almost determinant influence on the interaction patterns and the interface design. For instance the invention of the computer mouse was both a prerequisite and a motor for the development of graphical user interfaces in the late 1970s. In this sense multi-touch technology is the prerequisite and the driver for novel interfaces specific for the use of bare fingers as an input device. Today's interaction pattern language found in multi-touch tables and smartphones will be only the starting point for the evolution of an appropriate interaction language dialect for multi-touch Tablet-PCs.

2.3 A New Type of Context

Apple’s advertising films show iPad users located in living room scenarios. This suggests that the context of use of these new devices is not the office anymore. The typical iPad use scenario is not sitting on a chair at a desk, probably it is not work related anymore at all. In theory tablet-PCs are just as mobile as smartphones are, but their bigger size makes them much less ubiquitous. In contrast to mobile phones tablet-PCs are less likely to be pulled out at a bus stop in order to bridge a short waiting time. Apple's advertising films depict this novel context of use by showing users consistently situated on sofas – and probably this represents the most determining factor for the use context. The iPad is rather leisure than work related, and rather located in the living room than in public space.

3 FROM IDEATION TO PROTOTYPE

In order to foster innovative ideas, computer supported random processes and combinatorics were employed as creativity techniques. With the help of these techniques thousands of text snippets were generated and served as a source of inspiration. In a second step the few text snippets, which triggered promising ideas, were further evolved with a storytelling approach. The resulting stories were used as a basis for the development of use case descriptions and the design of activity-diagrams. The final outcome were either films demonstrating the (faked) use of the designed application or interactive demo prototypes, non-functional in an engineering sense, but giving an almost complete impression of the (intended) functionality as well as demonstrating interaction principles and the visual interface design.

3.1 Interdisciplinary Approach

The seminar took place in an interdisciplinary Digital Media program comprising interaction design, computer science, and media theory. It was held twice with only minor differences in the teaching approach: first in a bachelor program (mainly third and fifth semester students) and subsequently in an international master's program (mainly first and third semester students with diverse cultural backgrounds). In both cases the group was rather big with more than 30 students participating. The main focus of the seminar was on ideation, concept and interaction design. In order to visualise and demonstrate the concepts in digital prototypes a minimum of technical literacy is of course needed. Beyond that a technical implementation was not required. The students were asked to work in groups of two or three persons. Some groups consisted of students with different skills complementing each other (computer science or design) leading to a "division of labour" working style. In other groups students with similar backgrounds and skills gathered – mostly students with an interdisciplinary background already combining competencies in design and technology.

3.2 The Burdon of Reasoning

One of the keys to creativity is the ability to get rid of goal-oriented thinking and reasoning – at least temporarily for the first ideation phase. Human perception is to a great extent based on analysing, sorting, classifying and interpreting what we see, hear and feel. This permanent process of *making sense* also influences human thinking and can hardly be switched off in everyday live. In the normal mode of thinking our thoughts are permanently checked, filtered and being controlled. Avoiding weird and crazy thoughts is definitely helpful or even essential to cope in everyday live. However, when we try to generate innovative ideas this mode of controlled thinking is a significant handicap. On top of this evolutionary-biological aspect, formal education has a great tradition in successfully teaching pupils to first and foremost avoid mistakes and to keep them from taking risks or from experimenting [4]. Several means can help to overcome this way of disciplined and controlled thinking: time pressure, random processes, combinatorics, and drugs. With exception of the latter all of these were applied in the seminar and will be described in detail in the following paragraphs.

3.3 Generating Raw Input

In the first session students were introduced to the general topic of the seminar (see "2 Anticipating Emerging Typical Application Types") and the schedule for the semester. Due to the big group size of more than 30 students a classic brainstorming method did not seem promising. Experience shows that the bigger a group gets, the smaller the percentage of people contributing to a discussion gets [5]. Instead, the students were asked to collect terms they associate with a given theme. They could choose from given themes that were related to the seminar's topic: *leisure, living room, touch, mobile,* etc. In order to avoid reflecting and filtering their associations the students were told to write down as many terms as possible in only two minutes time – with the student producing the longest list being the winner. Even though there was nothing to win, the group altogether produced a set of more than 400 different terms in only two minutes. One might think that the amount of terms that are not too relevant for the topic might be a problem and should be filtered out in the following step. But surprisingly enough the list provided a well-balanced mix that kept the relation to the topic on one hand and ensured a good level of inspiring glitch on the other hand.

3.4 Random Processes and Combinatorics

The goal of the next step was to create combinations from the 400 collected terms, which were hoped to trigger ideas for innovative products. In the first seminar a *random process* was used to generate combinations. The lists of terms were cut up in paper snippets containing one word each. The paper snippets were collected in individual baskets for each theme (*leisure, living room, touch, mobile, etc.*). The students were then asked to draw one term from each of the baskets (i.e. themes) and write down a description of a product, not longer than two sentences, making use of all of the words they drew from the baskets. In order to avoid censorious thinking again only a very short time was given to work on this task. After only three iterations more than a hundred product ideas had been written down, most of them rather funny than useful – but all in all more than enough for a first round of discussion, filtering, and selection for further consideration.

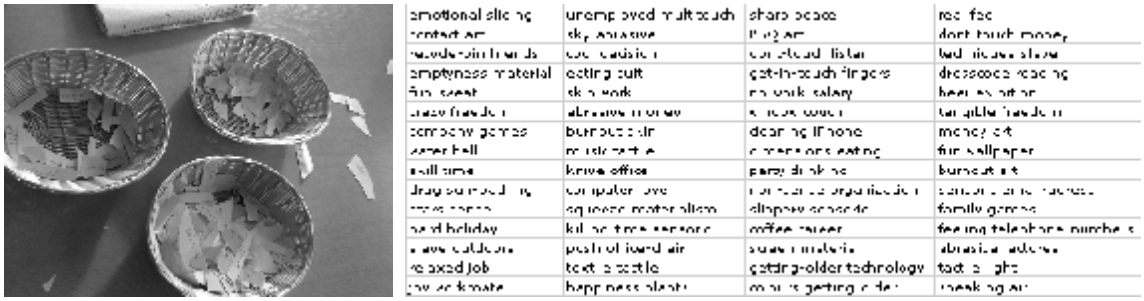

Figure 1. Using random processes and cominatorics to generate input

In the second seminar *combinatorics* were used to create an even bigger plethora of word combinations. The terms were combined to simple pairs – each term with every other one – by a simple software script. Thus an input of 400 terms generated almost 80,000 unique word pairs. For a single person it would take three days to scan through this list when giving each pair just one second

of attention. In this second seminar students were asked to scan through the generated list until they had found at least five combinations that trigger promising ideas and write these ideas down in one or two sentences.

3.5 Ensuring User-Centred Thinking by Storytelling

A standard problem in human computer interface design is getting computer scientists and designers to think in a users perspective. There are examples of user testing and involvement of real users in the design process already in the 1960s. For instance Larry Tesler's work at Stanford University, Xerox PARC and Apple Computer included interviews and what is today called usability testing with real end-users who also participated in the design sessions [6]. Regrettably a participatory design approach is too time consuming to fit into the tight schedule of a four hours per week design seminar. The best alternative to working with real users is empathising as much as possible with the target audience. But both computer scientists and designers often are not able or willing to take a users perspective. Especially computer science students – trained mainly in solving given technical problems – often find it hard to keep themselves from thinking in technological terms. Design students on the other hand often are too self-opinionated to develop empathy with users and a sense for their needs. One of the most popular methods to encourage a user-centred view is the use of *personas* – fictitious prototypical users who are described precisely in terms of personal and professional background, as well as their needs and goals [7]. Developing use cases with specific personas in mind has become a standard method in usability engineering in the last decade. These use cases were often already documented in the form of tables or diagrams with a strong focus on software functionality. Today, the so-called agile software development approach works with lists of *user stories*: short descriptions of what a user can do, written in everyday language [8]. Especially for students with little experience in user-centred design both of these methods are prone to a rather fragmented view on the design problem and to lose sight of the social context of use. In order to keep a strong focus on the user and their context the author literally forced the course participants to write long and detailed stories illustrating a day in the life of a typical user of their new iPad application. After some initial resistance (*I'm not a writer, it will be embarrassing …*) the feedback became very positive when the stories had been written and read out in the group. Everyone felt that writing the story had helped getting a clearer idea of what people should be able to do with their product. Especially concepts with an emphasis on mobile and social interaction profit from this approach. By writing stories from an everyday user perspective the narrow focus on concrete features and functionality is broadened in favour of user activities that are not necessarily reflected on the software's interface, but still are crucial for the overall concept.

3.6 Extracting User Activity For Diagram Creation

Chris Crawford, an expert in interactive storytelling, also highlights the role of language as a tool for successful software design: *Always design the verbs first. Don't start with the technology.* [9]. After writing a detailed user story, the next step was to break the story down into single user actions. The easiest way to extract user activity from the written story is by simply looking at the user related *verbs*. Based on the activities represented in these verbs it is quite simple to lay out a use case or flow diagram that displays what the user does and how the interrelations of these activities are.

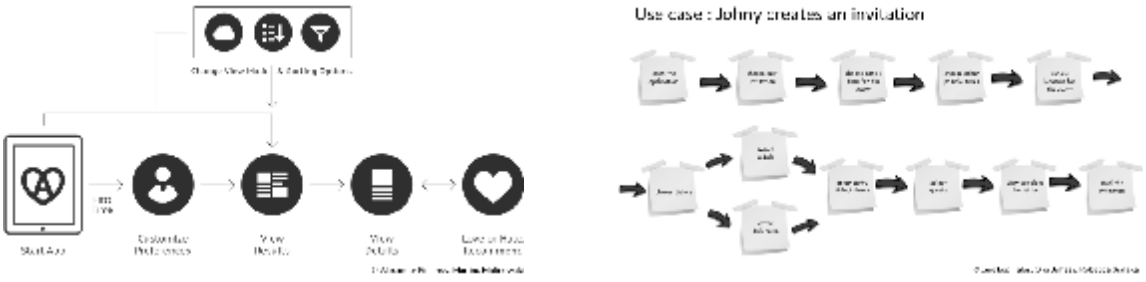

Figure 2. Flow Diagrams derived from the developed stories

3.7 Interactive Prototypes vs. Contextual Prototypes

As mentioned earlier, the final outcome of the seminar can be grouped into two categories: first, interactive prototypes that are as close as possible to a real marketable product in terms of visual appearance and interaction – comparable to a prototype in traditional product design. And second, presentations based on animation and film that show not only the product but also people using it, interacting with each other and with the device. In recent years students more and more chose to work with the latter film-based prototypes, which the author calls *contextual* prototypes. There are two reasonable explanations for this trend. One is the increasing importance of constitutive factors beyond the visible software interface: today interaction is often based on sensor input like GPS for geo-positioning or the accelerator sensor for spatial orientation. With Adobe Flash based prototypes for instance this is very hard to simulate. Concepts like this are much easier presented in a comprehensible way with animations and films that show not only the screen-based interface but also users moving and interacting in their environment. The other reason is found in the increase of social interaction in software. Whereas the visual surface of conventional task-oriented single user software can be completely self-explanatory, multi-user software and its social processes between users are hard to understand by merely looking at the screen.

Figure 3. Prototypes including visualisation of the users' context and their social interaction

4 RESULTS

Concepts gained from the described process that made it to the final prototype stadium cover a great variety of topics. Some examples:

- Non-linear presentation software
- Application for organizing lunch with several courses over a social network
- Software that maps incoming phone numbers to personal vibrating patterns
- Augmented reality application showing information about stars and constellations when the camera is pointed to the nightly sky
- Virtual world-wide aquarium connecting people by personal message-carrying fish
- Social software for organizing challenges and competitions
- Multi-touch sequencer for loop-based electronic music
- Application for generating proposals of what to wear (combinations due to personal collection, event, style, and weather)
- Storytelling application in which the interaction modifies the story
- Several multi-touch and multi-user musical instruments
- Mobile dating and profile matching application
- Avatar-based interface for a personal chat community software
- Fitness trainer application based on personal music collection

Apart from the expected and intended learning goals like concept, design and prototyping skills, a rather surprising insight was that there is obviously no "end of innovation" in sight. In the first seminar session students frequently complained: *this has been done before, there is already an app for that*, or

even *everything has been done before!* This scepticism was overcome quickly with the presented creativity techniques and the resulting stream of idea nuclei. Even though 99% of these were rather useless, the sheer quantity generated a feeling of abundance. At the end the small percentage that made sense provided more than enough input to still make it hard to choose from several promising concepts.

5 CONCLUSION AND OUTLOOK

The genius designer who produces great ideas out of nowhere is a strong cliché, and it implies that using "creativity aids" is almost an act of dishonour. However, the results of this seminar suggest that great ideas and good concepts can be encouraged a lot by simple methods like creating word-combinations with the help of a software script. Even though design has its great and unique power of visual thinking, a purely text-based storytelling approach is evidently able to push both concept development and user-centric thinking especially in early phases of design projects. The most interesting issue this seminar has thrown up is the question of appropriate ways of prototyping. Both types – the film based prototypes and the interactive prototypes – have their pros and cons. Film based prototypes do show users, the use process, and the context, but the viewer lacks the actual experience of interacting. On the other hand interactive prototypes – especially in the case of multi-user and location-based applications – only highlight some aspects of the whole use process. An attempt to find a happy medium or even a synthesis between these two approaches should be done in future seminars.

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