Design Thinking for Search User Interface Design

Arne Berger
Chemnitz University of Technology
Strasse der Nationen 62
09107 Chemnitz
Germany

arne.berger {at} informatik.tu-chemnitz.de

ABSTRACT
The paper describes with the help of a brief example how design methods, namely those formed in design thinking can help search user interface design to innovate throughout the software development process.

Categories and Subject Descriptors
H.5.2 [**Ergonomics, Evaluation/methodology**]: Design Methods in Search User Interface Design

General Terms
Measurement, Documentation, Performance, Design, Human Factors, Experimentation

Keywords
Design Thinking, User Interface Design, Design Methods, Qualitative Studies

1. INTRODUCTION
Since Tim Browns ingenious talk on TED [1.], Design Thinking (DT) had a huge impact on the business and design world. By injecting the way designers think into accustomed business processes, CEOs hoped to gain an advantage in competition. Designers on the other hand hoped their overall influence might increase. However, the field has more to offer than bringing creative techniques to supposedly uncreative domains. The first publications on the matter appeared as early as the late 1960s [2., 3., 4.] as a way to externalize the enigmatic design process. Since then, the creative application of design methods (DM) has proven its effectiveness, fun and relevance countless times. [5., 6.] Despite its persistent application in typical creative domains, the radical application of DM for digital age products is still a young discipline.

1.1 Design Thinking vs. Design Methods
The difference between DT coined and developed at Stanford [7.] and DM as defined by Jones amongst many others [3.] needs to be precised in another publication. For now, the author (a Designer) is grateful to see the broad spectrum of DM finally being brought to attention due to the success of DT. However, there are way more methods to use than the 51 methods as suggested by DT [8.] and there are way more feasible design processes than defined in DT. Because of the briefness of this paper and for the sake of a better understanding, DT is used as an expression for the design process, while DM is used as an expression for any design method from the DT or any other DM toolbox.

2. CURRENT STATE OF DESIGN METHODS IN SEARCH USER INTERFACE DESIGN
The possibilities of DM are still badly implemented into product development. However, a subset of DM, namely User Centered Design (UCD) is fairly well implemented in the domain of interface design, including that of search user interface design. UCD significantly helps evaluating user needs but often fails to innovate. UCD methods mainly consist of a relatively strict set of methods compared to what DT and DM have to offer [9.]. Those methods are capable of gaining insight and evaluating interfaces but do not encourage an innovation process for future user interfaces.

As an user interface design professional working in an academic development environment that is mainly formed by information retrieval experts, the following description of a typical workflow abstracts the prototypical UCD process of developing search user interfaces.

2.1 Current Process of Search User Interface Design
1. Users tasks and problems are observed via Site Visits or Website Analytics [10.]. Those methods help to gain insight into specific user problems. The combination of both nowadays is the holy grail of gaining insight into users issues [10.].

2. Information retrieval experts and search user interface designers use methods like brainstorming to plan a software product. It is used mainly as a conversation starter, but also functions as a way to frame the current state of technical possibilities.

3. Users problems (step 1.) are interpreted and tried to be solved with the help of the technical possibilities (step 2.) which are then implemented.

4. The usability of the search user interface proposed in 3. is evaluated via user studies comparable to the ones in step 1.

Iterations: The abovementioned steps are iteratively repeated several times. With the help of prototypes the interface is refined before a final implementation takes place. However these steps only help to streamline the interface. They are not fully useful for innovating an interface according to DTs possibilities.

2.2 Critics of the Current Process

We believe that the process of nailing down the problem and suggesting a vital solution after framing technical possibilities and observing users is insufficient. Those well established methods have the main advantage of providing hard numerical measures. Which is even more so, when measures like precision and recall are used to learn how efficient a system is. Via those standardized measurements a comparison between different solutions is easy to draw. Relying on those hard measures only shows insights, which can be formulated in numbers and concluded from those.

On the other hand, soft properties of a search user interface like »what user really want«, »fun of use«, »suitability to unusual tasks« and in parts »user satisfaction« are next to impossible to measure via hard numbers. Although efforts exist [11.] measurability of qualitative soft properties is hard to be standardized. Outcomes therefore are less clear cut and often fail to be comparable via statistics. As the academic viewpoint in the field tends to analytic comparison, soft properties are seldom explored, described and measured. Therefore subsequent findings often fail to be implemented.

Based on the before mentioned, we propose the radical application of DT in search user interface design via »participatory prototypes«. This concept integrates users and developers alike. We demonstrate its process briefly in the next chapter and explain its application in three following examples.

3. PROPOSED DESIGN THINKING PROCESS FOR SEARCH USER INTERFACES

In the business world (see introduction) DT is foremost a process used for innovating new products.

The DT process is defined as following [8.]

Understand: Understand problem and context.

Observe: Externalize future users problems via e.g. extreme user interviews or empathy maps.

Define: Interpreting and weighting the gained knowledge from the previous steps via e.g. ad-hoc personas.

Ideate: Using common or uncommon creative techniques, e.g. body storming for generating many ideas.

Prototype: Visualize and communicate ideas with the help of fast and cheap prototypes with paper, Lego bricks or the product box method.

Test: Future users test those prototypes, via e.g. story telling techniques.

We believe that DT can and should be incorporated in any possible stage of a development cycle. Interface design prototypes are extraordinary easy to manufacture and cost next to nothing.

We suggest to apply the DT process more closely to the development of search user interfaces to benefit from its many advantages, esp. to force the pace of innovation.

3.1 Prototype Categories

As the label »prototype« may be misleading, we tend to think of anything capable of producing feedback as a prototype. To make further understanding easier we classify prototypes as following in the order of their advancement:

3.1.1 Very Low-Fi Prototype (Conceptual Model)

Generated by: user

Function: none, may not be technically feasible

Workflow: only conceptual

Visual Design: none

Medium: analog

Modality: any

Usually user generated, often not understandable without the creators explanations. It only describes a preliminary workflow of operations and functions and is not necessarily technically feasible.

3.1.2 Low-Fi Prototype (e.g. Paper Prototype)

Generated by: user, designer

Function: none, may not be technically feasible

Workflow: preliminary, mimicking operations

Visual Design: none

Medium: analog

Modality: any

Usually presented via the Wizard-Of-Oz technique it incorporates as many operations as possible and always fakes function.

3.1.3 Mock-Up

Generated by: designer

Function: none, may not be technically feasible

Workflow: mimicking operations closely

Visual Design: none

Medium: digital

Modality: any

Is often (and should be) visually unapealing, mimicking operations closely, but fakes function.

3.1.4 Dummy (often refered to as Click Dummy)

Generated by: designer

Function: none, may not be technically feasible

Workflow: mimicking operations

Visual Design: existing, often visually polished

Medium: digital

Modality: any

Incorporates a polished visual design, mimicking operations, but fakes function. May or may not incorporate the proposed interaction paradigm. The most common implementation of the later is a browser based click dummy that fakes the functions off a mobile touchscreen device.

3.1.5 High-Fi Prototype

Generated by: designer, developer

Function: incorporates some or most of the proposed functions

Workflow: mimicking operations

Visual Design: existing, often visually polished

Medium: digital

Modality: same as end product

Is similiar to a Dummy but also incorporates some of the proposed functions. It also incorporates the proposed interaction paradigm.

3.1.6 Alpha Grade Version

Generated by: developer

Function: incorporates some or most of the proposed functions

Workflow: mostly operational

Visual Design: may or not be existing

Medium: digital

Modality: any

A prototype proposed by developers that demonstrates most basic functions, usually does not feature a polished design.

3.1.7 Beta Version

Generated by: developer

Function: incorporates some or most of the proposed functions

Workflow: fully operational

Visual Design: existing

Medium: digital

Modality: same as end product

A visually polished prototype most often proposed by developers is a functioning program that may have bugs or quirks and is mainly used in order to get rid of those.

3.2 Observations for Prototypes

As this brief listing suggests most of the prototyping work in search user interface design is done by a designer. Thus helping to maintain a conversation between what users want and what developers can implement.

There are usually no direct prototypes from the users. Users comments or observations are interpreted multiple times. First they are made operable via prototypes, crafted by designers, which subsequently are interpreted by the developers.

Prototypes from the perspective of a developer are used only for evaluation during the end of the implementation cycle. As a lot of code and effort went into these, heavy changes are omitted and hopefully eliminated with earlier prototypes.

While the main goal of DT is to encourage interdisciplinary user groups to create innovative prototypes, it does not focus on direct prototypes from users or developers.

3.3 Implications for Process

We want to continously implement user prototypes into the development and we also encourage a process where developers explain technical feasibility via prototypes even in very draft and early stages.

This realization came through practical usage of various DM in a couple of projects. The following chapter briefly describes how we introduced participatory prototypes to search user interface design for the creation of playlists for mobile video consumption.

Two other successful projects include Design Thinking for a customized faceted navigation and Design Thinking for a multitouch interface for searching in large multimedial repositories.

4. DESIGN THINKING THE CREATION OF PLAYLISTS FOR MOBILE VIDEO CONSUMPTION

We wanted to address a problem, know to many smartphone users on the move. We understand that, weather commuting or going out with friends users usually avoid constructing complex search queries to find suitable content to watch.

To define the problem, we asked users what they miss and want from a mobile TV application. Two main points emerged:

With services like youtube consumers are left having to refine a search query several times or to use non-customized item lists such as »most viewed«. On the other hand, in traditional TV a moderator weaves a golden thread and guides viewers via this potentially emotional connection through a series of video clips. After an ideate session the most promising prototype was a mixed breed of playlists, woven together by emotional metadata. To gain insight into users mindsets regarding the construction of those personalized playlists we applied various DM.

To find out which emotional content attributes users are looking for, we asked participants to map out a virtual space of content properties and show how they thought to navigate within it. This method usually helps to discover pathways and interests in which people make sense of a particular content space. The results eventually help to make sense of how to construct queries for filter specification.

Users were asked to individually draw a map or diagram of what comes to their mind when being on the move and having a mobile video handset available, whether sitting on public transportation alone or being in a pub with friends. The six users had 15 minutes time to draw a map or scheme and were asked to freely associate parameters to form a personalized playlist. Given the mindset of being on the move, users formed questions from a simple vocabulary and subsequently wanted to change only certain parameters after watching a few video items. A discussion with all participants followed.

The results lead to the assumption that users are interested in direct mood filters. Most of the user generated maps feature mood clusters or the simple question »how« in a list of questions.

Based on those findings the developers of the future interface with the help of a designer proposed a low fidelity prototype containing a filter named »How« together with more filters based on the four cardinal questions Who, Where, When, What. This was done because all those metadata fields could be filled with metadata readily available in the existing database. To prove the concept it was introduced to twelve users. Users' feedback on this approach was insightful in two ways. On one hand, users at large expressed their general approval on the advantages that might arise by constructing exhaustive content filters with just a few steps of interaction. On the other hand, the pre-structured characteristic was heavily criticized. However, the rigidly defined prototype inspired participants to incredibly rich feedback. This proposal in combination with open ended questions has proved to be a fast

and convenient way to gain user feedback on a large variety of issues without a lot of explanation. The main insight is, that all users found and used the filter option »how«. Most user feedback was given on only this feature. Findings are discussed in depth in [12].

TV Anytime [13.] is a metadata standard that defines metadata for broadcasts. It is common to use in describing video items and also features 53 moods. For the sake of technical interoperability we wanted to stay within the realm of this particular metadata standard but also wanted to make the proposed moods more accessible for users. Based on those technical restrictions and the previous results we individually asked 45 potential users to sort the moods into self-defined categories that made sense to them.

At least two completely different ways of sorting prevailed. One group of users preferred an order that resembles a classification into movie genres, while a second group was interested to sort them according to emotional dependencies. While a number of 45 users was significant enough to reveal two groups, users assigned to the first group were too few to manifest significance. Focusing on the larger group (35 participants) seven mood categories were filled unanimously. Apart from very few moods all other moods are mutually joint to groups. This could make the previous discussed low fidelity prototype more flexible in navigating complete mood sets. Based on those findings, users proposed an interface that asks questions in an order that is more determined by them. A subsequent High-Fi prototype was built, incorporated 1000 video items. It allows the selection of a variety of moods as well as a combination of filters derived from the five cardinal questions. A formal user study is now underway.

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