Is it too late?

Investigating implications of late introduction of a user-centered approach in design processes

Andreas Berglund
Abstract

With the increasing number of digital applications being developed today, the demand on smooth processes and satisfied end users increase along with it. In software development the focus on functionality is central in any process and is the factor determining whether or not the application is functional. However, even if a product is functional it does not mean that it is easy to use, hence providing a satisfying user experience. The purpose of this paper is to study whether or not there are any implications regarding the user experience when a user-centered approach is not applied from the beginning of any given process, taking the variety of methodologies available in regard. The paper is supposed to provide an initial insight into the problems regarding application of user-centered design in the development of digital artifacts. This is a qualitative study where six practicing interaction designers where interviewed regarding their experiences in processes where they had been involved from the start and projects where they had been involved at a later stage, and what, if any, differences there were. The results showed that there is in fact a difference in how the respondents viewed the different scenarios, with the most significant difference being that the impact they had decreased the further down the line they were introduced to the project, as well as the value of user tests drastically decreased. Budget and deadline were two important aspects that were pointed out as being the deciding factor when dealing with changes in a project where late introduction of user-centered design had occurred.

1. Introduction

1.1 Background

In IT and system development today there are high demands on delivery of secure and stable systems. With the wide range of different devices used today the demand for a more thorough consideration of the user experience becomes increasingly higher. With the general public becoming more and more fluent when it comes to interacting with digital devices and software, the users’ demands on the product will likely increase along with it (Mobile Marketing Statistics Compilation, 2016). Even if a product satisfies the functional needs, if the resulting user experience is unsatisfactory, if the user has difficulties carrying out the tasks provided by the product, it will likely be considered a failure. However, with the monetary factor arguably being a central aspect in most processes, a user-centered approach can be an expensive option to utilize. In software development there is almost always a clear focus on what a specific artifact is supposed to achieve in terms of functionality while the user experience and usability may be overlooked or disregarded. This could result in artifacts that are unsatisfactory to the user which could in turn lead to limited or no usage, which means limited or no income generated by the product. It could be argued that there is a consensus within the field of HCI and interaction design that a user-centered approach to a design process is vital to the success of the finished product (Benyon, 2014). Regardless of this, inadequate software that cannot provide the users with the desired experience even though the overall functionality is what the users expect are consistently released to the market. Just by browsing the App Store or Google
Play and searching for an application to provide a specific function or service, there are almost always a smaller number of more successful applications followed by a large number of similar applications with fewer downloads, hence they can be considered to be unsuccessful. Exactly what characterizes a successful software may vary. In this study the reasoning of Benyon (2014), that user-centered design is important in any given process is used as a base for further investigating how the final user experience may be affected by introducing user-centered design, and in particular interaction designers, at a later stage of the process.

By using the concepts regarding elements of user experience presented by Jesse James Garrett (2011) and the topics of interest presented by Lauralee Alben (1996) as a theoretical basis this study intends to investigate the implications and effects of neglecting to regard the user experience and user-centered design perspectives in the early stages of a design process of a digital application and what, if any, impact the choice of methodologies have on these design processes. Furthermore, with regards to these concepts, I am asking what impact later introduction into processes have on the work of interaction designers. Since most projects in the field of system development have clear specifications to what the applications needs to be able to do, I hope to provide arguments that support the notion that even if the functional requirements are met the underlying user experience aspects can be neglected if a user-centered approach is not utilized in the early stages of development of any given digital artifact. The main purpose of the study is to provide information that can be used to gain a deeper understanding regarding the consequences of applying user centered design in the early stages compared to later in a design process in the field of software development.

1.2 Research questions
The research questions posed for providing the necessary results to acquire this information is the following:

- What are the differences between late and early introduction of a user-centered approach in design processes in the field of software development?
- What impact does late introduction of user-centeredness have on the interaction designers in terms of workflow and techniques?
- What role does the choice of methodology play?

2. Related research
2.1 Rationale
The theories and research provided in this section will be referred to and adhered to when analyzing the data of the study. Interaction design, user-centered design and user experience are the central themes to which the study will relate and refer. Considering the research question of the paper regarding the early versus late introduction of user-centered design in software development the declaration of the most commonly used methodologies in software development seems logical. Since the use of agile methodologies has been widely adopted lately there was a significant chance that at least some of the respondents would utilize them (Benyon, 2014). Therefore, an introductory account to them was needed since at least basic
knowledge of the terminology is required throughout this paper and they will be taken into account in the analysis with regards to the subjective views of the respondents regarding the importance of chosen methodology or methodologies.

2.2 Interaction design

According to Alan Cooper et al. (2007), Interaction design is often defined as the practice of designing interactive digital products, environments, systems and services. Interaction design has like many other design fields a focus on the aesthetics but the main focus is on behavior. Additionally, Cooper et al. (2007) states that interaction design as a field involves studying how things might be rather than how things actually are, which separates interaction design from the fields of science and engineering. Moreover, interaction design has a clear focus on catering to the needs and demands of the end user of the particular product or artifact, Goal Oriented Design, while other disciplines may have a more technical approach to the developing process. In the Goal oriented design methodology it is regarded to be of vital importance to have a clear understanding of the goals and requirements of the target user. (Cooper et. al., 2007) In addition, Preece et al. (2002) define interaction design as designing interactive products to support people in their everyday and working lives, while continuing to emphasize that it is about creating a user experience that will ultimately “enhance and extend the way people work, communicate and interact.” (Preece et al., 2002, p. 6) The authors argue that there are four basic activities involved in the process of interaction design. These activities are “identifying needs and establishing requirements, developing alternative designs that meet those requirements, building interactive versions of the designs so that they can be communicated and assessed and finally, evaluating what is being built throughout the process.” (Preece et al. 2002, p. 12) Winograd (1997) provides a slightly different definition of the term interaction design, where he argues that it is the design of “spaces for human communication and interaction.” (Winograd, 1997)

In his book The Inmates Are Running the Asylum, Alan Cooper argues that the approach to how problems with interactive software are solved needs to be renewed. He states that designers are faced with different problems when designing interfaces for digital artifacts than when designing interfaces for traditional or analog products that do not include software, for example inanimate objects such as tools. (Cooper, 2004)

Thomas Green et al., (1996) has defined fourteen cognitive dimensions which provide a common vocabulary for developers to utilize when identifying and discussing different aspects of a design process of any given artifact. In addition to the original dimensions provided by Green et al., (1996) the field of HCI, specifically the article Dealing with new cognitive dimensions (2000), has provided additional dimensions in an effort to expand the areas of use of the framework in relation to the development of newer technologies. (Blackwell, 2000) A central aspect to consider when it comes to interaction design is the user experience.

2.3 User experience

Jesse James Garrett defines user experience as the “other”, often overlooked aspect of product design. He argues that the functionality, what the product actually does, is what is given the most attention in most development processes. Additionally, Garrett states that the user
experience aspect, how the product actually works, is what often determines if the product is a success or a failure. Moreover, user experience doesn’t have anything to do with below-the-surface functionality of a product. It is about how it looks and works on the outside, when a user is interacting with the artifact. Whether or not a product delivers a good user experience is determined by how well the end user is able to interact with it. (Garrett, 2011) Preece et al. (2002) argues that many products that require user interaction to carry out their tasks has not been adequately designed in with the user in mind, resulting in an unsatisfactory experience for the user even though the artifact effectively carries out the tasks from an engineering perspective. Moreover, Preece et al. (2002) presents a number of aspects beyond improving efficiency and productivity that interaction design strives to achieve. They argue that interaction design is about creating systems that are satisfying, enjoyable, fun, entertaining, helpful, motivating, aesthetically pleasing, supportive of creativity, rewarding and emotionally fulfilling. These terms are concerning the resulting experience of the user, what the system feels like to the user (Preece et al., 2002). It should be stated that there is clear distinction between usability and user experience, and that the two should not be mistaken for one another. The following model by Preece et al. (2002) serves to illustrate the different dimensions targeted by the two terms where the outer ring describes terms that concern user experience while the inner ring describes aspects of usability.

This study is primarily concerned with the outer ring, the user experience, without disregarding the importance of considering the usability aspects in a design process. While they target different aspects of interaction design, both of these aspects are important to consider in order to carry out a successful user-centered design process (Preece et al., 2002). The following section will talk more specifically about user-centered design.
2.4 User-centered design

User-centered design can be achieved by a number of approaches. Preece et al. (2002) divide the main methods into two groups, ethnographic-based methods and participatory methods. The ethnographic approach does not necessarily involve the users directly, while participatory methods are the opposite, where users are involved to a large extent (Preece et al., 2002). There are a number of available methods and techniques within these that can be applied to processes in order to achieve user-centeredness. User testing, personas and scenarios are arguably the most common and scenarios and personas often appear together (Benyon, 2014). User testing involves exposing people from the proposed target group to the artifact in order to provide feedback. Benyon (2014) states that being human-centered or user-centered is an expensive effort. Since it involves observing people and trying ideas out the process takes time. Being user-centered is an additional cost to any given project, and given this fact, it is a valid question to ask whether or not it is worth taking so much time to user test and prototype products throughout the process. However, Benyon answers that very question with a firm ‘Yes’ and continues to present four aspects that benefit from a user-centered approach. Referring to several case studies presented by Williams et al. (2007) Benyon argues that a user-centered approach to designing interactive systems results in reduced number of calls to customer helplines, fewer training materials and increased sales among other things. Safety is another aspect that will benefit from this approach, since there are multiple reports of accidents that could be traced back to displays showing faulty information or the user not understanding the system itself. Privacy is another aspect that Benyon is highlighting. Given the availability of information, both personal and public, with the current online environment, Benyon argues that people need to be able to trust the system they are using. The last aspect of the four is sustainability. With the number of technological devices being discarded every year and the sheer power consumption of our civilization, sustainability and environmental awareness should be taken into account by any designer of interactive systems, especially when utilizing a user-centered approach. (Benyon, 2014)

If in any given design process the goal is to create engaging and efficient user experiences the concept of user-centered design is applied. According to Garrett (2011) the concept of user experience is simple. One only has to take the end user into account throughout the entire design process. However, Garrett argues that the implications of implementing this seemingly simple concept can be complex.

“Everything the user experiences should be the result of a conscious decision on your part” - Jesse James Garrett (2011, p. 17)

In any given design process, compromises are likely to be difficult to avoid. This can be regarding time or budget given the project at hand. However, if a user-centered design perspective is applied these compromises are unlikely to happen by accident and the process and the resulting user experience of the product can be controlled. (Garrett, 2011)
“The biggest reason user experience should matter to you is that it matters to your users. If you don’t provide them with a positive experience, they won’t use your product.” - Jesse James Garrett (2011, p. 17)

Garrett (2011) talks about five component elements to be considered when utilizing user-centered design in order to achieve the best possible user experience. These five “planes” as Garrett calls them consists of the surface plane, the skeleton plane, the structure plane, the scope plane and the strategy plane. Each plane is dependant on the plane below.

![Diagram of five components](image)

*Figure 2 The five components involved in user experience design. (Garret, 2011)*

On the surface of any given digital artifact are the visual elements which make up the design. Below the surface is the skeleton which consists of the placement of buttons, images and other objects with which the user is expected to interact. The function of the skeleton is to optimize the placement of elements in order to provide an efficient user experience. The structure is a more abstract form of the skeleton, where the structure plane consists of a definition of how a user would navigate the artifact, how one would get to one step and from that one on to next and so on. The scope determines what the specific functions and features of an artifact are. The strategy plane is basically an explanation to what the aim of the developers of the artifact are as well as what the intended need and use for the end user is.

Garrett (2011) continues to talk about the web as being divided into two separate sections which could be applied to his model. The web as an information medium and the web as a platform for functionality. The objective of this model is to put the functional aspects of an application on the left side and the more abstract aspects on the right side. This is an extension
of the previously mentioned model, and provides an opportunity to even further divide the aspects of any given digital artifact. Below is the model with his division with respect to web artifacts. (Garrett, 2011)

![Diagram of Garrett's model](image)

**Figure 3** Extension of the five components. (Garrett, 2011)

### 2.5 Quality of experience

Lauralee Alben (1996), is presenting a list of aspects to consider when developing interactive products in order to best cater to the needs of the end user in terms of a good user experience. She presents seven different topics which she argues to have a significant importance when it comes to user experience design. (Alben, 1996) Although the article is quite old, the topic and the contents of the article seem to be of value still and the factors presented are worth taking into account.

Did the design team have a good **Understanding** of the needs of products potential users? Was it an **Effective design process** in terms of execution and planning? What methodologies were used and were there any major design issues? Is the product **needed**? Does it have any actual impact? What needs does it satisfy? How **Learnable and usable** the product is to use and to what extent any given user would encounter problems while learning to use it. The next aspect questions whether or not the design solves the **appropriate** problems in terms of context, such as social, cultural or economic. Does the product offer a cohesive **Aesthetic experience** in terms of visuals, information and interaction? **Mutable**
aims to question whether or not the designers considered the mutability of the product, if needed, and whether or not the design allows the product to evolve to fit new uses in the future. **Manageable** is a term that targets the aspect of installation, training, maintenance, cost and supplies, and whether the designers have considered these aspects from a user centered perspective. (Alben, 1996)

The following section will provide an insight in different methodologies commonly used in software development.

### 2.6 Methodologies & User-centeredness

Given the argument that an iterative approach needs to be used in order to be user-centered the argument could be made that the choice of methodology plays a part in the process (Preece et al., 2002). In order to provide a basic understanding for the process of software development this segment will describe the most commonly used methodologies in the field. I would argue that this is of importance since the methodology used will be taken into account when analyzing the data in order to draw conclusions to whether or not the choice of methodology affects the user-centeredness in a design process and ultimately the user experience.

#### 2.6.1 Waterfall model

The waterfall model is perhaps the best known and historically most widely used methodology in software development. It is a sequential where each step of the process is completed before the next ensues. Figure 1 is a visualization of how the waterfall model is structured. Winston Royce (1970) provided the first description of what the design process might look like using the waterfall model. In *Managing the development of large software systems*, Royce describes the different steps in the model while stating that an iterative approach in each step is optimal, although not fully utilized. (Royce, 1970)
2.6.2 Agile methodologies

An agile approach in software development has been defined as emphasizing individuals and interactions over the processes and tools used, working software over comprehensive documentation, customer collaboration over negotiation of contracts and responding to change over the following of a set plan. (Beck et al. 2001) The authors also argue that while there is value on both sides of the separation they consider the value of their emphasized aspects to trump the traditional approaches toward the tools, documentation and strict following of set plans. Beck et al. (2001) present twelve principles of agile software development in the Agile Manifesto. These principles are cited below followed by a visual example of what the agile process might look like, taking into account the different steps of development and when and to what extent user tests are likely to be conducted.

“Our highest priority is to satisfy the customer through early and continuous delivery of valuable software.

Welcome changing requirements, even late in development. Agile processes harness change for the customer’s competitive advantage.

Deliver working software frequently, from a couple of weeks to a couple of months, with a preference to the shorter timescale.

Business people and developers must work together daily throughout the project.

Build projects around motivated individuals. Give them the environment and support they need, and trust them to get the job done.

The most efficient and effective method of conveying information to and within a development team is face-to-face conversation.

Working software is the primary measure of progress.

Agile processes promote sustainable development. The sponsors, developers, and users should be able to maintain a constant pace indefinitely.

Continuous attention to technical excellence and good design enhances agility.

Simplicity--the art of maximizing the amount of work not done--is essential.

The best architectures, requirements, and designs emerge from self-organizing teams.

At regular intervals, the team reflects on how to become more effective, then tunes and adjusts its behavior accordingly.” - (Beck et al. 2001)
The model above is shown in order to provide a clear visualization of the distinction between the traditional waterfall model and agile methodologies and the way a process will look in the different settings. There are several different frameworks to adhere to when utilizing agile development in processes. This theses will cover two of the most popular, Scrum and Kanban.

2.6.3 Scrum

Scrum is a framework for utilizing agile workflows in software development. It is defined as a method for helping people address complex adaptive problems while maintaining productivity and creativity in order to deliver valuable and high quality products. Scrum has been used in product development since the early 1990’s. In any implementation of the Scrum framework there need to exist a Scrum team. Scrum utilizes Sprints in order to encapsulate the underlying tasks in a time frame. The Scrum Alliance (2016) defines a Sprint as a time-box of a month or less within which a segment and potentially releasable version of the product is created. With the conclusion of one Sprint, the next one ensues directly after the completion.

The Product Backlog consists of a list of requirements for the product to be developed. This list is the only reference to what requirements are expected to be met with the finished product. As stated by the Scrum Alliance, the Product Backlog is never complete, but is only the layout of the first known and most thoroughly understood requirements. (The Scrum Alliance, 2016)

The Sprint Backlog is essentially the specific items selected from the Product Backlog for the current Sprint including a plan for completing the actual increment of the product and reaching the goals set up for the particular Sprint. (The Scrum Alliance, 2016)

In a Scrum team there are several different elements. There is a product owner, the development team and a Scrum master. The strength of a Scrum team is that they are cross-functional and self-organizing which means that the team itself are in charge of the way that
they choose to complete a specific task in contrast of being controlled by an outside party. This
team-based model promotes the optimization of flexibility, creativity and productivity. Below
is an explanation of the different roles involved in the process.

The product owner serves as the project manager in a sense with responsibilities involving
the overall structure of the process, the work of the development team and the ensuring that
the end product meets the specified requirements. Since the Product Owner is the sole person
responsible for the process and that the product backlog is followed and understood by the
development team. (The Scrum Alliance, 2016)

What makes up the Development team is essentially the individuals involved in the actual
producing of the product or artifact itself. There are no explicit titles appointed to members of
the Development team, everyone is simply regarded as a developer, no matter what the specific
area of expertise might be. While there are specific areas of expertise among the different team
members, the team as an entity is accountable for the successful development of the product.
There is no specified size for the development team, rather, the team should be kept small
enough to maintain a viable process and large enough to account for the completed tasks in a
sprint. (The Scrum Alliance, 2016)

The main focus for the Scrum Master is to maintain the overall process and see to it that the
team is following the Scrum theory in terms of practice and rules. The Scrum Master also
handles the interactions with parties outside of the Scrum Team in order to provide and
understanding for the process at hand which will in turn help maximize the value created by
the team. (The Scrum Alliance, 2016)

2.6.4 Kanban
Kanban is a method for providing an agile approach to product development originally
developed by Toyota. Contrary to Scrum, Kanban is not constrained to the same fixed process
and team composition. The Kanban method consist of only two clear constraints. It is supposed
to serve as a means to limit the work in progress and to visualize the workflow. The
visualization is done by displaying a step-by-step map of the overall process. The steps in
Kanban are called phases and are supposed to have a limit to the work in progress which serves
to identify bottlenecks and to avoid having too many ongoing tasks at one time. In order to
measure performance Kanban uses the phrases Lead Time and Cycle Time. Lead Time is the
amount of time between the creation and completion of a task while Cycle Time is the amount
of time between the initiation of the task and its completion. (https://kanboard.net/documentation/what-is-kanban)

Kanban as a method could arguably aid the user-centered approach in design processes,
given the fact that the number of active tasks at any given time is limited by the method itself.

3. Method
The aim of this study is to examine the processes and methodologies utilized by practicing
interaction designers in different scenarios. The objects of study are divided into two distinct
scenarios, one being where the designer is involved from the initial stages of the development
of a digital artifact, and the other being projects where the designer is introduced at a later
stage. Since the study requires the respondents to have experience with both scenarios, early
& later introduction, a problem-oriented qualitative study with a predefined research question was applied (Bell & Nilsson, 2000). The study aims to distinguish any differences in how methods and approaches for achieving a good user experience are applied in the different settings and if there are any significant differences regarding what process methodologies are utilized. Moreover, given the limited time of the study, the statement that this paper will make a strong claim on its own seems unreasonable. Rather, this paper should be adequate to be used a basis and starting point for further study within the topic.

According to Patton (2002), qualitative methods are used when trying to understand the world from the respondents’ point of view (Patton, 2002). This definition fits the study well since the aim is to get an inside view of individual interaction designers views of different design processes and what the limitations and possibilities are depending on the particular project. The data gathering was done by conducting semi-structured interviews and in-depth written interviews for the respondents that weren’t able to participate in person or via skype or other means of vocal communication. The remainder of this chapter will focus on how the respondents were chosen, the sample size, how the data collection was conducted, the methods chosen for analysis of the data as well as the ethical aspects taken into consideration during the study.

3.1 Identifying possible respondents

The respondents in this study are all educated interaction designers with significant experience with designing and developing digital artifacts, with experience in both redesigning of existing artifacts and the development and production of new ones. This fact, that they had participated in differing kinds of processes were important for this study since the aim is to provide a deeper understanding regarding the consequences of applying user centered design in the early stages compared to later in a design process in the field of software development. The initial aim was to get a hold of interaction designers with at least a couple of years of working experience in order to ensure the involvement in a significant amount of projects. However, the most important aspect that was taken into account when gathering the respondents was the fact that they had experience from being involved from the start of a process as well as being introduced at a later stage in order to be able to gather the necessary data to answer the research question. This turned out not to be a problem since all of the possible respondents that were asked to participate had the necessary experience, even the ones that ultimately chose not to participate. The experience from multiple projects of different scopes would likely improve the quality of the results given the argument that the more projects one has been involved with the more experienced you are and the more accurate the account will be. The process of gathering the respondents was initiated by sending emails to interaction designers at local software development companies and asking whether or not they would consider participating the study. If they chose to participate, a time and place for an interview was decided upon.

For ethical purposes the participants were informed of the format of the interviews and asked for permission to tape the interviews in order to produce a transcription of it for analyzing. Furthermore, the respondents were told that the survey was voluntary and that their participation could be withdrawn at any time of their choosing. None of the six respondents
chose to cancel their participation however. The aspects considered in this section is referring to the four parts of research ethics summarized by Vetenskapsrådet (2002).

### 3.2 Sample size & Data collection

Theoretical sampling was used for the process of collecting data for the study. Theoretical sampling is defined by Glaser and Strauss (1967) as the process of data collection for generating theory whereby the analyst collects, codes and analyses the data and decides what data to collect next and where to find them, in order to develop a theory as it emerges (Glaser & Strauss, 1967, p. 45). Two methods for data collection were used in this study; semi-structured interviews and structured written interviews and the number of respondents were determined by how many of the contacted practicing interaction designers had time to or wanted to participate in the study. Initially, possible respondents were contacted, with six of them agreeing to participate in live interviews and one respondent opting for a written interview answered via email. With the statements of Bell & Nilsson (2000) and Ritchie et al. (2003); that the sample size should be determined by taking triangulation, reliability and time into account. (Bell & Nilsson, 2000)(Ritchie et al., 2003) Bell & Nilsson (2000) defines triangulation as the controlling of found phenomena and the validity of the collected data by utilizing several sources for data collection. For this study, with seven respondents in total, triangulation is possible which will likely increase the reliability of the results of the study. Had there been more time to conduct the study the number of respondents would likely have been larger which could have further increased the validity of the results. Below is an account of the participating respondents including their age and number of years working as interaction designers.

<table>
<thead>
<tr>
<th>Respondent</th>
<th>Age</th>
<th>Years as interaction designer</th>
<th>Gender</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>25</td>
<td>1.5</td>
<td>Male</td>
</tr>
<tr>
<td>2</td>
<td>29</td>
<td>2</td>
<td>Male</td>
</tr>
<tr>
<td>3</td>
<td>30</td>
<td>5</td>
<td>Female</td>
</tr>
<tr>
<td>4</td>
<td>28</td>
<td>2</td>
<td>Male</td>
</tr>
<tr>
<td>5</td>
<td>28</td>
<td>1</td>
<td>Female</td>
</tr>
<tr>
<td>6 (Written interview)</td>
<td>33</td>
<td>5</td>
<td>Male</td>
</tr>
</tbody>
</table>

Table 1 Respondent matrix

### 3.3 Semi-structured interviews

For the study semi-structured interviews were chosen with Patton’s (2002) general interview guide as the basis for the designing of the actual interview structure. The interview guide proposes outlining a specific set of topics to explore (see Appendix 1). The interviews were designed to provide the necessary data regarding each individual respondents approaches to the design process in differing projects and if and how the fact that later implementation of user-centered design affected the impact and ability to affect the process itself for each
respondent. The interviews were conducted with the support of the aforementioned interview guide established by identifying the vital aspects of interaction design and more specifically with user-centered design in mind. These aspects were derived from the literature provided in the related research section.

According to Ritchie et al. (2003) an interview is conducted in order to gain an understanding of the research question from the perspective of the respondent even though the researcher may have a solid idea of what to discuss or explore. The authors are pointing out that there are three different stages of an interview, each with its own individual purpose and they argue for the importance to attend to these aspects. The stages are arrival, introducing the research, beginning of the interview, the interview itself, wrapping it up and after the interview. The authors claim the three initial stages aid the researcher ease the respondent into a deeper level of discussion where the particular problems at hand may be addressed. The following stages have the opposite effect (Ritchie et al., 2003). While designing the interview these aspects were considered.

3.4 Structured written interviews

One of the respondents in the study preferred to participate by answering the questions via email. For these written interviews the original interview guide (see Appendix 1), was used in its original form. The questions in the questionnaire aren’t prone to yes or no answers so decision was made that the interview guide could be used for written interviews without any significant changes to the structure and design. As Jacob & Ferguson (2012) state however, it is important to keep the interview relatively short and to the point in order to not generate disinterest in the respondent. A concise and to the point interview with relevant questions are more likely to generate a thorough result. (Jacob & Ferguson, 2012)

3.5 Data analysis

For the analysis of data Patton’s (2002) inductive and deductive analysis was used. To clarify, inductive analysis, which is defined as the discovering of patterns in a result set, was used in order to categorize and sort out the answers given by the respondents. Deductive analysis was used to the extent that the results were analyzed to identify if they would map onto Garrett’s (2011) framework regarding the elements of user experience. The five semi-structured live interviews were all recorded and transcribed in order to get a clear overview and to simplify the process of going through the data. By continuously studying and transcribing the results from the interview the opportunity to improve the interview guidelines for following interviews was given. With the data transcribed a process of thematic analysis ensued. The concept of thematic analysis refers to the recognition of patterns in a set of data that may appear to be random. (Patton, 2002) The recognition of patterns was a central part of the analysis of the gathered data. From the results of the interview data and from the interview guideline the results were structured into two main categories, methodologies and early vs. late introduction of the interaction designer. Within each of these main categories results regarding user-centered design, user experience and user tests are presented independently. Bryman (2011) states that pattern recognition often serve a significant role in qualitative analysis. This statement is adhered to with respect to the fact that Garrett (2011) and his user experience
framework was used as a support in the analysis of the data, and in order to be able to identify similarities in the results compared to the framework, a thorough process regarding pattern recognition was needed and used. In addition, Alben’s (1996) quality of experience themes were used and considered in the analysis. As stated earlier, the publication is quite old but from a user experience perspective, the different aspects she presents are still valid in terms of what should be considered.

### 3.6 Method criticism

For this particular study the method of interviews presents potential drawbacks. With the interviews structured in this way the individual respondents’ answers will likely contain some form of bias toward the way they are used to working, which is a risk when working with subjective data. This would arguably be a minor issue if the sample size had been more significant. An aspect that is worth mentioning in this section is the fact that all of the participating respondents have fairly limited experience from working in the field, considering the most experienced respondent has worked five years as an interaction designer. This could affect the results of the study. The optimal method for obtaining objective data when researching this particular phenomenon would arguably be to conduct longer, more thorough, observations at the actual workplaces of interaction designers. However, with the limited time of this study and the fact that there was only one person conducting it made it impossible to conduct observations of this sort with a significant sample size within the given time frame. With regards to these aspects a realistic aim for this study would be to have it serve as an initial probing into the mindsets of working interaction designers. This study could then be used as a starting point for more thorough investigations of the problems presented. Given these conditions semi-structured interviews were chosen as the next best thing for this particular study. The semi-structured layout of the interviews permitted me to approach the respondents with follow-up questions depending on what their answer to an initial question was.

### 4. Result

The results are divided into three different categories based on the topics investigated in the interviews. The main categories are the experience of the respondent, methodologies and their experience working early and late introduction into projects. Within each of the categories, the results will be presented with regards to the initial research question along with a clarification whether or not the answer refers to early or late implementation of the user-centered approach.

#### 4.1 The experience of the respondents

The first topic touched upon in the interviews was whether or not the respondents had experience from both of the scenarios in the study, early and late introduction to a project or process. The interviews showed that all six of the respondents had experience from both scenarios, with the only discrepancy being that the amount of different projects they had been involved in varied, in direct relation to the amount of time they had been practicing their craft. Respondent 5 had the least amount of experience, with only being involved in two projects in total, and being involved from the start on one, and being involved later in the process in the
second. Respondent 2 and 4 each had experience from two projects from each scenario while respondent 1, 3 and 6 each had experience from a higher number of projects to which they could not give an exact number.

4.2 Methodologies
All six of the respondents were asked to give an account of the development methodology or methodologies they usually utilized in their projects. While the traditional and traditionally used waterfall model was not intrinsically used in any of the cases, respondent 1 and 2 stated that even though they were utilizing an iterative approach to each process, they did not use any type of agile methodology to their full extent either. They stated that while they were aware of both Scrum and Kanban, neither of the methodologies had been fully implemented in the development processes at their respective companies. Respondent 3 declared that they were in fact utilizing an agile approach to their projects, with Scrum being the more commonly used, with some instances of Kanban being utilized as well. In the case of respondent 4, Kanban was the methodology of choice, and the one they utilized in basically all of their projects. Respondent 5 and 6 declared that Scrum was used throughout their respective companies’ development processes. However, respondent 6 stated that Scrum has only been utilized for two of their five years at their specific company. Before that, no particular methodology was used, but “a more iterative type of waterfall methodology” (- Respondent 6).

4.3 Early vs. Late introduction
For one of the projects where respondent 1 was involved from the start, they had the opportunity to conduct a thorough research of the potential target group of the application that was being produced. In addition to this, they used a focus group from the potential target group throughout the process in order to evaluate the application iteratively. This resulted in the team being able to focus more on the actual functionality of the product while at the same time having a user-centered approach in the process. When asked if any follow-ups were conducted after the launch of the application, respondent 1 stated that they tracked the usage for a predetermined period of time after the launch. This enabled them to actually determine whether or not the application and the process itself had been a success. Respondent 1 concludes that in this particular project they ended up with a good product that yielded a good user experience.

“There is a big focus on meetings, research and competition analysis in the initial stages, and after that we simply follow the plan that is set up by way of the scrum methodology.” - Respondent 1

For the scenario where respondent 1 was involved at a later stage of the process, a more or less finished product was presented to them, and they were asked to implement more functionality into the already existing frame of the application. The respondent stated that this proved problematic right from the start, since the developing of the original application had been less than optimal from a user-centered perspective.

“In the project where we were given a finished product the original was developed by a couple of people who didn’t use any type of project management whatsoever,
and I felt that this affected our ability to implement it in a good way when given the product with the list of desired new implementations of functionality.” - Respondent 1

The flow of interaction and the way a user was guided through the application did not leave much room for implementation of new functionality within the existing framework and the budget of the project did not provide the option to redesign on a grander scale. The respondent stated that a set of user tests were conducted in order to evaluate the current state of the application and determine where and how the new functionality could be implemented. The tests showed that the users had trouble with the existing functionality and had a hard time envisioning where the new functions would be reasonable to incorporate.

“So there was no good way for me to implement these functions in a logical way, which was my task without restructuring the entire application, but of course there was no time for that.” - Respondent 1

Respondent 2 and 4 each had two years of experience working as interaction designers and had similar experiences regarding the two presented scenarios. The difference here is the type of methodology used, as respondent 2 was not utilizing any specific framework, only an iterative design process, and respondent 4 was using Kanban to its full extent.

When asked about being involved from the start of a project respondent 2 stated that the ability to conduct a more thorough research of the field and potential target group increased significantly in this scenario. Moreover, the respondent elaborated that for a particular project conducted by their company they utilized structured interviews within each of the iterations throughout the entire process. This resulted in a comprehensive understanding to what the end user may want in terms of both visual design and functionality and the respondent felt that it limited the amount of errors made in the application itself.

Respondent 4, who were working with the Kanban methodology, had a similar experience regarding being involved from the start of a project. The respondent argued that the ability to take as many aspects regarding both user experience and usability into account increased with the early implementation of the interaction design, and user-centered design in particular. Since the respondent only had two years of working experience as an interaction designer, the amount of projects were limited, but in every project that he had been involved from the beginning the concept of personas and scenarios had been used in order to take a user-centered approach. By constructing varying kinds of personas and different scenarios they could draw conclusions to whether or not a certain function or feature would be valid from a user experience perspective. The respondent stated that this particular process was used in other projects at the company where he had not been personally involved as well. For the projects where respondent 4 had been involved at a later stage in the development process, they still tried to approach the problem in the same manner, with the constructing of scenarios and personas. However, the respondent states that being introduced later, whether it involves a half-finished product being handed to another team or the redesigning of an existing and functional product, presents the team with problems. It depends on whether or not there is any type of data available when it comes to previous user tests during the development process or, if a finished product for redesigning, any type of usage data. If this sort of information is
lackluster, the respondent argues that later implementation of user tests could prove both costly and redundant depending on the situation. The respondent states that user tests are almost always costly, and could be rendered redundant if applied too late in a process. Respondent 4 gives an example that happened in one of their projects. Similar to respondent 1, user tests were conducted late, and highlighted problems that simply could not be addressed within the existing budget or time frame of the project.

Respondent 3 states that there is a distinct difference between the early stage introduction and the later. When being involved from the start the entire team has a much greater sense of control of the overall process and to what extent user tests and user-centered design should be utilized. Moreover, the respondent argues that with user tests being both costly and time consuming, good planning and thinking ahead are required in order to ensure a smooth process.

“We are trying to utilize the concept of user tests throughout the processes. However, in the project I’m working on right now the only structured test so far has been a sort of think-aloud version of a focus group with four respondents involved.” - Respondent 3

Since the respondent and their entire company is utilizing the Scrum methodology, the distinct sprints enable them to have a good overview of the iterations, and determine when and how user tests should be implemented. The respondent explains that focus groups are regularly used in their processes.

“The opportunities to evaluate are abundant in an agile process so in my opinion it’s never too late to implement anything, within reasonable boundaries. With that said, it’s obviously much easier if the user-centered approach is applied from the very start.” - Respondent 3

For later introduction into a project, respondent 3 says they are utilizing the same methodology, Scrum. Since the respondent and their company already have an interaction designer in every scrum team, if there is a domestic project that is handed to a different team or a team member is replaced, the implications of later introduction are not that significant. In those cases it is only a matter of briefing the new party of what has been achieved thus far, both in terms of functionality as well as if any user tests has been conducted and if so, the results of them. If there is an existing external project however, for example the redesigning or application of additional functionality to an existing product, the implications are slightly more significant. Respondent 3 argues that it depends largely on the amount of information available with regards to the product itself, results of potential user tests and any and all user data. In this case, the respondent states that even if user tests are conducted, at a late stage of any product development, there are monetary implications for any design decision taken as a result. Even if user tests should identify problems, the required actions to fix the particular issue may need to fit within a budget and/or time frame. However, the respondent says that there have been projects where the budget has not been a problem, and the issues highlighted by late user tests were able to get fixed. The respondents states that for these projects, the time frame had allowed for major fixes to be implemented at a later stage.
“It depends a lot I think. When it comes down to it, it is the owners or the person handling the budget that decides what’s possible and what’s not in terms of late implementation of suggested changes” - Respondent 3

For respondent 5, who had the least amount of experience as an interaction designer, being limited to only one project with early involvement and three where she had gotten introduced to an existing project, also stated that the difference was significant between the two scenarios. For the project where the respondent had been involved from the start she felt that it was easier to think about and apply a user-centered approach to the design process. She elaborated that within the company there was not that many of the developers that knew much about or paid much attention to the user experience of the software they produced. The mentality was more angled towards functionality. With the early involvement in a project however, the respondent felt that it was easier to implement and try to consider the user experience through a user-centered approach throughout the process.

Additionally, for the processes where the respondent was introduced to projects at a later stage she described implications regarding the application of a user-centered approach. This depended on how the project had been conducted in the earlier stages, but in all experienced cases, there had been no previous user tests conducted, nor had there been any personas or scenarios utilized. This made the situation harder for the respondent since there was simply not enough time within the project deadline to conduct the desirable amount of user tests or other type of evaluation in order to identify shortcomings in the applications. For one of the projects however, the time aspect was not an issue, but rather the budget of the project did not allow for any evaluation of significant magnitude to provide sufficient data.

Respondent 6, who wanted to participate in the study through email, explained that he is experiencing a difference between early and late introduction. However, since their company has been using Scrum for the past two years, he stated that the difference is less noticeable now, using that methodology. That can be compared to when before they were using Scrum when no particular methodology was used other than the reflective choice of conducting less structured iterative processes. For the projects where the respondents is involved from the start he argues that there is much more room to plan ahead and get a good handle on the situation and decide when and what type of user tests should be conducted.

“If I as an interaction designer am introduced into a project where the user-centered approach has been neglected initially, the fact still stands that there is a cyclic and iterative process here, and even if the argument can be made that a product may benefit from having most of the interaction design work being done early, there is really no hindrance to applying it at a later stage given the fact that we are using agile methodologies in our processes.” - Respondent 6

The respondent argues that with an agile methodology such as scrum being used it is easier to get introduced to a project at a later stage, with the condition being that at least some form of user-centered approach has been utilized. As several of the previous respondents have stated as well, has there been no attention paid to the user experience and potential target group of the application, the job of an interaction designer of trying to apply a user-centered design gets significantly harder. Moreover, the respondent argues that with the agile approach provided
by the Scrum methodology they have more control over the product and how the users respond to it thanks to the fact that they evaluate the product at its current stage after each completed sprint. Regarding whether later implementation of user centered design could affect the value of evaluations the respondent states the following.

“It would depend on the budget and the time frame in my opinion. You can always conduct some form of evaluation but the results may prove that significant changes would have to be made, that may not fit within a budget and/or time frame.” – Respondent 6

5. Discussion

From the gathered data and the result that the majority of the respondents were utilizing some form of agile, or at the very least iterative, development process, the argument made by Benyon (2014) that the more traditional waterfall methodology is being replaced by the iterative agile processes can be confirmed. This conclusion is arguably worth taking into account when analyzing the early vs. late introduction of interaction designers and the impact it has on the resulting user experience from a user-centered perspective. Since the use of agile or iterative processes were common among the respondents and the fact that two of the respondents specifically stated that Scrum (The Scrum Alliance, 2016) as a method makes it easier to get involved later in a project as an interaction designer the argument that a structured agile development process is worth considering could be made. However, since this was not visible in the data from all the respondents, some criticism towards the validity should be applied.

An interesting fact that emerged from the interviews is that all six of the respondents had similar views regarding the impact that they could have when involved early in a project in contrast to late. When involved early, they all felt that they could make a significant impact on the overall process, with a user-centered approach and the control of potential user testing. They stated that it was easier to get a good overview and in that manner take control of what actions would be needed in terms of user-centered design from a user experience perspective. This would also ease the process of applying user-centered design from Garrett’s (2011) point of view, where he states that one only has to take the end user into account throughout the entire process in order to give yourself the opportunity of ultimately creating a satisfactory user experience.

In contrast, there was some discrepancy between the respondents in the answers regarding the later introduction into projects. From this particular aspect a clear pattern in the fact that the respondents that utilized Scrum were more open to the possibility of applying user-centered design at a later stage emerged. However, all of the respondent recognized the risk of monetary and temporal factors playing a big role in the overall impact that the interaction designer had in the process when introduced late. This falls in line with what Benyon (2014) states; that a user-centered approach to design is an expensive effort. This will arguably in turn have a negative effect on the user-centeredness of the design process and by that, ultimately, the user experience of the finished product. Garrett’s (2011) statement that the concept of user experience is simple, if only the user-centered approach is applied throughout
the process applies here as well, with the emphasis on the fact that the individual interaction
designer cannot control whether or not user-centered design is applied in early stages or not.

A vital aspect to consider when analyzing this data however, is that more than one of the
respondents claim that even if they are involved later in a project, where the user-centeredness
has not been completely neglected, the room for improvement and impact of the interaction
designer could still be significant, if the budget and deadline will allow for it. Due to these
statements, the argument that monetary and temporal aspects play a big role is strengthened.

Given Garrett’s (2011) model an argument could be made that if user-centered design is
neglected in the early stages of a design process, all of the layers of the model will be affected
in one way or another with the possible exception of The Scope Plane, which involves the
functions and features on a more theoretical level the model is interpreted. Regarding Garrett’s
(2011) model, the expectation was that the respondents would have a view on the process that
would fall in line with the model. Moreover, the majority of the respondents explained their
average processes in a way that did not consider all the layers of the model in great detail. The
layers that were given the most attention was generally scope, skeleton and surface. With
regards to these results the argument could be made that knowledge of the model in its full
format could benefit a user-centered approach since it specifically targets the design of user
experience. However, the results of the study shows that the model cannot be applied directly
to the way the processes of the respondents in this study are conducted.

The results of this study confirms what Benyon (2014) says; that a user-centered approach
is of importance to consider and apply during the development of digital artifacts, in this case
the field of software development. Moreover, the study shows that when you as an interaction
designer is introduced to a particular project plays a significant role to the amount of impact
you have in terms of user-centered design in order to produce a product with a satisfactory
experience for the user. The results also show that evaluation plays a significant role as well,
unless they are utilized too late in a process with a strained budget and/or time frame. If that
is the case, several other factors come into play. If evaluations conducted late in a process
reveal significant problems and there is no room for improvement or redesign of the particular
issues, the designer and/or the team has got an uncomfortable decision to make, regardless of
what the choice is.

Given Alben’s (1996) aspects regarding quality of experience, the gathered data point to the
conclusion that some are more considered than others. The term understanding, which
points to the initial knowledge of the needs of the products potential users, is one that could
likely be directly affected by applying a user-centered approach at a later stage. Purely
functional aspects of understanding may not be affected; the functions are always a vital
part. However, the user experience is an important aspect of understanding and may very
well be affected if user-centeredness is neglected early on. Whether or not the product is
needed, is arguably the most basic of the aspects and was considered in all cases. Learnable
and usable seemed to be an aspect directly affected by when user-centeredness was applied.
The aesthetic experience is arguably something that is always considered in some sense, it
seems unlikely to strive for an application that does not provide the user with at the very least
decent aesthetics. However, there is a distinction here, aesthetic experience is not the same as
user experience in this case. According to the results, the respondents stated that even if the
aesthetics were considered in the projects where they had not been involved from the start, it
did not necessarily mean that a user-centered approach was applied. **Mutable, manageable and appropriate**, seem to be aspects that were considered the least, and not mentioned at all in the results. Even if they would be valuable to consider, they seem to offer the least amount of value.

6. Conclusion

The aim of the study was to provide a deeper understanding regarding the importance of taking a user-centered approach in design processes by investigating how practicing interaction designers approached the problem when being involved from the beginning of the processes and what challenges late introduction in projects might bring. The questions to be answered were the following.

- What are the differences between late and early introduction of a user-centered approach in design processes in the field of software development?
- What impact does late introduction of user-centeredness have on the interaction designers in terms of workflow and techniques?
- What role does the choice of methodology play?

By presenting the results of the study and analyzing them in relation to existing frameworks and theories such as Garrett (2011) and Benyon (2014) the argument can be made that there are significant implications in design processes if the concept of user-centered design is applied too late or not at all. The main problems presented involve an unsatisfactory resulting user experience of the final product and significant monetary implications if fixes or redesigning of the product are to be carried out at a later stage as a direct result of utilizing user tests too far along in the process. There is also the aspect of time to take into consideration. Since most projects has a fixed timeframe within which to complete the product, the more the process comes along, the more difficult it will be to improve aspects that has already been implemented. Directly related to this, the second question is answered as well, with the impact on workflow and techniques being guided by the amount of money and time available in the current project. As the respondents who were using Scrum and Kanban as methods mentioned, improvements are never impossible, but a combination of an agile approach room for improvement in terms of time and money, changes can be made. With that said, the third research question is answered. The methodology does play a role in some cases, but with only a third of the sample size acknowledging it a reliable conclusion to the scope of the impact cannot be made. It is important to add that the respondents that did not see agile methodologies as a factor did not utilize them in any ordered fashion. This fact affects the results and further investigation regarding their view on the same topics while utilizing agile methods would be an interesting path to take on this issue.

This can be put in contrast to a full out user-centered approach where there would be prototypes produced based on results of user tests in order to prohibit and foresee as many user experience and usability issues as possible. The results of the interviews showed that an
agile approach to software development helps the interaction designer, and hence the entire team achieve a smooth user-centered design in projects where they were involved from the start. The results showed a significant difference when it came down to projects where later introduction happened, and the general consensus was that achieving a smooth user-centered process with the desired results in terms of user experience and usability.

Additionally, the conclusions drawn in the study are based on the results of the conducted interviews, and since there was a fairly small sample consisting of practitioners with relatively limited and varying amount of experience as practicing interaction designers it is likely that a different sample may produce results that does not fully match these.

An important aspect to consider that appeared from the conducted interviews is that when asked about user-centeredness and user testing, none of the respondents mentioned utilizing any other method for achieving a user-centered design process. This could be due to the interviews being unintentionally phrased in that fashion or it could be that user testing is more widely applied than for example scenarios and personas. However, in order to draw any conclusion regarding this that does not involve speculation, more research would be needed, with data gathering targeting this issue.

Alben's (1996) list of aspects to consider fall in line with how the importance of user-centered design is presented in the analysis of this study. Since the aspects target the understanding of the needs of the users, whether or not the product can fill a gap in the market, the aesthetic experience along with the more general aspect regarding whether or not the actual design process is effective or not, the argument can be made that the list of aspects is worth considering in any given design process.
7. Further research

Since the sample size provided in this study is fairly small, the results could be used as a basis for further investigation of the topic. Further research regarding this could involve, as stated in the method criticism chapter, to conduct more thorough and lengthier workplace studies, where observations of interaction designers at work would provide objective data, in comparison to the subjective data of the six different interaction designers of this study.
References


Jacob, S. A., Ferguson, S. P. (2012). Writing interview protocols and conducting interviews: Tips for students new to the field of qualitative research. The Qualitative Report 17(42), 1-10.


Appendix 1 – Interview guidelines

This is a study to research and identify if there are any significant differences in the way interaction designers work when user centered design is implemented early in a design process in comparison to later introduction. Two scenarios are presented; one where user centered design is implemented initially and one case where user centered design is implemented at a later stage of any given process.

Do you have experience from both of the presented scenarios?

What development methodology/methodologies are you utilizing?

How are you utilizing the concept of user centered design in your processes?

How does your role as an interaction designer differ between the two presented scenarios?

How does the amount of input and impact you as an interaction designer have differ between the two?

How could the two scenarios have different impacts the overall user experience of the finished artifact?

To what extent are you conducting structured and planned user tests?

How do you track the success of the finished product?

Do you interpret any relation between the potential success of an application and the extent of user-centered design used in the process?

How could late implementation of interaction designers and/or user centered design thinking affect the value of (if there are any) user tests?

If neither of the presented scenarios have been experienced, could you talk about what possible limitations, if any, late implementation of interaction designers and user-centered design could bring?

Please describe a typical design process at your company.
Appendix 2 – Written interview

This is a study to research and identify if there are any significant differences in the way interaction designers work when user centered design is implemented early in a design process in comparison to later introduction. Two scenarios are presented; one where user centered design is implemented initially and one case where user centered design is implemented at a later stage of any given process.

**Do you have experience from both of the presented scenarios?**

Yes, I have significant experience regarding both of these scenarios. Since I’ve been in the business for about five years I can’t recall exactly how many projects it concerns.

**What development methodology/methodologies are you utilizing?**

We’ve been using Scrum as a methodology for about two years now. Before that we didn’t adhere to any specific framework. Although we did try to keep the processes iterative and agile. You could say we used a more iterative type of waterfall methodology back then.

**How are you utilizing the concept of user centered design in your processes?**

Currently when we are using Scrum to its full potential it’s much easier to take the users into consideration and actually evaluate the product after each each sprint. This provides crucial information to how the product at its current stage aligns with what the users might want and expect.

**How does your role as an interaction designer differ between the two presented scenarios?**

My role is essentially the same. However, i feel that the amount of input and the actual changes that I can implement without hassle differ widely. However, now that we are strictly using Scrum, this has become less of a problem, since all the sprints are evaluated which helps prevent any misunderstandings regarding the user experience.

**How does the amount of input and impact you as an interaction designer have differ between the two?**

This question is related to the one above.

**How could the two scenarios have different impacts the overall user experience of the finished artifact?**
If I as an interaction designer am introduced into a project where the user-centered approach has been neglected initially, the fact still stands that there is a cyclic and iterative process here, and even if the argument can be made that a product may benefit from having most of the interaction design work being done early, there is really no hindrance to applying it at a later stage given the fact that we are using agile methodologies in our processes. As I wrote above, the situation was different back when we didn’t use Scrum at all. The user experience factor and the user centered design was prone to be overlooked when we didn’t have the set sprints to complete and evaluate.

**To what extent are you conducting structured and planned user tests?**

Some form of evaluation is conducted after each sprint is completed. Before, without Scrum, we didn’t have the clear guidelines to exactly when and how to conduct evaluations. It was often done early in the process and pretty much neglected during development.

**How do you track the success of the finished product?**

It depends on the product. Webpages and applications can be easily tracked via the App Store, Google Play and Analytics. Any extensive evaluation beyond that has not been done.

**Do you interpret any relation between the potential success of an application and the extent of user-centered design used in the process?**

Difficult question to answer since my own skill and the skill of the teams i’ve been working on have been evolving over time along with the way we conduct our work. But I feel that we gain more control over how the finished product is received and appreciated when utilizing the user-centered design to its full potential.

**How could late implementation of interaction designers and/or user centered design thinking affect the value of (if there are any) user tests?**

It would depend on the budget and the time frame in my opinion. You can always conduct some form of evaluation but the results may prove that significant changes would have to be made, that may not fit within a budget and/or time frame.

**If neither of the presented scenarios have been experienced, could you talk about what possible limitations, if any, late implementation of interaction designers and user-centered design could bring?**

I’ve experienced both.

**Please describe a typical design process at your company.**
As I’ve said, we are utilizing Scrum to control all our design processes nowadays which means that we a Scrum Master that oversees that we complete the sprints we set up in the specified time frame. And at the end of each sprint we conduct some form of evaluation, what exactly we do differ from project to project.