

A Lifecycle for User Experience Management in Agile Development -PhD Thesis-



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Abstract

Context. Agile methods are increasingly being used by companies, to develop digital products and services faster and more effectively. Today's users not only demand products that are easy to use, but also products with a high User Experience (UX). Agile methods themselves do not directly support the development of products with a good user experience. In combination with UX activities, it is potentially possible to develop a good UX.

Objective. The objective of this PhD thesis is to develop a UX Lifecycle, to manage the user experience in the context of Agile methods. With this UX Lifecycle, Agile teams can manage the UX of their product, in a targeted way.

Method. We developed the UX Lifecycle step by step, according to the Design Science Research Methodology. First, we conducted a Structured Literature Review (SLR) to determine the state of the art of UX management. The result of the SLR concludes in a GAP analysis. On this basis, we derived requirements for UX management. These requirements were then implemented in the UX Lifecycle. In developing the UX Lifecycle, we developed additional methods (UX Poker, UEQ KPI, and IPA), to be used when deploying the UX Lifecycle. Each of these methods has been validated in studies, with a total of 497 respondents from three countries (Germany, England, and Spain). Finally, we validated the UX Lifecycle, as a whole, with a Delphi study, with a total of 24 international experts from four countries (Germany, Argentina, Spain, and Poland).

Results. The iterative UX Lifecycle (Figure 1) consists of five steps: Initial Step 0 'Preparation', Step 1 'UX Poker' (before development/Estimated UX), Step 2 'Evaluate Prototype' (during development/Probable UX), Step 3 'Evaluate Product Increment' (after development/Implemented UX), and a subsequent Step 4 'UX Retrospective'.

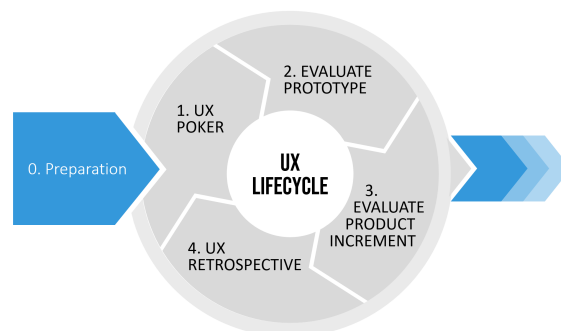


Fig. 1 User Experience Lifecycle with its five Steps (A simplified Representation)

With its five steps, the UX Lifecycle provides the structure for continuously measuring and evaluating the UX, in the various phases. This makes it possible to develop the UX in a targeted manner, and to check it permanently. In addition, we have developed the UX Poker method. With this method, the User Experience

can be determined by the Agile team, in the early phases of development. The evaluation study of UX Poker has indicated that UX Poker can be used to estimate the UX for user stories. In addition, UX Poker inspires a discussion about UX, that results in a common understanding of the UX of the product. To interpret the results from the evaluation of a prototype and product increment, we developed or derived the User Experience Questionnaire KPI and Importance-Performance Analysis. In a first study, we were able to successfully apply the two methods and, in combination with established UEQ methods, derive recommendations for action, regarding the improvement of the UX. This would not have been possible without their use. The results of the Delphi study, to validate the UX Lifecycle, reached consensus after two rounds. The results of the evaluation and the comments lead to the conclusion, that the UX Lifecycle has a sufficiently positive effect on UX management.

Conclusion. The goal-oriented focus on UX factors and their improvement, as propagated in the UX Lifecycle, are a good way of implementing UX management in a goal-oriented manner. By comparing the results from UX Poker, the evaluation of the prototype, and product increment, the Agile team can learn more about developing a better UX, within a UX retrospective. The UX Lifecycle will have a positive effect on UX management. The use of individual components of the UX Lifecycle, such as UX Poker or Importance-Performance Analysis, already helps an Agile team to improve the user experience. But only in combination with the UX Lifecycle and the individual methods and approaches presented in this PhD thesis, is a management of the user experience in a targeted manner possible, in our view. This was the initial idea of this PhD thesis, which we are convinced we could implement.

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Chapter 1

Introduction

Nowadays, a wide range of different digital products and services are being developed and offered. From classic desktop applications, such as photo editing or enterprise resource planning, to apps for smartphones, tablets or smartwatches, to control panels for Industrie 4.0 machines. Everywhere, there is more human-computer communication that needs to be designed. Users demand that the operation of digital products and services be effective, efficient, and satisfying. However, these classic usability aspects are no longer sufficient. Users want more than just an effective, efficient, and satisfactory application. Users expect to be able to use the product to solve their tasks, in a quick and efficient manner, without having to put in any major effort. Furthermore, for a product or service to succeed, it is also essential to consider a good UX. Regardless of development methods, methods and approaches have been developed that focus on a good user experience. This includes, for instance, human-centred design EN ISO 9241-210 (2020), which focuses on humans when developing requirements. The method or approach, used to develop the elicited requirements, is not further described in human-centred design.

Manufacturers of interactive products and services have identified that rapid feedback from customers, and the market, is beneficial for product development. In this way, changes and requests from the user can be implemented more quickly, or more agilely. Agile methods try to fulfill this requirement by offering an iterative approach to development. Companies use agile methodologies to develop products more efficiently. Agile methods (e.g. Scrum (Schwaber, 2004), Kanban (Anderson, 2010), or Extreme Programming (XP) (Beck and Andres, 2007)) reduce the time taken to develop a product, available to the market (Serrador and Pinto, 2015). The iterative approach to developing software minimises the risk of developing software that is not in line with the market (Boehm and Turner, 2003).

What all Agile methods have in common, is that they provide a framework for the iterative development of interactive products. The goal is to develop a potentially deliverable result, through role allocation and standardized meetings, at time intervals (iteration). A typical iteration will take 2-4 weeks. In this way, requirements of whatever kind can be implemented. There is no selection process to determine which requirements these are, whether these requirements are also desired by the user, or if they have a positive influence on the UX. Thus, it is quite possible to efficiently develop requirements that the user does not even consider necessary. Agile methods, however, have a feature that can be exploited: Iteration and constant adjustment of the priority of entries in the product backlog. In this way, the requirements that are managed in the Product Backlog can also be re-evaluated and sorted, again and again, with respect to the expected UX. The planning of the next iteration

can then take place, on the basis of the new evaluation. By performing retrospectives (Schwaber, 2004) at the end of an iteration, both the product quality and the agile process quality can be improved.

To verify that a good UX has been achieved, UX can be evaluated after the product increment is developed. This is already a known and common practice. One requirement for software development, however, may be that the expected UX can be evaluated before development begins.

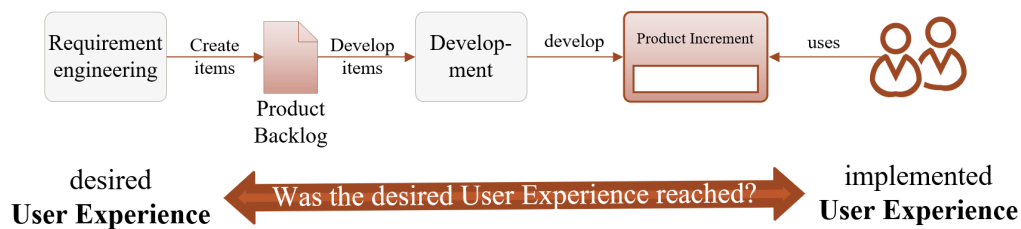


Fig. 1.1 Desired User Experience and Implemented User Experience

In Agile software development methodology, all requirements from the Requirements Engineering (Figure 1.1, left side) are usually recorded in a product backlog. These are developed into a product increment by the development team, after an evaluation (such as complexity and required time). The developed product increment is then used by the user (Figure 1.1, right side). A product backlog item can, or maybe should, have an impact on the UX. After development, the UX can be measured, using various methods (Vermeeren et al., 2010). Comparison with the previously assumed UX, however, is not possible, unless it has been systematically measured. From our point of view, the resulting problem is as follows: There is no systematic verification between the desired and implemented UX.

For this reason, the primary research objective of this Ph.D. thesis is to investigate how quality, in terms of UX, can be managed in Agile methods. The objective is to develop a lifecycle that allows the management of the user experience before, during, and after development. The idea is to determine the UX as early as possible, because then the possibility of acting or managing is achieved. To this end, we would like to archive the following objectives:

- Determine the current state of the art of UX management with the focus on Agile Methods.
- Develop a set of requirements, concerning UX management, that can be used to develop a UX Lifecycle.
- Develop and present the UX Lifecycle, based on the set of requirements of UX management.
- Determine the current state of the art of UX questionnaires.
- Create a method to estimate the UX in earlier stages of development.
- Present and create methods to interpret the results of UX questionnaires.
- Evaluation of the UX Lifecycle to ensure that the lifecycle is valid.

We are convinced that the problem and outcome of the Ph.D. thesis are essential, and relevant, for many companies worldwide. One reason for this is that processes, in general, can only be improved, if they have been systematically recorded and evaluated beforehand. As stakeholders, we address all roles that are responsible for the product. These are, for example, the product owner (Schwaber, 2004) or the product manager. UX professionals, such as UX researchers or UX designers, are also addressed as stakeholders. With the UX

Lifecycle, an Agile team is able to manage the UX in a targeted manner. This means that the UX Lifecycle, with the 5 steps and the permanent evaluation of the UX, supports the Agile team in UX management. Through this permanent determination of the UX (Desired UX, Estimated UX, Probable UX, and Implemented UX), it can be determined before, during, and after development, whether the requirements to be implemented are still targeted, with regard to the UX.

This PhD thesis is structured as follows:

In Chapter 2, we will start with a deep analysis of the state of the art of UX management. Therefore, we present the results of our SLR study, with focus on the Integration of UX and Agile methods. The chapter ends with a gap analysis to determine the research gap.

In Chapter 3, we will outline the challenges, research methodology, and objectives of this PhD thesis. Furthermore, we present the vision of this PhD thesis. The vision is then broken up into specific objectives, and then assigned to the appropriate research methodology.

In Chapter 4, we will present a set of requirements for UX management, based on the results of our SLR from Chapter 2. Based on this set of requirements, we introduce the UX Lifecycle.

In Chapter 5, we will provide an overview of standardized UX questionnaires. Additionally, we present the User Experience Questionnaire (UEQ) in more detail, as this questionnaire plays a prominent role in this thesis. Furthermore, we present a list of UX factors that we have compiled from different sources.

In Chapter 6, we will introduce *UX Poker* as a new method. With this new method, the user experience can be estimated at an early stage of development. We also present the results of our first evaluation study of UX Poker.

In Chapter 7, we will present four different methods for interpreting the results of UX questionnaires. To get a deeper understanding of the results of a UX questionnaire, we analyze the data using the methods *UEQ Results*, *UEQ Benchmark*, the new method *IPA Analysis*, and the new method *UEQ KPI*. In a large study, we show the implementation of the methods, using a survey on YouTube, WhatsApp, and Facebook.

In Chapter 8, we will present the results of our Delphi study to validate the UX Lifecycle, as a whole. The Delphi study contains 28 statements, divided into six areas (5 Steps of the UX Lifecycle and Overall). Therefore, we include the ratings and comments of 24 experts.

Finally, in Chapter 9, we will state the final conclusion of this thesis, point out the outcome and contribution, and outline the future work of research.

The Appendix at the end of the Thesis consists of five individual parts. Appendix I provides an overview of our investigations with the UEQ, that we conducted as part of this work. Appendix II presents an overview of all publications analyzed in Chapter 2. Appendix III presents the detailed results of the study for UX Poker. In Appendix IV, the responses of the participants from the UX Poker study are presented. In the last section, Appendix V, the detailed results of the Delphi study, from Chapter 8, are presented.

Chapter 2

Related Work

The previous chapter discussed the background of the problem domain, which we aim to address with this PhD thesis. For this reason, we refer to the three main fields of Agile Methods, user experience and user experience management. In this chapter, we will explore the problem domain in detail. Additionally, we will perform an in-depth analysis of the state of the art concerning user experience management.

To this end, we will address the following research questions for this chapter:

- RQ-1.1: Which approaches are suitable for UX management in an Agile context?
- RQ-1.2: What conclusions can be deduced from the studies found?
- RQ-1.3: How can User Experience in Agile software development be planned and controlled for a product backlog item or a requirement before the development?
- RQ-1.4: What retrospective proposals exist to improve User Experience processes in terms of Agile software development?

This chapter is structured as follows: Section 2.1 provides an overview of the foundations of user experience, Agile Methods, and Human-Centered Design. Section 2.2 briefly summarizes the related work and presents gap analysis. Section 2.3 presents the review method including research questions from this SLR, search strategy, selection process, quality assessment, and data extraction. Section ?? outlines the results and key findings of our SLR, as well as the answers to our research questions. Section ?? discusses the meaning of the findings and the limitations of our study. The chapter ends with Section 2.4, with conclusions and ideas for future work.

2.1 Foundations of User Experience, Agile Methods, and Human-Centred Design

Today's users expect a high level of satisfaction while interacting with a product. They expect to be able to use the product, without any major effort, to finish their tasks in a quick and efficient manner. Moreover, for a product to succeed, it is important to consider hedonic interaction qualities—i.e. those that are not directly target-oriented (Preece et al., 2015). In summary, the user wants to have a positive user experience while interacting with any product or service.

2.1.1 User Experience

In the years between 1996 and 2010, 27 different definitions or concepts and models of the term user experience have been published (Roto et al., 2011). This number illustrates that there are different views of the term and the meaning of user experience. Law et al. (2009) noted, in a study they conducted, that it is difficult to define user experience. The authors reasoned that user experience is initially understood as a fuzzy and dynamic concept. This includes emotional, affective, hedonic, and aesthetic variables. Due to the number of different definitions, or concepts, UX research has split up, making a common definition difficult (Law et al., 2009).

The results from Law et al. (2009) form the basis for the definition of *user experience* in EN ISO 9241-210 (2020). Here, user experience is defined as ‘user’s perceptions and responses that result from the use and/or anticipated use of a system, product or service’. Therefore, user experience is viewed as a holistic concept that includes all types of emotional, cognitive, or physical reactions concerning the concrete, or even only the assumed, usage of a product formed before, during, and after use. The user experience is defined in EN ISO 9241-210 (2020) as a holistic construct made up of various individual components, such as emotions, imagination, etc., that can be used to create a user experience. The user experience is a deeply subjective sensation that takes place exclusively in the mind of the user (Hassenzahl et al., 2009).

The user experience, i.e., the user’s experience when using a product, can be divided into different temporal phases. Figure 2.1 shows the different points in time and phases of user experience, according to Roto (2011):

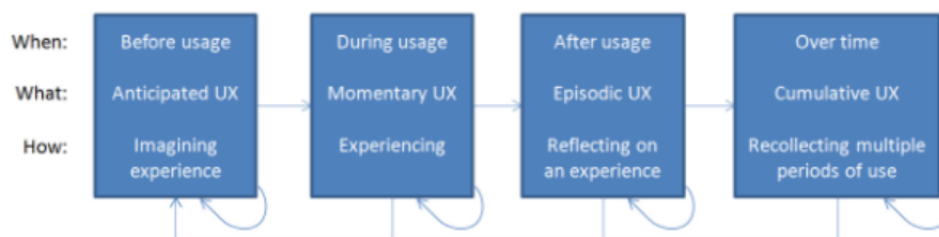


Fig. 2.1 Timing and phases of User Experience according to Roto et al. (Roto, 2011)

- **Before usage (Anticipated UX):** The user has a certain prior experience and expectation when using the product.
- **During usage (Momentary UX):** During use, pragmatic qualities or usability are perceived above all.
- **After usage (Episodic UX):** After use, the user reflects on the interaction that took place. The evaluation takes place directly after use and again after a time interval.
- **Over time (Cumulative UX):** The overall evaluation of the product by the user is the sum of the individual experiences that have taken place over a longer period of time.

A different interpretation defines user experience as a set of distinct quality criteria (Preece et al., 2015) that includes the classical usability criteria or pragmatic qualities, such as efficiency, controllability, or learnability, and non-goal directed or hedonic quality criteria (Hassenzahl et al., 2001) like stimulation, novelty, or aesthetics (Tractinsky, 1997). This definition has the advantage of splitting the general notion of user experience into a number of quality criteria, thereby describing the distinct, and relatively well-defined, aspects of user experience. These quality criteria are called UX factors within this thesis.

At various points in this thesis, the term user experience is considered further. For example, Chapter 5 gives an overview of existing UX factors and questionnaires that measures UX factors. Chapter 7 presents different methods for interpreting the results of UX questionnaires. In today's world, Agile methods are common for developing products with a high user experience, which we will introduce in the next section.

2.1.2 Agile Methods

In early 2001, seventeen software developers met in Utah to discuss new approaches to software development (Beck et al., 2001). The reason was that the sequential software development models that had been common until then, such as waterfall or the V-model, no longer met the requirements of developers and customers. Among other things, it was criticized for stipulating that all requirements had to be designated, even before development of the software began. However, this could never be followed through in practical implementation, in a way that allowed necessary or desired changes to be implemented with change requests.

As a result of this meeting in Utah, the 'Manifesto for Agile Development' was developed (Beck et al., 2001). The manifesto consists of four basic values, which are:

- **INDIVIDUALS AND INTERACTIONS** over processes and tools
- **WORKING SOFTWARE** over comprehensive documentation
- **CUSTOMER COLLABORATION** over contract negotiation
- **RESPONDING TO CHANGE** over following a plan

The four Agile Values are intended to help people understand the concept of Agile software development. Each Agile Value consists of a left and a right part. The left part is more important than the right part. This does not mean that the right part is unimportant, just less important than the left part.

On this basis of Agile Values, several Agile methods and frameworks for Agile software development emerged, such as Scrum (Schwaber, 2004), Kanban (Anderson, 2010), or Extreme Programming (XP) (Beck and Andres, 2007). These partly served as a template for the Agile manifesto and were thus developed beforehand. One objective of Agile methods is to develop products for the market faster (Serrador and Pinto, 2015). The iterative approach to developing software minimizes the risk of developing software, that is not in line with what is needed in the market (Boehm and Turner, 2003). By performing retrospectives (Schwaber, 2004) at the end of an iteration, both product quality and Agile process quality can be improved. The main risk in Agile software development is that the Agile team focuses mainly on implementing requirements and not on the users need (Nielsen, 2008). One way to minimize this risk is to apply the process of Human-Centered Design.

2.1.3 Human-Centred Design (HCD)

Human-Centred Design (HCD) is an approach to develop user-centred products, by putting the user at the centre of the development process. The idea behind HCD is to develop a great understanding of the user and their requirements. The purpose of HCD is that the product is developed around the human being. His or her needs should be recognized and implemented. Not only functional requirements should be identified, but also

those that positively influence the user experience. HCD is defined in EN ISO 9241-210 (2020) as an iterative process. The HCD process is illustrated in Figure 2.2.

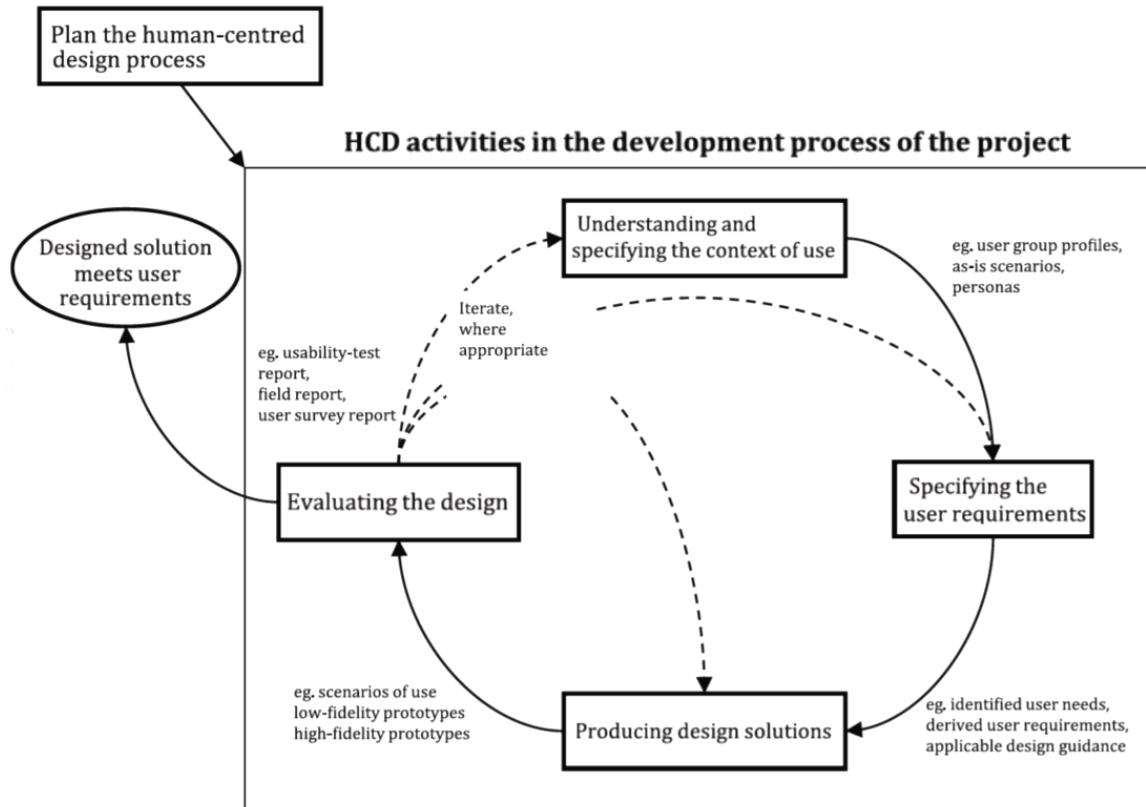


Fig. 2.2 Human-Centered Design EN ISO 9241-210 (2020)

The focus is placed on the user through the iterative process and continuous testing of alternative solutions. EN ISO 9241-210 (2020) defines requirements and recommendations for Human-Centered Design approaches. It also shows how this can be used and organized within the company. EN ISO 9241-220 (2020) takes up this principle and expands it with a detailed description of the principles and activities as structured processes with defined results.

Both EN ISO 9241-210 (2020) and EN ISO 9241-220 (2020) describe activities that can be used to develop human-centered products. Recommendations are given on how the HCD process can be implemented. Individual HCD activities are discussed without specifying the method for implementation. However, examples are given, per HCD activity, of which typical methods are used. However, they do not directly describe how these can be used for user experience management.

2.2 User Experience Management

The term UX management is used differently in the literature. The main task of a UX manager, according to Szóstek 2012, is the empowerment of the UX team. Szóstek 2012 describes the development of the team with the selection of the best career path for the individual team member. This includes career planning and

development, team management, and training of individual team members. UX management in this case is related to team building and empowerment.

In addition to building a UX team, Anderson et al. 2007 proposed that C-level executives should be involved. C-level executives should understand that UX management is necessary to develop products with a high user experience. With the cooperation of C-level executives, UX teams can work successfully. For the implementation of UX management, Anderson et al. 2007 and Rosenberg 2019, for example, offered various patterns that provide support at the levels of planning, decision, tactics, and conflict.

UX maturity models are suitable to measure the current state of UX activities and its maturity level in the team. In the next section we present some UX Maturity Models.

2.2.1 UX Maturity Models

The use of UX Maturity Models is one way to at least measure the current state of implementation of UX activities within the organization. The advantage of using such a model is that it determines the current maturity level of an organization. Thus, its weaknesses can be identified. The result can be used to work specifically on improving UX Maturity. There are different UX Maturity Models that measure different aspects.

The *Total User Experience Management (TUXM)* (Duh et al., 2016) model contains elements such as UX objectives, integrated design systems, strategic communication, continual improvement, fact-based decision-making, and a T-type design team. Companies can use this model to assess their development status. The TUXM can visualize the gap between departments in a company, in terms of UX development. This visualization of weaknesses illustrates to other departments the necessity and meaningfulness of company-wide UX development, and promotes collaboration between departments.

The *Nielsen Corporate Usability Maturity Model* (Salah et al., 2014a), on the other hand, comprises dimensions such as the developers' attitude towards usability, the management's attitude towards usability, the usability practitioner's role, usability methods and techniques, and strategic usability. The Nielsen Corporate Usability Maturity Model was developed by Jakob Nielsen in 2006. It is composed of eight stages or maturity levels (Salah et al., 2014a). It states that organizations typically go through the same sequence of stages in the course of their usability maturation. The first stage starts from initial skepticism and ends in the final stage with extensive trust in user research.

Another approach is the metric *Index of Integration (IoI)* (Joshi et al., 2010). This metric can be used to determine the maturity level of typical HCI activities in the development team. The IoI is calculated based on the HCI activities performed in the respective software engineering phase. Each activity is assigned a score. The IoI is then calculated using a weighted formula. The value range is 0 to 100, where 100 represents the best possible integration of HCI activities and 0 the worst.

It is noticeable that the presented approaches capture different dimensions of UX management. For example, the TUXM model measures the dimension 'UX objectives', which is not present in *Nielsen Corporate Usability Maturity Model*. The metric *Index of Integration (IoI)*, in turn, only includes HCI activities. Conversely, the Nielsen model is more focused on practical implementation. The testing of a suitable UX maturity model should be carried out before deployment, and tailored to the needs of the organization (Salah et al., 2014a).

It can be summarized, that the term user experience management is used differently in the literature. In addition, there are various user experience Maturity Models that can measure a degree of maturity. In the next section, we would like to present a basic understanding of user experience management from our point of view.

2.2.2 GAP Analysis

We generally understand management based on the explanations of Drucker (2009) and Magretta and Stone (2013)—it is a combination of a goal, a strategy, and resources. When applied to UX, user experience management consists of a UX goal, a UX strategy, and UX resources (Figure 2.3) based on the work of Mckeown (2020).

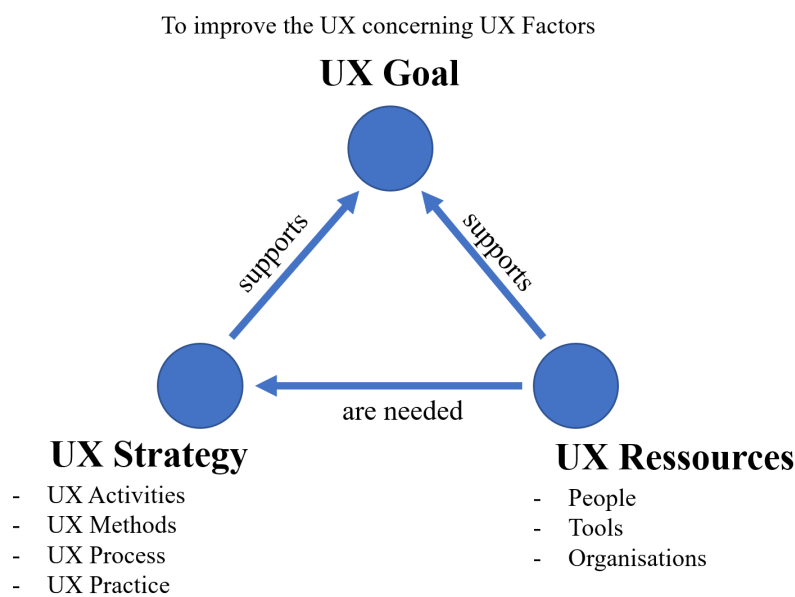


Fig. 2.3 User Experience Management based on Mckeown (2020).

For example, a UX goal can be set upfront, based on user research, to improve the UX for a selected factor of the UX. This can be, for example, the UX factor ‘Trust’. To improve the UX factor ‘Trust’, a UX strategy can be developed from various UX methods, which is then implemented by a UX team (UX resources). A subsequent evaluation with the User Experience Questionnaire Plus (UEQ+) (Schrepp and Thomaschewski, 2019b) or the SUPR-Q (Sauro, 2015) can be performed. The result can be used to determine whether the previously defined UX goal has been achieved or not.

Both UX strategy and UX resources are necessary to achieve the UX goal. This should be understood before the next development iteration, whose requirements positively support the UX goal. In this way, the UX goal can be achieved in a goal-oriented manner. In our view, it makes absolute sense to empower and develop a UX team. This is a necessary prerequisite to any successful UX management implementation. In our opinion, however, a UX goal and a UX strategy are also needed to be able to operate UX management successfully.

2.3 The State of the Art of UX Management

This chapter is censured as it is pending to be published.

2.4 Chapter Summary and Conclusion

This chapter presents an SLR about managing the UX process to identify suitable approaches for user experience management. The SLR was conducted according to the guideline offered by Kitchenham and Charters (2007). In an initial search, we found 44,637 studies. Our search process reduced the number of studies to 1,253. We analyzed these studies by their titles and abstracts, and performed a quality assessment. These measures helped us to select 49 studies, including seven studies that were selected through a snowballing process.

This SLR has different implications for both practitioners and scientists. Based on the explanations in 'Related Work' (Section 2.2), we can summarize that approaches and methods are used to develop a better user experience, but not goal-oriented by defining a UX goal. Furthermore, there is no definition of UX management, or a common understanding of UX management.

The approaches identified in the studies deal with the integration of UX methods or HCI in Agile Methods. Upfront UCD design, communication/collaboration, and teaching UX methods have been applied in several studies. All other approaches have only been presented in the respective study, without being found in other studies. In addition to the use of the approaches, several UX methods have been identified, that have been used in combination with the approaches. The three most frequently identified UX methods are prototyping (low/high), personas, and task/usage scenarios. Among the approaches and UX methods analyzed, it has been found that only one approach makes it possible to define a UX goal before development, and to test it after development Joshi et al. (2010). All other approaches aimed to systematically integrate the UX methods into Agile software development. Many of them can be used for UX management, if they are adapted accordingly.

In conclusion, it can be summarized that UX management is neither sufficiently described, nor used in a targeted manner. Further research may focus on a process model or lifecycle that would take a desired UX goal into account, and figure out whether the goal is reached. To this end, we will develop a UX Lifecycle that includes a UX goal, a strategy to reach the UX goal, methods to interpret the outcome, and a UX retrospective to improve the usage of the UX Lifecycle. We present the UX Lifecycle in this thesis.

Chapter 3

Challenges, Research Methodology, and Objectives

In agile methods, different methods and processes are used to manage the UX for the product being developed. The methods are used, either before the actual development as a separate iteration, or during the development iteration. We could not identify a common understanding or definition of UX management, or the use of UX methods in the sense of UX management, in our SLR (Chapter 2).

In this chapter, we will outline the challenges and objectives of this PhD thesis. Therefore, we will discuss the challenges of the thesis, in Section 3.1. In Section 3.2, we will present the vision of this PhD thesis. Based on this vision, we separated the vision into specific objectives, and then assigned the appropriate research methodology.

3.1 Challenges

In our GAP analysis in the previous chapter (Section 2.2.2), we found no definition of UX management. There is also no common understanding of UX management to build upon. There are many different approaches to how UX management is understood and implemented. Some authors use the term UX management in the context of employee development. This means training employees on UX methods, and empowering their development within the team, focusing on UX. Other authors use UX management in the context of UX maturity models. A UX maturity level is determined, based on which measures can then be derived.

For these reasons, we have decided that we are not explicitly targeting UX management with our SLR. The search string includes user experience and Agile, and corresponding variations of the terms. We were pretty sure that such a general search would also yield related results. However, as previously stated, this is because no definition of UX management is known.

Accordingly, we were then able to identify 49 studies through our SLR, that address the integration of UX methods into Agile Methods. Furthermore, we were able to identify and analyze 16 SLRs from the 49 studies. From these SLRs we extracted numerous insights, regarding the integration of UX methodologies into Agile

Methods. The SLRs, and the other studies identified, used different research questions to investigate the current state of integration, in terms of usability.

The applicability of the UX methods was indirectly investigated in the SLRs. From our point of view, this does not go far enough. We are convinced that UX methods should be considered, concerning the following criteria or challenges:

- At what point in the development process can the UX method be used?
- What impact does the method have on the UX of my product?
- How can the method support the achievement of a UX goal?

The challenge in UX management is, on the one hand, to make the UX visible to everyone, and then to manage it accordingly, via a UX goal. Without visibility, it is not possible to check whether a UX goal has been achieved or not. UX can't be managed without a UX goal. And management, in this sense, means setting and achieving UX goals. The challenge for the PhD thesis is to implement this view on UX management. UX methods are to be used at the right time in the development process, to contribute to a UX goal, and make the UX goal visible and measurable. Then, it is our conviction, that UX management can be established. This is a different way of approaching the use of UX methods. It is not only about using UX methods in Agile methods successfully and gainfully, but about using them in the sense of a UX goal. We have taken on these challenges to derive our objectives for this Thesis, which we present in the next section.

3.2 Objectives

The overall goal of this thesis is based on the challenges as described in Section 3.1. From our point of view, the management of UX should be the elementary components of this thesis. The vision of this Thesis is therefore:

The primary research objective of this Ph.D. thesis is to investigate how quality, in terms of UX, can be managed in Agile methods.

Based on the vision of this thesis, we would like to develop a lifecycle for UX management, in the context of Agile Methods. This UX Lifecycle should enable Agile teams to manage the user experience of their product. UX management means that the Agile team can identify potential for improvements to their product, in terms of UX. Furthermore, the Agile team could then improve the UX in a targeted manner. The UX Lifecycle should support the agile team significantly in this process.

We have divided the vision of this thesis into individual sub-objectives. This Ph.D. thesis follows the Design Science (DS) research methodology provided by Johannesson and Perjons (Johannesson and Perjons, 2014), in combination with the guidelines by Wieringa (Wieringa, 2014) and Peffers et al. (Peffers et al., 2014). The classification system given by (Wieringa, 2014) can be used to classify the research questions. The design science process is divided into the following activities: explicate problem, define requirements, design and develop artifact, demonstrate artifact, and evaluate artifact. We present the sub-objectives in Figure 3.1 with the corresponding applied method, the research questions, and the expected outcome.

The proposal of this PhD thesis was presented at the CAISE conference 2019 (Hinderks, 2019). The objectives and the design science were discussed within the Doctoral Consortium. Valuable input could be

The primary research objective of this Ph.D. thesis is to investigate how quality in terms of UX can be managed and improved in Agile methodologies.					
DS Activity	Objective	Method	Research Question	Expected outcome	Chapter
Explicate problem	State of the art of UX Management	SLR	RQ-1.1: Which approaches are suitable for UX management in an Agile context?	List of approaches	2
			RQ-1.2: What conclusions can be deduced from the studies found?	List of conclusions	2
			RQ-1.3: How can User Experience in Agile software development be planned and controlled for a product backlog item or a requirement before the development?	List of proposals	2
			RQ-1.4: What retrospective proposals exist to improve User Experience processes in terms of Agile software development?	List of proposals	2
Define requirements	Requirements for UX Management	Tertiary study	RQ-2.1: What requirements can be derived from literature reviews with the focus on user experience and Agile development?	Set of requirements	4
Design and develop	Approach for a Lifecycle to manage UX	/.	RQ-2.2: What does a lifecycle that covers UX management look like? UX Lifecycle	UX Lifecycle	4
Demonstrate Artefact	State of the art of UX questionnaires	Literature review	RQ-3.1: What standardized UX questionnaires can be used for the UX Lifecycle?	Set of UX questionnaires	5
			RQ-3.2: Which UX factors exist that can be measured with a UX questionnaire?	Set of UX factors	5
			RQ-4.1: How can the potential impact of a user story on selected UX factors be estimated?	UX Poker	6
Evaluate Artefact	Validating the UX Lifecycle	Delphi study	RQ-5.1: How can the result of a UX questionnaire be interpreted?	UEQ KPI / IPA	7
			RQ-6.1: Does the use of the UX Lifecycle help an Agile team to develop products with better UX together?	Statement on validity	8
			RQ-6.2: What specific implications can be derived from the validation of the proposed UX Lifecycle?	Set of implications	8
			RQ-6.3: What general implications can be derived from the validation of the proposed UX Lifecycle for UX management?	Set of implications	8

Fig. 3.1 Overview Design Science, Methods, Research Questions, and expected Outcome from this Thesis

integrated into the PhD thesis. Since this presentation, we have started working on the vision and objectives. In the next sections, we present the steps of our Design Science process, which is shown in Figure 3.1.

3.2.1 Explicate Problem

This Ph.D. thesis is based on an SLR. The SLR aims to provide the current status, regarding the integration of UX methods and techniques into Agile software development. As a result, potential problems by using existing technologies and artifacts supporting the integration of UCD and Agile methods will be addressed. The SLR answers the following RQs:

- RQ-1.1: Which approaches are suitable for UX management in an Agile context?
Agile
- RQ-1.2: What conclusions can be deduced from the studies found?
deduced
- RQ-1.3: How can User Experience in Agile software development be planned and controlled for a product backlog item or a requirement before the development?
- RQ-1.4: What retrospective proposals exist to improve User Experience processes in terms of Agile software development?

The SLR was conducted according to the guideline offered by Kitchenham and Charters (Kitchenham and Charters, 2007). In an initial search, we found 44,637 studies. Our search process reduced the number of studies to 1,253. We analyzed these studies by their titles and abstracts, and performed a quality assessment. These measures helped us to select 49 studies, including seven studies that were selected through a snowballing process. Using these 49 studies, we answered research questions RQ-1.1 through RQ-1.4.

3.2.2 Define Requirements for the UX Lifecycle

The focus of this thesis is the UX Lifecycle. With the UX Lifecycle, it is possible for Agile teams to manage and visualize the user experience for their product. The main objective of the UX Lifecycle is that all team members are, more or less, involved in the process of the lifecycle. By measuring the user experience before, during, and after development, management of predefined UX goals is created. In addition, the UX Lifecycle supports the Agile team (UX professionals and developers) to specifically improve the user experience of the product. In our view, this is one of the requirements for UX management. This objective will be addressed as follows:

- RQ-2.1: What requirements can be derived from literature reviews with the focus on user experience and Agile development?

To identify the requirements, we conducted a tertiary study. Based on the sixteen SLRs found in Section ??, we derived corresponding requirements for the UX Lifecycle. We assigned these identified requirements to the categories ‘people/social’, ‘technology/artifact’, and ‘process/practice’. The goal was to identify requirements for all categories, which could be taken as the basis for the UX Lifecycle.

3.2.3 Design and Develop the UX Lifecycle

Based on the requirements we identified from the tertiary study, we developed our UX Lifecycle. The term Lifecycle is defined as starting when a product is conceived, and ending when the use of the product is no longer available (IEEE Standards Association, 1993). The UX Lifecycle goes beyond this period, as UX decisions can impact a company's other products as well. We use the term Lifecycle primarily for the continuous improvement of the user experience over the entire product lifecycle. The research question we pose for the UX Lifecycle development is:

- RQ-2.2: What does a lifecycle that covers UX management look like?

The UX Lifecycle is based on a few, but in our opinion important, steps: Preparation, UX Poker, Evaluate Prototype, Evaluate Product Increment, and UX Retrospective. We have developed UX Poker as a new method and integrated it into the UX Lifecycle. With UX Poker, it is possible to estimate the UX of a Product Backlog item, before development by the Agile team. The estimation has the advantage of allowing targeted product backlog items that improve user experience to be selected. We have also developed methods for interpreting the results of evaluations with UX questionnaires, since UX evaluation is an important part of the UX Lifecycle.

3.2.4 Demonstrate the UX Lifecycle

Parts of the UX Lifecycle are demonstrated by providing an application in a real-world context. The requirements identified from the response to RQ-2.1 can thus be checked in an initial validation. Any corrections can be made. The results can also be used to prepare the evaluation or validation.

- RQ-3.1: What standardized UX questionnaires can be used for the UX Lifecycle?
- RQ-3.2: Which UX factors exist that can be measured with a UX questionnaire?

Which UX factors exist that can be measured with...

- RQ-4.1: How can the potential impact of a user story on selected UX factors be estimated?
- RQ-5.1: How can the result of a UX questionnaire be interpreted?

To answer the research questions, we conducted several studies for evaluation and validation. In a literature review, we identified UX questionnaires (RQ-3.1), as well as UX factors (RQ-3.2), that are potentially suitable for use in the UX Lifecycle. We evaluated the new method 'UX Poker' with 30 test subjects from four companies, in different workshops (RQ-4.1). In an international study with a total of 467 participants, we adapted methods to interpret the results of UX questionnaires, and to derive recommendations for action (RQ-5.1).

3.2.5 Evaluate UX Lifecycle

The final goal of this thesis is the evaluation or validation of the UX Lifecycle. We have already evaluated individual parts of the UX Lifecycle, like UX Poker or methods, to interpret evaluations with UX questionnaires. In this step, we want to validate the UX Lifecycle as a whole. We have validation results from individual studies from the step 'Demonstrate the UX Lifecycle', as well as results from the validation of the entire UX Lifecycle. We addressed this objective with the following research questions:

- RQ-6.1: Does the use of the UX Lifecycle help an Agile team to develop products with better UX together?

Does the use of the UX Lifecycle help an Agile team to develop products with an altogether better UX?

- RQ-6.2: What specific implications can be derived from the validation of the proposed UX Lifecycle?
- RQ-6.3: What general implications can be derived from the validation of the proposed UX Lifecycle for UX management?

For this purpose, we conducted an international Delphi study. To this end, 24 experts from three different countries took part in the Delphi study between September and November 2020. The experts rated and commented on 28 statements. The consensus was reached in 24 of the 28 statements after two rounds.

3.3 Chapter Summary

In this chapter, we have presented the challenges, research methodology, and objectives of this PhD thesis. As a main challenge, we addressed the collaboration between UX professionals and developers, as well as the definition and review of UX goals. The objective of this PhD thesis is to develop a UX Lifecycle that enables Agile teams to manage the UX of their product. To achieve this objective, we have developed the following specific goals:

- Explicate problem: State of the art in UX management
- Define requirements: Requirements for UX management
- Design and develop: Approach for a lifecycle to manage UX
- Demonstrate artifact:
 - State of the art for UX questionnaires
 - Create a method to estimate UX in earlier stages of development
 - Interpreting the results of UX
- Evaluate artifact: Validating the UX Lifecycle

As a result, a UX Lifecycle will be developed. To develop the UX Lifecycle, we have built a research methodology according to Johannesson and Perjons (2014), in combination with the guidelines by Wieringa (2014) and Peffers et al. (2014). Each step of our research methodology has the purpose of achieving one or more specific goals. In the next chapters, we will address all specific goals and the corresponding research questions.

Chapter 4

The UX Lifecycle

In the previous chapter, we presented the challenges, research methodology, and objectives. In this chapter, we will present the results of the Design Science activities ‘Define Requirements’ and ‘Design and Develop’. For this purpose, we have developed the UX Lifecycle. The UX Lifecycle (Figure 4.1), which is presented in this thesis, is an iterative process to support Agile teams in UX management. The UX Lifecycle consists of an initial Step 0 ‘Preparation’, followed by Step 1 ‘UX Poker’, Step 2 ‘Evaluate Prototype’, Step 3 ‘Evaluate Product Increment’, and a subsequent Step 4 ‘UX Retrospective’. The ‘UX Poker’ method is used to estimate the influence of a user story, or an epic, on selected UX factors. By comparing the results from the UX Evaluation of a prototype and the Product Increment developed from it, an Agile team can conduct a UX Retrospective. In the UX Retrospective, the results are compared, and improvements are made to the UX activities for the next iteration.

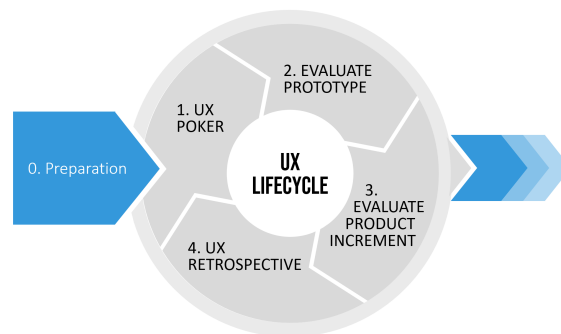


Fig. 4.1 Proposed User Experience Lifecycle with its five Steps (A simplified Representation)

To this end, we will address the following research questions in this chapter:

- RQ-2.1: What requirements can be derived from literature reviews with the focus on user experience and Agile development?
- RQ-2.2: What does a lifecycle that covers UX management look like?

This chapter is structured as follows: Section 4.1 presents requirements for UX management based on the results of our SLR (Section 2.3). Section 4.2 briefly summarizes the selected requirements for our UX

Lifecycle. In Section 4.3 we introduce the UX Lifecycle. The chapter ends with Section 5, with a summary and conclusions.

4.1 Requirements for UX Management

This chapter is censured as it is pending to be published.

4.2 Selected Requirements for our UX Lifecycle

We assessed the individual requirements and developed our UX Lifecycle, based on the requirements. We did not cover all requirements with the UX Lifecycle, because some requirements could not be covered with the UX Lifecycle. For example, the requirement ‘Create sufficient capacity of UX designers’ (Jurca et al., 2014) cannot be covered with a UX Lifecycle. A Lifecycle cannot solve a problem concerning the capacity of staff. That should be solved at another level. The requirement ‘Separate product discovery and product creation’ (Brhel et al., 2015; Da Silva et al., 2015), in our opinion, collides with the requirement ‘Improve and optimize collaboration between UX professionals and developers’ (Curcio et al., 2019; Da Silva et al., 2015; Jurca et al., 2014; Salah et al., 2014b). For this reason, we chose one of the two requirements. In Table 4.1, we have marked those requirements which we have adopted in our UX Lifecycle.

Table 4.1 Overview of the Selected Requirements for the UX Lifecycle

Category	Requirement	UX Lifecycle
People/Social	- Improve and optimize collaboration between UX professionals and developers	X
	- Create sufficient capacity of UX designers	
	- Continuous stakeholder involvement	X
Technology/Artifact	- Apply evaluation methods to evaluate the product	X
	- Create and evaluate prototypes to get feedback from the user	X
	- Use of artifacts for artifact-mediated communication	X
	- Use of documentation to communicate within the team	
Process/Practice	- Create a Big Picture of the product to remain focused	
	- Formalize suggestions for integrating usability techniques into Agile software development in order to increase quality	X
	- Separate product discovery and product creation to be more independent	
	- Parallel interwoven creation tracks to better work together	
	- Iterative and incremental research, design, and development to learn after each iteration	X
	- Allocated time for upfront activities to be prepared for development	X

The requirements for the UX Lifecycle can be summarized as follows:

Our UX Lifecycle should improve and optimize the collaboration between UX professionals and developers. It should also include the stakeholders continuously, and use user stories to address requirements. Furthermore, the usage of prototypes and the evaluation of the prototypes should be implemented. The primary approach of the UX Lifecycle should be a iterative and incremental research, design, discovery, development, and delivery. Finally, the UX Lifecycle formalizes suggestions for integrating UX techniques into Agile methods.

The selected requirements are the basis for the UX Lifecycle. In the following section we present the resulting UX Lifecycle.

4.3 The UX Lifecycle

GAP analysis (Section 2.2.2 and ??) has shown that UX methods are not targeted, in terms of achieving UX goals. It is common to use UX methods before development, to achieve a good UX. However, the goal is not named, and also not checked before, during, or after development. So, no direct link is made between the UX activities before development and the UX evaluation of the product after development. The UX Lifecycle is based on the approach that UX management can only be successful, if the user experience is known as early as possible, and this is then measured throughout the process up to the finished product. We distinguish between ‘Desired UX’, ‘Estimated UX’, ‘Probable UX’, and ‘Implemented UX’, as shown in 4.2.

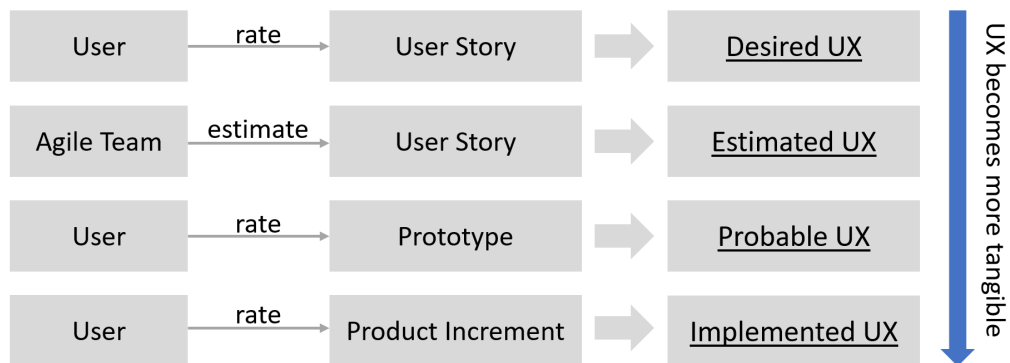


Fig. 4.2 UX Stages: Desired UX, Estimated UX, Probable UX, and Implemented UX

The basic idea of our iterative approach is that the UX is still very unspecific and vague in the early phase of development. However, the UX then becomes more concrete in the course of development, up to the very concrete UX of the Product Increment. In the early phase of development, the ‘Desired UX’ is only very vague. The only thing a user can evaluate at this stage is a User Story. user stories are difficult to rate by the user, because user stories only describe the result and are rather vague. The next phase of UX is ‘Estimated UX’, which is estimated by the Agile team. The assumption is that an Agile team can estimate the user experience of a User Story, through their experience. In the next phase, the ‘Probable UX’ is evaluated by the user, based on a previously developed prototype. In the last phase, the ‘Implemented UX’ is evaluated by the user, based on the developed Product Increment.

The UX Lifecycle attempts to target the user experience, by using these different phases of the UX of a product. The basic principle of the UX Lifecycle consists of measuring the user experience before

(Estimated UX), during (Probable UX) and after (Implemented UX) a development iteration (see Section 4.2). In a subsequent retrospective, improvements and actions for future iterations are developed from all three measurements.

In Figure 4.3, the proposed UX Lifecycle consists of an initial Step 0 ‘Preparation’, followed by Step 1 ‘UX Poker’ (before development), Step 2 ‘Evaluate Prototype’ (during development), Step 3 ‘Evaluate Product Increment’ (after development), and a subsequent Step 4 ‘UX Retrospective’. The UX Lifecycle is an iterative process, consisting of Step 1 through Step 4. Step 0 is the preparation for the first launch, and can be performed again after a few iterations, if required.

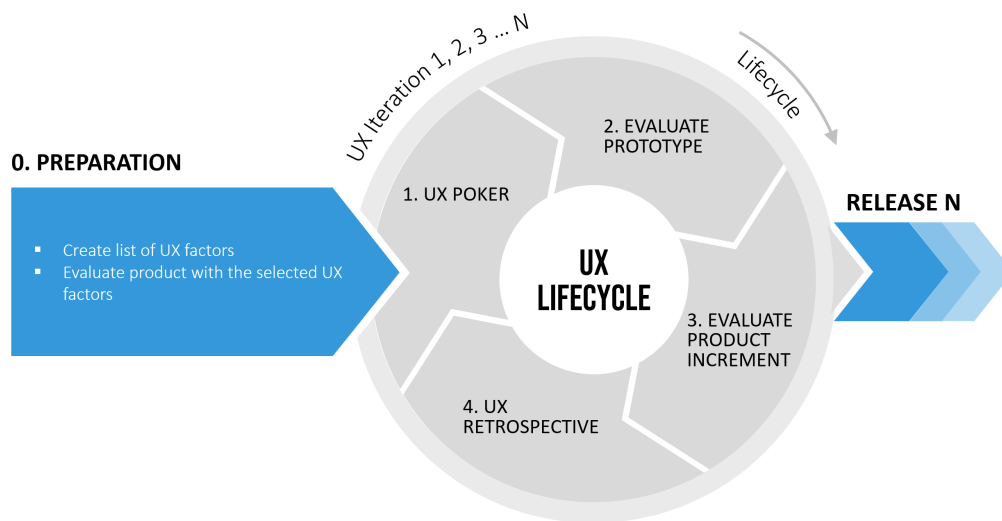


Fig. 4.3 Proposed User Experience Lifecycle with its five Steps

In the next sections, each step is described in greater detail.

4.3.1 Step 0: Preparation

Goal: Create a list of UX factors, which are important for the product. **Purpose:** This list of UX factors serves as a basis for the further steps in the UX Lifecycle. If possible, this list should be complete and suitable for product development. However, no more than 5–7 factors should be selected, or else meaningful measurements of the factors will no longer be attainable. If the number of factors is too high, there is a risk that UX Poker in Step 1 and UX Evaluation in Step 2 and 3 will become inefficient, and thus the actual goal will not be achieved. As a result, the basic setup for measuring the UX is defined in this step. This definition can be changed after each iteration. It may well be that after a UX retrospective (Step 4), it is recognized that UX factors are missing or do not fit. In this case, the list of UX factors should be revised. We present a list of possible UX factors in Section 5.2.

4.3.2 Step 1: UX Poker

Goal: Estimate the influence of a given User Story for each UX factor. **Purpose:** At the end of UX Poker, each product backlog item has an indication of how much this product backlog item influences each UX factor. A UX goal can be, for example, to improve the UX factor's attractiveness. For the next iteration, the team can select those user stories that support the UX goal, based on the 'Estimated UX'. The new method UX Poker is inspired by Planning Poker (Haugen, 2006) and presented in Chapter 6

4.3.3 Step 2: Evaluate Prototype

Goal: UX Evaluation of the prototype. **Purpose:** Before starting to develop the product increment, it is advantageous to create and evaluate a prototype, based on the selected product backlog item. By evaluating the 'Probable UX' of the prototype, one will perceive whether the 'Estimated UX' in the step UX poker was appropriate.

There are several methods to evaluate the UX of a prototype (Rajeshkumar et al., 2013). In this thesis, we use UX questionnaires to measure the UX of a prototype. However, other methods to measure the UX are generally not excluded. The only condition is the use of UX factors, as they are necessary for the UX Lifecycle. The goal is for the Agile team to learn, based on the results. This is a crucial point, as the effort required to create a prototype is manageable, but the insights gained can be great. This ensures that the right decisions can be made, before the actual development. In Chapter 5.1, we present a list of UX questionnaires. Moreover, we present, in Chapter 7, methods to interpret the results from UX questionnaires.

4.3.4 Step 3: Evaluate Product Increment

Goal: UX Evaluation of the product increment. **Purpose:** By evaluating the UX of the product increment, one will get the final feedback from the users, in order to determine whether the estimated UX, in the step UX poker, was appropriate. In addition to specific methods for evaluating a prototype, there are also methods for evaluating the UX of products (Vermeeren et al., 2010). This third step is similar to the second step, except that the artifact being evaluated is different. We also prefer, in this thesis, UX questionnaires to measure the UX from the product increment. Also applicable for this step are the list of UX questionnaires 5.1, and the methods to interpret the results from UX questionnaires, presented in Chapter 7.

4.3.5 Step 4: UX Retrospective

Goal: The UX Retrospective is an opportunity for the Agile team to inspect itself, and create a plan for improvements to be enacted during the next iteration. **Purpose:** The purpose of the UX Retrospective is to assess the effectiveness and efficiency of the last iteration, in respect to the results from UX Poker (Estimated UX), and the evaluations from prototype (Probable UX) and product increment (Implemented UX). The objective of the UX Retrospective is to better estimate the potential UX, using UX Poker. Conducting a retrospective can generally identify areas for improvement (Schwaber and Sutherland, 2020), especially for software development (Kashfi et al., 2016).

4.4 Chapter Summary

In this chapter, requirements for UX management were presented. Based on the results from the SLR, requirements were identified and categorized accordingly as People/Social, Technology/Artifact, and Process/Practice. From the list of requirements, those requirements that were mapped with the UX Lifecycle, were then selected.

Our UX Lifecycle should improve and optimize the collaboration between UX professionals and developers. It should also include the stakeholders continuously, and use user stories to address requirements. Furthermore, the usage of prototypes and the evaluation of the prototypes should be implemented. The primary approach of the UX Lifecycle should be iterative and incremental research, design, discovery, development, and delivery. Finally, the UX Lifecycle formalizes suggestions for integrating UX techniques into Agile Methods.

The iterative UX Lifecycle consists of five steps: Initial Step 0 'Preparation', Step 1 'UX Poker' (before development/Estimated UX), Step 2 'Evaluate Prototype' (during development/Probable UX), Step 3 'Evaluate Product Increment' (after development/Implemented UX), and a subsequent Step 4 'UX Retrospective'. With its five steps, the UX Lifecycle provides the structure for continuously measuring and evaluating the UX in the various phases. This makes it possible to develop the UX in a targeted manner, and to check it permanently.

In the next chapter, we present a list of UX factors that can be used with the UX Lifecycle, as a basis for measuring UX during the iteration. Also, in the next chapter, we present UX questionnaires that measure various UX factors. This forms the basis for the evaluation of prototypes, as well as product increments.

Chapter 5

UX Questionnaires and UX Factors

In the previous chapter, we presented the UX Lifecycle. In Step 0 (Preparation), important UX factors are to be selected for the product. With these UX factors, the possible influence of an epic or User Story on the selected important UX factors is then to be estimated in Step 1 (UX Poker). The selected UX factors should reflect the user experience of the product. A UX Evaluation of the outcome should be measured in Step 2 (Evaluate Prototype) and 3 (Evaluate Product Increment).

To this end, we will address the following research questions in this chapter:

- RQ-3.1: What standardized UX questionnaires can be used for the UX Lifecycle?
- RQ-3.2: Which UX factors exist that can be measured with a UX questionnaire?

To address research question RQ-3.1, we give an overview of a standardized UX questionnaire in Section 5.1, based on the publication of ?. Additionally, we present the basic elements of a UX questionnaire 5.1.2. Finally, we give an overview of the different features of each UX questionnaire.

To answer RQ-3.2, we provide an overview of UX factors in Section 5.2. This list is based on the publication of ?, and has been updated in this thesis. Based on the list of UX factors and the publication of Hinderks et al. (2021b) (under review), we present the UX Poker method in Chapter 6.

5.1 Standardized UX Questionnaires

This chapter is censured as it has
been published in ?.

5.1.1 The User Experience Questionnaire (UEQ)

The UEQ, as well as the UEQ+, have a prominent role in this thesis, because they are used frequently all over the world. The original version of the UEQ was designed in German and English (Laugwitz et al., 2008), but has so far been translated to several languages like Spanish (Rauschenberger et al., 2013), Portuguese (Cota et al., 2014) and many more (Hinderks et al., 2021a). There is also a short version of the UEQ (Schrepp et al., 2017b) with a corresponding benchmark (Hinderks et al., 2018a). The UEQ in all available languages, an Excel sheet for data analysis, and the UEQ Handbook are available, free of charge, at www.ueq-online.org.

The objective of the UEQ is to allow a quick assessment, taken by end-users, covering a preferably comprehensive impression of user experience. It should allow the users to express feelings, impressions, and attitudes that arise when experiencing the product under investigation, in a very simple and immediate way. The UEQ consists of 26 items. Each item consists of a pair of terms with opposite meanings (Figure 5.1). The item can be rated on a 7-point Likert scale, from -3 (fully disagree) to +3 (fully agree).

	1	2	3	4	5	6	7	
annoying	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	enjoyable
not understandable	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	understandable
creative	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	dull
easy to learn	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	difficult to learn

Fig. 5.1 UEQ Item Example

The items are grouped into 6 factors: Attractiveness, Perspicuity, Efficiency, Dependability, Stimulation and Novelty (Figure 5.2). It can be assumed that the factors are not independent. The overall impression of a user is captured by the attractiveness factor, which is influenced by the other 5 factors. Attractiveness is thus, a valence dimension. Perspicuity, Efficiency and Dependability are pragmatic quality aspects (goal-directed), whereas Stimulation and Novelty are hedonic quality aspects (not goal-directed).

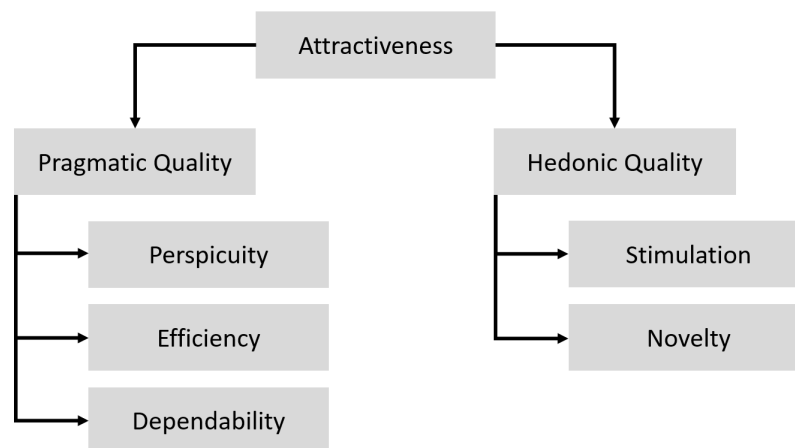


Fig. 5.2 UEQ - Separated According to UX Qualities and UX Factors.

The User Experience Questionnaire Plus (UEQ+) (Schrepp and Thomaschewski, 2019b) takes on a special role. The UEQ+ is a framework, in which the questionnaire can be individually created from a defined list of UX factors. For example, the UEQ itself can also be developed from the UEQ+. The UEQ+ is, therefore, not a

questionnaire with defined UX factors, but a framework for designing an individual UX questionnaire. Thus, a questionnaire can be designed individually for the respective test object, without losing the construct validity (Kang, 2013). Each individual UX factor has been constructed by factor analysis through various studies (Schrepp and Thomaschewski, 2019b). A manual for the individual use of the UEQ+ is available accordingly (Schrepp and Thomaschewski, 2019a). A complete list of UEQ+ factors is listed in table ??.

5.1.2 Anatomy of a UX Questionnaire

All UX questionnaires presented here are structured according to the same pattern. A UX questionnaire consists of the following three elements:

- **UX factors:** Describes an aspect of the user experience. The sum of all UX factors represents the range of user experience, that the questionnaire is able to measure.
- **Items per UX factor:** Each UX factor is represented by a set of items in a questionnaire, usually between 3 and 7 items.
- **Scale per item:** The rating for an item is assessed using a rating or Likert scale. A rating scale is used to capture rank-based statements, made by a participant. A Likers scale is used to capture personal attitudes through agreement or disagreement.

A standard UX questionnaire is characterized by the fact, that it is usually constructed using factor analysis or correlation analysis. Using these methods, items are selected and assigned to the corresponding factors. The result is a construct-valid questionnaire, that can be used. In the Table 5.1 we have listed all questionnaires from section ?? with their characteristics and functions.

Table 5.1 Function Matrix of UX and Usability Questionnaires in Alphabetical Order

Questionnaire	Factors	Items	Items for Importance	KPI	Benchmark	Short Version	Languages	Chargeable
Usability								
IsoMetrics	7	90				X	1	
IsoNorm	7	35				X	4	
PSSUQ	3	19					2	
PUEU	2	12					1	
PUTQ	8	100					1	
QUIS	5	27					4	X
SUMI	5	10					12	X
SUS	1	10			X		6	
User Experience								
AttrakDiff2	4	28				X	2	X
meCUE	9	33					2	
SUPR-Q	3	8			X		1	X
UEQ	6	26	X	X	X	X	36	
UEQ+	20	80	X	X			25	
VisAWI	4	18				X	2	
Web-CLIC	4	12				X	2	

Optionally, benchmarks are available for the questionnaires, which are usually broken down into the individual UX factors of the questionnaire. For example, benchmarks exist for the SUS (Sauro, 2011), the UEQ (Schrepp et al., 2017a), and the SUPR-Q (Sauro, 2015). With a benchmark, UX practitioners can compare their own results with other results. A benchmark is always an average value, over several different evaluations. This means that a comparison with a benchmark is always a comparison with the average result of several evaluations.

The UEQ and UEQ+ also measure the perceived importance per UX factor. This means that, in addition to the items per UX factor, an additional item also asks for the perceived importance. Thus, there is a value for performance and importance per UX factor of the UEQ and UEQ+. Additional analysis can be calculated with these two values, such as the IPA analysis (Section 7.4) or UEQ KPI (Section 7.5).

The additional items on perceived importance per UX factor were added in the process of developing the UEQ KPI. Statistical analyzes have shown the independence of the additional items (Hinderks et al., 2019b). We assume that other questionnaires, which we have presented here, can be extended in this way, using the same procedure.

We decided to use the UEQ and UEQ+ for the UX Lifecycle, for two main reasons. The first reason is that the UEQ+ represents the largest spectrum of user experience, with 20 UX factors. The UX Lifecycle should be applicable to as large a number of products as possible, which is supported by the number of UX factors of the UEQ+. The second main reason is that only the UEQ or UEQ+ has the ability to query the importance of each UX factor. As a result, the UEQ provides two values for each UX factor. On the one hand, is the actual value per UX factor, which reflects the current rating. And on the other hand, the value per UX factor, which reflects the importance of that factor. Based on these two values, additional methods can be applied to interpret the results, such as Importance-Performance Analysis (IPA) or a Key Performance Indicator (KPI). An IPA measures customer satisfaction and presents it graphically, so that recommendations for action can be made (Section 7.4). A KPI represents condensed information in a single number, that can then be used within a company's reporting (7.5).

5.1.3 Use of the UEQ and UEQ+ in this Thesis

We have been using the UEQ, and later the UEQ+, in various scenarios since 2012. The results from the studies on various test objects were also the basis for scientific publications. A complete overview of the studies and the publications is listed in the appendix ???. For this thesis, six studies were conducted, using the UEQ or UEQ+. We conducted a total of 6 studies in Spain, England, and Germany. We evaluated 6 different test objects with 1,330 participants. The results have been published in three different publications. These are listed in Table 5.2.

The selected test objects and the results of the individual studies were not the primary objectives. We conducted the studies to gain deeper insights, concerning the interpretation of the results. When using the UEQ, as well as other questionnaires, we found out that a classification of the results is of high importance. The question that always arises in this context is: how good or bad is the result? And this question cannot be answered easily. Since UEQ, or measuring user experience, is an essential activity in the UX Lifecycle, we have dedicated a separate chapter to interpreting the results from User Experience Questionnaires (Chapter 7).

Table 5.2 Overview of the Conducted Studies with the UEQ/UEQ+ for this Thesis

Year	Country	UEQ Ver- sion	Testobject	Number of participants	Resulting publi- cation
2017	Spain, England, Germany	UEQ	Skype	362	Hinderks et al. (2019b)
2017	Spain, England, Germany	UEQ	Amazon	433	Hinderks et al. (2019b)
2017	Spain	UEQ	Wikipedia	68	Hinderks et al. (2019b)
2019	Germany	UEQ+	YouTube	195	Hinderks et al. (2019a)
2019	Spain	UEQ	WhatsApp	24	Hinderks et al. (2019a)
2019	England	UEQ+	Facebook	248	Hinderks et al. (2020)
3 Countries			6 Test objects	1.330	3 Publications

5.2 User Experience Factors

This chapter is censured as it has
been published in ?.

5.3 Chapter Summary and Conclusion

In this chapter, we have presented a list of 15 UX questionnaires (Table ??). The questionnaires measure different aspects of the user experience. Some measure usability, while others claim to measure the entire user experience. A questionnaire is always limited to the factors it measures. The User Experience Questionnaire Plus (UEQ+) provides a framework to selectively measure only the UX factors that have been chosen. With currently 20 UX factors (Table 5.1), the UEQ+ is the questionnaire with the most UX factors. This is another reason why we decided to use the UEQ+ for the UX Lifecycle.

In addition, 34 UX factors were presented in this chapter. Each of these UX factors measures different aspects of the user experience. Each UX questionnaire measures different UX factors, so the respective product should be checked in advance, in order to determine which UX questionnaire can be used sensibly to evaluate it. After all, not every factor is equally important for a product. It therefore makes sense that the questionnaire not only measures the UX, but also the importance of the individual UX factors.

In summary, the ideal UX questionnaire measures only those UX factors that are also important to the user. The User Experience Questionnaire Plus (UEQ+) is a framework, with which one can create an individual UX questionnaire, related to the product to be evaluated. This allows us to measure only the most important UX factors. In addition, the UEQ+ measures the importance of the individual UX factors. With this additional information, it is always possible to check whether the UX factor is still important, or not. Another advantage is the possibility that, with the importance, there are additional interpretation possibilities of the result. For this reason, we decided to use the UEQ+ in this thesis.

Chapter 6

UX Poker

In the previous chapter, we presented a list of UX factors and standardized UX questionnaires. In addition, in Chapter 4 we presented the UX Lifecycle. In Step 0 of the UX Lifecycle (Preparation), important UX factors are to be selected for the product that has to be developed. With these UX factors, the possible influence of an epic, or User Story, on the selected important UX factors is then to be estimated in Step 1 (UX Poker). The selected UX factors should reflect the user experience of the product. To this end, we will address the following research question for this chapter:

- RQ-4.1: How can the potential impact of a user story on selected UX factors be estimated?

This chapter is structured as follows. Section ?? briefly summarizes the related work. In Section ?? we present the new method, UX Poker, in greater detail. Section ?? presents the research methodology to evaluate UX Poker. Section ?? outlines the results and key findings of our evaluation study. Section ?? discusses the meaning of the findings, the limitations of our evaluation study, and the improvements that could be made to it. The chapter ends with Section 6.2, with a summary and conclusions, and ideas for future work.

6.1 Method UX Poker

This chapter is censured as it is pending to be published.

6.2 Chapter Summary and Conclusion

In this chapter, we have presented our new method: UX Poker. With UX Poker, it is possible to estimate the potential influence of a user story on the user experience, in a team. This involves estimating the UX per UX factor, which was previously selected as important for the product. We conducted and evaluated UX Poker in a study with four different teams. During the evaluation of UX Poker, two main findings were obtained:

- **Usage of Personas:** The use of personas would be helpful for conducting UX Poker. This way, every team member has the same perspective.
- **User Perspective:** By having team members estimate the potential impact of each user story, from the user's perspective, new insights for the user story have been identified. Thus, the requirements were once again refined and adapted, from the user's point of view.
- **Team Communication:** The complete team, including UX professionals, talk or discuss with each other about the user experience of their product. This is an important step to create a common understanding about UX in the whole team.

Both findings have a positive impact on the UX Lifecycle. This is a goal that an Agile team should achieve, when using the UX Lifecycle 4.2. During the evaluation, it has been shown that an Agile team with UX Poker is able to estimate the impact of a user story on the user experience.

Based on the study we conducted to evaluate UX Poker, we can summarize that UX Poker can be used successfully in practice. UX Poker enables a team to focus on UX. That UX Poker can be used successfully is also shown by the international Delphi Study, conducted in this thesis with experts to evaluate the UX Lifecycle 8. Certainly, UX Poker should be evaluated in further studies. However, there are indications that UX Poker can also be used successfully, in these studies.

Chapter 7

Interpreting Results from UX Questionnaires

In the previous chapters, UX factors were used to estimate the influence of a user story on UX factors. This is Step 1 (UX Poker) in the UX Lifecycle. In this chapter, we present different methods to interpret results from UX questionnaires, to conduct Step 2 (Evaluate Prototype) and Step 3 (Evaluate Product Increment) of the UX Lifecycle. The measurement of the user experience in Step 2 and Step 3 are crucial, since the results in Step 4 (UX Retrospective) are compared with those in Step 1 (UX Poker). Thus, the UX in Step 1, 2, and 3 is determined by estimation and measurement. The different results can be compared, and conclusions can be drawn for the next iteration.

A UX questionnaire can measure different UX factors. Additionally, a UX questionnaire is an often-used method (Lazar et al., 2010). Not least, due to the number of different questionnaires (see Table ??), UX questionnaires can be considered established. We will give an overview of the common questionnaires for measuring user experience, and present how to interpret the results from those questionnaires. This is important for the UX Lifecycle, since both Step 2 (Evaluation Prototype) and Step 3 (Evaluation Product Increment) measure the user experience. To this end, we will address the following research question for this chapter:

- RQ-5.1: How can the result of a UX questionnaire be interpreted?

In this chapter, we present the results of three studies, using different methods to analyze a UX questionnaire's results. The methods of analyzing and interpreting results from a UX questionnaire, presented in this section, are based on the User Experience Questionnaire (UEQ) (Laugwitz et al., 2008) and the User Experience Questionnaire Plus (UEQ+) (Schrepp and Thomaschewski, 2019b). We chose the UEQ, because it is a well-known UX questionnaire that is available in Spanish, English and German, allowing us to conduct studies in those countries. The UEQ/UEQ+ is available in the languages we need (Spanish, English, German).

We selected a dataset with three different products, evaluated in three countries (see Section 7.1). Using this dataset, we performed various analyzes to interpret the results of the evaluation, in different ways.

The following list gives an overview of the different methods of evaluation presented in this subsection.

- **Section 7.2 - UEQ Results:** Statistical analysis, such as variance or confidence level, of performance and importance, as well as reliability. Based on published results from (Hinderks et al., 2019a) and (Hinderks et al., 2020).
- **Section 7.3 - UEQ Benchmark:** Comparison of the data with the UEQ benchmark. Based on the work of (Schrepp et al., 2017a) and (Hinderks et al., 2018b).
- **Section 7.4 - IPA Analysis:** Analysis of the data using Importance-Performance-Analysis. Based on published results from (Hinderks et al., 2019a) and (Hinderks et al., 2020).
- **Section 7.5 - UEQ KPI:** Calculation of the UEQ KPI, based on the data. Based on the work of (Hinderks et al., 2019b)

The original UEQ consists of six UX factors: Attractiveness, Perspicuity, Efficiency, Dependability, Stimulation, and Novelty (Laugwitz et al., 2008). A modular extension of the ‘User Experience Questionnaire’ is the UEQ+ (Schrepp and Thomaschewski, 2019b). The UEQ+ has a modular structure, so that the UX factors can be selected individually from a list, for each test object. In this study, we used both questionnaires, which are described in the next sections.

This chapter is structured as follows. In Section 7.1 we present the three studies conducted in detail. In Section 7.2 we present the results of the studies, using statistical analysis. Section 7.3 presents the results for the UEQ Benchmark. Section 7.4 presents the application of Importance-Performance-Analysis (IPA) to the results of the studies and their interpretation. Section 7.5 presents the calculation of a KPI, based on the User Experience Questionnaire (UEQ). Section 7.6 shows recommendations for action, based on the different methods of interpretation. The chapter ends with Section 7.7, with a summary and conclusions.

7.1 Context of the Dataset

In this study, products with a high level of awareness were evaluated, to ensure that the participants could assess the products. The test objects selected were YouTube, WhatsApp, and Facebook. We evaluated the test objects with two different versions: UEQ+ and UEQ (Figure 7.1). We used different versions of the UEQ to be able to use different factors for the test objects. The UEQ has a fixed set of UX factors, whereas for the UEQ+, we adopted selected UX factors (Figure 7.1). For the UEQ+ (YouTube and Facebook), we selected the following factors from the proposed list: Intuitive Use, Quality of Content, Reliability of Content, Trust, and Stimulation. The two versions, UEQ+ and UEQ, measure both performance and importance.

The study was conducted in Germany for YouTube, in Spain for WhatsApp, and England for Facebook, through online and paper versions of the questionnaire. We collected the German dataset from the University of Applied Sciences Emden/Leer, the Spanish dataset from the University of Sevilla. The German dataset was collected by Anna-Lena Meiners as part of her studies. For the English dataset, we chose a social panel (Prolific Academic ¹) to collect the data. A total of 467 participants took part in the study. In addition to the UEQ, we also asked for their age and gender. Furthermore, we asked how often they use YouTube, WhatsApp, or Facebook. We wanted to determine whether the intensity of use affects the result.

Moreover, the participants assured us that they had used the product at least once a month. The remaining answers were divided into 195 for YouTube, 24 for WhatsApp, and 248 for Facebook (Table 7.1).

¹<https://www.prolific.co/>

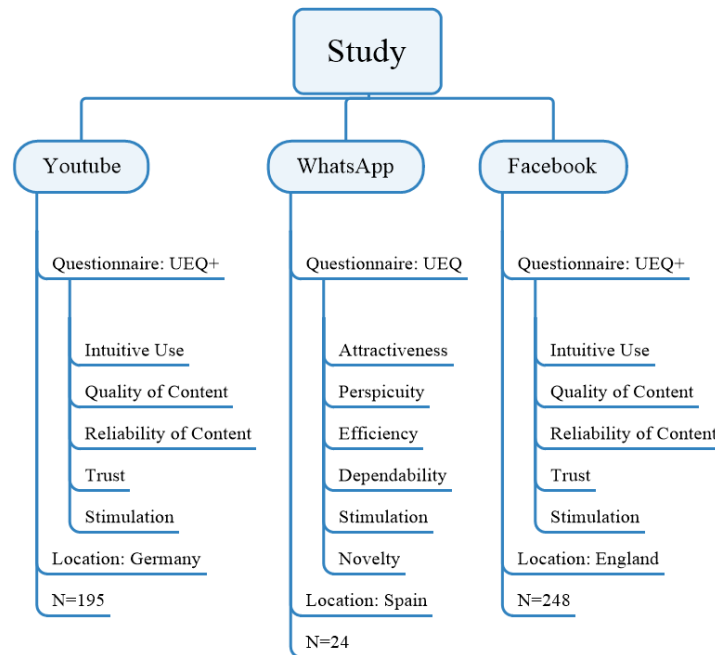


Fig. 7.1 Overview of the Study (Hinderks et al., 2020)

Table 7.1 Number of Participants

Test object	Country	Total
YouTube	Germany	195 (65 females, 123 males)
WhatsApp	Spain	24 (5 females, 18 males)
Facebook	England	248 (132 females, 112 males)
Total		467

The average age is 32 years (31 for women, 32 for men) for the German dataset, 23 years (22 for women, 23 for men) for the Spanish dataset, and 30 years (32 for women, 28 for men) for the English dataset.

7.2 UEQ Results

This chapter is censured as it has been published in (Hinderks et al., 2019a) and (Hinderks et al., 2020).

7.3 UEQ Benchmark

This chapter is censured as it has been published in (Schrepp et al., 2017a) and (Hinderks et al., 2018b).

7.4 IPA Analysis

This chapter is censured as it has been published in (Hinderks et al., 2019a) and (Hinderks et al., 2020).

7.5 UEQ KPI

This chapter is censured as it has been published in (Hinderks et al., 2019b).

7.6 Recommendations for Action

The analyzes by the UEQ/UEQ+ (see section 7.2) do not offer any recommendations for action. However, it is a good idea to compare the values for performance and importance directly. If the importance is higher than the performance, this factor should be improved. If this approach is applied to our studies, the Reliability of Content (ROC) and Trust (TRU) scale of YouTube should be improved. At WhatsApp, the factors Efficiency (EFF), Dependability (DEP), Stimulation (STI) and Novelty (NOV) should be improved. And at Facebook, the

factors Quality of Content (QOC), Reliability of Content (ROC), and Trust (TRU) should be improved. If the UEQ benchmark market is used as a basis for WhatsApp, Novelty (NOV) should be improved.

All other factors are in the average range, or above. Importance-Performance Analysis (IPA) considers the results from the UEQ/UEQ+ relative to each other. This means that it is not the absolute difference between performance and importance that is relevant, but the relative difference to each other. Applied to YouTube, Trust (TRU) should be improved, whereas Intuitive Use (INU) should be neglected. At WhatsApp, the factor Novelty (NOV) should be improved, and Perspicuity (PER) should be neglected. And at Facebook, the factors Reliability of Content (ROC) and Trust (TRU) should be improved, whereas Intuitive Use (INU), Quality of Content (QOC), and Stimulation (STI) should be neglected. An overview of recommendations for action is given in Table 7.2 for YouTube, Table 7.3 for WhatsApp, and Table 7.4 for Facebook.

Table 7.2 YouTube: Recommendations for Action

	UEQ Analysis	Benchmark	IPA
Intuitive Use (INU)		N/A	–
Quality of Content (QOC)		N/A	
Reliability of Content (ROC)	X	N/A	
Trust (TRU)	X	N/A	X
Stimulation (STI)		N/A	

Table 7.3 WhatsApp: Recommendations for Action

	UEQ Analysis	Benchmark	IPA
Attractiveness (ATT)			
Perspicuity (PER)			–
Efficiency (EFF)	X		
Dependability (DEP)	X		
Stimulation (STI)	X		
Novelty (NOV)	X	X	X

Table 7.4 Facebook: Recommendations for Action

	UEQ Analysis	Benchmark	IPA
Intuitive Use (INU)		N/A	–
Quality of Content (QOC)	X	N/A	–
Reliability of Content (ROC)	X	N/A	X
Trust (TRU)	X	N/A	X
Stimulation (STI)		N/A	–

Factors were selected, based on two criteria. First, only factors that have a suggestion for improvement, in at least two methods, should be selected for improvement. Second, those factors that were assigned to the Q2 (Possible Overkill) and Q3 (Low Priority) quadrants in the IPA should no longer be improved. The results obtained from the three methods can be summarized for the products as follows:

- **YouTube:** The first priority is to improve Trust (TRU). The Intuitive Use (INU) factor is rather over-achieved.

- **WhatsApp:** The first priority is to improve Novelty (NOV). The Perspicuity (PER) factor is rather overfulfilled.
- **Facebook:** The first priority is to improve Reliability of Content (ROC) and Trust (TRU). Intuitive Use (INU), Quality of Content (QOC), and Stimulation (STI) tend to be overachieved.

The initial situation, in Step 2 (Evaluating Prototype) and 3 (Evaluating Product Increment) of the UX Lifecycle, is often the question of which UX factors should be improved. Each individual method (UEQ Analysis, Benchmark, and IPA) delivers a result. From this result alone, a recommendation for action can be derived. The consideration of the results from all three methods, however, brings a clear added value, with regard to a recommendation for action. If one method does not provide a clear result, another method can provide clarity. For example, the *Quality of Content (QOC)* factor for Facebook should be improved, according to UEQ Analysis. However, the IPA result recommends the opposite, because the UX factors are set in relation to each other. In contrast, the *Novelty (NOV)* factor should definitely be improved for WhatsApp, as the results of all three methods suggest an improvement.

7.7 Chapter Summary and Conclusion

We used the User Experience Questionnaire (UEQ) and the User Experience Questionnaire Plus (UEQ+) to evaluate YouTube (N=195), WhatsApp (N=24), and Facebook (N=248) in one study. We then analyzed the results using the analysis tool provided by the UEQ. Furthermore, we compared the results with the UEQ Benchmark. A subsequent interpretation, with the Importance-Performance Analysis, provided further understanding. Further, we used the results to develop the UEQ KPI, which can be communicated within the company as a KPI.

The methods, presented here, provide the opportunity to interpret the UEQ/UEQ+ results in different ways. The goal is to gain more insights than are achievable, by just using one method. The summary of the results from the presented methods 7.6 shows, that the combination of the individual methods provides significant added value. In this context, to the best of our knowledge, the application of the IPA method is the first, based on a UX questionnaire. The IPA method offers a significant added value for the interpretation of the results of a study, with the UEQ or UEQ+.

The presented methods can be applied in Step 2 (Evaluate Prototype) and Step 3 (Evaluate Product Increment), and provide important insights for the next iteration. Targeted product backlog items can then be selected to drive improvement, in targeted UX factors. In the UX Retrospective, the results can be presented and discussed. This serves to improve the UX Lifecycle in general.

Chapter 8

Validation of the UX Lifecycle

In Chapter 4, we introduced the UX Lifecycle. This is based on the GAP analysis from our SLR (Section 2.3), and the requirements derived from it (Section 4.1). Chapter 5 provides an overview of standardized UX questionnaires and UX factors. In Chapter 6 and 7, we presented methods that can be used to apply the UX Lifecycle.

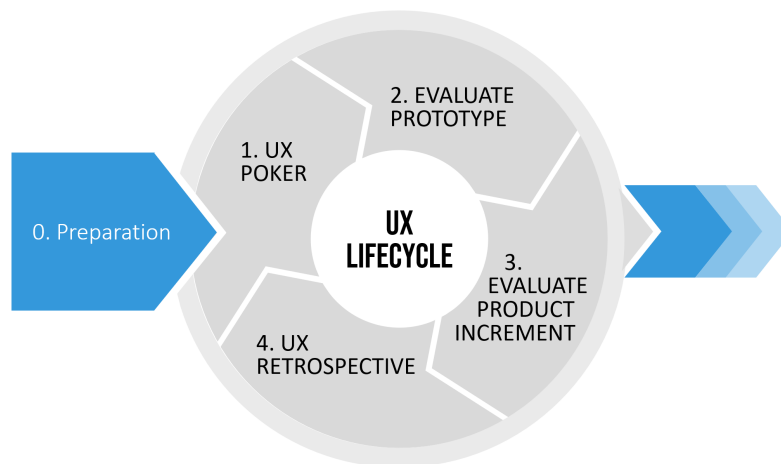


Fig. 8.1 The UX Lifecycle - Simplified Presentation

In the previous chapters, we have developed the foundations for each step of the UX Lifecycle (see Figure 8.1). Each step, excluding *UX Retrospective*, was validated in one or more studies. *Preparation* and *UX Poker* were validated in a German study, with 4 teams and a total of 30 participants. Methods for interpretation of results from UX questionnaires were conducted for steps *Evaluate Prototype* and *Evaluate Product Increment*, in an international study with a total of 467 participants from three different countries (Germany, England, and Spain). In this Chapter, we will present the results of our Delphi Study, to validate the UX Lifecycle as a whole. To achieve this goal, we have designed three research questions, which the Delphi Study will answer in detail. The research questions are:

- RQ-6.1: Does the use of the UX Lifecycle help an Agile team to develop products with better UX together?

- RQ-6.2: What specific implications can be derived from the validation of the proposed UX Lifecycle?
- RQ-6.3: What general implications can be derived from the validation of the proposed UX Lifecycle for UX management?

This Chapter is structured as follows: Section ?? gives background information, concerning the Delphi method we used. Section ?? presents the research methodology, including the Delphi study. Section ?? outlines the results and key findings of our Delphi study. Section ?? discusses the meaning of the findings, the limitations of our Delphi study, and the improvements that can be made. The Chapter ends with Section 8.2, with conclusions and ideas for future work.

8.1 Validation of the UX Lifecycle

This chapter is censured as it is
pending to be published.

8.2 Chapter Summary and Conclusion

In this Chapter, we presented the results of the Delphi study to validate the UX Lifecycle. The Delphi study, with 24 experts, was conducted between September and November 2020. Based on 28 statements, the experts each gave a rating (strongly disagree - strongly agree). In addition to the evaluation, the experts had to write a comment.

Only two rounds were conducted to reach a consensus. The results of the evaluation and the comments lead to the conclusion, that the UX Lifecycle has a sufficiently positive effect on UX management. With the help of UX Lifecycle, UX management can be implemented with the combination of a UX goal, a UX strategy and the necessary UX resources.

In the following list, we would like to summarize the three most important findings, once again.

- The goal-oriented focus on UX factors and their improvement, as propagated in the UX Lifecycle, is a good way of implementing UX management in a goal-oriented manner.
- By comparing the results from UX Poker, the evaluation of the prototype, and product increment, the Agile team can learn more about developing a better UX within a UX Retrospective.
- The UX Lifecycle will have a positive effect on UX management.

With the UX Lifecycle, UX management can be implemented with the combination of a UX goal, a UX strategy and the necessary UX resources.

Chapter 9

Results, Future Work and Conclusion

With this PhD thesis, we contribute a UX Lifecycle to manage the user experience in Agile methods. For this purpose, we gave an overview of the state of the art of UX management. In addition, we gave requirements for UX management, based on the results from the state of the art. On this basis, we developed the UX Lifecycle, which consists of five individual steps, and can be integrated into Agile methods. We have developed new methods for the UX Lifecycle. These include UX Poker, UEQ KPI, and Importance-Performance Analysis to analyze the results from a UX questionnaire. In this chapter, we will give an overview of the results and findings of the thesis.

This Chapter is structured as follows: Section 9.1 provides an overview of the results and findings, developed in this thesis. Section 9.2 lists upcoming work that should potentially be addressed, upon completion of this Thesis. Section 9.3 presents the added value of this thesis. For this purpose, the objectives from section 3.2 are presented with the results, and then the added value of this thesis is shown.

9.1 Results

Agile methods are used to develop interactive products and services across almost all industries. One of the main characteristics of Agile methods is to produce permanent results through iterations, which can then be evaluated. Through the evaluation and feedback from the users, corrections can be made in the next iteration. The communication between the different roles in Agile methods, such as Product Owner, Scrum Master or Developer (Schwaber and Sutherland, 2020), are promoted via defined meetings. The requirements to be developed are typically managed in a product backlog.

Which requirements will have a positive influence on the later user experience is not managed in a product backlog. In general, Agile methods are designed in such a way, that any requirements are managed in a product backlog, regardless of whether they make sense or not. There are different approaches to integrate UX activities into Agile methods. In our SLR, we have been able to identify different approaches that support Agile teams, to develop a better user experience. From our point of view, however, a systematic management of the user experience is missing.

The main contribution of this PhD thesis is the UX Lifecycle (Figure 9.1). With this UX Lifecycle, an Agile team is able to manage the user experience of interactive products or services, in the context of Agile methods.

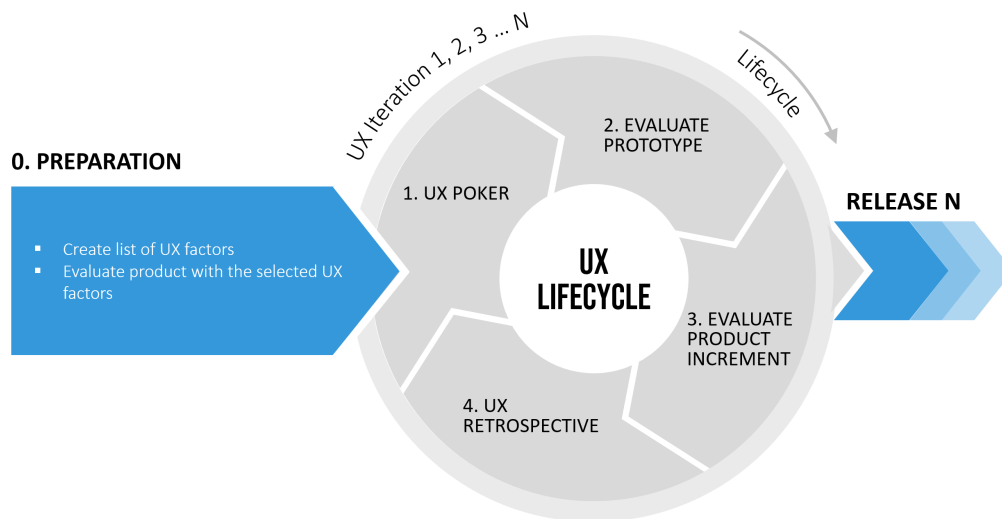


Fig. 9.1 Proposed User Experience Lifecycle with its five Steps

The UX Lifecycle consists of five steps, which are briefly described in the following list.

- **Step 0 - Preparation:** This step aims to create a list of UX factors, which are important for the product. This list of UX factors serves as a basis for the further steps in the UX Lifecycle.
- **Step 1 - UX Poker:** This step aims to estimate the influence of a given user story, for each UX factor. At the end of UX Poker, each product backlog item has an indication of how much this product backlog item influences each UX factor.
- **Step 2 - Evaluate Prototype:** This step aims to evaluate the UX of a prototype. Before starting to develop the product increment, it is advantageous to create and evaluate a prototype, based on the selected product backlog item. By evaluating the UX of the prototype, one will get perception of whether the estimated UX in the step UX Poker was appropriate.
- **Step 3 - Evaluate Product Increment:** This step aims to evaluate the UX of a product increment. By evaluating the UX of the product increment, one will get the final feedback from the users, in order to determine whether the estimated UX in the step UX Poker was appropriate.
- **Step 4 - UX Retrospective:** This step aims to conduct a UX Retrospective, as an opportunity for the Agile team to inspect itself and create a plan for improvements, to be enacted during the next iteration. The purpose of the UX Retrospective is to assess the effectiveness of the last iteration, in respect to the results from UX Poker, and the evaluations from prototype and product increment.

In addition, methods were developed in the context of this thesis, that are helpful in the implementation of the UX Lifecycle. These are listed below.

- **UX Poker** is for estimating the user experience for user stories (Hinderks et al., 2021b). The method aims to estimate the UX, before implementing the user stories. This has provided another way to sort or filter the Product Backlog, in accordance with the estimation. This allows targeted user stories to be selected, to improve a specific predetermined UX factor.

- **Importance-Performance Analysis (IPA)** is an approach that analyzes the results from the User Experience Questionnaire (UEQ) (Hinderks et al., 2019a, 2020). The aim is to create another possibility, to interpret the results of the UEQ, and to derive recommendations for action from them. This can be useful for practical purposes, and provides additional support for UEQ users.
- The **User Experience Questionnaire KPI** summarizes both the subjective rating of a product, and the perceived importance of the UEQ scales in a KPI (Hinderks et al., 2019b). The resulting UEQ KPI can be used for communication within an organization, as a key performance indicator.

In connection with the development of the UX Lifecycle, other findings from studies conducted have been developed, in addition to the UX Lifecycle and new methods. These are summarized in the following paragraphs.

We conducted an SLR to assess the current state of the art of UX management. The SLR has different implications for both practitioners and scientists. It can be summarized that approaches and methods are used to develop a better user experience, but are not goal-oriented by defining a UX goal. Furthermore, there is no definition of UX management, or a common understanding of UX management.

Additionally, we identified different approaches that deal with the integration of UX methods or HCI in Agile methods. Upfront UCD design, communication/collaboration, and teaching UX methods have been applied in several studies. In addition to the use of the approaches, several UX methods have been identified, that have been used in combination with the approaches. The three most frequently identified UX methods are prototyping (low/high), personas, and task/usage scenarios. Among the approaches and UX methods analyzed, it has been found that only one approach makes it possible to define a UX goal before development, and to test it after development Joshi et al. (2010). All other analyzed approaches aimed to systematically integrate the UX methods into Agile methods. Many of them can be used for UX management, if they are adapted accordingly.

***Summary 1:** There are various UX methods that can be integrated into Agile methods. None of these UX methods can be used directly for UX management. UX management itself is neither defined, nor is there a common understanding.*

In our SLR, 16 relevant SLR studies were selected, and served us as a basis for deriving requirements for UX management. We have analyzed the SLRs, and identified requirements for the integration of UX methods into Agile methods. The requirements for UX management can be summarized as follows:

- Improve and optimize collaboration between UX professionals and developers
- Create capacity of UX designers
- Continuous stakeholder involvement
- Evaluate Product
- Create and evaluate Prototype
- Use artifact-mediated communication
- Communicate with documentation
- Create Big Picture of the product
- Suggestion for integration of usability techniques into Agile methods

- Parallel interwoven creation tracks
- Iterative and incremental research, design, and development
- Allocated time for upfront activities

In a further step, we selected those requirements, which fit the idea of our UX Lifecycle.

Summary 2: *Our UX Lifecycle should improve and optimize the collaboration between UX professionals and developers. It should also continuously include the stakeholders, and use user stories to address requirements. Furthermore, the usage of prototypes, and the evaluation of the prototypes, should be implemented. The primary approach of the UX Lifecycle should be a iterative and incremental research, design, discovery, development, and delivery. Finally, the UX Lifecycle formalizes suggestions for integrating UX techniques into Agile methods.*

A main part of the UX Lifecycle is to measure the user experience at different stages. To measure the UX, we have presented a list of 15 usability and UX questionnaires. The questionnaires measure different aspects of the user experience. Some measure usability, while others claim to measure the entire user experience. Questionnaires which measure usability and user experience would be, for instance, the AttrakDiff questionnaire, User Experience Questionnaire (UEQ), meCUE, and Standardized User Experience Percentile Rank Questionnaire (SUPR-Q).

Summary 3: *A questionnaire is always limited to the factors it measures. In summary, the ideal UX questionnaire measures only those UX factors, that are also important to the user.*

We then extracted the UX factors from the questionnaires, to create a list of UX factors. This list can be used to select those UX factors, that are important for the product. We extracted 34 UX factors from the questionnaires. Each of these UX factors measures different aspects of the user experience. Each UX questionnaire measures different UX factors, so UX questionnaires should be checked in advance, to determine which can be used sensibly, for the respective product to be evaluated.

Summary 4: *Not every factor is equally important for a product. It therefore makes sense that the questionnaire not only measures the UX, but also the importance of the individual UX factors.*

The User Experience Questionnaire Plus (UEQ+) is a framework, with which one can create an individual UX questionnaire, related to the product to be evaluated. This allows one to measure only the most important UX factors. In addition, the UEQ+ measures the importance of the individual UX factors. With this additional information, it is always possible to check, whether the UX factor is still important or not. Another advantage is that, with the importance, there are additional possible interpretations of the result.

Based on the UEQ+, with the UEQ+ Analysis and UEQ Benchmark, we developed additional methods to interpret the results from the UEQ+. The new methods, *UEQ KPI* and *Importance-Performance analysis (IPA)*, provide the opportunity to interpret the UEQ+ results in different ways. The goal is to gain more insights than could be gained, by just using the UEQ+ analysis or UEQ Benchmark.

Summary 5: *The combination of the methods UEQ/UEQ+ Analysis, UEQ Benchmark, UEQ KPI and IPA provides significant added value. The IPA analysis, especially, compares the results of the evaluation. From this, recommendations for action can be derived, which in turn can be implemented in an iteration of the UX Lifecycle.*

In the previous chapters, we have developed the foundations for each step of the UX Lifecycle. Each step, excluding *UX Retrospective*, was validated in one or more studies. *Preparation* and *UX Poker* were validated in a German study, with 4 teams and a total of 30 participants. Methods for interpretation of results from UX questionnaires were conducted for steps *Evaluate Prototype* and *Evaluate Product Increment*, in an international study with a total of 467 participants, from three different countries (Germany, England, and Spain).

We evaluated the UX Lifecycle, as a whole, in a Delphi study with experts from different countries (Hinderks et al., 2021b). The results of the evaluation, and the comments, lead to the conclusion that the UX Lifecycle has a sufficiently positive effect on UX management. With the help of UX Lifecycle, UX management can be implemented with the combination of a UX goal, a UX strategy and the necessary UX resources. The most important findings can be summarized as follows:

Summary 6: *The goal-oriented focus on UX factors and their improvement, as propagated in the UX Lifecycle, are a good way of implementing UX management, in a goal-oriented manner. Furthermore, by comparing the results from UX Poker, the evaluation of the prototype, and product increment, the Agile team can learn more about developing a better UX, within a UX Retrospective. As a result, the UX Lifecycle will have a positive effect on UX management.*

With the UX Lifecycle, UX management can be implemented, with the combination of a UX goal, a UX strategy and the necessary UX resources.

9.2 Future Work

We validated the UX Lifecycle, as a whole, with a Delphi study. We also validated individual steps, such as UX Poker, UEQ KPI, and IPA, with special studies. Overall, the results allow us to conclude, that the UX Lifecycle effectively supports an Agile team in UX management. The extent to which the UX Lifecycle can be used effectively, in various practical projects, needs to be evaluated in further studies. During the evaluation, the UX Lifecycle has to prove itself. We have gathered first practical experience with UX Poker in a study (Hinderks et al., 2021b). The results are promising for the UX Poker method, and concerning the requirement ‘Improve and optimize collaboration between UX professionals and developers’ (Section ??). When evaluating the UX Lifecycle, special focus should be given to collaboration within the Agile team. This helps to establish a common understanding of the UX, for the product being developed. Another focus should be placed on the UX Retrospective. In the UX Retrospective, the Agile team should reflect on the UX achieved (estimated UX, probable UX, and implemented UX) and, if necessary, draw conclusions for future iterations. We have not yet had any practical experience in conducting a UX Retrospective. This should be part of future studies.

The UX Lifecycle is structured, so that it can be integrated into Agile methods, such as Scrum or Kanban. An essential component is the use of iterations, which is also used in Agile methods. Within an iteration, only a few essential steps (Step 1 to 4) have to be implemented. We deliberately did not create any new roles for the UX Lifecycle, as we believe that the established roles in Agile methods, such as Scrum Master or Product Owner, are sufficient. The UX Lifecycle calls for a UX Professional, as another specialist role within the Agile team. Further studies should investigate, to what extent the UX Lifecycle can be practically integrated into Agile methods. The results of the Delphi study indicate that it is possible, in principle. However, more detailed investigations should confirm this. It should also be investigated, how the UX Lifecycle can be used in distributed Scrum teams.

To round off the UX Lifecycle, it would be useful to support it with a tool. All individual steps of the UX Lifecycle can be supported with a tool. The following functions are available for this purpose: Selection of UX factors (Step 0 - Preparation), execution and evaluation of UX Poker (Step 1 - UX Poker), execution and interpretation of UX Evaluation (Step 2 - Evaluate Prototype and Step 3 - Evaluate Product Increment), as well as the support of Step 4 - UX Retrospective, with the presentation of the different measured UX (estimated UX, probable UX, and implemented UX). Support with a tool is especially appropriate for Step 1 and 2, the evaluation of the UX with a UX questionnaire. This tool should then, both record the evaluation of the subjects, and perform the analysis. Additionally, it would be useful, if the data could be compared with other evaluations. Thus, the development of one's own benchmark for this product, or related products, is also possible. Thus, essentially all steps of the UX Lifecycle would be mapped in one tool.

9.3 Conclusion

Finally, it should be noted that this thesis offers several contributions to UX management. One would be the results we presented in the section 9.1. In chapter 3, we defined seven objectives. For each objective, we posed corresponding research questions, along with an expected outcome. All objectives, that had been defined, could be achieved. We will repeat these objectives in the following list, and summarize the corresponding outcome.

- **O1 - State of the art of UX management:** The SLR was carried out successfully. We have reached relevant findings, which have been the basis for further work. We were able to identify a list of approaches for UX management (Section ??). In addition, we were able to summarize conclusions from the studies analyzed (Section ??). We could not identify any direct approaches, that can measure the UX for a product backlog item (Section ??). In addition, we could not identify any approaches for a retrospective, regarding UX activities (Section ??).
- **O2 - Requirements for UX management:** Based on the results of the SLR, we extracted requirements for UX management. We have summarized the list of requirements in Section ??.
- **O3 - Approach for a lifecycle to manage UX:** Based on the requirements for UX management, we have developed the UX Lifecycle (Section 4.3).
- **O4 - State of the art of UX questionnaires:** In a literature review, we identified a list of UX questionnaires (Section 5.1). In addition, we could identify UX factors, based on the UX questionnaires (Section 5.2).
- **O5 - Create a method to estimate UX in earlier stages of development:** To this end, we developed the UX Poker method (Section ??), which we evaluated in a first study (Section ??).
- **O6 - Interpreting the result of UX questionnaires:** For this purpose, we have developed or derived two new methods: UEQ KPI and Importance-Performance Analysis. In addition, we have integrated the established methods UEQ Analysis and UEQ Benchmark, to interpret the results from UEQ/UEQ+.
- **O7 - Validating the UX Lifecycle:** We validated the UX Lifecycle with an international Delphi study. As a result, a consensus was reached on all key statements. Furthermore, the experts certified the UX Lifecycle, as having a positive effect on UX management.

The UX Lifecycle supports an Agile team in various ways, to focus on a good UX, or to operate UX management. For an Agile team, there are now significant advantages, which we have summarized in the next paragraphs.

The UX Lifecycle helps an Agile team to select UX factors that are important for their product. This thesis provides a list of UX factors, that can be selected for a product. The UX factors should be chosen, based on importance to the product. The UX Lifecycle supports an Agile team in improving this selection, in which it can also determine, by applying the UEQ+, whether the user also considers the selected UX factors to be important. If this is not the case, the selection can be modified.

The UX Lifecycle supports an Agile team in determining the estimated, probable, and implemented user experience of their product. Using the UX Poker method, an Agile team can determine the estimated UX for a user story or epic. To determine the probable UX, the UEQ+ can be used to evaluate a prototype. The implemented UX can also be determined with the UEQ+, based on the product increment.

The UX Lifecycle supports an Agile team in building a common understanding of the user experience of their product. Using the UX Poker method encourages communication within the team, about the user experience. By asking team members to explain their estimations, a discussion is created, that results in a shared understanding of the UX. The common understanding of the UX prevents misunderstandings, and increases the knowledge of user experience, even for non-UX professionals.

The UX Lifecycle supports an Agile team in interpreting results from UX questionnaires. We presented four different methods for interpreting the results of UX questionnaires, in particular the UEQ and UEQ+. UEQ/UEQ+ Analysis, UEQ Benchmark, UEQ KPI and Importance-Performance Analysis can be used to better interpret results. Most importantly, recommendations for action can be derived, by applying several of these methods. These recommendations can then be directly implemented in future iterations.

The UX Lifecycle supports an Agile team in calculating a UX KPI. Accordingly, we developed a UX KPI, based on the UEQ/UEQ+, that can be used in controlling, in particular. In this way, the user experience for a product can also be expressed as a single KPI, and can be calculated continuously and accordingly.

The use of individual components of the UX Lifecycle, such as UX Poker or Importance-Performance Analysis, already helps an Agile team to improve the user experience. But only in combination with the UX Lifecycle and the individual methods and approaches presented in this PhD thesis, is management of the user experience in a targeted manner possible, in our view. This was the initial idea of this PhD thesis, which we are convinced we could implement.

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Appendix A

Appendix

A.1 UX Poker Questionnaire



The screenshot shows the LimeSurvey interface for a questionnaire. At the top left is the LimeSurvey logo. At the top right is a link labeled "Load unfinished survey". Below the logo is a progress bar showing 0% completion. The main heading is "UX Poker Workshop". The text below the heading reads: "Many thanks for participating in the workshop 'UX Poker'. This questionnaire is intended to provide further insights into the use of UX Poker. It would be great if you would fill out the questionnaire. You can answer the questions in English or German. There are 12 questions in this survey." At the bottom right is a blue button labeled "Next".

LimeSurvey [Load unfinished survey](#)

0%

UX Poker Workshop

Many thanks for participating in the workshop "UX Poker". This questionnaire is intended to provide further insights into the use of UX Poker. It would be great if you would fill out the questionnaire. You can answer the questions in English or German. There are 12 questions in this survey.

[Next](#)



Resume later Exit and clear survey

0%

About you

How old are you?

Only numbers may be entered in this field.

Your gender?

<input type="radio"/> Female	<input type="radio"/> Male	<input type="radio"/> No answer
------------------------------	----------------------------	---------------------------------

What is your role in the team?

Choose one of the following answers

How many years of experience do you have in your role?

Only numbers may be entered in this field.

Next

Fig. A.2 UX Poker - Questionnaire - Page 2



Resume later Exit and clear survey



The usage of UX Poker

***With UX Poker we were able to talk in a structured way about the influence of the epic on UX.**

	-3	-2	-1	0	+1	+2	+3	
Do not agree	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	agree

***UX Poker helped me to get a better understanding of the targeted UX for our product.**

	-3	-2	-1	0	+1	+2	+3	
Do not agree	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	agree

What added value do you see in using UX Poker?

Next

Fig. A.3 UX Poker - Questionnaire - Page 3



Resume later Exit and clear survey



Advantages and disadvantages of UX Poker.

***How easy was UX Poker to use?**

	-3	-2	-1	0	+1	+2	+3	
not easy	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	very easy

***Can UX Poker be applied to Epics?**

	-3	-2	-1	0	+1	+2	+3	
absolutely not	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	absolutely yes

***What tips would you have if you recommended UX Poker to others?**

***What worked well when using UX Poker?**

***What did not work well when using UX Poker?**

Submit

Fig. A.4 UX Poker - Questionnaire - Page 4



Thank you very much for your participation!

A.2 Results Study UX Poker

A.2.1 Q3: What added value do you see in using UX Poker?

- **P1:** Can help prioritizing features/stories by their estimated (positive) influence on the UX. Negative estimates could indicate that features/stories need to be changed or refined/sliced differently to optimize the impact on the UX.
- **P2:** See different perspectives of the team
- **P3:** Collaboratively, prioritizing product requirement and expectation "
- **P4:** Gaining a shared understanding of the overall UX of our product Understanding the persona better"
- **P5:** comprehensive assessment of the epic
- **P6:** Usually as an UX specialist I share the input with the team. With UX poker we have an open discussion, which is fruitful for my work but also to foster UX centered thinking within the team. If they have to take the perspective of the persona more often, they will be able to solve ux challenges on their own and contribute to discussions.
- **P7:** Sparking a conversation about personas, uncovering issues, uncovering non-intended impacts like i.e. if feature is not done well
- **P8:** no comment
- **P9:** Sehr interessant, um schnell die Meinungen des Teams einzuholen. "
- **P10:** * Das Ziel der einzelnen Epics wir genauer hinterfragt. Der gesamte Austausch im Team zeigt wie unterschiedlich einzelne Teammitglieder einen Epic in der Umsetzung sehen und wo deswegen nochmal deutlicher spezifiziert werden muss oder sogar eine Umplanung stattfindet. * Verschiedene Sichtweisen und Meinungen werden gehört, die in normalen Spezifikations-/Planungsmeetings nicht vorgetragen werden"
- **P11:** Wertvolle Diskussion über den Scope, Umsetzung und Effekte jedes Epics.
- **P12:** um allen im Team die Möglichkeit zu geben am UX-Prozess teilhaben zu lassen.
- **P13:** no comment
- **P14:** Effizientes "Brainstorming" + Bewertung der Vor- und Nachteile verschiedener Funktionen/Komponenten
- **P15:** no comment
- **P16:** Verständnis schärfen im UX.
- **P17:** Es hilft uns eine Brücke zwischen UX und Entwicklern zu schlagen, die bisher häufiger fehlte
- **P18:** Ich habe durch die Diskussion festgestellt, dass Features die ich selbst für sehr wertvoll erachte, eine ganz andere Wirkung/UX/etc haben können, je nachdem welche Rolle man fragt. Mehr Meinungen zu einem "potentiellen oder vermeintlichen" Feature einzuholen, sehr wertvoll

- **P19:** Ein strukturiertes Format zum Diskutieren/Bewerten über UX Konzepte. Mögliche Verwirrungen fallen recht früh auf. "
- **P20:** - Kommunikation im Team über das Thema UX - Lernen der Terminologie - Lernen der Nutzerperspektive, Kennenlernen der Zielgruppe - Praesenz des Themas UX, das meist nebenlaeufig passiert - Gegenpol zur vorherrschend technischen Sicht - Kennenlernen von ""emotionalen"" Werten in der Bewertung des eigenen Produktes"
- **P21:** no comment
- **P22:** no comment
- **P23:** Discuss UX-Features on a more general point of view without the fear to get into deep in to detailed discussion how to implement this feature specifically
- **P24:** no comment
- **P25:** Man kommt ins Gespräch und tauscht Argumente aus
- **P26:** Geringe Einstiegshürde für Personen die noch nicht so viel mit dem Thema zu tun hatten
- **P27:** Große Gegensätze treten zutage und können erkannt werden.
- **P28:** Strukturierte Diskussion über die UX, die in dem Umfang und mit versch. Perspektiven ggf. so nicht stattgefunden hätte.
- **P29:** Besseres Verständnis für das gemeinsame Produkt
- **P30:** It gives a more indepth approach and thinking how potential customers/users can and will the product in the future and in which area it can be best optimized to meet their needs.

A.2.2 Q6: What tips would you have if you recommended UX Poker to others?

- **P1:** Learning by doing. The different aspects of UX become clearer on the go.
- **P2:** just start and adjust/align your team understanding with the first discussions.
- **P3:** use to of process and clear understating of each area
- **P4:** Have a polling or voting tool ready so that the information and metadata is better structured
- **P5:** right persons to participating in to UX Poker
- **P6:** using it in combination with ux sharebacks to make them more interactive, also before refinements
- **P7:** Would definitely embedd in general discussion about the epics/ stories, i.e. refinement.
- **P8:** Die Epics müssen klar sein und aus sicht vom User, nicht nur rein technische Themen
- **P9:** Max. 10 Leute, da Diskussionen vermutlich schnell zeitlich explodieren
- **P10:** UX-Version als konkreten Satz formulieren und nicht nur als Begriff, um unterschiedliche Interpretation zu vermeiden

- **P11:** Epics sollten so klar wie möglich definiert sein. Epics sollten kein "und" enthalten weil es die Definition verwischt und die Bewertung erschwert (folglich auch die Team-Diskussion).
- **P12:** no comment
- **P13:** Epics klar/trennscharf definieren
- **P14:** Klare Definition eines Epics oder Themas
- **P15:** limit discussion in time
- **P16:** Die Themen sollten im Idealfall bereits bekannt sein
- **P17:** Kurz halten und Diskussionen zur Erörterung der eigenen Position nutzen und nicht in lange Diskussionen verfallen
- **P18:** Features sollten in einem gewissen Umfang schon durchdacht / vordefiniert worden sein, weil sonst viele unterschiedliche Annahmen das eigentliche "Rating" beeinflussen.
- **P19:** Ggfs. ist es sinnvoller möglichst relevante UX Anpassungen / Neuerungen besprechen und nicht kleinere Features
- **P20:** - Kontext erklären ist wichtig und Voraussetzung - fachliche Anleitung von jemandem aus dem UX-Bereich, da sonst Diskussionen über den Zusammenhang verloren gehen und schnell "Sinnfragen" kommen können ("Wofür machen wir das?", "Hat das was mit der technischen Umsetzung zu tun?") - feste Struktur fuer das Durchfuehren des UX-Pokers halten"
- **P21:** no comment
- **P22:** no comment
- **P23:** Use it as a tool on a more general level, not to the discuss the specific Implementation of an Epic with their impact on the Backend- and Frontendimplementation
- **P24:** Besprecht die UX Dimensionen im Vorfeld ganz genau / Allen muss klar sein, dass aus Nutzersicht geschätzt wird / Definition und Bedeutung der einzelnen Schätzwerte sollten besprochen werden / Ich denke, Übung macht auch hier den Meister. ;)
- **P25:** - Nicht zu viele Kriterien. Max. 3, sonst ist der Prozess zu langwierig - Es muss ein klares Verständnis herrschen, was die Kriterien bewerten. - Evtl. nur 2 Runden und dann entscheidet die Mehrheit. In der letzten Runde werden wenige neue Punkte genannt."
- **P26:** Die Definitionen die im vorherigen Termin gemacht wurden vorher ansehen (was verstehen wir unter Performance, Nützlichkeit, etc)
- **P27:** Die Bewertungsskalen unbedingt vorab Besprechen.
- **P28:** - Epics und Featuresets zu nutzen anstatt zu kleinteilig - Gegenstand der diskutiert wird genau beschrieben ggf. visualisieren um Klarheit zu haben dass alle das Gleiche bewerten"
- **P29:** Gute Methode, unbedingt mal ausprobieren. Gerade in interdisziplinären Teams. Am Anfang eines Projekts macht es mehr Sinn!
- **P30:** Think user focused and the target audience you are trying to reach with each feature/product.

A.2.3 Q7: What worked well when using UX Poker?

- **P1:** no comment
- **P2:** easy to get started
- **P3:** Collaboration
- **P4:** Moderation of the conversation Going through the topics of the agenda structured and systematically
- **P5:** task complexity estimations from different points of view
- **P6:** listening to others and find a good opportunity to convey the arguments for the UX effect rather than frontloading.
- **P7:** having different people in the team articulate their opinion (not the same ones)
- **P8:** Schnelle Konsensfindung Argumente austauschen und gleich wieder abstimmen. Das hat mir gut gefallen
- **P9:** Epics zu priorisieren
- **P10:** Keine zu breite Bewertungsskala, sodass eine Bewertung eher willkürlich entsteht
- **P11:** Ausbau des "Shared Understandings" eines Epics im Team.
- **P12:** Der Austausch untereinander, die Diskussion anzufachen
- **P13:** Schneller Überblick über unterschiedliche Sichtweisen
- **P14:** Schnelles Finden der Pros und Cons zu den Themen; Konstruktive Diskussion der verschiedenen Blickwinkel
- **P15:** fast estimating - visuality
- **P16:** Unklarheiten besprechen
- **P17:** recht einheitliches Verständnis und gute Kommunikation zwischen den Schätzenden.
- **P18:** Das potenzielle Feature zu sehen und die Entscheidungskriterien immer wieder mal zu hören und zu sehen, damit sich dies nicht über die Zeit verändert, man dinge vergisst in die Wertung mit aufzunehmen
- **P19:** Schnelle Abstimmungsrunden ohne große Diskussionen. Kleine Anmerkungen haben das Verständnis zu einem UX Thema schnell geschärft.
- **P20:** - die Struktur - die Form der Diskussionen - die Durchführung remote
- **P21:** Doppelte Abstimmung, Strukturierte Diskussion.
- **P22:** no comment
- **P23:** structured discussions on a high level. Getting the same idea of these high level UX-ideas
- **P24:** Alle Projektbeteiligten mussten sich zu UX Aspekten Gedanken machen, das fand so noch nie statt und ist sehr hilfreich.

- **P25:** - Argumente wurden ausgetauscht - Kurze Skala
- **P26:** Sich für eine von 5 Zahlen entscheiden geht schnell und ist einfach, muss man nicht groß erklären
- **P27:** Es ist relativ schnell.
- **P28:** - Eine Diskussion zu den erwarteten Features zu haben - den Impact auf die UX klar zu haben. Auch wenn wir kein Feature mit klar negativem Impact hatten.
- **P29:** Wirkt einfach. Man kommuniziert im Team. Das schafft Nähe und Verständnis für das Projekt.
- **P30:** Having a better understanding what our goal with a particular feature/product is.

A.2.4 Q8: What did not work well when using UX Poker?

- **P1:** no comment
- **P2:** understanding the scope of the influence: product, person, feature
- **P3:** Product scope must be define before having meeting (whole product of feature)
- **P4:** Voting anonymously (a tool would have helped)
- **P5:** not sure
- **P6:** as an UX guy I need to restrain myself more and listen more to others in that format
- **P7:** understanding is it all of product, is it all of epic/ slice of epic ..
- **P8:** hab ich jetzt nix
- **P9:** no comment
- **P10:** no comment
- **P11:** no comment
- **P12:** no comment
- **P13:** Schwierige Bewertung bei nicht klar abgetrennten Epics
- **P14:** Themen/Features waren manchmal nicht ganz klar definiert bzw. gesplitted (Native Share+Rate)
- **P15:** no comment
- **P16:** no comment
- **P17:** Die Erklärungen der Features waren sehr kurz und knackig, was grundsätzlich gut ist. Jedoch kamen hier und dort noch einige Nachfragen, weil die Features nicht zu 100% klar waren.
- **P18:** Sehr unklare Features bieten Raum für Interpretation, Annahmen .. Diskussion
- **P19:** Es gab teils Verwirrungen hinsichtlich der Begrifflichkeiten (Zuverlässigkeit finde ich persönlich schwer auf ein UX Konzept anzuwenden) sowie auf die aktuell zu besprechenden Screens.

- **P20:** Ich glaube, dass die UX Poker-Session heute als ein Experiment angesehen wird. Wenn es Teil der Produktentwicklung werden soll, braucht es noch viel Übung und vielleicht auch die Bereitschaft des Teams, gemeinsame Zeit fuer dieses Thema zu investieren.
- **P21:** Könnte Sinn machen die Bewertung per Endgerät (Mobile, Desktop etc) vorzunehmen, da die Einstufungen dort durchaus abweichen können und so das Bild verfälschen
- **P22:** no comment
- **P23:** What to do with the concrete outcome? What is the difference if the outcome is 1 or 2?
- **P24:** Die Diskussionen sind zum Teil doch recht langwierig. Man merkt dass on the same page sein, einfacher gesagt als getan ist. / Bei vielen Teilnehmern können das schnell teure Meetings werden. Aber vielleicht sollten bestehende Scrum Formate einfach in Richtung UX-Consideration adaptiert werden.
- **P25:** - Viel zu viele Kriterien - Unklare Kriterien - Generell zu lang
- **P26:** Wenn Teilnehmer ein unterschiedliches Verständnis von einem Thema haben kann es negative Auswirkungen auf die Abstimmung haben
- **P27:** Ein gemeinsames Verständnis für die Bewertungsskalen zu haben.
- **P28:** - Gemeinsames Bild was bewertet wird - herantasten an die Methodik / was heißt -2 und +2 genau
- **P29:** Kann ich jetzt noch nicht sagen...
- **P30:** Fully understanding what the different criteas mean/represent, eg. Performance (Just serverside or also the performance of possible generated income through the product?)

A.3 Results of the Delphi Study

A.3.1 Results of the Delphi Study - Step 1: Preparation

Statement 1.1: An agile team is able to select the important UX factors for the product from a given list with the support from a UX professional.

Table A.1 Rating Distribution 1 - Statement 1.1 - N=24

disagree						agree	
-3	-2	-1	0	+1	+2	+3	
1 (4.2%)	0 (0.0%)	2 (8.3%)	0 (0.0%)	3 (12.5%)	10 (41.7%)	8 (33.3%)	

Table A.2 Rating Distribution 2 - Statement 1.1 - N=24

disagree	neutral	agree
-3/-2	-1/0/+1	+2/+3
1 (4.2%)	5 (20.8%)	18 (75.0%)

Table A.3 Rating Statistics - Statement 1.1 - N=24

Expression	Value
N	24
Mean	1.75
Min	-3
Max	3
Median	2
Variance	2.28
Std. Dev.	1.51
Confidence (95%)	0.604
Confidence Low	1.146
Confidence High	2.354

- Expert 2450 (Rating 2): The presence of a UX professional is important, and also the involvement of the customer.
- Expert 2452 (Rating 1): It depends on the group of the real team, if there are no UX professionals this will be not so easy
- Expert 2633 (Rating 2): If the team members have some common understanding of the factors and some intro then this should work. Requires in the beginning some discussion and some concept clarifications, but should work.

- Expert 3671 (Rating 3): That still depends relatively heavily on UX-maturity. But yes, it works now. But where does the list come from?
- Expert 3925 (Rating 3): I consider that the agile team is built up by developers and the product owner. UX professionals should belong to the developer team.
- Expert 4183 (Rating 3): A agile team consent which the research loops can identify the needed factors.
- Expert 4867 (Rating -1): Missing end-users and customers. Their opinion for the selection of the UX factors is relevant. The opinion of the UX professional should be helpful.
- Expert 4952 (Rating 2): Yes, experts can identify UX factors, but maybe they are influenced by their specific view/goals. I think the view of end-users and customers must also play a role.
- Expert 5809 (Rating 2): I consider that it is possible but it depends on other aspects, that would make it more or less possible, such as: 1) More than a list, it should be a taxonomy, to help the team make a correct selection. 2) There should be a clear definition of the factors. 3) There should be prior training. 4) The impact of the high turnover that exists in the teams should be considered. 5) There is a team of UX specialists who collaborate with the dev teams, controlling the deliverables and working on improvement opportunities.
- Expert 6000 (Rating 3): I guess they need guidance in the beginning in order to establish a good understanding of UX factors
- Expert 6105 (Rating 2): I think this is possible and it is very important. As the agile team is joined by an UX Professional, this person will be able to present a list of UX factors with a definition of each factor. Using ranking, dot votings, etc. also the other team members (Product Owner and Developer) will be able to discuss and decide on the UX factors that are of relevance for the project or product. Same as with a strategy, the UX factors will only be accepted and lived by the team, if everyone participated in the decision process.
- Expert 6171 (Rating 3): Communication and frequent delivery are both main aspects of agile processes, so UX is necessarily being evaluated and discussed on a periodic basis. This makes the team members suitable for the task, no matter their previous knowledge or preparation on the area.
- Expert 6190 (Rating -1): The main key resource to select the UX factors should be the customer. The agile team has to determine them, but should not be the ones who select them.
- Expert 6952 (Rating -3): It is not to be expected, that an untrained team is able to understand, apply or even select unbiased factors that are by themselves pretty ambiguous. That step also misses the needs of the users, it seems, that no findings of user research is present.
- Expert 6983 (Rating 1): I think that pure developers might have difficulties to adapt their thinking to UX factors and need training or change of mind-setting to do so, e.g., new to the field of UX, computer administration background (pure programming/administration), Also, the Product Owner might have difficulties depending on her/his background. Generally, I agree which is why I gave a high rating and would address my concerns with additional communication of the agile team. Maybe even would include customer feedback, which is not part of the agile team. Actually, now that I read this. I think, not only the development team should make the decision but rather also the management. Therefore, I reduced my rating as I think, more stakeholders should be included in the decision.

- Expert 7682 (Rating 2): I think it could be true, when the whole agile team is very involved in the product cycle and when the group is big enough, so that they could have a good discussion of the selection of the main UX factors.
- Expert 7747 (Rating 1): The statement implies, that the agile team feels responsible for the UX factors. From my experience it is possible, that the agile team regards the UX as problem of someone else; therefore it would wait to be told what to do. New / adjustment: The modified statement fits my original one. I would like to add, that a team alone (without professional) might suffer from 'expert blindness' - they know what they have in mind and suppose that everybody else will understand it as well.
- Expert 7817 (Rating 2): We have a saying: where two Poles are, there are three sentences, but I think at the end of this process, the final decision has to be made by one person. The discussion should help him/her to make a choice (if there are differences between members of the agile team. The leader takes responsibility). — Well, I have a very bad experinence in that area. For the last 28 years I haev been in the role of Product owner (let's say) and finally as a user. Devs are always devs who think in agile methodes: do as less as possible. So I strongly agree with the sentence: "I don't believe most teams are currently able to understand the impact of UX factors" But If you added "with the support from a UX professional." maybe to outside teams that I know it would help. With mine, only a strong decision solves the problem, or in that case, helps to get te list in the proper (?) order of e.g. UX professional. But as you know it is not advisable to make strong decisions with teams, they have to come to agreement.

Also very important note, but it drievs to madness (testing each factor with finall users of the firm for which solution is proposed). And that's why I didn't mark the final level of agree: "Missing end-users and customers. Their opinion for the selection of the UX factors is relevant.

In general I agree that experts might be able to define the relevant UX factors but I doubt that this can happen without former research on user requirements. Especially the weighting/ ranking migbt be influenced too much by the internal perspective."
- Expert 8324 (Rating 2): Specially given that PO is the essential part of the team for this purpose.

Important to consider that the inclusion of specific UX professionals into the team with only UX skills can decrease the team flexibility and according to agility frameworks it is better to include people in the team with UX skills but other software engineering skills also.
- Expert 8385 (Rating 2): Given my experience with agile development teams in real situations, such teams can usually identify key UX aspects for the success of such development
- Expert 8493 (Rating 2): It highly depends on the UX maturity of the Team.
- Expert 8787 (Rating 3): An agile team should learn based on customer feedback which UX problems their product is facing. I agree if "support from a UX Professional" means collecting customer expectations, user needs and pain points. When this information is available, an agile team can decide which UX factors are decisive. Important: UX designers and UX researchers are part of the agile team.

A "given list" suggests that there is a separate consideration of UX in addition to the backlog. I think that's wrong. The prioritization should be based on the perceived importance from the customer's point of view.
- Expert 8966 (Rating 3): This is the only way it might work. It is not possible to "impose" a factor
- Expert 9007 (Rating 3): I believe that a team can do this with support.

Statement 1.2: To manage the UX, it is necessary to select the important UX factors for the product.

Table A.4 Rating Distribution 1 - Statement 1.2 - N=24

disagree						agree
-3	-2	-1	0	+1	+2	+3
1 (4.2%)	0 (0.0%)	0 (0.0%)	1 (4.2%)	3 (12.5%)	3 (12.5%)	16 (66.7%)

Table A.5 Rating Distribution 2 - Statement 1.2 - N=24

disagree	neutral	agree
-3/-2	-1/0/+1	+2/+3
1 (4.2%)	4 (16.7%)	19 (79.2%)

Table A.6 Rating Statistics - Statement 1.2 - N=24

Expression	Value
N	24
Mean	2.25
Min	-3
Max	3
Median	3
Variance	2.02
Std. Dev.	1.42
Confidence (95%)	0.569
Confidence Low	1.681
Confidence High	2.819

- Expert 2450 (Rating 3): I agree that this is important and possible.
- Expert 2452 (Rating 3): And to know what the product is going to be
- Expert 2633 (Rating 1): It clearly helps, but "necessary" is a bit strong. Many teams "manage" successfully the UX of their products, based on "intuition" and a good understanding of their users, but without any clear concept of UX factors.
- Expert 3671 (Rating 3): Focus is good (and ask the user) - I assume the team is flexible here and is understanding UX-basics and does not ignore basic UX-design
- Expert 3925 (Rating 3): I agree with this statement. It is very important to establish with are the UX factors preferred in a specific application
- Expert 4183 (Rating 3): At first identified the factors. What's important for the user.
- Expert 4867 (Rating 1): Focus should be on the important UX factors, but not sure if other factors can be totally ignored.

- Expert 4952 (Rating 3): You have to select the relevant UX factors, means the key factors. Otherwise, you can't manage UX for this product. But I think you also need here the opinion of the end-users to be included.
- Expert 5809 (Rating 3): It is not only about achieving a good UX, but that it is a repeatable process and that allows continuous improvement
- Expert 6000 (Rating 3): Sure you need focus and ux factors a very different and there may be a lot depending on the literature you take as a basis
- Expert 6105 (Rating 3): Yes, definitely. There might be UX factors that are contrary to each other. In addition a focus is often helpful within a process and the factors help to set up UX goals for a project. Having these goals it will be easier to handle the UX of the product.
- Expert 6171 (Rating 2): I mostly agree, but also think that many UX aspects are quite universal and can be shared between different domains.
- Expert 6190 (Rating 2): Definitely yes. 5-7 must be enough to keep the team focused.
- Expert 6952 (Rating 1): Depending on data / the user, the user group
- Expert 6983 (Rating 3): Seem to be obvious to do so. How else would you manage it otherwise? Reading the comments I want to add, that maybe the UX items are really not enough to define the product goals and the goal should be more detailed?
- Expert 7682 (Rating 3): Sure, I must have a set up, so that I can make a decision about the entire UX at all.
- Expert 7747 (Rating 2): I don't like the word 'select' so much. It might be 'identify and focus on'. New / adjusted: I leave my original statement as it is.
- Expert 7817 (Rating 3): Always should be clear what we want to obtain. It's too obvious to explain.
- Expert 8324 (Rating 3): Totally agree as this is key the prioritization so a realistic plan can be carried out to satisfy them.
No additional changes with respect to my previous comment.
- Expert 8385 (Rating 3): It is essential to identify the key UX factors that the end user expects from a product in order to be satisfied with it.
- Expert 8493 (Rating 0): It helps but is not crucial as many UX aspects are quite universal and can be shared between different domains. You would need to do that in order to increase your maturity though.
- Expert 8787 (Rating -3): UX can't be managed within a product. The product itself is just one of many elements for user experience. You can manage user experiences within user journeys.
I would agree with the following statement: To manage the UX, it is necessary to select the important UX factors for the user journey.
- Expert 8966 (Rating 3): Also, it would be ideal but impossible to speak generally about UX without choosing which of the many factors are used

- Expert 9007 (Rating 3): Without a shared and clear understanding of the concept of UX, it is impossible to manage ideas and the work of a team to improve UX.

UX can very well be managed as a factor in its own right, since the relationship between human being and product alone is decisive. I think other experts separate CX and UX differently.

Statement 1.3: It is important to know which UX factors to focus on, to manage the UX.

Table A.7 Rating Distribution 1 - Statement 1.3 - N=24

disagree						agree	
-3	-2	-1	0	+1	+2	+3	
0 (0.0%)	0 (0.0%)	1 (4.2%)	0 (0.0%)	0 (0.0%)	5 (20.8%)	18 (75.0%)	

Table A.8 Rating Distribution 2 - Statement 1.3 - N=24

disagree	neutral	agree
-3/-2	-1/0/+1	+2/+3
0 (0.0%)	1 (4.2%)	23 (95.8%)

Table A.9 Rating Statistics - Statement 1.3 - N=24

Expression	Value
N	24
Mean	2.63
Min	-1
Max	3
Median	3
Variance	0.77
Std. Dev.	0.88
Confidence (95%)	0.350
Confidence Low	2.275
Confidence High	2.975

- Expert 2450 (Rating 3): Just common sense
- Expert 2452 (Rating 3): Yes, this is an important fact. Without a basic UX knowledge, it can be very difficult to manage UX
- Expert 2633 (Rating 2): It definitely helps to get a clear idea which investments are most important.
- Expert 3671 (Rating 2): you can't serve all goods. The user researcher should be able to find the important factors. Perhaps in combination with other factors, such as brand.
- Expert 3925 (Rating 3): I also agree. It is required for the management of the UX
- Expert 4183 (Rating 3): Priorizases is the second milestone after the factors are identified
- Expert 4867 (Rating 3): See response Statement 1.2
- Expert 4952 (Rating 3): I would say, the same explanation above.

- Expert 5809 (Rating 3): Totally, because it is about requirements and all requirements must be duly prioritized for the value they provide.
 - Expert 6000 (Rating 3): I don't get the difference to the item above
 - Expert 6105 (Rating 3): Yes. As stated in statement 1.2 a focus is always helpful in order not to get bogged down. You will need a natural end to decide if you have reached your UX goals. Otherwise you can work on and on to add further UX factors to your product.
 - Expert 6171 (Rating 2): Mostly agree, but I think it depends on how mature the team is with respect to UX. A good job on managing UX can also be done without such focus.
 - Expert 6190 (Rating 3): Also yes.
 - Expert 6952 (Rating -1): The factors themselves are not sufficient... merely informative vorn concept work and to help priotize work for the product.
 - Expert 6983 (Rating 3): My question would be, is there a limit of factors for a product or service? Should there be a limit? Or the more the better? Depending on the context and product? Still, how else would you set the focus?
 - Expert 7682 (Rating 2): Yes, I think not all factors are necessary to evaluate products.
 - Expert 7747 (Rating 2): So, what's the difference to Statement 1.2? New / adjustment: I leave my original statement as it is.
 - Expert 7817 (Rating 3): If the question is about the chosen factors: all of them are the most important, but if the question is about: we have a massive list of UX factors, it is a little bit different. We have to choose which ones are essential, and then all of chosen ones are important.
 - Expert 8324 (Rating 3): It is reasonable, given that the approach to follow in order to manage th UX will depend on the selected factors.
- No additional changes
- Expert 8385 (Rating 3): Not all aspects of UX are equally important in every agile development we undertake, far from it.
 - Expert 8493 (Rating 3): It is a very good tool to focus and not getting lost in doing everything
 - Expert 8787 (Rating 3): It's a very theoretical approach. First and foremost, it is important to know what expectations users have. If these are exceeded, a great experience is achieved. A reliable selection of the relevant UX aspects is only possible through customer feedback.
 - Expert 8966 (Rating 3): Without the idea of "factors" management would be impossible from my point of view
 - Expert 9007 (Rating 3): Otherwise a lot of energy would go to work for UX-factors, which do not create the desired effect on the user. its simply a question of focus in common.

I would like to add that there are certainly factors that must not be underperformed (see Basic factors of Kano).

A.3.2 Results of the Delphi Study - Step 2: UX Poker

Statement 2.1: It is possible to estimate the impact of a UX factor on an epic.

Table A.10 Rating Distribution 1 - Statement 2.1 - N=21

disagree					agree	
-3	-2	-1	0	+1	+2	+3
0 (0.0%)	2 (9.5%)	2 (9.5%)	2 (9.5%)	2 (9.5%)	5 (23.8%)	8 (38.1%)

Table A.11 Rating Distribution 2 - Statement 2.1 - N=21

disagree	neutral	agree
-3/-2	-1/0/+1	+2/+3
2 (9.5%)	6 (28.6%)	13 (61.9%)

Table A.12 Rating Statistics - Statement 2.1 - N=21

Expression	Value
N	21
Mean	1.43
Min	-2
Max	3
Median	2
Variance	3.06
Std. Dev.	1.75
Confidence (95%)	0.748
Confidence Low	0.681
Confidence High	2.176

- Expert 2450 (Rating 2): I think it depends on how well written or specified is the epic. It may not be so easy.
- Expert 2452 (Rating 0): There are many factors to analyze, then this is not so easy
- Expert 2633 (Rating 8): I do not understand this? An epic, i.e. the functionality described in the epic, can have an impact on how well an UX factor is done in the product, but what does "impact of an UX factor on an epic" mean?
- Expert 3671 (Rating 1): That is probably very difficult and imprecise. It could be better with a very homogeneous user group. The UX factor and the epic must be described very well.
- Expert 3925 (Rating -2): when you have a large epic, it could be difficult to do it. Maybe it can include several user interfaces with different UX factors.

- Expert 4183 (Rating 8): I don't understand the question
- Expert 4867 (Rating 3): It is always possible to give an answer. I think it will be based on the personal experience. Not sure if it can be called an estimation.
- Expert 4952 (Rating 2): I think UX experts can estimate that. An epic gives more information about the influences but makes the estimation more complex. That could be problematic.
- Expert 5809 (Rating 3): Yes, because everything can be estimated, only that the estimate will have more or less confidence depending on the information available to estimate. In addition, these are non-functional requirements that add quality to the expected functionality and it must be possible to separate them from the functionality, for reasons of user story slicing.
- Expert 6000 (Rating 3): Yes, estimations are based on best guess. So, the estimation guides you through the iteration and has a positive impact on the discussion as well as in the shared understanding of the team
- Expert 6105 (Rating 2): An epic is big enough to get an impression how the UX factor will be influenced. Nevertheless, the impact has to be measured in the end to validate the estimation and to avoid assumptions.
- Expert 6171 (Rating 1): Can be done for abstract UX features, but difficult before any kind of user-based test.
- Expert 6190 (Rating 2): Yes. But it is also nice to know the purpose of the whole product, and not only the epic.
- Expert 6952 (Rating 2): The term "estimate" is maybe not the right one, since we should KNOW the impact, based on user research, competitive analysis or even the product strategy.
- Expert 6983 (Rating -1): In my opinion, the epic needs to be more specific, or the poker on user stories to estimate the impact of UX factors. The epics are from my perspective to big and abstract which can be differently interpreted by each team member which would lead to a long discussion over the mind-set or understanding. Only, if it is possible to stay 'abstract' also in the estimation it might work. Or to use this rating also as a starting point for brainstorming and personas. They (personas) should be actually taken into account for these estimations and not the subject opinion of one agile team member. This might help to avoid long discussion over uncertainties of the epic. Apparently, I am the only expert think that epics are not so good. When reading the comments, I don't understand the positive rating.
- Expert 7682 (Rating 3): Why not? We talk about an estimation and I think that the team could assess the epic more or less.
- Expert 7747 (Rating 8): I think that would depend greatly on the circumstances, the product, etc. New / adjustment: - none -
- Expert 7817 (Rating 3): Are you sure that you are asking about the impact of a UX factor on an epic? Or it should be vice versa? In both cases, in my opinion, it is possible to estimate the impact of one on the other one.

- Expert 8324 (Rating 3): UX factors are defined in such a way (eg. attractiveness) so the granularity of impact estimation on epics is suitable to have a relevant estimation.

Additional comment:

I do not see problems for estimation of the impact of a UX factor if this is enoughly described, in a similar way teams can estimate the impact of other quality characteristics.

- Expert 8385 (Rating -1): I do not agree with this statement at all, often key UX aspects in specific problem domains arise not from the use cases, nor from the user stories, but from a certain previous culture or idea conceived by the set of end users in a tacit and often expected way. It is therefore necessary to address a study of these factors explicitly and in isolation, beyond the study of the big stories.
- Expert 8493 (Rating 0): It is a tool to focus but I would rather say it is the other way round. An epic should have an impact on a UX Factor and that should be estimated.
- Expert 8787 (Rating -2): Creating great experiences is a very complex process. Only experienced UX experts can approximately assess the influence of a UX factor on the experience. I am not convinced that UX Poker is helpful in practical work.
- Expert 8966 (Rating 3): In general terms I agree; I think that for each particular system there might be variations
- Expert 9007 (Rating 3): I fully agree. It must even be possible, since development of different factors of the UX has so far been focused on specific goals. But without an estimation this would not be possible.

Statement 2.2: It is possible to estimate the impact of a UX factor on an user story.

Table A.13 Rating Distribution 1 - Statement 2.2 - N=23

disagree						agree
-3	-2	-1	0	+1	+2	+3
1 (4.3%)	1 (4.3%)	1 (4.3%)	6 (26.1%)	4 (17.4%)	5 (21.7%)	5 (21.7%)

Table A.14 Rating Distribution 2 - Statement 2.2 - N=23

disagree	neutral	agree
-3/-2	-1/0/+1	+2/+3
2 (8.7%)	11 (47.8%)	10 (43.5%)

Table A.15 Rating Statistics - Statement 2.2 - N=23

Expression	Value
N	23
Mean	1.00
Min	-3
Max	3
Median	1
Variance	2.73
Std. Dev.	1.65
Confidence (95%)	0.675
Confidence Low	0.325
Confidence High	1.675

- Expert 2450 (Rating 2): Same as above, I think it depends on the specificity of the story. It may not be possible to estimate until the team analysis the tasks it involves.
- Expert 2452 (Rating 1): When you obtain the correct information from users, yes, this can be possible
- Expert 2633 (Rating 8): see comment above
- Expert 3671 (Rating 1): There are certainly stories where it just works, and then stories where it doesn't work at all. Again, it depends on the precision of the descriptions.
- Expert 3925 (Rating 3): In my opinion, the user story usually is more adequate to be associated to a specific user interface with a set of UX factors.
- Expert 4183 (Rating 3): Yes, it is possible. If you define a US trying to test this factor and thinking what are the news of the user
- Expert 4867 (Rating 0): May be that it depends on the particular user story.

- Expert 4952 (Rating 1): UX experts can estimate that. A user story gives less information about the influences and makes the estimation easier to manage. Maybe you aren't provided by all needed information by the user story to estimate the impact.
- Expert 5809 (Rating 3): The same answer as above is valid here, only there will be a more precise estimate as a user story is a smaller portion of functionality than that of an epic, and estimation errors are reduced by reducing the size of what is estimated.
- Expert 6000 (Rating 1): Yes, but it will be more complex to achieve a good approximation. I believe the team must be trained on this.
- Expert 6105 (Rating -1): I think a user story is more detailed and too finely granulated to estimate the impact.
- Expert 6171 (Rating 2): Same comment as before, however more manageable than an epic, depending on how "common" the US is.
- Expert 6190 (Rating 0): Yes, if you know the context (epic or whole product) and the needs of the users.
- Expert 6952 (Rating 2): see above.. i would also add that this depends also on the quality on how a user story is written. A user story should be written in the same way (and in the same quality) as an requirement (in this case: an user requirement)
- Expert 6983 (Rating 2): Much more agree although, now that I think about it, they might be too small as Dimension is targeting a bigger picture. What about combing the epic with the user story and then rate that. I would rather not isolate the two.

Apparently, we (the experts) have some differences in how broad UX could be estimated 2.2.vs .2.1.. I think UX has to be connected to small user studies and that be presented on a bigger picture. So UX is more than just a use case. But at the same time, I think an epic is to broad to make an estimation about the little steps.

- Expert 7682 (Rating 3): The user story is more concrete, therefore I think that the team can estimate this, too.
- Expert 7747 (Rating 0): no comment New / adjustment: - none -
- Expert 7817 (Rating 3): Are you sure that you are asking about the impact of a UX factor on an user story? Or it should be vice versa? In both cases, in my opinion, it is possible to estimate the impact of one on the other one.
- Expert 8324 (Rating 0): It could be possible, but in this case the granularity seems to not match in the same way as for estimation of epics. So it seems to be more appropriate the estimation for epics.
Additional comment: I think that experience and guidelines to do this are very important to obtain more reliable estimations. In a similar way as story points, similar measures can be considered to guess the impact of UX factors on stories to help to do the estimation.

- Expert 8385 (Rating 0): I do not agree with this statement at all, often key UX aspects in specific problem domains arise not from the use cases, nor from the user stories, but from a certain previous culture or idea conceived by the set of end users in a tacit and often expected way. It is therefore necessary to address a study of these factors explicitly and in isolation, beyond the study of the big stories.

- Expert 8493 (Rating -2): Highly depends on how stories are written. They might be too technical or sliced down for a UX factor.
- Expert 8787 (Rating -3): Experiences consist of many elements. The influence of a single user story on user experience is very difficult to estimate. It is just one small element of many. I think even experts will be wrong.
- Expert 8966 (Rating 2): Again, in general terms it might be; in a particular system with a particular decomposition of an epic in user stories, it might be hard (even to determine if is neutral). But in some toy cases which I proved it seems that it is possible
- Expert 9007 (Rating 0): In general, a user story will be too small to estimate its individual impact on the UX. However, estimating is certainly easier than evaluating. Nevertheless, stories will have too small a share of one factor of the total UX of a product.

I think it depends too much on how big user stories are sliced.

Statement 2.3: DELETED

Table A.16 Rating Distribution 1 - Statement 2.3 - N=0

disagree						agree
-3	-2	-1	0	+1	+2	+3
0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)

Table A.17 Rating Distribution 2 - Statement 2.3 - N=0

disagree	neutral	agree
-3/-2	-1/0/+1	+2/+3
0 (0.0%)	0 (0.0%)	0 (0.0%)

Table A.18 Rating Statistics - Statement 2.3 - N=0

Expression	Value
N	0
Mean	0.00
Min	0
Max	0
Median	0
Variance	0.00
Std. Dev.	0.00
Confidence (95%)	0.000
Confidence Low	0.000
Confidence High	0.000

Statement 2.4: An epic can have a negative or positive impact on a UX factor.

Table A.19 Rating Distribution 1 - Statement 2.4 - N=19

disagree						agree
-3	-2	-1	0	+1	+2	+3
0 (0.0%)	1 (5.3%)	0 (0.0%)	3 (15.8%)	1 (5.3%)	4 (21.1%)	10 (52.6%)

Table A.20 Rating Distribution 2 - Statement 2.4 - N=19

disagree	neutral	agree
-3/-2	-1/0/+1	+2/+3
1 (5.3%)	4 (21.1%)	14 (73.7%)

Table A.21 Rating Statistics - Statement 2.4 - N=19

Expression	Value
N	19
Mean	1.95
Min	-2
Max	3
Median	3
Variance	2.16
Std. Dev.	1.47
Confidence (95%)	0.661
Confidence Low	1.286
Confidence High	2.609

- Expert 2450 (Rating 0): I think an epic may have a positive or no impact on a UX factor. It shouldn't be negative.
- Expert 2452 (Rating 0): It depends on the factor and the team analyzing this
- Expert 2633 (Rating 3): Of course new functionality or other changes will have an impact
- Expert 3671 (Rating 3): Yes, absolutely.
- Expert 3925 (Rating -2): It is the same with the estimation of the impact.
- Expert 4183 (Rating 8): No opinion
- Expert 4867 (Rating 3): As defined.
- Expert 4952 (Rating 3): Yes, the example video "Attractiveness" shows this clearly.
- Expert 5809 (Rating 2): The impact can be positive or negative, but it can also be zero. Among the requirements there is a positive, negative or neutral contribution relationship (cf. Wieggers)

- Expert 6000 (Rating 1): Yes, of course it depends on the type of UX factor.
- Expert 6105 (Rating 3): Of course. As it is already formulated in the example there are UX factors that are opposite to each other.
- Expert 6171 (Rating 3): I see it as an obvious statement. A big change/added feature can definitely impact UX.
- Expert 6190 (Rating 8): Don't understand the question.
- Expert 6952 (Rating 2): If it counters user needs or user requirements, it surely does :)
- Expert 6983 (Rating 8): Not sure how it is meant as an epic can not have a direct impact on the ux of a product? Or do you mean which factors they address, because sure an epic should represent a UX factor. Why is no opinion not in the rating of other users? I stay with my no-opinion as no further explanation was added.
- Expert 7682 (Rating 3): Sure, we describe here the needs of the users and their user paths. Therefore have these results an impact of the use of the product and this could be negative or positive.
- Expert 7747 (Rating 8): Actually, I am not sure whether this statement makes any sense logically and whether it states what it is supposed to state. New / adjustment: - none -
- Expert 7817 (Rating 3): No, nowadays the epic should follow UX factor. If it is not like that, we should change the epic to have a positive impact on a UX factor.

— Well, I, as the owner of a product, do not allow to do things which can cause such situation. Before it can happen (to do something against a goal) the team have to change the (UX) goal and agree with that. Sorry, I don't want to change my vote in this point.

" Cookie banners, for example, are annoying." - in my solutions we use only cookies when they help the user, and no banners are allowed.

But if someone needs to put them, the UX factor "not to be annoying" should be removed from the list, and this should be clearly explained to the Sponsor. In that situation epic will not have "a negative impact" on a UX factor.

Now, I have noticed that voting I only thought about negative impact, but in a sentence we vote for it is "or", so I have to change my vote to max agree - it always has as positive impact on a UX factor as possible to obtain (knowledge and skills of the team). Sorry for not taking the whole sentence under consideration. (see the previous paragraph. It was written before I noticed "or positive".
- Expert 8324 (Rating 2): Yes, it is clear from the provided example this relationship, and also the fact that an epic could also not have any impact on a UX factor

No additional changes
- Expert 8385 (Rating 3): Indeed the impact can be positive or negative
- Expert 8493 (Rating 2): It shouldn't be negative when the company is working user centric though
- Expert 8787 (Rating 0): An epic seems to be an assumption about customer needs. Satisfying this assumption can have an impact when customers actually have that need.

- Expert 8966 (Rating 8): I am not sure about the question, might it be neutral?
- Expert 9007 (Rating 3): There are requirements for products that do not promote a certain factor of UX, but reduce it. Cookie banners, for example, are annoying.

Statement 2.5: A UX professional with the support of the agile team can estimate the impact of a UX factor on a given epic.

Table A.22 Rating Distribution 1 - Statement 2.5 - N=23

disagree					agree	
-3	-2	-1	0	+1	+2	+3
2 (8.7%)	0 (0.0%)	0 (0.0%)	5 (21.7%)	1 (4.3%)	5 (21.7%)	10 (43.5%)

Table A.23 Rating Distribution 2 - Statement 2.5 - N=23

disagree	neutral	agree
-3/-2	-1/0/+1	+2/+3
2 (8.7%)	6 (26.1%)	15 (65.2%)

Table A.24 Rating Statistics - Statement 2.5 - N=23

Expression	Value
N	23
Mean	1.52
Min	-3
Max	3
Median	2
Variance	3.44
Std. Dev.	1.86
Confidence (95%)	0.758
Confidence Low	0.763
Confidence High	2.280

- Expert 2450 (Rating 2): They should be able but it may be difficult if the epic is not clear without further analysis.
- Expert 2452 (Rating 3): If there are the right people in the team, it can be possible. The new definition is better.
- Expert 2633 (Rating 8): see comment above
- Expert 3671 (Rating 3): The UX professional should be able to do this if he has the appropriate skills. And the team will learn.
- Expert 3925 (Rating 3): Yes, absolutely.
- Expert 4183 (Rating -3): For me here the most important role is the final user. Observing how they understand the draft of this epic then you can estimate the impact.

- Expert 4867 (Rating 0): Would be better if end users and customers could participate as well in the so called "estimation" of the impact. An UX professional will contribute with a better estimation than agile team members.
- Expert 4952 (Rating 2): A UX professional can do this, and the support of the agile team will help to evaluate and to improve the estimation.
- Expert 5809 (Rating 3): Yes, but it is necessary to clarify what impact the team can and should estimate: the team should not estimate impact in size but in effort.
- Expert 6000 (Rating 0): Like mentioned before, I believe the team needs training and guidance for this in the beginning. In addition, there is a dependency to the complexity of the product and the scope of the change.
- Expert 6105 (Rating 3): Sure, as it is just an estimation which is aggregated in the team from different opinions.
- Expert 6171 (Rating 2): I think it could only be somewhat estimated, and an agile team would be of great help to the UX professional.
- Expert 6190 (Rating 3): Yes, if everybody in the team has the same idea of the epic and its functionality.
- Expert 6952 (Rating -3): as stated above, it is unlikely that an agile team is qualified for that kind of an assessment. It is not even their job to assume the role of UX experts, Interaction designers,, Interface designers etc., but to develop and implement specifications.
- Expert 6983 (Rating 3): Yes, definitely. Although I would guess depending on the people, background and abstract level and not integrating personas it will lead to longer discussions over the order and rating. Maybe I was a bit optimistic. But if somebody can I think it is the UX Professional.
- Expert 7682 (Rating 3): In a discussion that will be moderated from that UX professional, for sure.
- Expert 7747 (Rating 0): See also first Statement: if it feels responsible - it might. Or not. New / adjustment: Now you made a ring closure with that one statement from above.
- Expert 7817 (Rating 0): Yes, they have to do it to see if they are capable of meeting the goal of a given UX factor.

—

If you place the UX professional here as a person who estimate, I have to change my choice. The UX professional is not a dev (or maybe he/she is - that's why my choice is in the middle now) who is implementing. So, I disagree with that. The dev team itself can estimate what would happen with the code when we want to do something. It is clear for me.

- Expert 8324 (Rating 2): Yes, it is demonstrated also by the provided example, in which techniques such as UX poker helps for this purpose
- With the change it is more clear the statement but it is necessary to consider if it is needed a specific ux professional or a trained team on UX. (to see former comment)
- Expert 8385 (Rating 0): For the same reason as mentioned above, it is not always easy to estimate

-
- Expert 8493 (Rating 2): Depends on the team and their UX maturity. This is likely if the UX professional has a certain standing in the team.
 - Expert 8787 (Rating 3): Only experienced UX experts can approximately assess the influence of a UX factor on the experience.
 - Expert 8966 (Rating 3): Definitely yes, they should
 - Expert 9007 (Rating 1): That depends on how much the team has built up the knowledge necessary to estimate. Do they know the user and the usual usage scenarios? If not, they simply lack the basis for a sound estimate. Would be the same for the effort. However, the estimation will gradually improve as the teams get feedback on the actual UX.

If the estimation is to be performed in UX Professional, the team still needs a lot of knowledge, so that expertise can be brought in to support it.

Statement 2.6: It is one way to manage the UX in a targeted manner by knowing the UX estimation for an epic or user story.

Table A.25 Rating Distribution 1 - Statement 2.6 - N=22

disagree					agree	
-3	-2	-1	0	+1	+2	+3
0 (0.0%)	1 (4.5%)	1 (4.5%)	3 (13.6%)	4 (18.2%)	5 (22.7%)	8 (36.4%)

Table A.26 Rating Distribution 2 - Statement 2.6 - N=22

disagree	neutral	agree
-3/-2	-1/0/+1	+2/+3
1 (4.5%)	8 (36.4%)	13 (59.1%)

Table A.27 Rating Statistics - Statement 2.6 - N=22

Expression	Value
N	22
Mean	1.59
Min	-2
Max	3
Median	2
Variance	2.16
Std. Dev.	1.47
Confidence (95%)	0.614
Confidence Low	0.977
Confidence High	2.205

- Expert 2450 (Rating 3): Makes sense
- Expert 2452 (Rating 0): I do not have this so clear, it also depends on the metric used and the way it has been used
- Expert 2633 (Rating 0): It helps, but again necessary is too strong
- Expert 3671 (Rating 0): It is very difficult to make a prognosis. If the finished product exactly meets the requirement, it may be easier. But what role does the context then play? I doubt.
- Expert 3925 (Rating -2): I think that it is most important to manage the set of user stories.
- Expert 4183 (Rating 3): An estimation can show you when you present the UI draft to the user of this way was correct or not
- Expert 4867 (Rating 3): Sure, it makes it easier.

- Expert 4952 (Rating 2): I would say yes, but I have no idea what alternative ways it could be.
- Expert 5809 (Rating -1): The estimate is unique for the epic and is estimated effort, so it must be considered that the estimate is a single value for many aspects together: functionality, UX, architecture and others. And, because of this, there could be the paradox that a complex UX question is seen in a low-effort estimate just by having a reusable component: a reusable functionality would reduce the effort of the entire epic.
- Expert 6000 (Rating 2): I don't have any details
- Expert 6105 (Rating 1): The estimation will help to decide on a focus when two or more epics have different impacts on a UX factors. The team will be able to decide with epic will get more attention.
- Expert 6171 (Rating 8): Still not sure about this one.
- Expert 6190 (Rating 2): Yes. To stay focused this is absolutely necessary.
- Expert 6952 (Rating 1): We would need to have more than just the epic.
- Expert 6983 (Rating 1): Here, I am unsure. It might. Although I feel that we need more validation of how personal opinions, mind-set and background influence our estimation and awareness of UX. This research might help to develop this. As it is more a possible solution but not the only one I updated my rating.
- Expert 7682 (Rating 2): I think yes, because we describe the user paths and the use of the product. So, we can measure the UX in a targeted manner.
- Expert 7747 (Rating 8): The statement (as written) implies, that the manipulation of UX in one way or another always requires an epic. This I don't think. New / adjustment: That statement confuses me.
- Expert 7817 (Rating 3): Yes, as I wrote earlier: if we find that something is against our UX factor, we have to change it, before we start implementation.

–

Yes, it should be known and based on it the UX factor can be removed from the list or change for something else. It would be nice, good and usable to know the UX estimation for an epic or user story before we decide to add/put it on the list, but I think the project should start with the idea and goals, and after that epics and stories appear.

- Expert 8324 (Rating 3): Totally agree, as efforts on UX could not been well focused otherwise.
Additional comments: The new statement is also right and more general as it includes also stories.
- Expert 8385 (Rating 3): Totally agree
- Expert 8493 (Rating 1): It helps for planning and Evaluation. But you can manage UX also afterwards when it is not part of the planning process. It gets harder then though
- Expert 8787 (Rating 2): In order to achieve a great experience, it is more important that the team is aligned with real customer needs. Agile teams need an up-to-date overview of customer needs and their relevance. You need to know the expectations of your customers. You must measure yourself by whether or not you exceed these expectations.

- Expert 8966 (Rating 3): If we are able to do this we can certainly manage the UX in a targeted way
- Expert 9007 (Rating 3): Without an estimate, there is simply no way to weigh up the individual options against each other. I think that the influence of an epic on the UX is important that otherwise agile planning cannot take place. Without the ability to prioritize up or down individual elements of the product backlog, a targeted development of UX becomes difficult.

Statement 2.7: Overall, UX poker is a suitable method of estimating the UX for an epic.

Table A.28 Rating Distribution 1 - Statement 2.7 - N=22

disagree						agree
-3	-2	-1	0	+1	+2	+3
2 (9.1%)	0 (0.0%)	1 (4.5%)	2 (9.1%)	3 (13.6%)	4 (18.2%)	10 (45.5%)

Table A.29 Rating Distribution 2 - Statement 2.7 - N=22

disagree	neutral	agree
-3/-2	-1/0/+1	+2/+3
2 (9.1%)	6 (27.3%)	14 (63.6%)

Table A.30 Rating Statistics - Statement 2.7 - N=22

Expression	Value
N	22
Mean	1.55
Min	-3
Max	3
Median	2
Variance	3.59
Std. Dev.	1.90
Confidence (95%)	0.792
Confidence Low	0.753
Confidence High	2.338

- Expert 2450 (Rating 3): Agree because it's collaborative
- Expert 2452 (Rating 0): It is another way to do it
- Expert 2633 (Rating 3): Can work if team has common understanding of UX
- Expert 3671 (Rating 2): It should work - It just gets better with practice.
- Expert 3925 (Rating 3): Maybe, It could be improved using cards in the same way that the poker estimation in the SCRUM method. The cards should be selected from 0 to 7 values.
- Expert 4183 (Rating 8): No opinion
- Expert 4867 (Rating 0): In general yes. I have doubts about the ROI.
- Expert 4952 (Rating 2): UX experts can simultaneously consider different UX factors and many influences by the epic, therefore estimating UX comprehensively.

- Expert 5809 (Rating -3): No, poker is not an estimation technique but a technique for displaying the estimation using Delphi. The estimate is held by the persons in their minds and is only shown with poker. The important thing is how to make the persons have the correct estimate in their minds and, for this, the appropriate estimation techniques must be sought.
- Expert 6000 (Rating 3): Yes the UX poker helps to achieve a shared understanding and UX poker guides the focus of the team on the UX aspects
- Expert 6105 (Rating 3): Yes, if there multiple people within the poker session the estimation is not based on one single estimation but on an aggregation of estimations.
- Expert 6171 (Rating 1): Again, as much as UX can be predicted at all, but this looks like a good way of doing it and staying focused on an otherwise a long discussion.
- Expert 6190 (Rating 1): I do not know so many other methods, so everything, that is keeping the team focused and is based on user needs, is good.
- Expert 6952 (Rating -1): Seems to me very resource-hungry and inefficient... i have not seen the basis for assuming what factors relate to the epic, aside from personal estimates, done by unqualified teammembers without any kind of user data.
- Expert 6983 (Rating 1): It's definitely a nice way of getting the discussion started and might help to set expectations and mind-set for agil team members. As said before, I would included personas so that agile team members integrate the users opinion when rating UX.
- Expert 7682 (Rating 3): It is a logical way.
- Expert 7747 (Rating 8): I have no experience with UX poker. New / adjustment: - none -
- Expert 7817 (Rating 3): In the case that we have more experienced members of the group or more influencing, powerful etc. ones, UX poker helps to obtain better results without their influences. And this can reduce the gap/differences between sentences of the team's members.
- Expert 8324 (Rating 3): I agree, the use of ordinal scales with a few significant labels help also for this purpose
No additional changes
- Expert 8385 (Rating 2): I think it may be a more accurate approach than any other holistic solution less oriented to such identification
- Expert 8493 (Rating 3): It is lightweight and improves the maturity of the Team, making the Poker better each time
- Expert 8787 (Rating -3): UX Poker assumes that it is possible for the members of a team to identify UX aspects and their effects on the basis of a model. Creating great experiences is very complex. I am convinced that only a few very experienced people are able to correctly assess the mechanisms in complex systems through deliberation.
- Expert 8966 (Rating 3): It seems so; so far, I haven't seen (or read) any approach which is better
- Expert 9007 (Rating 2): As long as the team has sufficient knowledge about the user and the usage context, UX-Poker is a good method.

A.3.3 Results of the Delphi Study - Step 3: Evaluation of the Prototype

Statement 3.1: Users can rate a prototype.

Table A.31 Rating Distribution 1 - Statement 3.1 - N=24

disagree						agree	
-3	-2	-1	0	+1	+2	+3	
1 (4.2%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	2 (8.3%)	5 (20.8%)	16 (66.7%)	

Table A.32 Rating Distribution 2 - Statement 3.1 - N=24

disagree	neutral	agree
-3/-2	-1/0/+1	+2/+3
1 (4.2%)	2 (8.3%)	21 (87.5%)

Table A.33 Rating Statistics - Statement 3.1 - N=24

Expression	Value
N	24
Mean	2.38
Min	-3
Max	3
Median	3
Variance	1.72
Std. Dev.	1.31
Confidence (95%)	0.525
Confidence Low	1.850
Confidence High	2.900

- Expert 2450 (Rating 3): That's what user testing is for.
- Expert 2452 (Rating 2): Yes, they should do it
- Expert 2633 (Rating 3): If it is a carefully designed interactive prototype
- Expert 3671 (Rating 3): You probably mean: With the help of a user, you can evaluate a prototype. To do this, you need a correct setting, the right questions and the right users.
- Expert 3925 (Rating 3): Of course, the user should evaluate the prototipe
- Expert 4183 (Rating 3): Of course it is one on the most important topic. This feedback should be introduce in the research.
- Expert 4867 (Rating 1): Yes, for functionality and UX. Aspects such as some technical or of security may be difficult to be rated or even to be identified by users.

- Expert 4952 (Rating 3): It is necessary to get feedback from "real" users when applying the product in the "real" context.
- Expert 5809 (Rating 3): Of course. The difficult thing is to know the bias of that rating.
- Expert 6000 (Rating 3): Yes, but it depends on the abstraction level of the prototype as well as on the type of person who evaluated it.
- Expert 6105 (Rating 3): When not the users who else can rate a prototype? As a product is built to support the users in achieving their goals or doing their tasks, they are the only persons to rate a prototype. Ratings from other persons will just make assumptions.
- Expert 6171 (Rating 2): Just a note, I think users' opinion is valuable given their end-user condition, but it's not as valuable as an expert's opinion on a user's direct observation
- Expert 6190 (Rating 3): Yes, if they are from the target group.
- Expert 6952 (Rating 3): that is part of the human-centred design, "Rate the prototype" is ambiguous though...
- Expert 6983 (Rating 2): Definitely, we do this a while in UX. Although one could argue that users never know what they really want. But they can rate what they like or dislike.
- Expert 7682 (Rating 3): Sure, but they will always compare this with a finished product.
- Expert 7747 (Rating 2): They better should be able to. New / adjustment: - none -
- Expert 7817 (Rating 3): A prototype helps to see if we understood the user or if the user has adequately expressed himself.
- Expert 8324 (Rating 2): Yes prototyping has been demonstrated as an effective approach for this and it is applicable to UX factors rating
No additional changes
- Expert 8385 (Rating 3): Totally agree with that
- Expert 8493 (Rating 3): With the right tool like a standardized questionnaire
- Expert 8787 (Rating -3): Users can not correctly evaluate prototypes themselves. In order for this to work, they would need to know the UX factors. Then they would be UX experts themselves. UX experts can assess the quality of a prototype based on observation of users or the use of other evaluation methods.
- Expert 8966 (Rating 3): Definitely yes, Users must evaluate and can evaluate a prototype
- Expert 9007 (Rating 1): This depends on how close the prototype is to the actual product. A low fidelity prototype will probably not be able to be estimated correctly because not all users have a corresponding idea. I agree that the feedback must not be received directly but must be interpreted by an expert.

Statement 3.2: It's more effective to evaluate a prototype in a context of use.

Table A.34 Rating Distribution 1 - Statement 3.2 - N=23

disagree						agree	
-3	-2	-1	0	+1	+2	+3	
1 (4.3%)	1 (4.3%)	1 (4.3%)	2 (8.7%)	4 (17.4%)	4 (17.4%)	10 (43.5%)	

Table A.35 Rating Distribution 2 - Statement 3.2 - N=23

disagree	neutral	agree
-3/-2	-1/0/+1	+2/+3
2 (8.7%)	7 (30.4%)	14 (60.9%)

Table A.36 Rating Statistics - Statement 3.2 - N=23

Expression	Value
N	23
Mean	1.57
Min	-3
Max	3
Median	2
Variance	3.08
Std. Dev.	1.75
Confidence (95%)	0.717
Confidence Low	0.849
Confidence High	2.282

- Expert 2450 (Rating 2): I agree with the new statement.
- Expert 2452 (Rating 3): This is the right definition because without the real environment it is difficult to know the real application of something
- Expert 2633 (Rating -3): The context of use will be described before. Does not make sense without
- Expert 3671 (Rating 3): Context is an important variable that controls behavior. Punctual tests of individual dialogues are misleading.
- Expert 3925 (Rating 0): There are tools that permit to create the questionnaire at the same time the user is testing the prototype (e.g. loop11)
- Expert 4183 (Rating 3): A prototype is created using feedbacks and use case of users. You need to evaluate this in this defined context.

- Expert 4867 (Rating 0): This may be different depending on the type of prototype and software that has to be developed. To evaluate a prototype of a simple homepage can be easy. A prototype of an application that offers a service a 24/7/365 for many time zones, in many languages, and has to fulfill many security features may be hard to evaluate.
- Expert 4952 (Rating 3): The major product weaknesses only become apparent in real-life applications.
- Expert 5809 (Rating 3): Totally agree. That is why there is a differentiated concept of "product quality" and "quality in use".
- Expert 6000 (Rating 1): I would recommend to rephrase the item New: It's more effective to evaluate a prototype in the assumed context of use. You never know how users interact with new features ;)
- Expert 6105 (Rating 3): Depends on who evaluates the prototype and on the scenarios. In a working context the users are very familiar with their context of use and shall be able to evaluate the prototype. If there is some kind of innovative new product in a consumer context it might be harder to evaluate the prototype.
- Expert 6171 (Rating 2): Sure, it's better in context, but you can't always afford that level of prototyping. Still think most important problems can be found with early, albeit rougher prototypes - that's more important and will save more time in the end.
- Expert 6190 (Rating 1): This depending of the amount of functions of the product. Or: is it something, that I already know or a completely new product.
- Expert 6952 (Rating 3): It is impossible without a context of use
- Expert 6983 (Rating 1): Why? We can get the context-of-use with e.g., observations.
- Expert 7682 (Rating 2): It depends on the prototype itself. Is it something completely new or not.
- Expert 7747 (Rating 8): Again, I am not sure whether this statement states what it is supposed to state. New / adjustment: This statement also confuses me. compared to what?
- Expert 7817 (Rating 3): It might be true, but if it happens, the UX professional should help to omit this problem.

—

It is always better to evaluate in a context of use. So for me is "strongly agree", but for me previous question/sentence to vote for was different.

- Expert 8324 (Rating 1): It is clear that rapid prototypes also have limitations and it can make the evaluation more complicated but when they are properly built these limitations can be mitigated. Additional changes. The new statement provides a more suitable description.
- Expert 8385 (Rating -2): Users are much more capable of abstracting from such lack of context than we developers think.
- Expert 8493 (Rating -1): Without any context it is hard but you do not necessarily have to actually use it
- Expert 8787 (Rating 3): That is true.

- Expert 8966 (Rating 2): It is much better now
- Expert 9007 (Rating 3): By considering the context of use, it becomes more effective to evaluate a prototype. Influences from the context can thus be taken into account.

Statement 3.3: There are different methods of evaluating the user experience from a prototype.

Table A.37 Rating Distribution 1 - Statement 3.3 - N=23

disagree						agree	
-3	-2	-1	0	+1	+2	+3	
0 (0.0%)	0 (0.0%)	0 (0.0%)	1 (4.3%)	0 (0.0%)	4 (17.4%)	18 (78.3%)	

Table A.38 Rating Distribution 2 - Statement 3.3 - N=23

disagree	neutral	agree
-3/-2	-1/0/+1	+2/+3
0 (0.0%)	1 (4.3%)	22 (95.7%)

Table A.39 Rating Statistics - Statement 3.3 - N=23

Expression	Value
N	23
Mean	2.70
Min	0
Max	3
Median	3
Variance	0.49
Std. Dev.	0.70
Confidence (95%)	0.287
Confidence Low	2.408
Confidence High	2.983

- Expert 2450 (Rating 3): There are many in the literature.
- Expert 2452 (Rating 2): Yes there are many different methods
- Expert 2633 (Rating 3): There are always different methods in UX
- Expert 3671 (Rating 3): Observation of behavior. Collection of ratings. Qualitatively, quantitatively.
- Expert 3925 (Rating 3): Of course, there are different methods and different questionnaires to evaluate the UI of a prototype.
- Expert 4183 (Rating 0): Maybe. But for me the more efficient is to test in the final user/customers...
- Expert 4867 (Rating 2): A list of methods should be proposed.
- Expert 4952 (Rating 3): There are different test methods.
- Expert 5809 (Rating 3): Of course. But for the simple reason that they depend on the type of prototype used.

- Expert 6000 (Rating 3): Yes it depends on the type of prototype and the things you want to evaluate
- Expert 6105 (Rating 3): Sure, as there are lots of existing evaluation methods beginning with qualitative user-based evaluations (usability testing) up to quantitative UX questionnaires.
- Expert 6171 (Rating 2): One can use different user testing techniques, depending on the prototype fidelity
- Expert 6190 (Rating 2): Yes. You know them better than I do. :-)
- Expert 6952 (Rating 3): Human-centred design
- Expert 6983 (Rating 3): Yes. There are a lot.
- Expert 7682 (Rating 3): Yes, not all methods are suitable for each prototype.
- Expert 7747 (Rating 8): With this I have no experience. New / adjustment: - none -
- Expert 7817 (Rating 3): Sure, a static page will be differently evaluated than the process stages with information about progress.
- Expert 8324 (Rating 3): Yes, questionnaires is one of them but other techniques for information gathering from users can be used (interviews, focus groups, etc.).
No additional changes
- Expert 8385 (Rating 3): Totally agree with that
- Expert 8493 (Rating 3): Quant like surveys, qual like usability Test with TOL...
- Expert 8787 (Rating 3): I don't get the point of the question. Of course there are different methods of evaluating prototypes. Always depends on the question.
- Expert 8966 (Rating 3): Yes, as well as it is difficult to evaluate a running system
- Expert 9007 (Rating 3): I'm thinking about thinking out loud or focus groups and, in the case of interactive prototypes, classic usability methods. Depends on how realistic the prototype is.

Statement 3.4: A prototype can help to make the right decisions regarding UX.

Table A.40 Rating Distribution 1 - Statement 3.4 - N=24

disagree						agree
-3	-2	-1	0	+1	+2	+3
0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	1 (4.2%)	3 (12.5%)	20 (83.3%)

Table A.41 Rating Distribution 2 - Statement 3.4 - N=24

disagree	neutral	agree
-3/-2	-1/0/+1	+2/+3
0 (0.0%)	1 (4.2%)	23 (95.8%)

Table A.42 Rating Statistics - Statement 3.4 - N=24

Expression	Value
N	24
Mean	2.79
Min	1
Max	3
Median	3
Variance	0.26
Std. Dev.	0.51
Confidence (95%)	0.204
Confidence Low	2.588
Confidence High	2.995

- Expert 2450 (Rating 3): That's what a prototype is for.
- Expert 2452 (Rating 3): Yes, definitively yes
- Expert 2633 (Rating 3): If there is enough time, which is in many projects not the case, testing with a prototype should always be done
- Expert 3671 (Rating 3): Is there an alternative?
- Expert 3925 (Rating 3): Yes, it is a fundamental tool to know if the final user is agree with the functionality and aspect of the user interface.
- Expert 4183 (Rating 3): The feedback of this prototype will give you this answers
- Expert 4867 (Rating 2): It is helpful although the costs of a prototype have to be considered.
- Expert 4952 (Rating 3): It allows testing under real conditions.

- Expert 5809 (Rating 1): It is essential, but not one prototype, but several, because a prototype is a model, which shows some things and loses others. Sometimes it is necessary to use several models to be able to represent more views of the thing under study.
- Expert 6000 (Rating 3): Yes, but it depends on the way the UX is evaluated
- Expert 6105 (Rating 3): Totally, as prototypes reduce risks in developing the wrong product or having not understand the requirements well enough.
- Expert 6171 (Rating 3): Perhaps not the most abstract aspects but definitely all those related to direct engagement.
- Expert 6190 (Rating 2): It can help to make the right decisions if the test users are the right ones and the prototype is good enough.
- Expert 6952 (Rating 3): Human-centred design requirement
- Expert 6983 (Rating 3): Hopefully, they help to visualize what has been discussed. Yes.
- Expert 7682 (Rating 3): Yes, because more information can be collected in advance.
- Expert 7747 (Rating 2): It better should. New / adjustment: - none -
- Expert 7817 (Rating 3): Sure, it is always done everywhere: a prototype, a test of the prototype, corrections if needed (always are), test again and so on with the final pass to production.
- Expert 8324 (Rating 3): Yes, they can help if they are effectively built.
additional comment: Prototypes have demonstrated their usefulness specially in this context (UX)
- Expert 8385 (Rating 3): Users are much more capable of abstracting from such lack of context than we developers think, so yes, a prototype must help to make the right decisions on UX
- Expert 8493 (Rating 3): It becomes tangible
- Expert 8787 (Rating 3): I totally agree. That is a general statement.
- Expert 8966 (Rating 3): No doubt it can help
- Expert 9007 (Rating 3): Not only users but also product designers need an image. With a prototype they can also better estimate what the effect on the UX will be.

Statement 3.5: It helps to make the right decisions concerning UX by comparing the outcome from UX poker with the evaluation of the prototype, before starting development.

Table A.43 Rating Distribution 1 - Statement 3.5 - N=22

disagree		neutral			agree	
-3	-2	-1	0	+1	+2	+3
1 (4.5%)	1 (4.5%)	0 (0.0%)	2 (9.1%)	3 (13.6%)	7 (31.8%)	8 (36.4%)

Table A.44 Rating Distribution 2 - Statement 3.5 - N=22

disagree	neutral	agree
-3/-2	-1/0/+1	+2/+3
2 (9.1%)	5 (22.7%)	15 (68.2%)

Table A.45 Rating Statistics - Statement 3.5 - N=22

Expression	Value
N	22
Mean	1.64
Min	-3
Max	3
Median	2
Variance	2.72
Std. Dev.	1.65
Confidence (95%)	0.689
Confidence Low	0.947
Confidence High	2.325

- Expert 2450 (Rating 2): It helps for reflecting about the estimation.
- Expert 2452 (Rating 1): It is another way, but of course, it helps
- Expert 2633 (Rating 0): If there is prototype testing, why do you need UX poker? Testing will provide the better results.
- Expert 3671 (Rating 1): I think the user rating is more relevant. The comparison is useful in order to reveal any differences.
- Expert 3925 (Rating 3): yes, it is very interesting to have both outcomes, the mockups and the list of preferred UX factors.
- Expert 4183 (Rating 8): No opinion
- Expert 4867 (Rating 3): A comparison is helpful.

- Expert 4952 (Rating 2): I'm not sure about the outcome of UX poker, but I think it will help.
- Expert 5809 (Rating 0): I understand that it will help, but determining if it is sufficient will depend on the very nature of system to be built.
- Expert 6000 (Rating 3): Yes, you can aggregate the learning from both actions in order to take informed decisions
- Expert 6105 (Rating 3): Yes. Evaluations of the prototype will clarify if the agile team did good estimations or if some assumptions get falsified.
- Expert 6171 (Rating 2): I'm not too experienced with poker, but I can see how it could help
- Expert 6190 (Rating 2): In this context using UX poker, yes.
- Expert 6952 (Rating -2): I think you are mixing 2 things.... the poker is based on no data at all... and you should have done planning based on identified user needs and user requirements BASED on user data before... now you collect formative evaluation on an presented solution... all feedback will be biased, because the users have used an solution. User Needs and User Requirements are solution-agnostic.
- Expert 6983 (Rating 1): It will in any case, yes. In my opinion, it doesn't matter if the comparing is similar or not. The reason is that even if the comparison shows a difference it will help to find out what happened. E.g., from expectations at the beginning, change of opinions, misunderstand and it will save costs (time, personnel etc) as this is discovered before the development and therefore helps to make the right decisions.
- Expert 7682 (Rating 3): Yes, I think so, because more information can be collected in advance.
- Expert 7747 (Rating 8): Again: no real experience - and also the Statement is some sort of obvious phrase. New / adjustment: - none -
- Expert 7817 (Rating 3): Yes, it is. The final user should evaluate the prototype, and the poker is not conducted by them or only by them.
- Expert 8324 (Rating 3): totally agree as the different perspectives about UX are discussed
no additional comments
- Expert 8385 (Rating 2): That's one way to do it
- Expert 8493 (Rating 2): It helps to make your poker better next time. Good to reflect on the accuracy of your estimation.
- Expert 8787 (Rating -3): It is sufficient to see whether the prototype meets the expectations, needs and capabilities of the users. You don't need UX Poker to do that.
- Expert 8966 (Rating 3): Yes, I also agree strongly with this
- Expert 9007 (Rating 2): I think that UX Poker can be used either before or after a prototype is created. Before the prototype, the outcome of the poker would be crucial for me if we are going to take the step to the prototype at all.

Statement 3.6: A UX questionnaire is a suitable method to measure the UX from a prototype.

Table A.46 Rating Distribution 1 - Statement 3.6 - N=24

disagree						agree
-3	-2	-1	0	+1	+2	+3
1 (4.2%)	0 (0.0%)	0 (0.0%)	4 (16.7%)	3 (12.5%)	10 (41.7%)	6 (25.0%)

Table A.47 Rating Distribution 2 - Statement 3.6 - N=24

disagree	neutral	agree
-3/-2	-1/0/+1	+2/+3
1 (4.2%)	7 (29.2%)	16 (66.7%)

Table A.48 Rating Statistics - Statement 3.6 - N=24

Expression	Value
N	24
Mean	1.58
Min	-3
Max	3
Median	2
Variance	1.99
Std. Dev.	1.41
Confidence (95%)	0.565
Confidence Low	1.019
Confidence High	2.148

- Expert 2450 (Rating 2): It is, but it may not be enough.
- Expert 2452 (Rating 2): Yes, it is one of the methods but a very useful one
- Expert 2633 (Rating 3): As long as the prototype is "realistic" enough
- Expert 3671 (Rating 0): depends on the question type an the number of responses - I see it critical
- Expert 3925 (Rating 3): Of course, the questionnaires to final users are an adequate tool to measure the UX
- Expert 4183 (Rating 0): A questionnaire is a guideline to bring the user to a valuable feedback
- Expert 4867 (Rating 2): Feedback needs to be gathered.
- Expert 4952 (Rating 2): Yes, it is one suitable method to get users feedback when the questionnaire fits.
- Expert 5809 (Rating 0): Again, it depends on the type of system to be built. In some cases it will be necessary to use helmets with electrodes obtaining brain signals.

- Expert 6000 (Rating 0): It depends on the type of prototype
- Expert 6105 (Rating 1): Yes. UX questionnaires are suitable to quantify hedonic aspects as well as pragmatic aspects, but there will only be the rating with any hints why UX goals are not reached. Only qualitative feedback will help to further improve the prototype in the right direction.
- Expert 6171 (Rating 1): I think it can cover some aspects, but for the more abstract ones it could be difficult from a prototype, unless it's hi-fi
- Expert 6190 (Rating 1): UX questionnaire is based on a hard ranking, so I can not be the only verification.
- Expert 6952 (Rating 2): Depending on the "questionnaire", but a questionnaire should not be the only method
- Expert 6983 (Rating 3): We are doing this for a while and it helps to measure users' opinions and perceptions of a product.
- Expert 7682 (Rating 2): It could help to collect the first impressions.
- Expert 7747 (Rating 2): Here, I have some experience and the questionnaire was definitely helpful. New / adjustment: - none -
- Expert 7817 (Rating 3): Each method is suitable, but as always it depends on the user - some of them prefer to express their opinions verbally.

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In the future the user can say: I didn't say that. With the written form it is not so easy.

- Expert 8324 (Rating 2): Yes, I agree but again the design of the questionnaire is key and it can be complemented by applying other techniques
No additional changes.
- Expert 8385 (Rating 2): Yes if it is an open questionnaire that allows the user to offer reticence in unexpected aspects a priori for the development team
- Expert 8493 (Rating 2): Yes, but I would never rely only on them
- Expert 8787 (Rating -3): We have not had good experiences with quantitative questionnaires in qualitative studies. Since the prototype is not tested in the real context of use, but in an artificial context, the data is mostly unusable.
- Expert 8966 (Rating 3): Yes, it is a suitable method
- Expert 9007 (Rating 3): It makes sense to keep the measuring method the same for all phases. If the prototype can be used interactively by a user (also on paper) then the user can also use a questionnaire. If the results of a questionnaire in one phase differ from the results of another phase, it could also be due to a change in the product (wireframe to mockup).

Statement 3.7: A UX professional is able to conduct a survey, by using a UX questionnaire, to measure the UX from a prototype.

Table A.49 Rating Distribution 1 - Statement 3.7 - N=24

disagree					agree	
-3	-2	-1	0	+1	+2	+3
0 (0.0%)	0 (0.0%)	0 (0.0%)	3 (12.5%)	0 (0.0%)	6 (25.0%)	15 (62.5%)

Table A.50 Rating Distribution 2 - Statement 3.7 - N=24

disagree	neutral	agree
-3/-2	-1/0/+1	+2/+3
0 (0.0%)	3 (12.5%)	21 (87.5%)

Table A.51 Rating Statistics - Statement 3.7 - N=24

Expression	Value
N	24
Mean	2.38
Min	0
Max	3
Median	3
Variance	1.03
Std. Dev.	1.01
Confidence (95%)	0.405
Confidence Low	1.970
Confidence High	2.780

- Expert 2450 (Rating 3): Makes sense
- Expert 2452 (Rating 2): This is more secure than a non-professional
- Expert 2633 (Rating 3): If a standard survey is used this should be possible
- Expert 3671 (Rating 2): I still find it a little difficult. A qualitative test would be better. But you can certainly also ask good quantitative questions.
- Expert 3925 (Rating 3): Of course, I believe that a team can prepare the tools to do so.
- Expert 4183 (Rating 0): Yes, it is can help but you need to ask open questions to understand the user concept
- Expert 4867 (Rating 3): I agree, UX experts are in charge of conducting the survey.
- Expert 4952 (Rating 3): Yes, of course, the UX professional should be able to do this.

- Expert 5809 (Rating 2): It could be possible, but I think this work corresponds more to the product design phase.
- Expert 6000 (Rating 3): Yes, I have no details because it is clear for me that there is no other answer to this statement
- Expert 6105 (Rating 3): As there are UX questionnaires that are evaluated and that are accompanied with analysis tools (e.g. prepared Excel sheets) it won't be too difficult for the agile team.
- Expert 6171 (Rating 0): Now this is a whole different question. Surveys are important for UX, but perhaps not the only reliable way of measuring UX. Should definitely be complemented with other methods.
- Expert 6190 (Rating 3): Yes, because it is easy to use. But everyone in the team should know what every single terms means.
- Expert 6952 (Rating 2): if the UX Professional is qualified for empirical research
- Expert 6983 (Rating 3): If the UX team member is trained it should be able to do that. If not, train them. Much better to include the UX professional. Even better to also include the agile team!
- Expert 7682 (Rating 2): Yes, with that professional it is possible.
- Expert 7747 (Rating 2): As before: only if they feel responsible. This is a too simple generalization. New / adjustment: This sounds more reasonable. The professional better should be.
- Expert 7817 (Rating 3): I think it should be done by UX professionalist as he/she doesn't have any influence of technology on his/her point of view.
– The sentence we vote has change accordingly to my text :-) so I have to change my vote to strongly agree
- Expert 8324 (Rating 0): Yes it is feasible that agile team can do this, given its nature.
Additional comment: Again it is important to consider the suitability of UX specific professionals vs UX capabilities in the team, to not affect to agility.
- Expert 8385 (Rating 3): Totally agree with that
- Expert 8493 (Rating 3): When the questionnaire is standardized, definitely. Otherwise the UX professional should be able to do it.
- Expert 8787 (Rating 3): That is true.
- Expert 8966 (Rating 3): Definitely yes
- Expert 9007 (Rating 3): Still why not?

A.3.4 Results of the Delphi Study - Step 4: Evaluation of the Product Increment

Statement 4.1: There are different methods of measuring the user experience from a product increment.

Table A.52 Rating Distribution 1 - Statement 4.1 - N=22

disagree						agree	
-3	-2	-1	0	+1	+2	+3	
0 (0.0%)	0 (0.0%)	0 (0.0%)	1 (4.5%)	1 (4.5%)	4 (18.2%)	16 (72.7%)	

Table A.53 Rating Distribution 2 - Statement 4.1 - N=22

disagree	neutral	agree
-3/-2	-1/0/+1	+2/+3
0 (0.0%)	2 (9.1%)	20 (90.9%)

Table A.54 Rating Statistics - Statement 4.1 - N=22

Expression	Value
N	22
Mean	2.59
Min	0
Max	3
Median	3
Variance	0.63
Std. Dev.	0.80
Confidence (95%)	0.333
Confidence Low	2.258
Confidence High	2.924

- Expert 2450 (Rating 3): It's in the literature
- Expert 2452 (Rating 1): Yes, there are different methods
- Expert 2633 (Rating 8): Depends on the increment
- Expert 3671 (Rating 2): Agree. In agile development, however, you should focus on a few quick standards.
- Expert 3925 (Rating 3): It is the same questions that the previous page, you can measure the UX of the prototype or the final user interface.
- Expert 4183 (Rating 0): Different yes it is possible but the more effective is observing how the final user understands the UX

- Expert 4867 (Rating 2): In order to agree or disagree I would like to know which methods for measuring you are referring to.
- Expert 4952 (Rating 3): Yes, there are different tools available.
- Expert 5809 (Rating 3): As I said before, of course there are and it depends on the type of system to be built.
- Expert 6000 (Rating 3): Yes, for instance qualitative vs. quantitative
- Expert 6105 (Rating 3): Yes, there are. You can evaluate product increments using user-based testing, questionnaires or even inspection methods.
- Expert 6171 (Rating 3): As there are methods to measure prototypes, sure
- Expert 6190 (Rating 2): There are many methods.
- Expert 6952 (Rating 3): Human-centred design... there are tons of methods for evaluation
- Expert 6983 (Rating 3): That is correct.
- Expert 7682 (Rating 2): Yes, that belongs to the context, where UX should be measured.
- Expert 7747 (Rating 8): Again, not enough experience here. New / adjustment: - none -
- Expert 7817 (Rating 3): Like before: the method depends on the user — and on the product's type.
- Expert 8324 (Rating 3): Same response that the provided for the different methods for measuring user experience from prototypes
No additional comments
- Expert 8385 (Rating 3): Questionnaires, open validation in operation, technical UX measurements, etc.
- Expert 8493 (Rating 3): There is, but Quant becomes more important because you want to quantify this increment.
- Expert 8787 (Rating 3): I don't get the point of the question. Of course there are different methods of measuring UX. Always depends on the question.
- Expert 8966 (Rating 3): Yes, there are!
- Expert 9007 (Rating 3): Each increment is a deliverable (though not worthy) product. Therefore almost all methods can be used.

Statement 4.2: A UX questionnaire is a suitable method of measuring the UX from a product increment.

Table A.55 Rating Distribution 1 - Statement 4.2 - N=24

disagree						agree
-3	-2	-1	0	+1	+2	+3
2 (8.3%)	1 (4.2%)	0 (0.0%)	2 (8.3%)	3 (12.5%)	7 (29.2%)	9 (37.5%)

Table A.56 Rating Distribution 2 - Statement 4.2 - N=24

disagree	neutral	agree
-3/-2	-1/0/+1	+2/+3
3 (12.5%)	5 (20.8%)	16 (66.7%)

Table A.57 Rating Statistics - Statement 4.2 - N=24

Expression	Value
N	24
Mean	1.50
Min	-3
Max	3
Median	2
Variance	3.48
Std. Dev.	1.87
Confidence (95%)	0.746
Confidence Low	0.754
Confidence High	2.246

- Expert 2450 (Rating 1): It only measures subjective factors
- Expert 2452 (Rating 2): You can apply the UX quest in different steps and this can give you a real idea of the evolution.
- Expert 2633 (Rating -3): In most cases the increments to a larger product are too small to have a measureable impact on a ux questionnaire. Exceptions may exist.
- Expert 3671 (Rating -2): The measurement accuracy ... don't konw, this is a very hard task to do. And: I don't think that's workable. The agile tests have to test the increments. You need enough returns. But you probably also have new features. They would also have to be tested.
- Expert 3925 (Rating 3): yes, in my opinion, it is an adequate method.
- Expert 4183 (Rating 0): It is again a guideline
- Expert 4867 (Rating 3): This is a concrete proposal.

- Expert 4952 (Rating 2): Yes, but the questionnaire must be product-specific; adaptable in with corresponding effort.
- Expert 5809 (Rating 0): Only in the construction of some types of systems.
- Expert 6000 (Rating 3): Yes, you have a standardized tool that can be used over several iterations
- Expert 6105 (Rating 1): Overall yes, but it will depend whether the increment is able to stand alone or whether the increment has to have an advanced status with multiple features already implemented.
- Expert 6171 (Rating 2): This applies more here than to prototypes, since PI are necessarily production-ready
- Expert 6190 (Rating 2): The UX Q is one option, but it is suitable.
- Expert 6952 (Rating 3): see above, depending on the questionnaire
- Expert 6983 (Rating 3): That is correct.
- Expert 7682 (Rating 2): Yes, it helps to get the first information.
- Expert 7747 (Rating 1): no comment New / adjustment: - none -
- Expert 7817 (Rating 3): The situation is the same as with prototype, but now there is no need to explain anything (with prototype it can be needed).
- Expert 8324 (Rating 2): Yes, also other complementary approaches could be applied to reinforce the findings
No additional comments
- Expert 8385 (Rating 3): Totally agree with that, due to my experience
- Expert 8493 (Rating 2): You want usually to have a Benchmark and see how your product develops over time.
- Expert 8787 (Rating -3): We have not had good experiences with quantitative questionnaires in qualitative studies. Since this is not the real context of use, the data is mostly unusable.
- Expert 8966 (Rating 3): It is a good method indeed
- Expert 9007 (Rating 3): Full agreement. However, the question arises whether the effort of a questionnaire with inviting, filling out and evaluating the sprint length can be reasonable.

Statement 4.3: A UX professional is able to conduct a survey, by using a UX questionnaire, to measure the UX from a product increment.

Table A.58 Rating Distribution 1 - Statement 4.3 - N=24

disagree						agree	
-3	-2	-1	0	+1	+2	+3	
1 (4.2%)	1 (4.2%)	0 (0.0%)	2 (8.3%)	3 (12.5%)	4 (16.7%)	13 (54.2%)	

Table A.59 Rating Distribution 2 - Statement 4.3 - N=24

disagree	neutral	agree
-3/-2	-1/0/+1	+2/+3
2 (8.3%)	5 (20.8%)	17 (70.8%)

Table A.60 Rating Statistics - Statement 4.3 - N=24

Expression	Value
N	24
Mean	1.88
Min	-3
Max	3
Median	3
Variance	2.81
Std. Dev.	1.68
Confidence (95%)	0.671
Confidence Low	1.204
Confidence High	2.546

- Expert 2450 (Rating 1): Not all team members may be able to conduct a UX survey, only those UX professionals in the team.
- Expert 2452 (Rating 2): Yes, This definition is more accurate with the reality
- Expert 2633 (Rating -3): see comments above
- Expert 3671 (Rating -2): The colleagues are convinced that it is possible. But I have the opinion that it is a great methodological challenge to evaluate the further development well with a survey.
- Expert 3925 (Rating 3): Yes, a team can prepare the tools to do so.
- Expert 4183 (Rating 0): Yes it is possible
- Expert 4867 (Rating 2): I guess the users will provide the answers to the UX questionnaire. Should be included explicitly in the statement.

- Expert 4952 (Rating 3): Yes, a UX professional can do this.
- Expert 5809 (Rating 2): Putting two of my previous answers together, it is only applicable on some types of systems and the task corresponds more to the product design phase, to the discovery team.
- Expert 6000 (Rating 3): Yes, why not. There is no other answer
- Expert 6105 (Rating 3): Sure. It is the same comment as 3.7 concerning the prototype instead of the increment.
- Expert 6171 (Rating 1): Sure, the UX professional is the one to do it, still not the only method I'd use
- Expert 6190 (Rating 3): Yes, if the team knows how to use it.
- Expert 6952 (Rating 2): As stated above, only qualified UX personell shall conduct evaluation / testing. Also: the personell that creates the solution shall not be the same that conducts evaluation.
- Expert 6983 (Rating 3): A UX professional should be able to do that. Otherwise, they should be not called a UX professional and trained. better!
- Expert 7682 (Rating 3): Yes, if this is done and evaluated using UX Professionals
- Expert 7747 (Rating 1): Again, only if it feels responsible. New / adjustment: This also sounds more reasonable.
- Expert 7817 (Rating 3): Sorry, previously I wrote that an agile team is not able. And I also noted that UX Professionalist should do it - it is true, but he or she is a part of the agile team. So if t is true, the agile team is able to conduct a survey (by him or her without the influence of technology).

–

As you can see I assumed here that the UX professionalist is a parto of the team. Your change confirms my voting now (without the UX pro the agaile team itself is not able to do it properly because it is not its goal).

- Expert 8324 (Rating 0): the same as for prototypes evaluation
Additional comment: same concern about UX professional vs agile team. If the teams requires specific UX professionals, quality professional, security professional, agility would not be the focus.
- Expert 8385 (Rating 3): Totally agree with that, due to my experience
- Expert 8493 (Rating 3): Same as for epic
- Expert 8787 (Rating 3): That is true.
- Expert 8966 (Rating 3): Definitively yes
- Expert 9007 (Rating 3): yes, but a team would be able as well to do so.

A.3.5 Results of the Delphi Study - Step 5: UX Restrospective

Statement 5.1: A UX retrospective enables an agile team to perceive advantages and disadvantages regarding the UX process.

Table A.61 Rating Distribution 1 - Statement 5.1 - N=24

disagree						agree	
-3	-2	-1	0	+1	+2	+3	
1 (4.2%)	0 (0.0%)	1 (4.2%)	1 (4.2%)	0 (0.0%)	5 (20.8%)	16 (66.7%)	

Table A.62 Rating Distribution 2 - Statement 5.1 - N=24

disagree	neutral	agree
-3/-2	-1/0/+1	+2/+3
1 (4.2%)	2 (8.3%)	21 (87.5%)

Table A.63 Rating Statistics - Statement 5.1 - N=24

Expression	Value
N	24
Mean	2.25
Min	-3
Max	3
Median	3
Variance	2.28
Std. Dev.	1.51
Confidence (95%)	0.604
Confidence Low	1.646
Confidence High	2.854

- Expert 2450 (Rating 3): Makes sense
- Expert 2452 (Rating 2): Yes, this is the way
- Expert 2633 (Rating 3): why not? A retrospective is a review of all the processes used in the dev cycle. Why should it not work for UX.
- Expert 3671 (Rating 3): Retrospective is a good method. The team has a lot of information, it should be relatively easy to do.
- Expert 3925 (Rating 3): The mission of a retrospective meeting is precisely to evaluate the process and what is going right or wrong
- Expert 4183 (Rating 0): If the end user will be the same of course. But if the focus of the new UX is different you can learnt about the process and research but not use the results.

- Expert 4867 (Rating 3): Feedback analysis is important.
- Expert 4952 (Rating 3): You have a list of actions to apply in the next iteration, including information from every team member.
- Expert 5809 (Rating -1): Just keeping in mind that the development team shouldn't do UX-specific retrospectives, but these retrospectives can be done by the UX specialist team and give feedback to the development team. This feedback will be very helpful.
- Expert 6000 (Rating 3): Yes, this should be the goal. Although I think that some people don't think that there should be something only focused on UX
- Expert 6105 (Rating 2): As the team compares the UX poker estimations with the evaluations of the prototype and increments, they will be able to improve the product. Th improve their acting and will get better with each iteration and from with every next project.
- Expert 6171 (Rating 3): Yes, actually it's the most suitable stage to do so
- Expert 6190 (Rating 3): A retrospective is always good to improve processes.
- Expert 6952 (Rating 2): nothing against retro :)
- Expert 6983 (Rating 3): Yes, I think that is possible.
- Expert 7682 (Rating 2): I think that is good solution to check the process.
- Expert 7747 (Rating 2): Retro and reflecting is always good. New / adjustment: - none -
- Expert 7817 (Rating -3): Sometimes conducting retrospective is a not a good idea, so I disagree with the statement. An retrospective treats about what went right and what went wrong, not about if the process has advanteges or disadvanteges.

—

For me process "looks like" or "is": 1. UX Poker and UX Goal 2. Evaluate Prototype 3. Evaluate Product Increment 4. UX Retrospective 5. Go To Point 1

and it is unchanged. The way we do things inside they can be changed and they are if someone is new to his/her duties or some wiser finds/discovers a new way of doing something.

But by the way: may voice was not calculated :-), or now I know that I am not an expert :-([and I strongly agree with that]

- Expert 8324 (Rating 3): Yes, in the same way as scrum retrospectives are key in the continuous improvement process
No additional comments
- Expert 8385 (Rating 3): Totally agree with that, due to my experience
- Expert 8493 (Rating 3): You need this to close the loop. Otherwise there is no point in doing the Poker
- Expert 8787 (Rating 3): Retrospectives are always a great way to improve the development process. I am convinced that UX should be built into the development process. Instead of organizing your own UX retrospective, I think it would be more productive to include UX in the usual retrospectives.

- Expert 8966 (Rating 3): Similarly to the "original" agile cycle, this kind of retrospective helps to improve the UX process
- Expert 9007 (Rating 3): Typically for retrospectives. they help with everykind of processes.

Statement 5.2: Conducting a UX retrospective helps the agile team to understand the benefits of a positive UX.

Table A.64 Rating Distribution 1 - Statement 5.2 - N=23

disagree					agree	
-3	-2	-1	0	+1	+2	+3
1 (4.3%)	1 (4.3%)	0 (0.0%)	0 (0.0%)	4 (17.4%)	6 (26.1%)	11 (47.8%)

Table A.65 Rating Distribution 2 - Statement 5.2 - N=23

disagree	neutral	agree
-3/-2	-1/0/+1	+2/+3
2 (8.7%)	4 (17.4%)	17 (73.9%)

Table A.66 Rating Statistics - Statement 5.2 - N=23

Expression	Value
N	23
Mean	1.91
Min	-3
Max	3
Median	2
Variance	2.54
Std. Dev.	1.59
Confidence (95%)	0.651
Confidence Low	1.262
Confidence High	2.564

- Expert 2450 (Rating 3): That's what a retrospective is for.
- Expert 2452 (Rating 2): Yes, this is the way
- Expert 2633 (Rating 1): If they have not understood already the UX retro can help, for some teams it will not be enough to convince people
- Expert 3671 (Rating 1): Based on the data, the results should be clear if the iteration was a success. So the team should realize that UX helps.
- Expert 3925 (Rating 3): Yes, it is the same aspect that the previous question.
- Expert 4183 (Rating 8): Same answer 5.1
- Expert 4867 (Rating 3): I would say "UX" instead of "positive UX"
- Expert 4952 (Rating 2): Discussing improvements means discussing positive UX aspects.

- Expert 5809 (Rating -2): I do not agree that the team does UX retrospectives, I would prefer that the specialized teams do it and give the feedback to the development teams.
- Expert 6000 (Rating 3): Yes, because the agile team is learning more about UX at all
- Expert 6105 (Rating 3): Since self-reflection always helps to improve oneself in every situation, I can well imagine that UX retrospectives also help to understand the benefit of UX.
- Expert 6171 (Rating 1): Yes, although it might take more time even after retrospective to get a good grasp on UX improvements
- Expert 6190 (Rating 2): To see the main benefits the team has to see people which are using the product in real life.
- Expert 6952 (Rating 2): if the findings are based on valid data
- Expert 6983 (Rating 3): Yes, that should work if a team is familiar with how to handle retrospectives.
- Expert 7682 (Rating 2): Sure. It helps the agile team to get a common understanding for the UX.
- Expert 7747 (Rating 1): Why shouldn't it? Again - the statement is a bit mushy. New / adjustment: - none -
- Expert 7817 (Rating -3): But why? UX retrospective supports better communication between UX professionals and other team members and does not give a better understanding of the benefits of a positive UX. But maybe we can say that in a case that if we do closer the users' requirements or expectation, the more pleasant retrospective is.

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The SCRUM (Agile) retrospective from my point of view consists of: 1. What did we do well? 2. What did we do wrong? sometimes called: What could be done better? 3. What will we be doing in the next sprint?

I think there is no place for better understanding the benefits of positive UX.

- Expert 8324 (Rating 3): Yes, as these aspects are discussed in this meeting
No additional comments
- Expert 8385 (Rating 3): Totally agree with that, due to my experience
- Expert 8493 (Rating 3): The results become tangible. You spend time discussing the evaluations which makes them more important
- Expert 8787 (Rating 3): Retrospectives are always a great way to improve the development process. I am convinced that UX should be built into the development process. Instead of organizing your own UX retrospective, I think it would be more productive to include UX in the usual retrospectives.
- Expert 8966 (Rating 3): And it also helps to decide which issues to include in the next iteration
- Expert 9007 (Rating 2): Although a team gets a better understanding of the UX of their product through retrospective, it does not mean that they understand more easily why a positive UX is important. This works when the team has access to user feedback.

Statement 5.3: UX retrospective supports better communication between UX professionals and other team members.

Table A.67 Rating Distribution 1 - Statement 5.3 - N=23

disagree						agree	
-3	-2	-1	0	+1	+2	+3	
1 (4.3%)	1 (4.3%)	0 (0.0%)	3 (13.0%)	1 (4.3%)	4 (17.4%)	13 (56.5%)	

Table A.68 Rating Distribution 2 - Statement 5.3 - N=23

disagree	neutral	agree
-3/-2	-1/0/+1	+2/+3
2 (8.7%)	4 (17.4%)	17 (73.9%)

Table A.69 Rating Statistics - Statement 5.3 - N=23

Expression	Value
N	23
Mean	1.87
Min	-3
Max	3
Median	3
Variance	3.03
Std. Dev.	1.74
Confidence (95%)	0.711
Confidence Low	1.158
Confidence High	2.581

- Expert 2450 (Rating 3): Makes sense.
- Expert 2452 (Rating 2): Yes, this is clear
- Expert 2633 (Rating 3): This should be the case
- Expert 3671 (Rating 3): Depends on the relevance of UX at the overall view
- Expert 3925 (Rating 0): neither better nor worse, the meeting should allow team members to detect what is or is not going well in the process.
- Expert 4183 (Rating 8): All team members should be involve in the UX definition. The different point of view improve the UX
- Expert 4867 (Rating 3): Communication improves team work.
- Expert 4952 (Rating 3): UX professionals get, e.g., better insight into the needs of the users.

- Expert 5809 (Rating 3): Absolutely.
- Expert 6000 (Rating 0): It depends on the people within the team. If there is a tension among professions than this may be an issue
- Expert 6105 (Rating 3): Since the other team members are not told by the UX professional what the UX looks like, but actively participate in discussions based on the evaluation results you will have a good feedback culture and improved communication.
- Expert 6171 (Rating 3): Agree, that's a good space for communication
- Expert 6190 (Rating 3): Totally agreed.
- Expert 6952 (Rating 2): it can help, if the whole team accepts UX/Usability as expertise of many aspects, not only visual design
- Expert 6983 (Rating 1): I just partly agree because there should be one retrospective for all issues on the last increments not just between the UX professionals and other team members but between all members as in a 'normal' retrospective. If there is a separate UX retrospective, yes it should.
- Expert 7682 (Rating 0): I think the whole process supports the better communication between all members, not the UX retrospective alone.
- Expert 7747 (Rating 2): no comment New / adjustment: - none -
- Expert 7817 (Rating 3): No doubt, as a retrospective is an exchange of thoughts and observations.
- Expert 8324 (Rating 3): This meeting fosters that different stakeholders (team members, etc.) are better aware about UX

Additional comment: Agile teams can benefit from the participation of UX professionals in their first sprints so they can acquire better skills to be able to work as "more" cross-functional team for future sprints.
- Expert 8385 (Rating -2): The simple fact of applying a technique does not imply doing it properly, and this benefit is only achieved by taking care of other complex team building aspects.
- Expert 8493 (Rating 2): Foster a common understanding and improve the teams UX maturity
- Expert 8787 (Rating -3): UX should be included in usual retrospectives.
- Expert 8966 (Rating 3): Yes, there is a cultural issue involved here and therefore retrospectives can help to "join" both cultures
- Expert 9007 (Rating 3): By focusing on specific topics and exchanging information about UX, a common understanding is developed between the participants. This helps with future communication.

Statement 5.4: A UX restrospective supports the agile team in realizing what worked well in the UX process.

Table A.70 Rating Distribution 1 - Statement 5.4 - N=23

disagree		neutral			agree	
-3	-2	-1	0	+1	+2	+3
1 (4.3%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	3 (13.0%)	8 (34.8%)	11 (47.8%)

Table A.71 Rating Distribution 2 - Statement 5.4 - N=23

disagree	neutral	agree
-3/-2	-1/0/+1	+2/+3
1 (4.3%)	3 (13.0%)	19 (82.6%)

Table A.72 Rating Statistics - Statement 5.4 - N=23

Expression	Value
N	23
Mean	2.13
Min	-3
Max	3
Median	2
Variance	1.75
Std. Dev.	1.32
Confidence (95%)	0.541
Confidence Low	1.589
Confidence High	2.672

- Expert 2450 (Rating 2): That's what a retrospective is for, not also what worked bad.
- Expert 2452 (Rating 2): Yes, this is ok
- Expert 2633 (Rating 2): see comments above
- Expert 3671 (Rating 3): Yes, that should work fine. When the effects are good and technical advancement does not dominate absolutely.
- Expert 3925 (Rating 3): Of course, I agree with permits to detect what worked well in the UX process
- Expert 4183 (Rating 8): Same answer 5.1
- Expert 4867 (Rating 3): Allows for improvements in the next iteration.
- Expert 4952 (Rating 2): Yes, if the UX Poker and estimation go in the right way.

- Expert 5809 (Rating 2): Of course. But the UX retrospective should be done by the team of specialists, because they will be able to do a precise cause-effect analysis and it will not be simply the opinions of non-specialists.
- Expert 6000 (Rating -3): Yes, this should be the goal
- Expert 6105 (Rating 3): I go along with statement 5.2
- Expert 6171 (Rating 1): Again, retrospective, even being the last step, could be a bit early
- Expert 6190 (Rating 3): Totally agreed.
- Expert 6952 (Rating 1): depending on the data on "what worked well"
- Expert 6983 (Rating 1): Is it just about the UX process? Or could it be also about the product itself or new insights of the user? Or the engagement/identification of the agile team with the product?
- Expert 7682 (Rating 2): this should take place in the respective feedback rounds.
- Expert 7747 (Rating 2): Well, yes. But feedback can be gained also differently. New / adjustment: - none
-
- Expert 7817 (Rating 3): Retrospective aims to answer what went wrong and right.
- Expert 8324 (Rating 3): Yes, at this is core part to be discussed in this meeting
No additional comments
- Expert 8385 (Rating 3): Totally agree with that
- Expert 8493 (Rating 3): Without a Shareback or Lookback, you will never know
- Expert 8787 (Rating 2): UX should be included in usual retrospectives.
- Expert 8966 (Rating 3): Yes, and what is not working well too
- Expert 9007 (Rating 3): Also typical for retrospectives, no matter what kind of process.

Statement 5.5: It is possible to compare the estimation from UX poker with the outcome of the evaluations of the prototype and product increment.

Table A.73 Rating Distribution 1 - Statement 5.5 - N=21

disagree						agree	
-3	-2	-1	0	+1	+2	+3	
2 (9.5%)	0 (0.0%)	0 (0.0%)	3 (14.3%)	4 (19.0%)	4 (19.0%)	8 (38.1%)	

Table A.74 Rating Distribution 2 - Statement 5.5 - N=21

disagree	neutral	agree
-3/-2	-1/0/+1	+2/+3
2 (9.5%)	7 (33.3%)	12 (57.1%)

Table A.75 Rating Statistics - Statement 5.5 - N=21

Expression	Value
N	21
Mean	1.43
Min	-3
Max	3
Median	2
Variance	3.36
Std. Dev.	1.83
Confidence (95%)	0.784
Confidence Low	0.645
Confidence High	2.212

- Expert 2450 (Rating 3): Makes sense
- Expert 2452 (Rating 1): I think this can be, not completely sure
- Expert 2633 (Rating 8): Do not understand this. Of course you can compare all numeric ratings, but is the expectation that the results match?
- Expert 3671 (Rating 2): Yes, it should be possible. It remains to be seen whether the many comparisons are practical.
- Expert 3925 (Rating 3): Yes, if the UX pokers establish a preferred factors, and they are not obtains a good results in the evaluation, some thing is going wrong, and it should be changed the prototypes and the final implemented product
- Expert 4183 (Rating 8): I don't understand the question

- Expert 4867 (Rating 3): Although it is a matter of time to invest in such a comparison.
- Expert 4952 (Rating 2): Outcome and evaluation give information about the quality of UX estimation.
- Expert 5809 (Rating 1): Yes, and it will surely help to see if the estimation technique was correct. And I insist, poker is not an estimation technique but a presentation of estimates, so we will have to compare it with the estimation technique that poker uncovered.
- Expert 6000 (Rating 3): Yes, same answer than before. The more information you have the more you learn
- Expert 6105 (Rating 1): At the moment when the same factors are applied in UX poker as in the evaluation, these results can certainly be compared.
- Expert 6171 (Rating 2): Yes, making the same observation as in the previous answers
- Expert 6190 (Rating 0): In my opinion not if you ask same people again.
- Expert 6952 (Rating -3): The Poker was on a completely different level than the prototype
- Expert 6983 (Rating 1): Depending what the estimations look like and how to compare that. Why will you compare it? To learn about the process? To improve the product? The UX goal? This should be a shorter iteration and not at the end of the product, which I guess was suggested.
- Expert 7682 (Rating 0): Hard. I don't know an approach to just compare this.
- Expert 7747 (Rating 8): Again, not enough experience. New / adjustment: - none -
- Expert 7817 (Rating -3): Always, but just to see where the differences are and try to guess or to learn why.

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Yes and not (unfortunately), because if we have put something on the list of UX goals (5-7 items) we can only evaluate if this chosen items are well done. And of course if we make a list of items which were canceled or deleted and ask to vote for them, it would help us to evaluate UX poker. Otherwise we only evaluate the level of implementation of proposed UX goal/goals. If during evaluation evaluator is asked: is something missing for you? It should help, but I'm pretty sure, that there is no such question. So I have to change my response / voting to negative.

- Expert 8324 (Rating 2): Yes, and here also it is very important to learn from the experience in the application of the methods (estimations and evaluations) in practice to refine them
No additional comments
- Expert 8385 (Rating 3): Totally agree
- Expert 8493 (Rating 3): There should be a correlation, otherwise what's the point in doing it? You need to check how good an estimation was.
- Expert 8787 (Rating 3): That is possible. I assume that this is the exciting moment when the team realizes that the assessments were mostly wrong.
- Expert 8966 (Rating 3): Yes, it should be possible indeed

- Expert 9007 (Rating 0): This depends on the content of the increment. The more individual, estimated elements come together in an increment, the more difficult it becomes to relate cause and effect with respect to UX.

Statement 5.6: The UX professional learns more to estimate accurately by comparing the estimation from UX poker and outcome from the evaluations from the prototype and product increment.

Table A.76 Rating Distribution 1 - Statement 5.6 - N=21

disagree		0			agree	
-3	-2	-1	0	+1	+2	+3
1 (4.8%)	1 (4.8%)	0 (0.0%)	4 (19.0%)	2 (9.5%)	6 (28.6%)	7 (33.3%)

Table A.77 Rating Distribution 2 - Statement 5.6 - N=21

disagree	neutral	agree
-3/-2	-1/0/+1	+2/+3
2 (9.5%)	6 (28.6%)	13 (61.9%)

Table A.78 Rating Statistics - Statement 5.6 - N=21

Expression	Value
N	21
Mean	1.43
Min	-3
Max	3
Median	3
Variance	2.96
Std. Dev.	1.72
Confidence (95%)	0.735
Confidence Low	0.693
Confidence High	2.164

- Expert 2450 (Rating 2): In general teams get better at estimating over time.
- Expert 2452 (Rating 2): This definition is better
- Expert 2633 (Rating 0): Depends most likely on the team
- Expert 3671 (Rating 2): With each iteration, the user is better understood and the predictions get better.
- Expert 3925 (Rating 2): I don't know, but it's clear that having more information helps to improve product quality, which in the end is the most important thing.
- Expert 4183 (Rating 8): I don't understand the question
- Expert 4867 (Rating 1): Clear. The agile team gets more experience on estimation.
- Expert 4952 (Rating 3): Yes, UX professionals can do this.

- Expert 5809 (Rating 3): Absolutely. But not because these techniques are compatible or not, but because it MUST always be estimated by applying more than one estimation technique to analyze the distribution of results and thus be able to calculate the confidence of the estimate (cf. McConnell)
- Expert 6000 (Rating -2): I am not sure whether they learn to estimate or if they learn more about the product and the target group
- Expert 6105 (Rating 3): As in any learning process, I assume that this is also true here.
- Expert 6171 (Rating 2): Yes, again, making the same observation as in the previous answers
- Expert 6190 (Rating 3): Yes. But this can be a long process and requires discipline.
- Expert 6952 (Rating 0): It can be of help for UX professionals
- Expert 6983 (Rating 3): I think that should especially at the beginning of integrating this process or new product the goal. It might change over time or with new people.
- Expert 7682 (Rating 0): Read the comment for 5.5
- Expert 7747 (Rating 8): I am not sure whether I understand that sentence. New / adjustment: - none -
- Expert 7817 (Rating -3): Yes, as they learn each other. They can better understand what the user thinks or needs.

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During UX poker we do not estimate, we choose what should be obtain, which factors will be our goals. Estimation for me is a "proces" that we do to say how much it will cost is to get the result expected. And it can be done by the dev team itself. So I think I have to change my unswer to negative (strongly disagree), and previously it was bad (should be strong disagree also: UX poker AND outcome - UX poker, no; outcome, yes so "no" AND "yes" gives "no").

- Expert 8324 (Rating 1): Totally agree, such as commented before, practical experience is key in agile methods application
Additional comments: I have adjusted my rating according to my opinion included in previous answers about specific UX professionals
- Expert 8385 (Rating 8): I have not applied other techniques that are sufficiently documented and different to be able to make a statement in this regard.
- Expert 8493 (Rating 2): Not only the UX professional should learn about that but he is most interested in it.
- Expert 8787 (Rating 3): That is true.
- Expert 8966 (Rating 3): Yes, there is a learning aspect in the cycle which is very valuable
- Expert 9007 (Rating 0): I think that no matter who estimates it. Here it is especially important to recognize from the pure numbers where more qualitative feedback is necessary to give better estimates for the future.

A.3.6 Results of the Delphi Study - Step 6: Overall

Statement 6.1: The UX Lifecycle enables agile teams to focus on UX.

Table A.79 Rating Distribution 1 - Statement 6.1 - N=23

disagree						agree	
-3	-2	-1	0	+1	+2	+3	
1 (4.3%)	0 (0.0%)	1 (4.3%)	1 (4.3%)	3 (13.0%)	3 (13.0%)	14 (60.9%)	

Table A.80 Rating Distribution 2 - Statement 6.1 - N=23

disagree	neutral	agree
-3/-2	-1/0/+1	+2/+3
1 (4.3%)	5 (21.7%)	17 (73.9%)

Table A.81 Rating Statistics - Statement 6.1 - N=23

Expression	Value
N	23
Mean	2.04
Min	-3
Max	3
Median	3
Variance	2.50
Std. Dev.	1.58
Confidence (95%)	0.646
Confidence Low	1.398
Confidence High	2.689

- Expert 2450 (Rating 3): It encourages all team members to think about UX
- Expert 2452 (Rating 1): It can be this way
- Expert 2633 (Rating 1): It sets some focus on UX topics and on what is important. Thus it will help
- Expert 3671 (Rating 3): Theoretically yes, but I'm afraid practically there will be a lot of additional work. As you mentioned, perhaps you can focus on the most important goals.
- Expert 3925 (Rating 3): yes, I think that the proposal accomplishes this goal.
- Expert 4183 (Rating 3): The feedback of this lifecycle will help the agile teams to focus in the UX
- Expert 4867 (Rating 3): That is very important.

- Expert 4952 (Rating 2): You can estimate and evaluate. You also have real test scenarios to validate the improvements, including the entire team.
- Expert 5809 (Rating 1): I would not say "focus", but give more value to UX, since the teams must focus on the solution that the customer expects and that surely includes many aspects.
- Expert 6000 (Rating 3): Yes because it guides their focus
- Expert 6105 (Rating 3): I totally agree. The discussion of UX factors and retrospective supports communication about UX and thus improves understanding and focus in the project.
- Expert 6171 (Rating 3): Yes, the method appears to help with focus
- Expert 6190 (Rating 3): Yes. Repetition improves every process.
- Expert 6952 (Rating -1): it is based on assumptions without applying an human-centred approach. It is not founded on an understanding of an user and identified user needs and therefore not compliant with human-centred design (as outlined in ISO 9241-210).
- Expert 6983 (Rating 2): Yes, that might work. I would need to try it out to see pitfalls.
- Expert 7682 (Rating 3): Yes, all members becomes a better understanding of the UX.
- Expert 7747 (Rating 8): I don't like that statement. It implies that UX is the most-focus-worthy thing during development. New / adjustment: I still don't like the statement. It's too much of a generalization.
- Expert 7817 (Rating 0): Not to focus, but to take it under strong consideration. Not to forget that this part of the project is also crucial.
- Expert 8324 (Rating 3): Such as it is designed it adapts scrum by putting the focus on UX
No additional changes
- Expert 8385 (Rating 3): Totally agree, based on my own experience
- Expert 8493 (Rating 3): It adds UX as layer and Part of their daily Job
- Expert 8787 (Rating -3): The process helps the team to focus on the methodological aspects that are necessary to achieve good UX. It is one possible way of introducing agile teams to the importance of UX. But: In my opinion, this will not profitably improve the user experience.
- Expert 8966 (Rating 3): By introducing UX as another task the agile team "naturally" focuses on UX
- Expert 9007 (Rating 2): Probably there are other things to focus on, but the different tasks and methods provide for increased communication about UX and thus a stronger perception of this design aspect. This automatically brings UX into focus.

Statement 6.2: The UX Lifecycle enables agile teams to identify epics with a positive impact on the UX more efficient.

Table A.82 Rating Distribution 1 - Statement 6.2 - N=24

disagree		neutral			agree	
-3	-2	-1	0	+1	+2	+3
1 (4.2%)	1 (4.2%)	1 (4.2%)	1 (4.2%)	4 (16.7%)	8 (33.3%)	8 (33.3%)

Table A.83 Rating Distribution 2 - Statement 6.2 - N=24

disagree	neutral	agree
-3/-2	-1/0/+1	+2/+3
2 (8.3%)	6 (25.0%)	16 (66.7%)

Table A.84 Rating Statistics - Statement 6.2 - N=24

Expression	Value
N	24
Mean	1.58
Min	-3
Max	3
Median	2
Variance	2.69
Std. Dev.	1.64
Confidence (95%)	0.656
Confidence Low	0.927
Confidence High	2.239

- Expert 2450 (Rating 2): You may have an epic with no influence on the UX that the team still needs to develop (e.g., a backend improvement)
- Expert 2452 (Rating 2): This definition is better because identifies epics with a positive impact
- Expert 2633 (Rating -3): This does not make sense. Epics in practice are in most cases a mixture of functional, legal, and UX requirements. Thus, if there is for example an urgent legal requirement that decreases UX (think about this whole DSGVO bullshit that decreases UX nearly everywhere) then epics with a negative impact on UX will result. For most products UX is only one factor of many.
- Expert 3671 (Rating 2): As I said above. It depends on the wording. I think there is team learning and the team can see better from the user's point of view. In addition, there are "objective" findings.
- Expert 3925 (Rating 3): Yes, that's the goal. But there I have a discrepancy with the author. It is clear that priority must be given to user stories that have a positive impact on the chosen UX factors. However,

it is also necessary to address those that are not so influential since they are part of the development. They are not eliminated, they are simply postponed.

- Expert 4183 (Rating 3): Completely agree
- Expert 4867 (Rating 1): True after the change.
- Expert 4952 (Rating 2): I think with this method, the teams can do this.
- Expert 5809 (Rating 3): Absolutely.
- Expert 6000 (Rating 1): no comment
- Expert 6105 (Rating 3): Yes, I agree.
- Expert 6171 (Rating 2): I agree it will help select in that direction, but positive influence is not guaranteed
- Expert 6190 (Rating 1): In the beginning everybody has to learn, but after some time it will work out.
- Expert 6952 (Rating -2): Since the team doesn't have any data on what the user needs and what requirements are essential, all decisions are based on guesses and unverified assumptions.. this could be very risky and expensive.
- Expert 6983 (Rating 2): Not yet, as it is not rated which epic to do first, or did I miss that? But it definitely gives the opportunity to do so.
- Expert 7682 (Rating 2): Yes, I think it could be.
- Expert 7747 (Rating 0): Again, is that the main goal of development? New / adjustment: The adjusted statement makes more sense. But for my taste it's also too general.
- Expert 7817 (Rating 3): Yes, because something which has a negative influence on UX will not be developed.

—

Yes, because we have an evaluation and retrospective in the UX Lifecycle. These two bring the desired information if the epic was good or not for the UX goal/goals. I'm not changing my vote.

- Expert 8324 (Rating 2): Yes, the method is designed to guide in this way based on the prioritization of epics according to their impact on UX
No additional comments
- Expert 8385 (Rating 3): Totally agree, based on my own experience
- Expert 8493 (Rating 1): It doesn't add it in the Management as a decision Framework, so it is just true with a good PO and less stakeholder interventions.
- Expert 8787 (Rating -1): Please have a look at my previous comments.
- Expert 8966 (Rating 3): It helps though I am not completely sure that it suffices
- Expert 9007 (Rating 3): If the poker gives data to the other prioritization, negative requests will have to be implemented (see cookie banner). Through the retrospective and estimation process, the team has access to data that helps identify the right epics.

Statement 6.3: With the UX Poker, the product backlog can be prioritized, concerning UX.

Table A.85 Rating Distribution 1 - Statement 6.3 - N=21

disagree						agree	
-3	-2	-1	0	+1	+2	+3	
1 (4.8%)	1 (4.8%)	1 (4.8%)	2 (9.5%)	2 (9.5%)	2 (9.5%)	12 (57.1%)	

Table A.86 Rating Distribution 2 - Statement 6.3 - N=21

disagree	neutral	agree
-3/-2	-1/0/+1	+2/+3
2 (9.5%)	5 (23.8%)	14 (66.7%)

Table A.87 Rating Statistics - Statement 6.3 - N=21

Expression	Value
N	21
Mean	1.71
Min	-3
Max	3
Median	3
Variance	3.51
Std. Dev.	1.87
Confidence (95%)	0.802
Confidence Low	0.913
Confidence High	2.516

- Expert 2450 (Rating 2): It is possible, but the team may choose to prioritize on other things (user needs)
- Expert 2452 (Rating 1): This is not clear for me at the moment
- Expert 2633 (Rating 0): Yes, if UX is considered alone. But this is not realistic. The importance of an epic depends on many factors and thus the prio will in most cases from a complex decision (involving management) about priorities. So having a UX prio does practically not help much.
- Expert 3671 (Rating 3): Yes, if tech people and human factors people can find an agreement :)
- Expert 3925 (Rating 3): Yes, but there are also non-UX factors that are important to the customer. I think this should also be taken into account to improve the process.
- Expert 4183 (Rating 8): I don't understand the question
- Expert 4867 (Rating 3): It is clear.
- Expert 4952 (Rating 3): The list of potential work items will help.

- Expert 5809 (Rating -2): Surely each aspect (UX, architecture, quality, etc.) will influence the total value they contribute to the end customer, but I do not agree that the estimates are made considering each aspect separately and, furthermore, the estimate is by effort, including the zero effort of already having a reusable component.
- Expert 6000 (Rating 0): There need to be other things in place to prioritize, e.g measurements not only estimates
- Expert 6105 (Rating 3): Yes, I would agree. As you focus on only some UX factors you can decide which epic pay in to these factors. As only valuable epics are paying in, you are able to prioritize the product backlog.
- Expert 6171 (Rating 3): Yes, poker can help with prioritisation
- Expert 6190 (Rating 1): If UX is the only factor, then yes.
- Expert 6952 (Rating -1): Depending on the quality of the backlog... but the backlog should be informed by the specifications and requirements.
- Expert 6983 (Rating 3): Yes, that might be true.
- Expert 7682 (Rating 3): Yes, for sure. You can summarize the entry to each UX factor.
- Expert 7747 (Rating 8): No experience. New / adjustment: - none -
- Expert 7817 (Rating 3): Yes, as UX is or should be a normal goal of development (sprint, project).
- Expert 8324 (Rating 2): It can be prioritized at a high level considering the used labels and it seems to be enough to focus the efforts on epics which are valuable for UX
No additional comments
- Expert 8385 (Rating 8): I have not previous experience on that
- Expert 8493 (Rating 3): Same as for agile planning poker
- Expert 8787 (Rating -3): The product backlog should be prioritized according to UX aspects regardless of a separate UX consideration. Otherwise, the team and product owner will lack the necessary skills.
- Expert 8966 (Rating 3): Yes, it is a good way to find what to prioritize regarding UX
- Expert 9007 (Rating 3): Not by the poker but by the results resulting from the poker. These could be simply registered also without Poker.

Statement 6.4: DELETED

Table A.88 Rating Distribution 1 - Statement 6.4 - N=0

disagree						agree
-3	-2	-1	0	+1	+2	+3
0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)

Table A.89 Rating Distribution 2 - Statement 6.4 - N=0

disagree	neutral	agree
-3/-2	-1/0/+1	+2/+3
0 (0.0%)	0 (0.0%)	0 (0.0%)

Table A.90 Rating Statistics - Statement 6.4 - N=0

Expression	Value
N	0
Mean	0.00
Min	0
Max	0
Median	0
Variance	0.00
Std. Dev.	0.00
Confidence (95%)	0.000
Confidence Low	0.000
Confidence High	0.000

Statement 6.5: Overall, this new UX Lifecycle supports agile teams in managing the UX of their product.

Table A.91 Rating Distribution 1 - Statement 6.5 - N=23

disagree						agree	
-3	-2	-1	0	+1	+2	+3	
0 (0.0%)	1 (4.3%)	1 (4.3%)	1 (4.3%)	4 (17.4%)	6 (26.1%)	10 (43.5%)	

Table A.92 Rating Distribution 2 - Statement 6.5 - N=23

disagree	neutral	agree
-3/-2	-1/0/+1	+2/+3
1 (4.3%)	6 (26.1%)	16 (69.6%)

Table A.93 Rating Statistics - Statement 6.5 - N=23

Expression	Value
N	23
Mean	1.87
Min	-2
Max	3
Median	2
Variance	1.94
Std. Dev.	1.39
Confidence (95%)	0.569
Confidence Low	1.301
Confidence High	2.438

- Expert 2450 (Rating 3): It encourages all team members to think about UX
- Expert 2452 (Rating 2): Yes, this is ok
- Expert 2633 (Rating 1): Maybe yes, but the practical question is if this focus on UX really helps. Practically you need to manage a bunch of different and often conflicting requirements from functional, legal, UX, branding, marketing, etc. perspective. In agile development this complex set of requirements and the resulting product improvements have to be managed constantly (from sprint to sprint) and in addition there are always external sources (management, customers, etc.) that have their own priorities and try to influence the planning. I question that a UX centric process does actually help much to do planning in this complex environment. Is the additional effort worth the additional insights. Very hard to judge. If this works must be tried practically and in different agile setups, since the concrete setup in a company will have an impact here.
- Expert 3671 (Rating 1): This is difficult to answer: I fear the additional working steps, and can a user rate an ux increment? Theoretically yes, of course. Practically ... don't know.

- Expert 3925 (Rating 3): I think it is a very good contribution. Only in my opinion, priority aspects other than UX should also be considered
- Expert 4183 (Rating 3): That is part of a agile process
- Expert 4867 (Rating 1): But only if they are enough resources regarding experts, time and money for the realisation of all the necessary evaluations. I am missing statements related to the analysis of costs vs. benefits of implementing such a UX lifecycle in real projects.
- Expert 4952 (Rating 2): Yes, but is the effort possibly too big in some cases because the individual steps are time-consuming and personnel-intensive.
- Expert 5809 (Rating 1): Yes, it will contribute.
- Expert 6000 (Rating 3): Yes it allows the team to learn and to grow
- Expert 6105 (Rating 3): Yes, compared to agile methods this UX Lifecycle approach will support agile teams in managing the UX of their product. Important will be that the development is evidence-based on the team decision and not on the subjective opinions of some managers.
- Expert 6171 (Rating 2): Yes, overall I think it helps the team to focus on UX and better manage resources to that end
- Expert 6190 (Rating 2): Yeah, it'll do that. It will be interesting to see how other variables (especially time and costs) additionally influence the ranking.
- Expert 6952 (Rating -2): I don't see the benefit to drop human-centred approach in favour of an estimation-based, feature-driven approach. Also, it neglects, that most of the work in UX/human-centred design is done outside of agile software development teams.
- Expert 6983 (Rating 3): That might be true. I do not see a reason why not but would like to try it out first.
- Expert 7682 (Rating 2): It is for me a logical way.
- Expert 7747 (Rating 8): no comment New / adjustment: - none -
- Expert 7817 (Rating 3): Yes, as devs need standardizations to follow. – If something is standardized and implemented or added to the process, this means is worth to take under consideration and it is exactly known how to do it.
- Expert 8324 (Rating 3): yes, in overall I totally agree that it can be helpful. No additional changes
- Expert 8385 (Rating 3): Totally agree, based on my own experience
- Expert 8493 (Rating 0): It is a way to integrate ux in their thinking but this is not all ux Management is about
- Expert 8787 (Rating -1): UX Lifecycle is a theoretical approach to improve UX aspects within a product or service. It is one possible way of introducing agile teams to the importance of UX. UX Lifecycle focuses on the theoretical elements of UX. There is a lack of customer expectations and needs. In order to manage UX, an agile team must have UX skills. UX activities must be integrated into usual development processes.

- Expert 8966 (Rating 3): It not only supports agile teams but also guides and helps, without any doubt
- Expert 9007 (Rating 2): In terms of UX management, this is true. However, I do wonder how this lifecycle interacts with other processes.

A.4 Overview of analysed Paper from the SLR

The table is on the two following pages.

Table A.94 Overview of SLR Paper with Additional Information - Part 1/2

Year	Title	Sub	Approach	Main-Method	other Methods	UI Process One/Two Track	Development Before	During	After	Usability UX/HCD	Scrum/XP	Test	quantitative Data	Involves User	PBI	Imp. UX Process
2007	Agile Development Iterations and UI Design	1	Study	Communication/ Collaboration		OneTrack	X	X	X	Usability	XP	No	No	no	no	Not systematic
2007	Agile Development Iterations and UI Design	2	Study	Horroration	Acceptance Test	OneTrack	X	X	X	Usability	XP	Yes	No	no	no	Not systematic
2007	Agile Development Iterations and UI Design	3	Study	Uprfront LCD design	Acceptance Test	TwoTrack	X	X	X	Usability	XP	Yes	No	no	no	Not systematic
2007	Agile Development Iterations and UI Design	4	Study	Uprfront LCD design	Acceptance Test	TwoTrack	X	X	X	Usability	Scrum	Yes	No	no	no	Not systematic
2007	Agile human-centered software engineering	1	Model	Cruiser Lifecycle	Card Sorting, Brainstorming, Focus Groups, Task/Usage Scenarios, Low-/High-Fidelity Prototyping, User/Experts Reviews, Usability Inspection, AtrankDiff	OneTrack	X	X	X	Usability	XP	Yes	Yes	Yes	no	Not systematic
2008	Agile Methods and User-Centered Design: How These Two Methodologies are Being Successfully Integrated in Industry	1	Study	Uprfront LCD design	contextual inquiry, low-fidelity prototypes, Usability testing, Personas	TwoTrack	X	X	X	Usability	Agile	Yes	No	yes	no	Not systematic
2008	U-SCRUM: An Agile Methodology for Promoting Usability	1	Model	U-SCRUM	Personas	OneTrack	X			Usability	Scrum	n.n.	n.n.	n.n.	no	Not systematic
2008	Probing an Agile usability Process	1	Model	Agile Usability Process	User Studies, Personas, Usability Expert Evaluations	OneTrack	X	X	X	Usability	XP	n.n.	n.n.	Yes	no	Not systematic
2010	A New Combined Method for LCD and Software Development and Case Study	1	Model	Inter-Combined Model	Interview, Questionnaire, Prototyping (low), Persona, Scenario	OneTrack	X	X	X	User Experience	Agile	Yes	n.n.	Yes	no	Not systematic
2010	Measuring effectiveness of HCI integration in software development processes	1	Method	Usability Goals Achievement Metric (UGAM)		-	X	X	X	Usability	Agile	Yes	Yes	yes	No	systematic
2010	Measuring effectiveness of HCI integration in software development processes	2	Method	Index of Integration (IoI)		-				Usability	Agile	n.n.	n.n.	no	No	systematic
2011	A Three-Fold Integration Framework to Incorporate User-Centered Design into Agile Software Development	1	Model	Three-Fold Integration Framework		OneTrack	X	X	X	Usability	Agile	Yes	No	Yes	No	Not systematic
2012	Agile Development and User Experience Design Integration as an Ongoing Achievement in Practice	1	Case Study	Uprfront LCD design		TwoTrack	X			Usability	Scrum	n.n.	n.n.	No	no	Not systematic
2012	Agile Development and User Experience Design Integration as an Ongoing Achievement in Practice	2	Case Study	Designer is Team-member		OneTrack	X	X	X	Usability	Scrum	n.n.	n.n.	No	no	Not systematic
2012	User Experience Design and Agile Development: From Theory to Practice	1	Model	UXD & AD		TwoTrack	X	X	X	User Experience	Agile	Yes	No	Yes	No	Not systematic
2012	The Usage of Usability Techniques in Scrum Projects	1	Study	.		.	.	.	.	Usability	Scrum	.	.	.	.	.
2012	How to Make Agile UX Work More Efficient: Management and Sales Perspectives	1	Study	.		.	.	.	.	User Experience	Agile	.	.	.	.	.
2013	Agile User Experience Design: an Agile and User-Centered Process	1	Study	.		.	.	.	.	User Experience	Agile	.	.	.	.	.
2014	Incorporation of Usability Evaluation Methods in Agile Software Model	1	Model	Agile Usability Model	FlickRQ	TwoTrack	X	X	X	Usability	Agile	Yes	No	Yes	No	Not systematic
2014	Agile Model - Towards a Reference Model on Integrating UX in Developing Software using Agile Methodologies	1	Model	Agile Usability Model		TwoTrack	X	X	X	User Experience	Agile	Yes	No	Yes	No	Not systematic
2014	Person as a Tool to Involving Human in Agile Methods: Contributions From HCI and Marketing Business processes relating to improve usability in E-commerce applications	1	Method	Persons		-	X			User Experience	Agile	n.n.	n.n.	No	No	Not systematic
2014	Business processes relating to improve usability in E-commerce applications	1	Method	Web business process redefining (WBPR)		-		X	X	Usability	Agile	Yes	no	Yes	No	Not systematic
2014	Integrating Agile Development Processes and User-Centered Design - A Place for Usability Maturity Models?	1	Study	.		.	.	.	.	Usability	Agile	.	.	.	.	.
2014	Improving UX Work in Scrum Development: A Three-Year Follow-Up Study in a Company	1	Study	.		.	.	.	.	User Experience	Scrum	.	.	.	.	.

Table A.95 Overview of SLR Paper with Additional Information - Part 2/2

Year	Title	Sub	Approache	Main-Method	other Methods	UI Process One/Two Track	Development Before	Development During	Development After	Usability UX/HCD	Scrum/XP	Test	quantitative Data	Involves User	PBI	Imp. UX Process
2014	Agile-User Experience Design: Does the Involvement of Usability Experts Improve the Software Quality? Suite of the Arr and a First Experiment.	1	Study	.	.	-	.	.	.	User Experience	Agile	.	.	.	.	.
2015	Teaching Software Developers to Perform UX Tasks	1	Case Study	Training on the job	A/B Testing	OneTrack	X	X	.	Usability	Scrum	yes	n.n.	Yes	no	Yes
2015	Task Allocation Between UX Specialists and Developers in Agile Software Development Projects	1	Study	.	.	-	.	.	.	User Experience	Agile	.	.	.	.	.
2015	Usability Evaluation Practices within Agile Development	1	Study	Usability Evaluation	Prototypes	-	.	.	.	Usability	Scrum	.	.	.	.	.
2016	How to reduce the UX bottleneck - train your software developers	1	Case Study	Training on the job	Focused Workshop, AB testing, Contextual Interview	OneTrack	X	X	.	User Experience	Scrum	yes	n.n.	Yes	no	Not systematic
2016	A Scrip-Based Prototyping Framework to Boost Agile-UX Development	1	Model	SIBAP		TwoTrack	X	X	.	Usability	Agile	Yes	No	Yes	No	Not systematic
2016	UserX Story: Incorporating UX Aspects into User Stories Elaboration	1	Method	UserX Story	Personas	-	X		.	User Experience	Agile	No	No	No	Yes	Not systematic
2016	Agile Human-Centred Design: A Conformance Checklist	1	Method	Checkliste for User-Centredness of Agile Processes		-	Process		.	User Experience	Agile	n.n.	n.n.	No	No	systematic
2016	Minimum Viable User Experience: A Framework for Supporting Product Design in Startups	1	Study	.	.	-	.	.	.	User Experience	Agile	.	.	.	.	.
2017	Integrating UCD and an Agile methodology in the Development of a Mobile Catalog of Plants	1	Model	XP + UCD Tools	Interview, Personas, Scenarios, User Evaluations	OneTrack	X	X	X	Usability	XP	Yes	No	Yes	No	Not systematic
2017	A license to kill - Improving UCSD in Agile development	1	Study	.	.	-	.	.	.	User Experience	Scrum	.	.	.	.	.
2017	Integrating User eXperience practices into software development processes: implications of the UX characteristics	1	Study	.	.	-	.	.	.	User Experience	Agile	.	.	.	.	.
2019	Usability improvement through A/B testing and refactoring	1	Method (Tool)	CSWR framework		-	X		.	Usability	Agile	Yes	No	Yes	No	Not systematic
2019	Agile UX: Integrating good UX development practices in Agile	1	Study	.	.	-	.	.	.	User Experience	Scrum	.	.	.	.	.