



UX professionals' learning and usage of UX methods in agile

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ABSTRACT

Context: The usage of User Experience (UX) methods has been studied through the years. However, little is known about UX professionals' lifelong learning processes related to UX methods in Agile, choosing what UX methods to use, and the enablers and hindrances for using the UX methods.

Objective: The study aims to broaden current knowledge about UX professionals' lifelong learning practices to understand their work situations better. The paper describes how UX professionals learn about and choose UX methods, their frequency of use, and the enablers and barriers when using the UX methods in Agile.

Method: An interview study was conducted with 13 UX professionals from various industries and two countries working with Agile and UX. We used a qualitative approach, and a thematic analysis was carried out to answer the research questions.

Results: The results show that support from colleagues is an essential component for learning about the methods and how to use UX methods. Time pressure makes UX professionals choose methods they know will deliver their desired results. Prototyping, user testing, user journeys, and workshops are the most frequently used UX methods. Additionally, the results show that UX professionals think that the UX methods are often too complicated and take too long to learn. Additionally, they find it challenging to integrate UX methods into Agile.

Conclusion: These findings indicate that UX methods might work better if designed to be less complicated and deliver results more efficiently. Moreover, collegial and peer learning is central to UX professionals. The HCI community could be more active in supporting this culture by sharing information and learning. Finally, the usability and UX of the tools affect which UX methods are used.

Introduction

Researchers and practitioners have introduced many new theories and UX methods to support UX professionals in their focus on work [16, 18,26,33,41]. This has resulted in a continuous learning journey for UX professionals [51,71]. In parallel to this, UX work has increased in complexity. What started as usability testing involving one user in front of a computer has developed into a sociotechnical problem space. This problem space includes numerous software and hardware, presenting UX professionals with multiple challenges. The problem space is accompanied by barriers to UX work in Agile software development processes. Examples of problems are lack of UX awareness, organisational inconveniences and limiting time constraints [5]12,51,62] even though there is a stronger focus on UX today than 20 years ago [22]. Additionally, a significant issue has been the increasing gap between research and practice because research lacks knowledge of UX methods used in practice [34,35].

Across industries, professionals focusing on UX use a range of titles such as UX Designer, UI Developer, and Usability Designer [9]. Some also claim that UX specialists have increasingly worked as business analysts and coaching development teams [22]. In their work, they use UX methods, which are methods (e.g., surveys, interviews, observations) for improving the user experience (UX) of products or services. Their lifelong learning can be best described as the continuous learning of skills, acquisition of knowledge, a need for growth, and the application of knowledge creatively in different environments [36,59]. Traditionally, learning is performed formally, for example, through training and lectures or informally through, for example, self-study [24,37].

This paper contributes knowledge about User eXperience Design (UXD) approaches within Agile processes, abbreviated as Agile UXD. Agile UXD has been studied over the last twenty years [1122,38,46,48]. A literature study from 2015 found 83 published papers on usability and Agile [8]. Other literature studies have concluded that within research on agile, the theme of usability was the second largest in the number of

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publications [39]. Typically, these studies examine which UX methods are used most frequently, how the informants rate their usage, and what the informants see as the barriers and enablers for using the methods. Previous research has concluded that “Although Agile UXD is an established research topic, there is always work to be done, issues to be addressed, and discoveries to be made” [22]. Very little research has focused on exploring the lifelong learning practice of UX professionals. Notably, knowledge about UX professionals learning Agile UXD methods is lacking. Moreover, the studies on what methods are used in Agile UXD are somewhat outdated, and software development processes are constantly changing. Hence, the research goal is to investigate how Agile UXD professionals apply and learn UX methods in Agile. We study the barriers to using UX methods and consider what enables UX professionals to use them. We have used a qualitative approach, and a thematic analysis was carried out to answer the following research questions:

- How do Agile UX professionals practice lifelong learning related to UX methods?
- What affects the choice of UX methods in Agile UXD?
- Which methods are used today in Agile UXD?
- What are the experienced barriers to and enablers for using UX methods in Agile UXD?

Background

This section introduces some related work on lifelong learning for UX professionals. We also present some background literature on Agile UXD and the challenges of integrating UX in Agile software development.

Lifelong learning

Lifelong learning has become essential for every UX professional because of the never-ending change in technology and the industry [37, 68]. Literature on software engineers’ lifelong learning [34] shows that their knowledge has a half-life of 2.5 years, which means that most of their knowledge is outdated after 2.5 years. Despite the efforts made to discover UX professionals’ needs, there is still information missing on applying and learning to use UX methods [9]. UX theories and methods’ research results show a gap between academia and design practice [34].

One study on lifelong learning [68] has shown that the pressure of constantly changing could make professionals uncomfortable and stressed. It also shows that the only way forward for engineers and UX professionals is to “*constantly learn, constantly upgrade their skills, and constantly adapt to new situations*” [68].

Graham Guest [37] and [31] highlight that the company could incentivise its employees by offering formal learning opportunities (e.g., training, access to conferences) or building a thriving informal learning setting. Guest predicted that this would contribute to professional and personal development alike. In his study in 2006, Graham Guest [37] has also made some predictions for the future. He concluded that learning would be lifelong, primarily self-directed and supported by mentors and colleagues. He also added that the learning culture will be interdependent and that professionals will borrow and exchange knowledge and solutions with other fields. In his view, it would be harder and irrelevant to distinguish between professional and personal development.

Learning includes formal learning situations within institutional grounds and informal learning practices outside schools. Schugurensky recognised three formats of informal learning: (a) self-directed learning is both conscious and intentional, (b) incidental learning is conscious though unintentional, and (c) tacit learning, also known as socialisation, is unconscious and unintentional [66]. However, the balance between formal and informal learning is changing. Interest in informal learning situations has substantially grown during the last three decades [47]. In a study about what affects lifelong learning for scientists [24], the

authors have found that a company’s innovation was positively related to the employees’ learning. The same study shows a trend for employees to participate less in formal training. The most common way participants learn was “learning by doing” in an informal learning setting, meaning professionals learned by applying the method or the skill [24]. According to research, companies have recently integrated novel ideas, such as Hackathons, as learning [30]. Novel concepts and approaches have also come from research [43].

As well as being a part of lifelong learning and informal learning, studies have shown that self-directed learning is a primary indicator of a company’s growth [34,37]. According to another study [71], Google is the primary tool for finding learning resources. The study [71] has found four essential aspects of self-directed learning: “*where to look, what kind of queries to write, when to ask and whom to ask.*” Additionally, research has shown that self-directed learning could cause stress, usually when employees believe they have not learned enough to complete the task. The study also shows that learning often happens in the employees’ leisure time, leading to burnout and stress [71].

To achieve lifelong learning, professionals need to improve their competence [36]. UX professionals need to enhance their knowledge of frameworks, UX methods, tools, UX theories, research, and user perspective, incorporating continuous learning [34,40]. Research also shows that design competence includes “*holistic competencies around generic capacities,*” such as experiences, attitudes and capabilities [42]. Another research has extended the definition of design competence with non-technical skills or methods and tools, such as communication with people and global engineering [61,2,23,35].

The usage of ux methods and practice

The usage of UX methods and success factors for using them have been studied through the years. One of the first survey studies from 2004 asking professionals working on usability and UX activities about which methods they used and how they rated the usage of the methods showed that the highest-rated UX method was low fidelity prototyping. However, the think-aloud method, prototyping, field studies, and interviews received high ratings [38]. The main enablers reported in this study for using the UX methods listed were: project management support and planning the usage of the UX methods is planned at the beginning of the project. Additionally, management’s support for using these methods is reported as very important. Another study from 2008 shows that professionals rated usability requirements more critical for a project’s success than user testing [11]. The most frequently used methods for gathering usability requirements were practice from previous projects and interviews with users. Survey results from 2012 show that the most frequently used UX methods in Scrum projects were: workshops, low fidelity prototyping, interviews and meetings with users [48]. The highest-rated method in this study was formal usability testing, even though the professionals in the study did not frequently use that method because of time constraints.

One PhD thesis shows that the UX methods, and usability as a general quality concept, were marginalised in practical systems development and that it is not a natural part of the development process methods and did not fit well into the software engineering practice view of what is essential [5]. Other studies have focused on usability evaluations. They are impractical and challenging to use and point to a need for more lightweight evaluation methods [29]. The UX methods often require professionals to take the time to learn how to use them even though their work is highly time-constrained [64]. When asked to determine the essential methods to their work, most of Roedel and Stolteman’s study participants emphasised methods for facilitating collaboration with stakeholders outside the design team. The stakeholders mentioned were clients, developers, and internal business stakeholders. Many participants mention workshops, brainstorming or prototyping sessions to reach a consensus about the goals and problems in projects.

The main results of an analysis of how easy it is for UX professionals

to integrate UX methods into both Scrum and Kanban show that since Kanban is a more flexible process, it is easier to integrate UX methods in that process than in Scrum [56]. Many professionals who want to include UX and usability activities in their work still have their minds set mainly on technical challenges, programming aspects, and functionality of the product rather than the UX [1]. One of the main obstacles they reported was the lack of suitable methods integrated into their work practices without demanding too much resources.

Challenges to agile UXD

Agile systems development processes (Agile) have become the norm for software development practice in some areas of society. The most commonly used process, Scrum, focuses on delivering functioning software in iterations and emphasises speed, communication, and developer collaboration. In Scrum, small, cross-functional teams produce the results in sprints, often two weeks [20]. The first sprint in a project, often called Sprint-0, includes setting up the tools used in the project and activities for understanding the requirements, the context and the user. This sprint is followed by several sprints focusing on designing and developing the system.

In Scrum, several other activities are defined: daily stand-up meetings, sprint reviews and retrospective meetings. During the daily stand-up meetings, the teams meet and check the status of their tasks. The potentially shippable product is displayed and discussed with customers at the sprint reviews. The customers and, sometimes, the users are invited to sprint reviews. During the retrospective meetings, the team discusses how to improve their work processes in the next sprint [21].

Agile UXD has been studied over the last twenty years [1122,38,46,48]. A literature study from 2015 found 83 published papers on usability and Agile [8]. Other literature studies have concluded that within research on agile, the theme of usability was the second largest in the number of publications [39]. Typically, these studies examine which UX methods are used most frequently, how the informants rate their usage, and what the informants see as the barriers and enablers for using the methods.

Some researchers have addressed how UX methods are used and how UX professionals work within Agile [17,19,48,50,53]. One can conclude that Agile is not a very user-centred process, and that including the UX perspective in Agile is challenging primarily due to lack of time, the set up with the sprints does not match the work with user-centred design and that there is a strong focus on technical functionality and less focus on UX.

Other studies point to the need of improving current approaches for integrating UX methods into Agile for UX professionals [54] since history has shown that UX methods are often poorly integrated into Agile projects [17]. Consequently, research has introduced solutions like “Sprint-0” to integrate UX practice better into Agile development [4,9]. However, it has also been shown that UX professionals were rarely involved in developing the first backlog and were rarely a part of the initial stages of a project [52], so the sprint-0 approach might meet resistance.

When integrating UX methods in Agile, companies risk focusing more on customers than users when developing UX methods and UX theories that focus on users [9,55]. Contrary to the ideas of those creating theory, one reason for this focus is that access to users is limited. It takes too long to involve the users and costs too much or is impossible due to policies and restrictions [9].

Additionally, research has shown that the design phase is often fixed in one Sprint before the developing Sprints, which results in the UX methods not fitting in and causes stress for UX professionals [4,52].

It is well known that there are still many challenges in the UX professionals’ work, and the topic has been studied for decades [1,615,45,70]. Recent research [46,50] has also found that raising awareness and fighting for UX acceptance is still challenging for many companies even though things are improving. So the phenomenon of UX professionals’

work being challenging is not old. The literature concludes that organisational structures are a barrier to UX work as there is a focus on efficiency, rationality and time [5;12]. Moreover, several studies have demonstrated that communication is a significant issue within companies and prevents UX professionals from carrying out their work [9,51,64], and managers do not appreciate UX [15,63,70]. Studies have also shown that usability and user involvement still have low priority in organisations [1,12,44,70].

The above background describes that usage of User Experience (UX) methods has been studied through the years. However, little is known about UX professionals’ life-long learning processes related to UX methods in Agile, how they choose UX methods to use, and the enablers and hindrances for using the UX methods. Therefore, the study aims to broaden current knowledge about UX professionals’ lifelong learning practices to understand their work situations better. The paper describes how UX professionals learn about and choose UX methods, their frequency of use, and the enablers and barriers when using the UX methods in Agile. The results are based on an interview study with 13 UX professionals from various industries and two countries working with Agile and UX. We used a qualitative approach, and a thematic analysis was carried out to answer the research questions.

3. Method

We created interview questions from previous research deductively. We structured the interviews around these research questions:

- 1 How do UX professionals working in Agile practice lifelong learning related to UX methods?
 - a Where do they find information on UX methods?
 - b How do they learn about UX methods?
- 2 Which aspects do UX professionals consider when they choose UX methods in Agile development?
- 3 Which methods do they use today?
- 4 Which barriers and enablers affect their choice and usage?

We used a qualitative approach with 13 semi-structured interviews to gather data and ensure an understanding of UX professionals [25,57]. We used a purposive sampling strategy to find people who work with Agile and are from various industries and countries [3] and 13 participants were recruited, seven females and six males, with an average age of 35. The participants worked at four companies in Sweden and two companies in Germany. The six companies in which the participants worked ranged from a small company with ten employees to a global company with 283,000 employees. The participants had six years of experience working with UX on average. They had worked across many industries (e.g., healthcare, IT, aerospace, automotive). In general, the teams consisted of 5–15 members. Some of the UX professionals worked in the teams and sometimes there were 2 UX professionals within one team. Additionally, some UX professionals worked outside the teams dependent on the task, e.g. user story writing was done before teams were formed in the beginning of a project, or within a team while a project was running. Sometimes preliminary research needed to be done before a team was formed. See Table 1 for demographical information of the participants.

Due to COVID-19, the interviews were conducted with interviewee consent either on-site or remotely using Zoom as a recording and telephony software solution. The average length of the interviews was 45 min. Conducting remote interviews had the advantage of following COVID-19 regulations. However, it also made it harder to react to social clues, such as body language, and create a pleasant atmosphere [67].

Before the recording started, the participants were asked to agree to the consent form presented visually and verbally on Zoom or paper. Following the GDPR guidelines, data were anonymised and stored the data securely. The participants were given a consent form, and they could withdraw at any time.

Table 1
Demographical information about the participants in the study.

	Consultant vs. Employee	Position	Job title	education	training	Seniority
P1	Employee	Product Owner and UX Designer	Senior UX Design Specialist	Cognitive Science	Cognitive psychology, 8 years of experience as UX designer	Senior
P2	Employee	Design thinking coach and UX designer	Senior UX Designer	Graphic design	Started as a graphic designer, 15 years of experience as UX designer	Senior
P3	Employee	UX designer	UX Designer	Psychology	6 years of experience as UX designer	Junior
P4	Employee	UX designer	Senior UX Design Specialist	UX Design, Media and information science	12 years of experience as UX designer	Senior
P5	Consultant	UX designer & User researcher	UX designer	Information Science	User researcher for 4 months, ux designer for 5 months	Junior
P6	Consultant	UX designer	Senior UX Designer	Graphic design	7 years as a UX designer, graphic design, website design, digital products and services	Senior
P7	Employee	Design lead, design manager	Design Lead	UX Design	Graphic design, management, UX design	Lead
P8	Employee	UX designer	UX Designer	Psychology	Cognitive psychology, design thinking, 5 years as a UX design	Junior
P9	Employee	UX Designer	UX Designer	Design	Web design, digital web production, 7 years in UX design	Junior
P10	Employee	UX Designer	UX Designer	UX Desgin	2 years in UX design,	Junior
P11	Employee	UX Designer	UX Designer	Median and information science	1 years in UX design	Junior
P12	Employee	Design Manager, user researcher, inside manager	UX lead	Human Computer Interaction	4 years in UX design	Lead
P13	Employee	UX designer	Senior UX Designer	Graphic design	8 years in UX design	Senior

One of the authors conducted the interviews and did the first data analysis. We then discussed and analysed the data further together. We conducted a thematic analysis, creating themes deductively based on the questions and inductively for new themes [3,28]. The thematic analysis followed the process explained by Braun and Clark [7]. Since some interviews were conducted in German, some interviews were translated into English. Some of the quotes presented in this paper were also made more readable. The study was first published as a master thesis [32].

Results

This section reports our results on the lifelong learning processes in Agile UXD, how professionals choose UX methods, results on the usage of UX methods and the barriers to and enablers for using the UX methods.

4.1. Lifelong learning of UX methods in agile UXD

The UX professionals had four ways of learning new skills and learning about new UX methods for their work, namely: (1) learning from colleagues, (2) learning from experts, (3) formal learning and (4) learning by doing in their leisure time.

- (1) *Learning from colleagues:* One of the most frequently mentioned sources for learning new things or best practices was learning from colleagues. One participant told a story on how they learned to use the tool Sketch for prototyping:

“So, for example, the Sketch thing with prototyping was an application that was not my most exceptional skill. However, I started just sitting with another colleague helping me [...] we created together. Like divided work, so I was doing some frames, and {my colleague} was doing some other frames, and then we met up and compared, and we were like talking [...] how do you think this would work and {my colleague} said that I had to think about this button over here. Furthermore, when you start working together, you start working more coordinated. And eventually, {my colleague} could drop off these projects, and I could start doing it all by myself. That is a way of learning a new skill.”

Furthermore, the participants stated that working and learning in a team was highly significant. Sharing information, communication, and learning needs to be part of every team. The participants used

communication tools, such as Slack and Microsoft Teams, for sharing and learning, but they also used note-taking tools, such as Notion, to document and share knowledge.

- (1) *Learning from experts and mentors:* The participants followed “experts” or “mentors” on social media (e.g., Twitter, Instagram) to get inspired and learn about the latest methods, trends, UX skills and personal skills. They like having someone show them new trends, teach them how to apply new techniques and advise them on what to learn.

Many also used podcasts, websites, blogs and books to listen to experts. The most mentioned website for inspiration was Medium. They also used the sites: Hyper Island Toolkit, Nielsen-Norman Group and the IDEO toolkit to look up design practices.

One participant expressed the need for something less complicated and scientific than a book, which still holds more information than a blog. When asked about how UX professionals learned new skills and methods, one participant strongly expressed the desire for mentorship in UX for guidance in techniques: “[...] it is about having someone to guide you and answer questions.”

- (1) *Formal learning:* Several participants mentioned that they had lunch lectures organised by the company. In those, experts with diverse backgrounds presented topics such as accessibility. Participants visited conferences and individual training but were limited in how often they could visit a conference a few days every year.
- (2) *Learning by doing in their leisure time:* According to the interviewees, it was common to pick a UX method and apply it to the current project to see whether and how it works. Even though a few participants restricted their learning to their working hours, most agreed that they often learn during their leisure time. They also adapt UX methods from work to private life, such as Science-fiction prototyping.

Why are UX professionals learning? The participants mentioned that their work environment constantly changed, requiring them to learn and reinvent best practices. In addition to extrinsic motivation, participants said an intrinsic motivation for learning new UX methods and UX skills for personal development. They gave two examples of such

methods that they have learned: Science-Fiction Prototyping [49] and Black Horse Prototyping [10].

For eight of the participants, the employer incentivised learning by providing a week off every year. Some used this week to learn something off-topic, whereas others used the time to visit conferences related to their work. The participants also agreed that learning things “*off-topic*” increases their curiosity and willingness to learn. However, the professionals also needed to justify learning to their employer and themselves due to time pressure.

Depending on the years of experience in UX, young professionals tend to express more need to learn and understand everything than older professionals. The latter were more reluctant to use new methods or learn new theories.

Learning Barriers. The participants mentioned personal and organisational barriers to learning. If they had already learned a best practice or a method for a particular activity, they tended not to look for new techniques. This passive behaviour had two reasons: the participants had no time to learn new methods or were reluctant to learn overall.

Four participants said that their learning had slowed down the longer they worked because they became more satisfied with the skillsets and the methods they knew. One participant explained: “*So that over the years [...] you have filled your tool case.*” One problem mentioned was that sometimes they were only allowed to learn things relevant to and wanted by the customer or the employer because of costs.

Learning Enablers. Colleagues were the most mentioned enabler and accelerators for learning. One participant added the importance of having a learning culture.

Some participants mentioned that when using Scrum, concepts like the Daily Scrum meetings, the Sprint reviews, and the Retrospectives meetings support UX professionals in reflecting on and learning from their work. All of these meetings amplified their motivation for learning and for developing personally. In general, the participants reported that being open, curious and having fun is most important for consistent learning. Being open and curious helped them to stay innovative and think forward. It also encouraged them to learn about transferable methods from other fields and study innovative technology.

4.2. Choosing UX methods in agile

Similarities with the Scrum Process. The participants mentioned essential requirements when asked about what affected their choice of UX methods. A method should be used iteratively, similarly to how the Scrum process works. The UX method’s usage should start with one object in the first Sprint and then continue with the next object in the next Sprint. The methods should fit into Sprints, and the method’s usage should be iterative, quick and adaptable. According to UX professionals, a UX method should also be versatile, flexible, fast and easy to plan. In this context, it is interesting to note that only half of the participants from two companies participate in a Sprint-0, and the rest participate in other stages of the work.

Situated Methods. One participant mentioned that it is often hard to change a method to adapt to a situation. Sometimes, a method requires a specific situation. They mainly referred to the problems they were experiencing due to COVID-19 restrictions, which forced them to use the workshop method remotely. Another participant said: “*reacting ad-hoc to the teams’ needs and the customers, you cannot always plan everything. You have to stay flexible.*”

Effort expectancy. The UX method should also be easy to use, meaning that it should not require too much effort, be simple to understand and apply. Participants expressed that it often takes a too long time for UX professionals to understand a method since it is too abstract.

Performance expectancy. Most participants mentioned that a method needs to be valid, possible, concrete and reliable. These characteristics meant that methods should support them in achieving their goal, not missing the target group, and making the results tangible and

understandable. Moreover, some participants try to predict the outcome of using a UX method and match it to the desired results to conform to the projects’ goals.

Cost expectancy. Some participants mentioned that a method needed to work at a low cost, and the data should be reusable and transferable to other situations. They could also reuse data gathered previously not to have to perform tasks again. This would make it more efficient to work with UX.

Social influence. Moreover, the UX professionals liked a tool based on the social aspects of the tool: Whether collaboration possibilities are provided. Often tools allowing collaboration are preferred. Furthermore, companies’ licence regulations affect the choice to a very high degree.

Customer-centred or user-centred. Whether the UX professionals’ approach is more customer-centred or user-centred influences their choice of a UX method, many UX professionals had to follow a customer-centred approach because they had an obligation to fulfil the customer’s wishes. The focus on the customers results in strictly following the business goals without involving the users. Having limited user access makes it impossible for UX professionals to use specific UX methods, such as user testing.

Some UX professionals used a workaround by asking a user representative to design and evaluate a system. This can be a person from the user group or a group manager. One participant reports that they were not granted access to a user, even when asked to improve the user experience with a high-fidelity prototype. Four participants from two companies confirmed that they follow a customer-centred and not a user-centred approach. The participants indicated that the customer influences decisions, but most decisions are still based on the user. The participants who follow a more customer-centred process use the customers’ key-performance indicators as design goals. Our interviews indicate that UX professionals working at smaller companies might be more affected by the customers than UX professionals in larger companies.

4.3. Usage of UX methods by UX professionals

When asked about which UX methods they most frequently used, the participants mentioned: (1) prototyping, (2) user testing, (3) user journeys and (4) workshops.

- (1) Prototyping: Prototyping was used for various purposes and situations according to the participants. They used different prototypes, from low fidelity to high fidelity, to quickly confirm whether the idea was possible and usable, to teach new functions and “*if there is something essential missing.*” Two interviewees mentioned using an uncommon variation of prototyping called “*Dark Horse Prototyping*” and “*Science-Fiction Prototyping.*” Dark-Horse prototyping involved implementing crazy ideas no one in the design team thought about. The interviewees described Science-Fiction prototyping as utilising futuristic technology and social structures. Depending on a prototype’s fidelity, the participants used different design tools, such as Balsamiq, Sketch and Axure. Some participants, however, did not have access to some of the design tools due to complicated license purchase regulations at the company.
- (2) User Testing: The participants needed to quickly conduct user testing to save money, avoid deviating from the project, and lose focus on the actual goals. Furthermore, user testing also depended on having access to users. Even though it is an expensive method in terms of money and time, one participant reported that it is the method demanded by many clients: “*I think the demand for user testing is remarkably high. Clients start to understand the value of user testing.*”
- (3) User Journeys: User journey mapping was a method that was used early on in the development, together with creating

personas and building a backlog of requirements. It helped the UX professionals understand the user's needs and how the product could fit those. The UX professionals created goals, requirements and user stories for the entire project based on the initial feedback from users and customers on the user journeys. One participant mentioned a recent use of machine learning for data-driven journey mapping. She said those journey mapping decisions are usually based on a "gut-feeling," whereas the data-driven decision would feel "more justified" and more efficient to use.

- (4) Workshops: The participants used workshops at every development phase. Many participants used this method to create design sessions to create new ideas or understand customer needs. Some participants mentioned using workshops to develop and design a product with the workshop participants. Interviewees interviewed after the COVID-19 lockdown indicated problems with remotely organising workshops. One participant explained: "[...] remote working has always been a big challenge, especially in times of this virus. You are always limited in the way [how] to conduct them, meaning remote working, asynchronous working and since the tools and techniques are not designed for that [...]."

4.4. Barriers and enablers affecting which UX methods are used

The UX professionals pick a tool based on whether they can work collaboratively, whether they are familiar with the tools and whether the tools are used within companies' license regulations. The limiting factor most often mentioned for the usage of any UX method was time. Lack of time also influenced learning, managing stakeholders and user involvement. Time affected which prototype was chosen, whether the UX professional should conduct user testing to confirm a product's qualities and whether user representatives should replace the actual users. Time pressure makes UX professionals choose UX methods they know would deliver the results they want. Examples of methods mentioned that are too time-consuming are formal usability evaluations, future scenarios and survey studies to users. Moreover, several interviewees mentioned that UX methods are too abstract to understand easily and learn quickly and hence they avoid them.

One barrier consists of other peoples' views that UX is less critical, and not central for systems development. The participants explained that convincing stakeholders of the importance of UX were essential for them to use the UX methods in projects. Overcoming these barriers was mentioned as vital for the success of a project.

Another barrier mentioned was whether the UX professionals had access to the actual users. One participant said a way of lowering the barriers for user testing to ease the process of recruiting: "[...] since I started, we have had this process that every week we have a company recruiting users [...]. They are coming each Wednesday, and then each of the projects is free to sign up if there are free spots. The idea with this is that we just want to make the barrier for user testing as low as possible."

The business idea also influenced the use of a method: "I need to know how the company or the client makes money [...], so we can ensure that what we do will be loved by the client but also work towards their goals."

A strongly expressed barrier for using UX methods was remote working. Many of the participants mentioned that they must do a lot of their work remotely. They said that it was a problem before the lockdown due to COVID-19. However, especially during that period, when they had to shift to remote working, they realised how hard it was to use some UX methods remotely due to organisational obstacles (e.g., compliance and company restrictions).

Discussion

This section discusses the research questions on the UX professionals' lifelong learning processes and how they choose and use UX methods.

Lifelong learning

Learning from Colleagues. Colleagues have been the essential source for learning, as shown by the results of this study and indicated by earlier research [34,64]. Sometimes, the colleagues have been a source of inspiration to hear news about the field's latest trends, skills and methods. The interviewees describe that literature, including books and research papers, was not seen as a critical source of learning. Instead, UX professionals prefer to work and learn together (learning by doing). Colleagues explained to the UX professionals which UX methods to choose and apply, which indicates that colleagues are a source and an enabler and accelerator to learning. It is interesting to compare the interest and value of collegial or peer learning for the interviewees with this learning in the student population. Peer learning is not always a positive experience in the student population, and many students prefer a traditional learning process where the teacher explains to the student in a lecture [13,69]. In contrast, peer learning seems to be the preferred learning method in the lifelong learning context.

Mentor. In addition to colleagues, the results suggest that having mentors to teach and guide UX professionals in their work is valued. They liked to have someone show them new trends, teach them how to apply the latest methods, and advise them on what to learn. This need could be driven by the difficulty of choosing from many existing UX methods, keeping up with trends, and social and technological changes. It could be that UX professionals wish for someone to reduce this information load, someone who tells them where to look and which UX methods and tools to choose. This subject would need further research to explore the potential and understand how to facilitate learning and develop a mentoring process [14].

The Culture at the Company. The workplace culture is also formed by what a company offers and how it incentivises learning. Some interviewees suggest that companies need to decrease the effort and time required for learning and organise lunch lectures. Another possibility would be implementing a strategy where lifelong learning is a part of being an Agile UX developer. The results indicate that UX professionals would like dedicated days of learning at work, during office hours, rather than being forced to do it in their leisure time. Professionals also described that they sometimes have to justify learning activities to their employer and themselves. Learning was not a natural part of work due to a lack of time.

5.2. Choosing and using UX methods

Customer and User-Centred Approach. This study shows that some UX professionals had to follow a customer-centred approach because they had an obligation to fulfil the customer's wishes. Four participants from two companies confirmed that they follow a more customer-centred approach than a user-centred approach. As indicated in previous research, the participants who follow a more customer-centred process use the customers' key-performance indicators as design goals [9]. This focus on the customer rather than the user has been confirmed by previous research [9,55]. Whether UX professionals' approach is more customer-centred or user-centred influences their choice of UX method, the focus on the customer results in strictly following the business goals without involving the user. Having limited user access makes it impossible for UX professionals to use UX methods involving users, such as user testing. This could limit the quality of the results, as the customer and the user have different needs. Focus on the customer rather than the user in research needs to be discussed ethically and practically. An open discussion and understanding between research and practice would be beneficial.

Some UX practitioners ask user representatives instead of users when developing the software. The user representative can be a potential user or a manager. One participant reports that they were not granted access to a user, even when instructed to improve the user experience with a high-fidelity prototype. One participant mentioned that recruitment and

admission to users needs to be made more efficient. In their company, a fixed group was responsible for recruiting users regularly. Then, everyone in the company had the chance to book sessions, which was an easy and cheap way for UX professionals to get feedback from users about the product quickly.

This indicated that there is still a lack of awareness of the importance of user involvement which is confirmed by other studies [46]. However, researchers also need to consider improving the user-centred approach and UX methods. Research would need to discuss critically how the quality of a UX method's results is used without access to real users. Researchers need to adapt the UX methods to this limitation to meet the UX practice's needs or fulfil other requirements to assist UX professionals in using them more frequently.

UX in Agile Integration. As the previous research shows, integrating UX into Agile is sometimes challenging. According to our interviews, professionals working in Scrum projects must follow the outline and structure of the Sprints and the project plan, which means deadlines and timeboxing. This structure requires the UX methods to be easy to plan, not require much time, and the Agile UXD professionals need to be flexible. As the results indicate, UX professionals seldom pick a UX method not fitting into a Sprint. These strict deadlines make it impossible to follow an open approach that can be reiterated until enough information is gathered as in qualitative research, reducing the UX method's quality.

Similarly, research has demonstrated that UX professionals must adapt and be more open to the Agile mindset and its just-in-time and flexible approach [29]. That study showed successful UX integration into Agile by defining a pre-phase partly focusing on UX activities called Sprint-0. This was also the main result of a recent case study where UX professionals worked 100% in a pre-phase before the actual agile project began, but around 20% through the actual project [9]. Another study shows a different picture. Even though research has stated the utmost importance of and an influential impact by UX work on this initial stage of a project [52], the results show that few Agile UXD professionals participate in Sprint-0.

In summary, UX methods could be improved to make it easier for UX professionals to fit them into Agile projects, which could help to reduce stress for UX professionals. Ideally, UX methods should work in an iterative setting by delivering results after every sprint. They could then continue to be used iteratively to improve or provide new results. Methods could also be more flexible and quickly adapt to changing conditions, such as access to users or tools. Prototyping might be an excellent example of how to use a method iteratively. However, such an adaptation of UX methods to Agile UXD might reduce the design work's creativity and has implications for the design process.

The Influence of Tools. This study shows that the available software development tools highly influence the choice of UX methods. UX professionals decide to use one UX method depending on the software development tools that they know, licences and required effort to use the tool. Methods are aligned with the functions the tools have. For example, the prototype's fidelity was determined by the available tool. According to the results in this study, UX professionals pick a tool determined by whether UX professionals can work collaboratively with familiarity and within companies' license regulations. When designing UX methods, it is essential to consider which tools people are using, why they are using them (e.g., collaboration), and whether they are easy to use within organisations (e.g., compliance). Hence, more research is needed on the Agile UXD tools and critically assessing the available tools and their use in UX practice.

Time. Time is a vital factor in the practice of Agile UXD professionals. It comes in the form of deadlines dictating the choice of methods or making a method un-usable in the time given. Time can limit contact with users and customers, making the UX worse. Having less time also means that UX professionals applying the tools and methods require easy and fast learning and more time-efficient UX methods. As discussed in the Agile section, UX professionals can solve deadlines by

relaxing or extending the projects' design phase. It can also help to design UX methods that are flexible and deliver results quickly. In software development, there is a concept called a minimal-viable product [58], which is the product that carries only the features necessary. This lean approach aims to make delivering a workable product in a shorter period. For future research, it might be interesting to adapt UX methods, such as workshops, to this lean approach, which delivers results after every iteration.

The Agile UXD professionals apply different user involvement approaches depending on the project. Other researchers also pointed out the context-dependency of Agile UX (Da [22]). However, as the results from this study and previous research [52] show, problems arise due to adapting the methods to the time limitations. One example found in this study was the feeling of stress from not using UX methods properly, but instead in a "quick and dirty" way. The time pressure makes the professionals pick UX methods they know would deliver the results they want. Some Agile UXD professionals try to predict the outcome of using a UX method and match it to the desired results to conform to the goals. This approach could result in biased decisions and confirmation bias by UX professionals. Also, methods that might bring up issues and problems that are impossible to handle within the project scope are avoided.

Easy to Use. Previous research [60,65] has shown that some UX methods and UX theories from HCI are challenging to understand for UX professionals, and this is confirmed in our interview study. It often takes a long time for UX professionals to understand how to use a UX method since they find them too abstract to understand easily. This might be a consequence of the decreased interest in reading in society which is noticeable, especially among young men [27]. Researchers should perhaps lower the barrier to understanding UX methods if they want their UX methods to be used in Agile UXD practice. UX methods could be presented more easily and quickly to understand.

Additionally, the usage of the UX methods involving users could be made more accessible, for example, by organising the access to users. One of the participants reported that he/she could involve users during Wednesdays since users were asked to come to the company those days, and UX professionals could book users then. Research should also consider factors essential in UX practice, such as working collaboratively in teams. Overall, a critical discussion and exchange between research and practice are necessary for the benefit of both.

6. Limitations

The participants in the study are young UX professionals, and the average age was 35 years old, which makes the results somewhat biased towards young people. Also, the context of the interviews is northern Europe with participants from Germany and Sweden, so the study's setting is not global.

Another limitation was that the Swedish participants were interviewed in English, which is not their native language, which might have affected the results.

7. Conclusions

Overall, this work has been the first step in extending our understanding of UX practice and learning. To sum it up, the significant conclusions according to our study are as follows:

- The participants chose the methods they thought were best for their project and context. But their choice was affected by several factors and not only the quality of the results: the context of agile makes them prefer quick methods, methods that are supported by tools that they have a license for, performance expectancy, effort expectancy, cost and social influence.
- Collegial learning is central to UX professionals. The HCI community could be more active in supporting this culture by sharing information and learning.

- UX methods could be made less complicated and easy to learn and use for UX professionals.
- UX professionals suggest planning user access as a weekly activity to make users' involvement easier.
- The usability and UX of IT tools affect which UX methods are used. The HCI community could develop tools to support UX professionals in using UX methods. We have mainly seen that they want to work collaboratively and the tools needed to support that.

Credit author statement

Åsa Cajander: Conceptualization, Methodology, Validation, Formal Analysis, Writing - Review and Editing, Supervision, Project Administration, Funding acquisition, **Marta Larusdottir.:** Conceptualization, Methodology, Validation, Formal Analysis, Writing - Review and Editing, **Johannes Geiser:**Methodology, Validation, Formal Analysis, Investigation, Data Curation, Writing - Original Draft

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Data Availability

The authors do not have permission to share data.

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