Breaking the preliminary barrier: integrating continuous UX research into agile requirements engineering

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Abstract

Software requirements provide an essential foundation for the entire development cycle, independently of the software process model. Since agile practices embrace constant change, agile requirements engineering (agile RE) is crucial for effectively managing evolving demands. Simultaneously, user experience (UX) has become a key quality attribute for enhancing product acceptance. Consequently, research activities on users' needs and demands, i.e., UX research, into agile RE activities have become paramount to address user needs. However, as UX perceptions evolve over time, there is a growing necessity for continuous UX research to provide up-to-date insights to UX. This paper investigates the adoption of continuous UX research within agile RE practices. The study was conducted in two steps: first, a literature review of 16 selected papers identified the primary motivations for adopting this approach; second, interviews with 12 software professionals from diverse roles explored how this integration happens. The results indicate motivations such as continuous product validation and greater integration between teams. The findings also reveal that software professionals still apply continuous UX research in a preliminary manner, often restricted to critical functionalities. Finally, this work contributes five recommendations to assist agile practitioners in starting to implement continuous UX research in software development projects.

Keywords

Agile Requirements Engineering, User Experience, UX, UX Research, Continuous UX Research, SLR, Interviews

1 Introduction

Software requirements provide an essential foundation for the entire development cycle, independent of the software process model. Since Agile development embraces constant change, agile requirements engineering (agile RE) is crucial for effectively managing evolving demands [41]. Agile RE is carried out iteratively during the whole development process and refines high-level requirements into low-level tasks only when they are necessary for immediate development [41]. Consequently, the development process remains dynamic and adaptable to changes that may arise at any time [17]. Schön et al. [41] describe the core activities of agile RE as elicitation, documentation, validation, negotiation, and management, noting that in agile development, these activities are frequently intertwined rather than clearly delimited.

In this regard, agile RE activities play an essential role in fostering high-quality user experience (UX) [23, 41]. The term UX was popularized in the 1990s by Donald Norman, and, according to Norman and Nielsen [34], UX "encompasses all aspects of the end-user's interaction with the company, its services, and its products". The authors emphasize that UX extends beyond usability, incorporating emotions, expectations, aesthetics, personal meaning, and the context of use. Complementarily, it is also important to define UX design as an iterative practice of conceiving interactive systems guided by user requirements, applying knowledge of human factors to produce systems that not only fulfill tasks but also generate positive perceptions and responses [18].

To effectively integrate UX design into these processes, practitioners must identify and analyze user needs through UX research. Kieffer et al. [21] and Krout et al. [24] define UX research as the systematic investigation and evaluation of end-user experience to generate insights for product development. UX research helps designers understand user needs and develop solutions that better meet them, and it can be applied at any stage of the design process using methods such as interviews, user testing, and user observation [13]. This integration is recognized as a beneficial combination to improve the quality of the delivered product, fostering more collaborative and iterative cycles in software development [43, 45].

Since UX evolves through accumulated interactions, a continuous shift in the user profile is typically observed over the product's lifecycle [15, 30]. Beyond profile evolution, user needs and expectations are subject to change, alongside shifts in functional efficiency, aesthetic perception, and the user's growing expertise [5, 20, 25]. In this sense, longitudinal investigations, also known as Long-term UX studies, are particularly prominent. This approach enables the analysis of multifaceted UX factors through evaluations conducted across various touchpoints (pre-, during, and post-interaction) and throughout extended periods of use [9, 38]. Additionally, there is also continuous UX research, defined as the execution of "frequent user research activities and rituals to build customer-centric products" [16]. Humble [16] further notes that continuous UX research remains "always active", ensuring the persistent collection of data accessible to all stakeholders. Rather than functioning as a discrete phase, this approach integrates user insights and feedback throughout the entire development lifecycle [10].

Considering the importance of integrating UX research with agile RE, previous works have proposed various approaches and documented the challenges of this convergence [1, 2, 23]. However, the literature indicates that it remains difficult to achieve effective integration in practice. The time-constrained nature of Agile, the balance of workload between Agile and UX teams, and the prioritization of functionality over usability or UX features are recognized as significant challenges [1]. Several recurring issues, such as limited user participation, a weak shared understanding of requirements between designers and developers and insufficient specification of usability requirements are also frequently encountered [2]. Nevertheless, a continuous UX research approach may offer a viable alternative to mitigate these difficulties and challenges.

In this sense, this work seeks to identify the motivations for using continuous UX research integrated with agile RE and to understand how and if software professionals have applied this approach in practice. Specifically, the goal is to determine whether requirements engineers and developers are working with requirements that no longer align with current user needs, or if these requirements are updated based on continuously conducted UX research. Therefore, to investigate this integration between continuous UX research and agile RE, the following research questions (RQs) were defined: **RQ1:** *What are the motivations of software professionals for integrating continuous UX research with agile requirements engineering?* and **RQ2:** *How are software professionals currently conducting continuous UX research in integration with agile requirements engineering?*

To address the RQs, this study was conducted using a mixed methodology, which included a literature review and interviews with software professionals. The literature review supports the evidence regarding the motivations for utilizing continuous UX research among software professionals. In contrast, the interviews provided data on how these professionals employ UX research practices and the circumstances under which these practices are continuously applied.

The results indicate that the motivations for continuous UX research are related to the continuous validation of the product according to user needs, stronger team integration and increased agility. Regarding its application by professionals, varying levels of UX research and continuous UX research use were observed, depending on organizational characteristics, resource availability, and, in particular, the specific nature of the products and functionalities under development. Finally, this work contributes by proposing recommendations to support software professionals in the integration of continuous UX research and agile RE.

Section 2 provides a context and summarizes the related literature. Section 3 describes the research method. Section 4 presents the results. Section 5 discusses the findings and relates them to the literature and presents the proposed recommendations. Section 6 presents the threats to validity and Section 7 concludes the study.

2 Related Work

From a process perspective, the integration of UX work with Agile development has been explored by Ananjeva et al. [3], who conducted an action research study in a software company. The authors highlight that the integration of UX and Agile is complex and context-dependent. However, the study also emphasizes that achieving effective integration requires adjustments in both UX design and agile practices.

Similarly, Pillay and Wing [36] discuss the integration of UX design into agile processes and identify structural tensions. Although Agile emphasizes rapid delivery and minimal upfront design, UX activities often require more time for research and validation. The authors point out that short sprint cycles can limit UX activities, such as user research and design planning, negatively impacting the quality of user-centered design. Kollmorgen et al. [23] identified challenges and solution approaches for the integration of Agile and UX design. They observed challenges such as team collaboration and activity synchronization, inadequate organizational structures and processes, resource and capacity constraints, and time limitations and unclear responsibilities. In addition, they highlighted approaches including the integration of UX design and development specialists, and the adoption of sprint zero and upfront UI design. The work of Ciscon et al. [8] investigated how UX research is applied in agile RE activities and identified the positive and negative aspects of this integration through a case study. The results revealed that UX research practices and tools are the most frequently used to discover requirements, both in organizations with UX professionals and in organizations without these professionals.

The use of UX research practices was investigated by Martinelli et al. [29], where 45 studies were analyzed to identify the relationship between UX research practices employed by the software industry and Long-term UX. The results show that only 15 of the 38 identified UX research practices are related to Long-term UX. The authors discussed that knowledge on longitudinal user research appears to be scattered across the literature. In a complementary study, Martinelli et al. [28] conducted a multiple case study with software startups, focusing on the challenges of UX research and Long-term UX. As a result, the authors identified eight challenges, two of which are related to Long-term UX: "conducting continuous testing and evaluations with users" and "convincing startup professionals of the relevance of longitudinal user research". These findings suggest that, although the importance of continuous UX activities is recognized, their practical adoption remains limited due to organizational and cultural barriers.

The work by Guerino et al. [14] investigated the timing and motivations of UX activities in software startups through a survey with 90 professionals. The results show that most UX data collection occurs during user interaction with the product (Momentary UX). The authors identified that the main motivations for adopting UX practices are improving product/service quality, producing what users want to consume, and engaging customers. These findings indicate that UX adoption is primarily driven by immediate product concerns rather than by a long-term or continuous research strategy.

These findings are consistent with the study by Silveira et al. [48], which investigated UX work in software startups from the perspective of current practices. The authors identified that startups adopt UX practices mainly to create value for users, improve business results, and support product development decisions, with motivations such as creating successful products and improving product quality being among the most relevant. This reinforces the idea that, although organizations recognize the importance of

UX, its application is still driven by short-term needs rather than continuous or longitudinal strategies, in line with [14].

In general, the studies analyzed indicate that UX research is widely recognized as important for software development, particularly to improve product quality and align with user needs. However, the adoption of continuous UX research and its integration with agile RE remain limited. The literature suggests that UX activities are often conducted in isolated moments, rather than continuously across the software lifecycle, highlighting a gap that motivates further investigation in real-world organizational contexts.

3 Research Method

To achieve the study objective and understand the motivations for the integration (RQ1) and practices adopted for it (RQ2), an analysis was conducted of the results of a more comprehensive literature review to identify the motivations for using continuous UX research and its integration with agile RE. Subsequently, semi-structured interviews were conducted with industry professionals, allowing for a deeper understanding and contextualization of the literature findings based on practical experiences. The literature review also served as an inspiration for the interview, providing insights for the questions. The two methods applied are detailed below.

3.1 Systematic Literature Review

The most comprehensive Systematic Literature Review (SLR) [currently under review], following the recommendations of Kitchenham and Charters [22], involved identifying which and how UX research practices, techniques, methods, processes, roles, and other relevant aspects are integrated with agile RE in both industrial and academic settings. The advantages, disadvantages, positive and negative outcomes of using these approaches were examined. Motivations for using continuous UX research and how this approach can contribute to integration were also explored. To achieve these objectives, three main research questions were proposed. **RQ 1:** What UX research approaches (e.g. practices, techniques, tools, artifacts, roles) are integrated in agile RE? How does this integration occur in the agile RE stages? **RQ 2:** In what organizational context (e.g., country, sector of activity, size and agile method) are these approaches applied? **RQ 3:** What are the motivations for conducting continuous UX research? How can continuous UX research contribute to integration?

Based on the research questions and objectives of the broader SLR, a search strategy was developed. The final search string, created based on the analysis of seminal papers [2, 26, 29, 41] and developed through iterative testing of intermediate versions, was:

("agil" OR "agile design" OR "agile develop" OR "design thinking" OR "extreme programming" OR "kanban" OR "lean" OR "scrum" OR "xp") AND ("activit*" OR "approach*" OR "framework" OR "guideline" OR "integrat*" OR "method" OR "model" OR "practic*" OR "process" OR "task" OR "technique" OR "tool" OR "work") AND ("require* engineering" OR "requirement*" OR "user case" OR "user stor*") AND ("UX research" OR "HCD" OR "HCI" OR "UCD" OR "usab*" OR "user experience" OR "user research" OR "user study" OR "user-centered" OR "user-centred" OR "UX")*

The search string was executed in 6 electronic search databases: ACM Digital Library[1], IEEE *Xplore*[1], *Scopus*[1], Web of Science[2], Engineering Village[3], and *SOL*[3]. In most databases, searches were conducted using the "Title/Abstract/Keywords" fields or similar options. For ACM Digital Library and Scopus, the "Anywhere" field was used due to the search options available in these databases. The SOL Digital Library indexes publications in Portuguese and English, and many Portuguese papers include English abstracts, making them retrievable through English search terms. Nevertheless, Portuguese papers were excluded according to the predefined criteria, because this SLR included only English-language publications.

Figure 1 illustrates the five-stage selection process used to identify the papers included in this review. The initial search, conducted in May 2024 across the selected electronic databases, retrieved 4,500 papers. The exclusion criteria were first applied based on the title and abstract, removing papers published before 2009 (EC01), studies outside the Computer Science domain (EC02), non-scientific documents such as technical reports and books (EC03), duplicate papers (EC04), non-English publications (EC05), studies unrelated to software engineering, agile methods, or UX (EC06), short papers with fewer than four pages (EC07), and secondary studies, including systematic reviews, mapping studies, and gray literature (EC08). The remaining papers were then assessed against the inclusion criteria through a more detailed examination of the full text and other relevant sections, selecting studies that describe UX research approaches, practices, techniques, methods, tools, or processes applied to agile requirements engineering (IC01) and have the full text available (IC02). Finally, the selected studies underwent a quality assessment, resulting in the inclusion of 60 primary studies.

From the 60 selected papers, 16 papers focused on continuous UX research and agile RE integration were picked up from a streamlined process. The filtering was performed based on the responses to RQ3 of the SLR, that is, these papers contained excerpts about the motivations for using continuous UX research integrated with agile RE, and how this approach can contribute with integration and to building higher quality software products. For the present study, the SLR was updated to cover the 2024–2026 period with a specific focus on identifying studies related to continuous UX research, the core theme of this paper. Rather than re-executing the original search strings, which would have broadened the scope beyond the objectives of this study, we conducted a targeted search across three databases: ACM Digital Library, IEEE Xplore, and Google Scholar. This focused search did not identify any additional primary studies. Table 1 shows the list of 16 selected papers.

In the first step of paper analysis, a comprehensive reading of each paper was carried out. Using the Atlas.ti tool[4], a Thematic Analysis protocol [6] was adopted. The extraction of key excerpts was performed, specifically focusing on UX research approaches (e.g., practices, techniques, tools, artifacts, ceremonies, roles and processes), team dynamics, advantages, disadvantages, the challenges or conflicts arising from integration and motivations and benefits for continuous UX research. This iterative coding process

[1] https://dl.acm.org/; https://ieeexplore.ieee.org/; https://www.elsevier.com/products/scopus
[2] https://clarivate.com/academia-government/scientific-and-academic-research/research-discovery-and-referencing/web-of-science/
[3] https://www.engineeringvillage.com/; https://sol.sbc.org.br/
[4] https://web.atlasti.com/

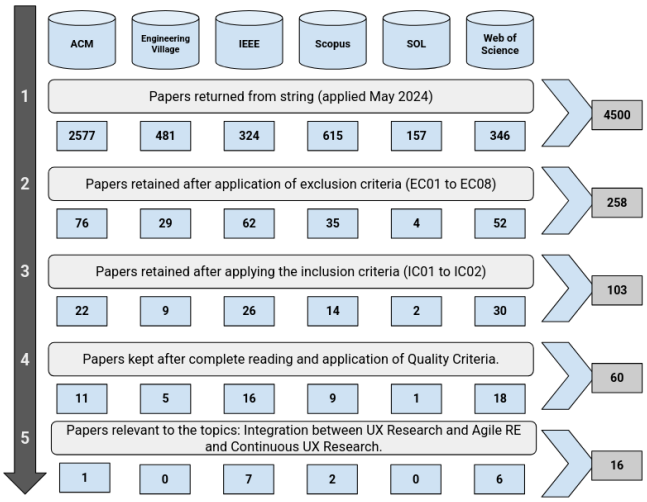

Figure 1: Research Bases, Steps and Number of Papers

was conducted in three iterations. As a result, 41 codes and 970 excerpts were identified (an average of 16 data points per paper) in the most comprehensive SLR. However, for the purposes of this study, the analysis and compilation of findings were carried out for the 16 selected articles that answered RQ3 of the broader SLR.

3.2 Interviews

Considering that the papers analyzed were not very comprehensive regarding the practice carried out by industry professionals in conducting UX research and continuous UX research, it was decided to conduct semi-structured interviews, following the guidelines of Shull et al. [46]. The semi-structured interview was chosen for its exploratory nature and for allowing the questions to be adapted whenever necessary [46]. The interviews were carried out by two researchers (R1 and R2), one asking the questions and another making notes. The remaining three (R3, R4 and R5) contributed to the study design and data analysis. R1, R4, and R5 have backgrounds in agile software development and UX research, with 15+ years combined experience in academia and industry. R2 and R3 have 5+ and 15+ years of experience, respectively, in agile software development. The professionals interviews were conducted with the approval of the Brazilian Research Ethics Committee (CAAE: 90622025.1.0000.5504) at the Federal University of São Carlos.

This interview examined how software professionals are currently conducting continuous UX research integrated with agile RE, including their underlying motivations and the extent to which they conduct such research continuously. A total of 12 software professionals working in software companies representing diverse roles were interviewed. The participants were nominated by company leadership based on their involvement in UX activities, since some organizations lack dedicated UX roles. Their professional experience ranged from 4 to 20 years and all were worked in organizations that employ Agile practices. Table 2 provides a detailed overview of professionals.

The semi-structured interviews were conducted in Portuguese between August and September 2025, with each session lasting between 30 and 60 minutes (interviews averaged 42 minutes, with most (7 out of 12) lasting between 40 and 50 minutes), totaling approximately 9 hours of recorded video. The interview questions (Table 3) were developed based on references [35] and [39], as well as the findings of the original SLR (Section 3.1). Question Q4, for instance, is similar to the first research question in the original SLR and aims to compare findings from the literature with industry practice. Similarly, question Q8 focuses on investigating the continuous execution of UX research, aligning with the objectives of the original SLR (see the script in the online Appendix[5]). Before reaching the final version of the questions, the questionnaire was developed and improved with the participation of all researchers.

Table 1: Selected Studies

ID	Title	Author(s) / Year
S01	Agile UX: Integrating good UX development practices in Agile	Pillay and Wing (2019) [36]
S02	Assist Users to Straightaway Suggest and Describe Experienced Problems	Senft et al. (2018) [44]
S03	Beyond Utility and Usability: Towards Affectability in Agile Software Requirements Engineering	Kamthan and Shahmir (2018) [19]
S04	Boosting Agile by Using User-Centered Design and Lean Startup: A Case Study of the Adoption of the Combined Approach in Software Development	Signoretti et al. (2019) [47]
S05	Combination of Scrum Lean-UX-based AI UX Design	Vasantham et al. (2023) [50]
S06	Coupling Design Thinking, user experience design and Agile: towards cooperation framework	Nedeltcheva and Shoikova (2017) [33]
S07	Dual-Track Agile in Software Engineering Education	Péraire (2019) [37]
S08	Examining the Foundations of Agile Usability with eXtreme Scenario-Based Design	Lee et al. (2009) [27]
S09	Factors Influencing the Acceptance of Online Mobile Auctions using UC Agile Software Development: An Early Technology Acceptance Model	Namoun et al. (2022) [31]
S10	Integrating requirements engineering and user experience design in Product life cycle Management	Anitha and Prabhu (2012) [4]
S11	Integrating UX work with agile development through user stories: An action research study in a small software company	Ananjeva et al. (2020) [3]
S12	Investigating Problem Definition and End-User Involvement in Agile Projects that Use Lean Inceptions	Ferreira et al (2021) [12]
S13	Lean User Research for Agile Organizations	Schon et al. (2020) [42]
S14	UXUP - User eXperience Centric Unified Process	Nasiri and Sadler (2018) [32]
S15	User-centered approaches in software development processes: Qualitative research into the practice of Hungarian companies	Szabó and Hercegfi (2023) [49]
S16	UserX story: Incorporating UX aspects into user stories elaboration	Choma et al. (2016) [7]

[5]https://doi.org/10.6084/m9.figshare.32159064

Table 2: Profile of the Professionals (Exp. C.: experience in the Company; Exp. R.: experience in the Role; Dur.: duration in minutes)

ID	Role	Exp. C.	Exp. R.	Company	Dur.
P1	Fullstack Developer	5	7	A	36
P2	Fullstack Developer	3	20	A	30
P3	Product Owner	3	16	A	35
P4	Project Manager	3	6	B	49
P5	Software Engineer	1	7	B	40
P6	UX Designer	1	4	B	31
P7	Software Engineer	6	6	C	49
P8	UX Designer	2	20	C	49
P9	Quality Analyst	3	6	C	43
P10	UX Designer	2	8	D	50
P11	UX Designer	1	6	D	60
P12	Product Owner	5	6	D	42

Company A: Segment: Education; Total number of employees: 1700; Total employees in SW area: 13. **Company B:** Software factory (23 / 14). **Company C:** Web/App (66 / 15). **Company D:** Financial (700 / 120).

A pilot study conducted by R1 with two industry professionals (excluded from the final sample) led to minor adjustments to the phrasing and the order of the questions. All sessions were facilitated via Google Meet[6], automatically transcribed using Read.ai[7], and subsequently verified for accuracy by two researchers (R1 and R2).

The interview data underwent qualitative closed coding [40] using a predefined set of 27 codes derived from the original SLR. Researchers R1, R2, and R3 independently coded randomly assigned transcripts (six by R1, three each by R2 and R3) using the Taguette tool[8], holding consensus meetings to resolve discrepancies. The team collaboratively consolidated and refined the final codes. Researchers R4 and R5 then reviewed the analysis. See a visual coding example and the codebook in the online *Appendix*[5].

4 Findings

This section presents the main findings highlighted and divided by research question. Table 1 lists the papers from the SLR and Table 2 presents information on professionals. Excerpts from selected papers and interviews serve as examples of identified data. Since all interviews were conducted in the professionals' native language (Brazilian Portuguese), the quotations presented to support the conclusions are free translations of the excerpts.

4.1 Motivations for integrating continuous UX research with agile RE (RQ1)

The results identify various motivations (underlined in the paragraphs below) for using continuous UX research integrated with agile RE in the selected papers.

The first identified motivation was about continuous product validation in relation to user needs and perspectives and has been cited in several studies [S01, S10, S11]. Through continuous UX research, the development team can track evolving user needs and develop, as well as validate, the requirements that the end user will use. Users should participate in the entire project lifecycle, which includes the discovery, specification, and validation stages of requirements: "*End users should be involved throughout the project lifecycle to validate the product and ensure that stakeholders accurately represent them*" [S01]. Furthermore, errors can be detected and adjustments made as quickly as possible, increasing product quality. "*The user perspective is a constant concern*" [S11].

Integration between teams is strengthened when UX research is conducted continuously. Traditional UX research typically involves a research and analysis phase at the beginning of a project, with the results then passed on to the requirements engineering and development teams. In contrast, continuous UX research conducts research frequently and in parallel with project execution, requiring teams to work in a more integrated and organic way. For example, [S07] states that "*the two tracks [research and development] run continuously and in parallel, and the whole team is involved in both tracks*". In this way, the unity and involvement of both teams is enhanced by the continuous execution of UX research integrated with agile RE. [S11] mentioned that through continuous UX research, UX professionals have the responsibility of allowing requirement teams to receive continuous user feedback. Finally, [S16] emphasized that these activities are naturally continuous and integrated: "*treat design as a continuous activity integrated throughout software development, not just in the initial phase*".

The improvement of agility in software development was cited by some papers. When teams have greater flexibility and a greater

Table 3: Questions of the interview

ID	Question
Q1	What are your activities within the organization? a) What is your involvement with UX research? or b) What is your involvement in requirements engineering?
Q2	Can you briefly describe your work and that of your team? How is the team structured?
Q3	What is the adopted development model and how is it applied?
Q4	What approaches, practices, techniques, tools, and artifacts do you use to understand user needs, challenges, or expectations?
Q5	How are product requirements typically defined and maintained by the team?
Q6	Is there integration between UX research and agile RE? a) Are there specific approaches, practices, and techniques for this purpose? b) And do they work well?
Q7	Regarding the activities mentioned: who performs these activities and how often?
Q8	Is UX research conducted continuously? That is, before, during, and after product development and delivery.
Q9	How are user research results shared with the team? And how do these results impact product requirements?
Q10	What are the main challenges, conflicts, and difficulties you observe in the integration between UX research and agile RE?
Q11	What approaches, practices, and techniques have worked well in integrating UX research and agile RE?
Q12	Would you like to add anything that wasn't asked and that you consider important?

[6]https://meet.google.com
[7]https://www.read.ai
[8]https://taguette.org

ability to adapt quickly to changes in scope, the principles of agility are indeed met. [S06] reinforces this point by stating that "*The effectiveness of Agile comes from its ability to adapt quickly based on feedback, which means that the work of a UX designer is continuous*". [S08] cites how continuous UX research can enhance agility in projects that integrate UX research with agile RE: "*Deliver UI designs frequently, to get continual feedback from end users and customers to improve the product*" and "*Continuous attention to good design, both in terms of code and user interface, enhances agility*".

Another aspect identified was related to the dynamic nature of software development, both in terms of requirements and UX demands. [S14] highlights the importance of continuously evaluating the product's UX: "*UX should usually be evaluated before, during and after interacting with a product over time given the dynamic nature of human emotional state, which leads to the belief that improving UX should be attempted since the start and throughout the development process, not just at its end*". Agile methods value and embrace changes in requirements, and through continuous UX research, the agile team has continuous access to these changes. Researchers are able to closely monitor user feedback and understand the impacts that may affect the discovery, specification, and validation of requirements in a more agile away. "*Besides that, UX is dynamic, because the user's perception could easily change over time. As a result, experts should pay special attention to different episodes of usage (e.g., pre-use [expected UX], onboarding [first UX], in-use [momentary UX]) when designing and evaluating UX*", states [S15].

Finally, [S13] also states that continuous UX research promotes greater user involvement in product development: "*users and stakeholders should understand that they can influence product development through continuous feedback*". The continuous collection of this feedback ensures a constant flow of opinions and suggestions for product improvement, and with this, the user realizes that their opinion and involvement are indeed important for product development. [S09] adopted the principle of "*continuous stakeholder involvement from start to end*" in their study to ensure, among other objectives, the development of the correct requirements and to enhance user satisfaction and product acceptance. This aligns with the assertion by [S03] that "*in the prevalent consumerized software environment, continual positive user experience with a software system is necessary for a long-term acceptance of (and allegiance to) the system by its user*". Finally, [S12] states that early and continuous user involvement, starting from the discovery and specification phases of requirements, significantly contributes to reducing barriers to use: "*Users' participation from the beginning of the process supports understanding where and how the product can fit into their routine and aids in identifying elements of the problem domain and obstacles to implementation*".

4.2 Conduction of continuous UX research in integration with agile RE (RQ2)

Regarding how software professionals conduct continuous UX research integrated with agile RE, the results reveal different scenarios and ways of using it. These findings were organized into 4 scenarios (underlined), as described below.

Scenario 1: Partial use of UX research. The results show that professionals P1, P2, and P3 (Company A) conduct UX research in a partial (and even isolated) manner in the project evaluated in this study: "*I think it's very much based on feeling; there's nothing [research] very specific to UX*" [P1] and "*In an isolated way, even occasionally, to validate a functionality, a specific task, but in an isolated way, not within a process*" [P3]. Practices, techniques, and tools, when employed, occur sporadically; examples include prototyping, creation of user stories and user journey analysis. "*In the beginning, there were the prototypes that the other developer worked on*" [P1]. As the agile team does not have contact with end-users, requirements are elicited through meetings and interviews with the undergraduate admissions office. User stories are also complemented by acceptance criteria and are the main artifacts for requirements specification [P3], and GitLab tool[9] acts as the central requirements repository for different documents managed jointly by the agile team and the undergraduate admissions office; it includes a specification of UI aspects (e.g., components, text, colors, report format) [P1]. Finally, team communication with internal clients occurs via Mattermost[10], which supports asynchronous discussions on questions, changes, and deliverable validation. On the other hand, they also reported the absence of a UX professional on the team to perform UX research and UX design activities, and they did not cite or provide examples of the continuous use of UX research in the project they were working on: "*Specifically, user research, we practically didn't have any. Research with responses, with analysis of the responses*" [P3].

Scenario 2: Moderate use of UX research. Professionals P4, P5, and P6 (Company B) pointed out that UX research is not conducted continuously in their projects. [P5] said that requirements discovery begins with meetings and interviews with clients via Google Meet involving the whole agile team. The doubts and clarifications of user needs are gathered from WhatsApp groups conversation: "*We always created a WhatsApp group with these clients*". In the requirements specification, the UX professional initially created prototypes [P4] in Figma[11]: "*We have a complete design that our UX professional creates, which the client reviews and approves*" [P5]. No data was found to indicate that these professionals use continuous UX research. According to [P4], UX research mainly takes place before development and after the delivery of functionalities: "*Generally [the research] is much earlier. During development, we don't have clear user research. But after [delivery], after a few days, usually [the research] happens again so we can understand*". [P5] emphasized the emphasis on UX research after the delivery of functionalities: "*It's almost a service provision instead of a product delivery, you know? Because the first version of a chatbot [the company's product], especially, won't always be the most effective*". [P6] also mentioned that: "*after we deliver a project, we even provide a guarantee period, which we usually say is generally 15 days, during which they can request adjustments and everything else*". The results indicate that the professionals at this company focus on continuous delivery, but are still seeking to implement continuous UX research: "*Deliveries are very continuous*" [P5].

Scenario 3: Execution of continuous UX research for critical functionalities. Professionals P7, P8, and P9 (Company C), on the

[9] https://about.gitlab.com/
[10] https://mattermost.com/
[11] https://www.figma.com/

other hand, are concerned with conducting UX research on a continuous basis. As [P7] articulates, the goal is: "*Bringing this [continuous UX research] into the day-to-day work of developers, so that it becomes a daily concern for [both] development work and quality*". However, [P8] indicates that continuous UX research is currently applied inconsistently: "*I think it depends heavily on the functionality. When a feature truly needs to be monitored and observed, it gains the opportunity for more detailed prior research, as well as more comprehensive requirements during development*". [P8] exemplifies: "*Regarding [the payment functionality], the team is tireless. As soon as the screen is live, they are already observing whether it is converting or if it is meeting a specific objective*". Requirements discovery start by the Operations team, which identifies needs from user feedback collection, i.e., opinion research, user surveys, client campaigns. "*So, when we want to discover something that really requires getting closer to the users and asking, they are the ones who execute it, it's the operations team"* [P7]. After prioritizing the users' demands, the requirements are described in Slack[12] to encourage participation and deliberation by the company's cross-functional team. The requirements specification is carried out in the Jira[13] and Confluence[14] tools [P8, P9] and involves the creation of user stories and personas. The UX professional then creates the mockups, prototypes, and designs in *Zeplin*[13] and Figma.

The results reveal that professionals at Company C are more advanced in their application of UX research practices and techniques, and for critical system functionalities, they perform continuous UX research. Another example of functionality cited in this scenario is "New User Registration" and "User Research" within the company's social networking solution. In other words, the range of functionalities that receive greater attention in continuous research is directly related to generating revenue for the company and maintaining user satisfaction during product use. Some of the practices these professionals employ include A/B testing, session recordings, observability (and log management with Datadog[15] and *Grafana*[13] tools) and real-time user surveys: "*so, we have NPS [Net Promoter Score] surveys, satisfaction surveys, feedback surveys (...) We've also done A/B testing; we've done functionality previews. So we were able to test with some users*" [P8, P9]. [P7] adds: "*we use session replay tools on a case-by-case basis, where we can observe user behavior with private data obfuscation, while still being able to see the flows that the user utilizes*".

Scenario 4: Planning for the execution of continuous UX research. The professionals P10, P11 and P12 (Company D) said that the requirements discovery is highly collaborative with agile and UX teams working together: "*We [UX team] begin working with the agile team on their development discoveries, while we explore user experience, UI requirements, and prototypes — sketching and creating low-, medium-, and high-fidelity prototypes*". The UX team conducts primarily through internal interviews, semi-structured conversations, and observations with the aim of understanding internal users' expectations [P10]. In specifying the requirements, the UX team creates UI prototypes in Figma and uses user stories with acceptance criteria, personas, and use cases, and this documentation is stored in Azure DevOps [P11, P12].

On the other hand, it was possible to perceive that these professionals still do not employ continuous UX research, but only continuous monitoring and collection of user feedback: "*So [the research] is before, during, and after. Not UX research, but an understanding of needs. [Collection of] feedback*" [P10]. [P10] also mentioned the absence of a UX team in this monitoring: "*The people from the business areas have contact with the clients; they are not completely at the mercy of them, but there is no user experience person dedicated to carrying out this monitoring*". On the other hand, [P11] emphasized the team's motivation for using continuous UX research: "*So, the intention is that yes, there will be this monitoring before, during, and after, but this has not yet been implemented in a structured way, because I think it doesn't fit so well in other projects, but the expectation here for this [project] is yes, that it will be [researched continuously]*". [P12] reinforced the issue of not conducting continuous UX research: "*I don't know about the post-delivery phase. Before and during [development], they have follow-up, because we have to; when installing development, some doubts arise, and we have to refer back. But after, I don't know. I have follow-up even during, I'm sure of that*".

Based on the results, the professionals who participated in this study can be grouped into four categories: (i) who work with UX research on an ad hoc basis; (ii) who work with UX research, but in a traditional manner; (iii) who work with UX research, and with the intention and resources for continuous execution; and finally (iv) who work with continuous UX research and employ specific practices, techniques, and tools[16].

5 Discussion

This study examines the integration of UX research and agile RE, focusing on the implementation of continuous UX research. In addition to presenting the motivations for the continuous execution of UX research, this work investigates how software professionals in various roles evaluate, plan, and execute continuous UX research integrated into agile RE. In this section, the motivations are indicated in bold. Beyond answering the research questions, recommendations to assist software professionals in using continuous UX research within their activities were provide.

5.1 Motivations for integrating continuous UX research with agile RE (RQ1)

To answer research question RQ1: "*What are the motivations of software professionals for integrating continuous UX research with agile RE?*", data from a literature review were explored. The results revealed that the literature highlights the **continuous product validation** to ensure that the deliveries meets user needs. Through continuous UX research, teams are able to monitor, in real time, the evolution of shifting user needs regarding both functionality and UX aspects. This same motivation was identified in the study by Guerino et al. [14]. In the survey conducted in that work, 61.1% of respondents cited that one of the primary motivations for conducting

[12]https://slack.com; https://zeplin.io/; https://grafana.com/
[13]https://www.atlassian.com/software/jira
[14]https://www.atlassian.com/software/confluence
[15]https://www.datadoghq.com/product/session-replay/

[16]However, in this study, continuous UX research is not disseminated across all product functionalities, but only to those considered critical.

UX research is "improving the quality of the product/service", while 48.9% agreed that "producing what the user wants to consume" is a major driver. Another motivation relates to the **enhanced integration between development and UX teams** that continuous UX research provides. As reported by Ciscon et al. [8], teams work more frequently and in a more integrated manner when UX research approaches are adopted by organizations on a continuous basis. Because they interact daily during product development and face challenges together naturally, greater empathy and integration are fostered. Lighter and more continuous practices improve confidence and integration [3].

The **increased agility** in projects was also cited as a motivation in the work of Guerino et al. [14]. Although the focus is on the issue of "time savings in development" (36.7% of participants identified this motivation), it is possible to perceive the alignment between the findings in this study and those in the research by Guerino et al. Pillay and Wing [36] point to the tension between the agility inherent in development, with short iterations, versus the longer timeframes of traditional UX research. The use of shorter and more frequent continuous UX research practices can help reduce these conflicts. Another reason identified in the literature concerns the **dynamic nature of development**. As cited by Szabó and Hercegfi [49], the constant changes in user needs, regarding both new requests and adjustments to functionalities already in use, require continuous research with users. The inherent dynamics of UX require the researcher to monitor different stages of product use (before, during, and after) [32].

The work of Martinelli et al. [28] highlighted that one of the primary challenges of UX research and long-term UX is the continuous execution of tests and evaluations with users. Maintaining user engagement over time is exceptionally difficult, even for large and established companies. In this regard, the authors recommend the adoption of continuous UX research techniques. The use of continuous UX research techniques and practices can **increase user engagement** over time, as it seeks to bring the user closer to the development process while valuing their opinions and feedback. This motivation was also cited in the work of Guerino et al. [14]. The authors stated that 46.7% of survey participants responded that the adoption of long-term UX research practices "engages customers".

Another study that also investigated the motivations for utilizing UX research was conducted by Silveira et al. [48]. The authors examined the reasons for employing UX research practices, specifically focusing on software startups. The value created for the user and the development of successful products were the most frequently cited reasons by the professionals surveyed. The results differ because they are derived from a systematic literature review and do not distinguish between traditional companies and startups; however, the objective of creating products that meet user needs (and generate value for them) emerges once again as one of the primary motivations.

5.2 Conduction of continuous UX research in integration with agile RE (RQ2)

To address research question RQ2: "*How are software professionals currently conducting continuous UX research in integration with agile RE?*", data from interviews conducted with 12 software professionals in four Brazilian software organizations were explored. The results revealed various scenarios regarding how professionals conduct continuous UX research integrated with agile RE.

The first group of **professionals performs sporadic UX research activities ad hoc**, without a defined UX research process. The reasons cited were a lack of resources within the team and the absence of a professional dedicated to UX research to assist with these activities, aligned with [23]. It is possible to assume that these professionals do not use continuous UX research because they are still beginners in the use of UX research practices and techniques.

A second group of **professionals uses a broader range of UX research techniques and practices**, such as interviews, user feedback collection, prototype creation, cross-functional teams, and sprint zero. However, these professionals did not demonstrate any desire to conduct continuous UX research in the development of their products. The results indicated that professionals in this organization conduct UX research more prominently during the pre-use phase and after product delivery. This contrasts with the findings of Guerino et al. [14], which showed that most surveyed professionals collect UX data while users are interacting with the product or service (Momentary UX). This study, however, differentiated professionals based on their company types (specifically startups) and the growth stages; in contrast, the present study did not categorize professionals according to their specific organizational affiliations. One of the reasons for this still somewhat limited use of UX research may be related to limited resources, since, for example, the development team only has one role responsible for UX activities.

The third group of **professionals reveals a more comprehensive use of UX research; however, they have not yet implemented it continuously**. These professionals are willing to adopt continuous UX research, supported by a greater availability of resources compared to professionals in more restricted contexts within other organizations. These professionals work in multidisciplinary teams with various roles responsible for UX design and UX research. In this case, the challenge for the use of continuous UX research may be related to a lack of awareness regarding the relevance of longitudinal user research. This challenge was explored by Martinelli et al. [28], who highlighted the difficulty of hiring UX professionals with a mindset that prioritizes the continuous UX research. Furthermore, such professionals can better engage senior management regarding the competitive and product-related advantages of an environment that fosters long-term UX efforts.

Finally, the fourth group of **professionals indicates the use of both UX research practices and continuous UX research**. However, the results show that these professionals utilize techniques, practices, and tools such as A/B testing, session replay, satisfaction surveys, and NPS (Net Promoter Score), which are characteristic of continuous UX research, but only for critical functionalities of the company's product. The functionalities related to new user registration, user research, and especially payment plans receive greater attention from the organization and, consequently, lead professionals to conduct continuous research with application users. The fact that continuous UX research is conducted on only a limited number of product functionalities may be related to a challenge in long-term UX identified by Martinelli et al. [28]: the difficulty of performing continuous tests and evaluations with users. Given

the challenges of engaging users who are consistently available for research, practitioners prioritize the most critical product functions.

The results show that the characteristics of the companies and the projects being executed play a major role in how professionals apply UX research and continuous UX research techniques. Factors such as team size, allocated resources, the presence or absence of a UX professional on the team, support from senior management, and the specific characteristics of the product under development can impact the adoption (even if only partial) of UX research and continuous UX research practices. Furthermore, most professionals do not utilize specific continuous UX research practices, with only participants P7, P8, and P9 mentioning their use. One reason for this may be related to the professionals' lack of knowledge regarding the motivations and benefits of continuous research. Finally, the additional resources (personnel, time, and financial) required for the application of continuous UX research can also influence the degree to which this approach is implemented.

5.3 Recommendations

Based on the findings, five recommendations were proposed to support software professionals in integrating continuous UX research with agile RE. The difficulties and challenges inherent in this integration, as well as the motivations and use of continuous UX research practices, techniques, and tools, were mapped and used to propose recommendations. Each finding from RQ1 gave rise to a recommendation, and the relationships between the findings of RQ2 and the recommendations are illustrated in Figure 2.

Recommendation 1: Prioritize emerging user needs: one of the primary motivations to use continuous UX research [3, 14] lies in the ability of teams to more rapidly track whether the requirements being developed and delivered actually meet the real and emerging needs of users. Recommendation: each sprint should include a review of emerging user needs, updated UX acceptance criteria, and a rapid cost-benefit assessment of requirements. Quickly create simple prototypes for user validation and avoid rework. Use techniques such as A/B testing to evaluate the most effective implementation of user needs. If resources are limited, start with the most critical features.

Recommendation 2: Increase collaboration between UX and development teams: the most frequent conflicts in the integration of UX research and development occur between the respective teams. The work of Ananjeva et al. [3] discusses this conflict and encourages the use of deliberation to facilitate open, inclusive, reflective, and reciprocal discussions between relevant stakeholders. Recommendation: adopting continuous UX research practices will lead to more frequent contact between teams during the generation, analysis, and utilization of insights regarding user needs. Professionals should work in a deliberative environment that promotes mutual trust between teams. Encourage the use of asynchronous chat tools, such as Slack and Mattermost, for more effective communication between teams. Democratize research and its results with the entire team. Promote weekly backlog refinement sessions in which both UX researchers and developers participate.

Recommendation 3: Enhance agility with quick responses to user needs and problems: as discussed, the effectiveness of Agile [33] stems from its ability to adapt quickly based on user feedback and research. Continuous UX research can improve agility by reducing uncertainty, avoiding rework, and accelerating decision-making. Recommendation: utilize continuous UX research to reduce uncertainty continuously and early. Instead of long research cycles, conduct short and continuous feedback cycles, identify and fix user problems as quickly as possible. Check application-generated log data and use observability tools to respond to the user before they even complain. Integrate user research activities into the agile RE, for example, with research results guiding planning.

Recommendation 4: Promote user engagement through short and frequent activities: the work of Martinelli et al. [28] notes that one of the challenges associated with long-term UX is the continuous execution of testing and evaluations with users. Companies generally encounter difficulty in encouraging users to utilize the application consistently and provide feedback on multiple occasions. Recommendation: bring the user closer to the solution's development through short and frequent activities focused on the research and validation of their needs. Demonstrate to the user how their feedback was captured, analyzed, and implemented in the construction of the system's functionalities. Again, quickly create simple prototypes for user validation. Utilize screen sharing and recording tools (session replay) to analyze user behavior. Create a small, rotating panel of active users so they can participate in brief testing sessions or gather feedback.

Recommendation 5: Align UX Design and development activity cycles: as pointed out by Pillay and Wing [36], one of the challenges of integrating UX research and agile RE lies in the conflict between the time dedicated to the "minimal upfront design" of Agile and UX activities that require more extensive research and validation time. A common mistake is that research results arrive too late. Recommendation: align the UX research cycle with the development cycle through continuous UX research activities that are short but frequent. UX Research rituals should be conducted weekly to provide constant insights for requirements professionals. Whenever possible, perform UX activities in advance of a sprint or development cycle. For example, use the Sprint Zero practice.

6 Threat to validity

To ensure methodological rigor, validity threats were addressed following the Kitchenham and Charters guidelines [22] for the SLR and Shull et al. [46] for the interviews with professionals. Construct validity was established through refined search strings and pilot-tested interview protocols. During data collection, at least two researchers attended each session to clarify any misunderstandings and the recordings were automatically transcribed and manually reviewed for precision.

Internal validity was strengthened through the adoption of a structured and well-defined protocol for study selection, combined with an independent review process to reduce potential selection bias. Subsequently, an inter-rater agreement analysis was conducted to assess the consistency between reviewers, providing additional evidence of the rigor and reliability of the selection process. In the interviews, professionals from various organizations with diverse backgrounds and expertise were included, examining a broad set of issues to mitigate potential biases.

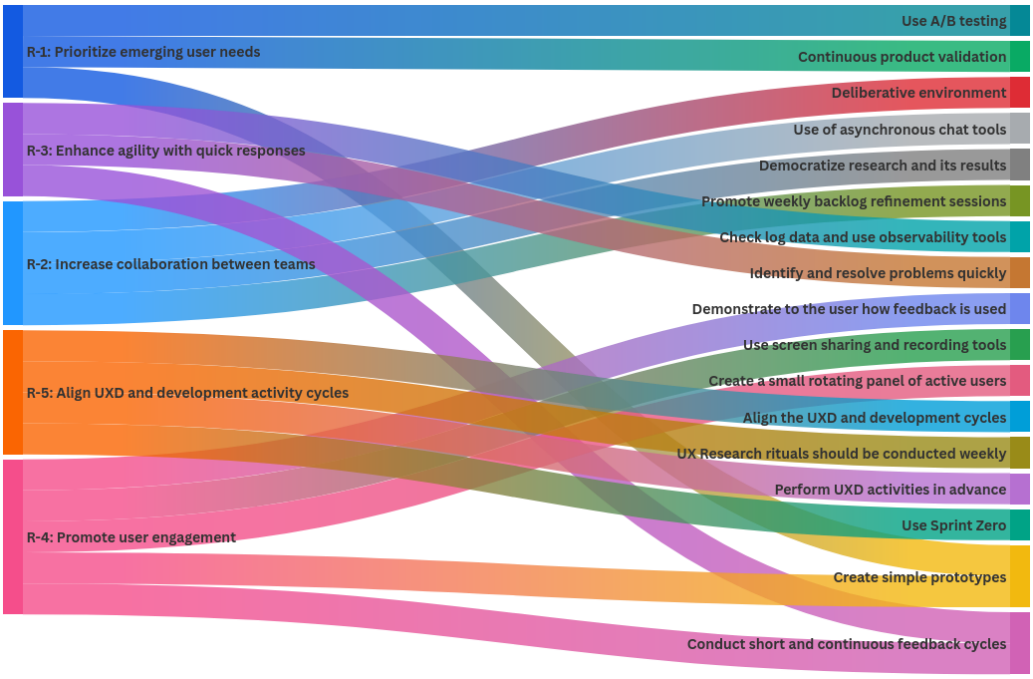

Figure 2: Relationships between the proposed recommendations and the RQ2 findings.

Regarding external validity, the SLR benefited from a large sample size and the application of a quality assessment [11] to score papers based on the presented information. In the interviews, participants were selected from four software companies differing in size, domain and location (featuring diverse operational setups across state capitals and the countryside, including one geographically distributed team); this supports a degree of abstraction while acknowledging that organizational context may limit generalization and that replications in other settings are encouraged.

Finally, conclusion validity and reliability were safeguarded by involving two researchers in the selection of papers and quality assessments, as well as in conducting data extraction and in-depth qualitative analysis. In the interviews, the analysis with multi-researcher participation at each stage was performed, while the cross-checking of transcriptions and analyses reduced interpretive discrepancies.

7 Conclusion and Future Work

This paper aims to identify the motivations for utilizing continuous UX research and to explore how this approach has been integrated into practice by software professionals within agile RE. Data on these motivations were collected from a subset of papers selected by a systematic literature review. In addition, information on how continuous UX research is used by practitioners was gathered and analyzed through interviews with 12 professionals who hold diverse roles in the software industry.

The results showed that the main motivations are related to the continuous validation of the product, which enables the development of solutions that meet the current needs of the users. The findings also revealed that professionals still perform continuous UX research in varying ways, depending on available resources and the characteristics of the solution under development, prioritizing the most critical functionalities of the product. In addition, five recommendations on the application of continuous UX research by software professionals were proposed.

The contributions of this work are valuable for both academics and practitioners. The discussions provide insights into the motivations and underlying reasons for using continuous UX research. Future works on the use of continuous UX research integrated with agile RE and the organizational cost of implementation can foster a broader adoption of this approach. Furthermore, the recommendations for software professionals can serve as a practical guide for those who intend to implement continuous UX research practices, techniques, and tools throughout the development of their products will serve as the foundation for a formal approach to integrate continuous UX research with agile RE.

Artifact Availability

Artifacts available at: https://doi.org/10.6084/m9.figshare.32159064. Due to confidentiality requirements on the part of the professionals, the raw data from the interviews cannot be made publicly available.

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