Guiding the Adoption of UX Research Practices: An Approach to Support Software Professionals

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Abstract: The interest in User Experience (UX) with interactive products and services has grown in the industry. In this context, the research with end-users contributes to articulating practices, methods, and research techniques on UX that can be applied at different stages of software development. Nevertheless, software development professionals have demanded tools that can aid them in selecting the suitable method or technique for a given purpose of user research. To address this demand, we developed guidelines that suggest methods and techniques for working with user experience research. Considering the guidelines, we created the GURiP tool in the virtual catalog format, providing a more dynamic interaction with the guidelines. We evaluated the proposal acceptance with 32 software professionals from software startups and established companies. Our results revealed that professionals of both types of companies showed similar acceptance and reported more positive than negative feedback about the guidelines. We also found that participants' profiles, such as years of experience or affiliation with startups or established companies, did not influence the acceptance of the guidelines.

1 INTRODUCTION

In recent years, there has been a significant increase in recognition of challenges associated with integrating the design of user experience (UX) into software development (Silveira et al., 2021; Hokkanen and Väänänen-Vainio-Mattila, 2015; Kashfi et al., 2019). There are different definitions of UX in the literature; however, the majority of them include both the software's functionalities and its quality characteristics as elements perceived by end-users during their interactions (Hassenzahl, 2018). Software professionals (e.g., developers, UX designers, and UX researchers) have faced obstacles to incorporating UX into development processes, such as a lack of knowledge in UX and limited availability of resources (Kashfi et al., 2019; Silveira et al., 2021). Besides, studies indicate that the adoption of UX practices is fundamental in all stages of software development (Silveira et al., 2021; Hokkanen and Väänänen-Vainio-Mattila, 2015).

From different UX design disciplines, UX Research emerges as essential to sustain the product conception and evolution (Farrell, 2017). UX Research systematically researches and evaluates users' interaction with a product by providing techniques and methods to collect, analyze, and interpret user data (Farrell, 2017; Pazitka, 2019). Practices for this purpose generate meaningful insights on UX design, which contribute to decision-making about product development from users' motivations and pains (Pazitka, 2019). Thus, UX Research practices (i.e., *UXR practices*) represent recurring attitudes, actions, or activities of user experience research and evaluation work, which satisfy user-centered product development (Meingast et al., 2013). UX Research work is relevant to reducing the risk of failure in product development (Süner-Pla-Cerdà et al., 2021), besides bringing significant value and establishing a competitive edge for the company (Silveira et al., 2021).

Despite the variety of UX methods and techniques, there is a lack of solutions to facilitate the selection of UX Research methods and techniques most suitable for the needs of companies and their product development objectives (Hokkanen and Väänänen-Vainio-Mattila, 2015). Professionals can easily find a description of practices dedicated to data collection and analysis in UX (Süner-Pla-Cerdà et al., 2021); however, there is still a lack of knowledge among professionals about how to analyze user feedback (Sil-

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veira et al., 2021). Besides, professionals struggle in how to transform user data into useful information for software development (Hokkanen and Väänänen-Vainio-Mattila, 2015).

From the gap of tools that support the application of UX Research into practice, a set of 14 guidelines was proposed. These guidelines assist software professionals in their UX Research work by suggesting UXR practices, methods, and techniques to conduct research and evaluation with users. These guidelines were conceived from a Systematic Literature Review (SLR) that analyzed 45 studies conducted in the software industry. Considering the findings of the SLR, we developed an online catalog Guidelines for UX Research in Practice (GURiP) to provide a useful and accessible resource for professionals looking for advice on how to implement UX Research in practice.

We evaluated the acceptance of the guidelines in the dimensions of perceived ease of use, usefulness, and intent to use, as well as the participants' overall feedback. Our study involved 32 professionals who were instructed to apply the GURiP tool's guidelines in practical UX Research scenarios. The group of participants comprised a diverse range of profiles, including UX and software professionals in different positions in software startups and established companies. We considered it relevant to have startup and established company professionals in our sample due to the literature suggesting that startup professionals generally have a shorter tenure of professional experience. Our findings indicate that the guidelines were well-received and emphasized that they could be useful mainly for novice professionals. Our results also showed that participants' professional backgrounds did not significantly impact the guidelines' acceptance, demonstrating their suitability across various profiles.

This paper is organized as follows. The related work and the conception of the guidelines are presented in Sections 2 and 3, respectively. Section 4 gives all the procedures adopted in the guidelines evaluation. The findings are presented in Section 5 and the discussion of the findings and the their relation with the literature in Section 6. Finally, the contributions and the conclusions are pointed out in Section 7.

2 RELATED WORK

A survey involving 65 organizations in Saudi Arabia examined professionals' perceptions of UX and related practices, focusing on obstacles impeding the integration of UX work in software development environments (Majrashi and Al-Wabil, 2018). The results indicated that participants identified the primary obstacle as a lack of understanding or knowledge about UX Research, exacerbated by a shortage of trained UX professionals. Another survey in Saudi Arabia gathered responses from 75 software professionals (Alhadreti, 2020). The study aimed to assess the perception of professionals about the significance of UX in software development and the challenges in UX work. The findings showed that task analysis, prototyping, and heuristic evaluation are methods prevalent during various stages of product development, especially in the prototyping phase.

A previous study also discussed the main challenges of integrating UX and agile methods in software development (Meingast et al., 2013). Among the findings, the significance of collaborative activities, such as brainstorming sessions and information sketching, along with the involvement of stakeholders and developers in UX activities, was highlighted. In another study, the authors categorized organizational barriers from a systematic literature review (Kervyn de Meerendré et al., 2019). These barriers encompass the inadequacy of UXR practices and methods, insufficient UX literacy, and suboptimal utilization of UX artifacts. The study highlights a prevalent lack of comprehension among professionals regarding UX, often compounded by confusion between UX and User Interface (UI). This misunderstanding, in turn, contributes to hindering the application of UX Research methods and artifacts within organizational contexts.

A recent study presented a UX Process Reference Model (UXPRM), which includes delineating fundamental UX lifecycle processes and systematically classifying UX methods and artifacts (Kieffer et al., 2019). UXPRM furnishes a comprehensive overview of UX-centric practices that encompass collecting data on opinions, feedback, and user behavior. Methods for knowledge elicitation are further categorized into those involving user participation and those without, the latter focusing on predicting system usage through expert opinions. In a SLR, the authors highlighted the need for specialized UX research technologies prioritizing user-friendliness and comfort (Rivero and Conte, 2017). The results argue that future UX evaluation technologies should integrate diverse aspects and prevent duplication or confusion between quantitative and qualitative data from achieving comprehensive evaluation reports.

In addition to these studies, researchers proposed a tool to recommend UX evaluation methods by employing filters that conducted the stakeholders during evaluations (Oliveira et al., 2023). The feasi-

bility study gathered positive feedback from participants about the perception of the usefulness of tools that suggest UX methods to help professionals in the decision of which practice or method they should adopt. Besides, the feedback revealed the need for tools for centralized ease of access to UX-related content guides.

Our guidelines differ from the related work above by focusing on a specific UX area, i.e., UX research. The guidelines were elaborated considering a SLR, a similar approach adopted by (Rivero and Conte, 2017), incorporating UXR practices widely employed in the industry.

3 UX RESEARCH PRACTICES' GUIDELINES

Our guidelines aim to assist software professionals in working with UXR practices. In particular, we intend to support professionals in employing UXR practices in industry settings. The guidelines related to UXR practices are categorized into six groups (see Table 1 for group descriptions). Fourteen guidelines were derived from the literature, as outlined in Table 2. Each guideline includes details about the methods and techniques suggested, practical guidance to apply them, and the professionals who should be involved in putting the guideline into practice. Each guideline clearly defines its objectives and outlines the associated benefits of the proposed methods and tools.

The guidelines were elaborated by following a rigorous Systematic Literature Review (SLR) method (Kitchenham and Charters, 2007). The entire process of guideline construction is detailed in our previous work (Martinelli et al., 2022). In this paper, we will briefly describe the construction process; further details will be added in case the paper is accepted.

The search string was applied to five scientific paper's search engines (i.e., *ACM Digital Library*, *Engineering Village*, *IEEE Xplore*, *Scopus*, and *Web of Science*) and resulted in 634 papers selected. Our exclusion criteria focused on eliminating papers published before 2001, short papers, or studies that showed technical problems of software (e.g., algorithm optimization, programming). Meanwhile, our inclusion criteria are dedicated to selecting papers that describe UXR practices applied by the software industry, as well as papers that present contributions to UX Research work (e.g., how has been applied user research, collection, analysis, or interpretation of data).

After applying the inclusion and exclusion criteria, 45 papers were deemed relevant to our analysis. We thus conducted a qualitative analysis using open code, a technique in which the names and meanings of the codes emerge from the analyzed data itself (Gibbs, 2018). The researcher assigns codes and definitions to each set of extractions based on the common meaning of these extractions (Charmaz, 2006). As a result, we identified 38 UXR practices that were applied by the software industry.

Table 1: Groups of UXR Practices.

Research Planning (RP)
Actions focused on planning activities in UX Research, encompassing the definition of research goals, organization of research tasks within software development teams, and the creation of artifacts or prototypes to facilitate research conduct.
Research Training (RT)
Actions to encourage a culture of research and user evaluation among software industry professionals, including training in UX research skills.
Collecting Data with Users (CD)
Actions dedicated to generating data through research and user testing, conducted at different stages of the software development cycle.
Data Analysis (DA)
Actions that aid decision-making in software development through quantitative and qualitative analysis methods.
Organization and Communications (OC)
These communicative actions involve organizing and communicating with professionals in software development. They are related to research and evaluations conducted by these professionals.
Design with Research (DR)
Approaches that integrate UX Research into the UX Design process, with a special focus on creating the initial design, involving the development of software prototypes. These designs and prototypes serve as support for conducting user research activities.

These practices were further categorized into six groups (see Table 1) based on essential actions or attitudes dedicated to UX Research work, e.g., defining research goals, collecting user feedback, applying user tests, and developing research skills. Consequently, we developed a set of guidelines that can help professionals choose the best UXR practices, methods, and techniques to facilitate data collection and evaluation at different stages of the product lifecycle.

Considering the guidelines, we have developed the GURiP tool, building upon our formulated guidelines and their respective categories (see Figure 1). This tool is specifically tailored for professionals in the software industry, with a primary objective of facilitating the finding of new techniques and methods of UX Research suitable for each stage of product development. The GURiP tool[1] offers three distinct views: one provides an overview of general categories, another shows the details of the guidelines within each specific group, and a final view offers more in-depth information about individual guide-

[1]GURiP tool available in http://uxleris.net/gurip/.

Table 2: Guidelines for UX Research in Practice (GURiP).

Research Planning (RP)	
RP1	Defining goals, strategies, and pre-established roles related to the practical work of UX Research.
RP2	Planning user research and evaluations, considering the support of artifacts to aid in this planning.
Research Training (RT)	
RT1	Conducting workshops, training sessions, and internal study groups on UX Research among professionals involved in different teams.
RT2	Establishing partnerships with academic experts in UX/UCD or with agile and UCD consultants to conduct workshops or training sessions on UX Research.
RT3	Implementing strategies to guide on the importance of UX at the business level and promote the UX Research practices carried out internally by professionals involved in different teams.
Collecting Data with Users (CD)	
CD1	Conducting collections that combine different moments of product use by users (before, during, and after use) to generate longitudinal UX research.
CD2	Generating initial and anticipatory user research before the product development cycle.
CD3	Frequent and continuous user testing and evaluations at any stage of product development.
Data Analysis (DA)	
DA1	Developing user data analyses to generate valuable insights for product development.
DA2	Frequently analyzing operational and system data derived from user interactions with products and services.
DA3	Conducting qualitative analyses of user interaction with the product and cross-referencing results with quantitative data.
Organization and Communications (OC)	
OC1	Adapting research and evaluation activities with users according to project needs and available resources.
OC2	Creating lean artifacts or actions to share knowledge about users.
Design with Research (DR)	
DR1	Developing designs integrated with UX Research practices and guided by UX information.

lines.

The GURiP tool's catalog presents categories with titles, icons, and descriptions on cards (see Figure 1(a)). By selecting a category, the user can access the category page containing the guidelines. Users can access all the essential information for each guideline, including the title, objective, recommended methods and techniques, and the professionals involved (see Figure 1(b)). The methods suggested are shown as hyperlinks to external pages with more in-depth details. We provide the option to obtain additional information about each guideline, provide instructions on how to implement it, and highlight its usage benefits (see Figure 1(c)). The tool is available on the Internet; however, we could not provide its link due to the double-blind review policies.

4 EVALUATION

Our study followed the guidelines for experimental studies (Wohlin et al., 2012). Our study was approved by the ethics committee of the Federal University of São Carlos under the process number 68524023.0.0000.5504.

The study was conducted by two researchers, hereafter referred to as R1 and R2. R1 is an undergraduate student in Computer Science and currently plays the role of web developer as an intern at a company; R2 is a Ph.D. candidate in Computer Science with 6+ years of experience in User Experience and qualitative research.

4.1 Planning

Participants were invited to take part in the study voluntarily through announcements disseminated via LinkedIn. Our invitation included posts in professional groups related to UX Research, UX Design, and software development. Additionally, we sent emails to contacts within our professional network. The selection of participants was based on convenience and availability to participate in the study (Wohlin et al., 2012). Both professionals from startups and established companies were invited to join. The participants were divided into two groups: one consisted of software startup professionals, and the other composed of software professionals from established companies.

We designed the study to explore two scenarios using guidelines through the GURiP tool. Within the tool, users were free to navigate through guideline groups and subsequently, within each group, access the available guidelines in each category. In each scenario, participants had the flexibility to select one or more guidelines that best suited the proposed situation.

An online questionnaire was developed to collect data on participants' professional profiles (e.g., years of experience, market segment of the company, and role in the company). The questionnaire included the Informed Consent Form to obtain participants' agreement to be part of the study. We also created an online feedback questionnaire based on the Technology

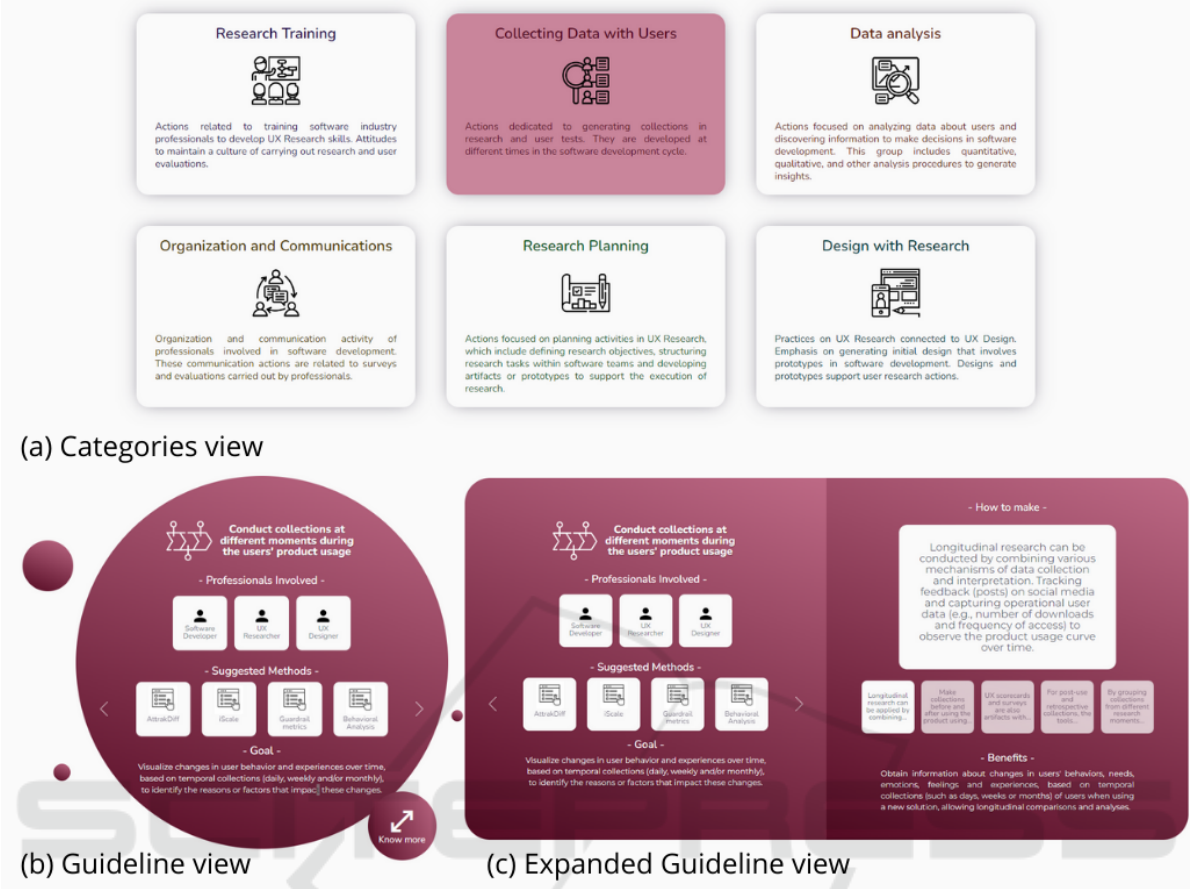

Figure 1: GURiP Tool.

Acceptance Model 3 (TAM3) (Venkatesh and Bala, 2008), an updated version of the Technology Acceptance Model (Davis, 1989) to gather participants' perceptions of the guidelines. We utilized TAM3, which presents questions divided into three constructs. The perceived usefulness construct represents how much a person believes using a specific technology can enhance their performance in UX-related tasks. The ease of use construct is related to the perception that the technology can be adopted effortlessly. The third construct concerns the user's intention to use the technology (Dias et al., 2011). We added three open-ended questions at the end of each construct.

Finally, we wrote up two scenarios that depict how users would interact with the guidelines. The scenarios aimed to assess practical aspects such as the application's ease of use, utility perception, and users' comprehension of categorizing guideline groups (see Table 3).

We had a senior researcher with 20+ years of experience in empirical studies in industry and User Experience research evaluate our study. They reviewed and refined the profile questionnaire and other artifacts. In addition, a professional with eight years of experience in software development and UX design participated in our pilot test. This professional helped us understand what hindered their understanding of the scenarios, which allowed us to improve the clarity and accuracy of the scenarios. After these changes, we concluded that no further alterations were necessary, and the study could proceed.

Table 3: Scenarios.

Scenary 1
"You need to gather feedback from users about a new feature implemented. Afterward, you need to materialize this feedback through an electronic presentation to share the results with the team."
Scenary 2
"You need to identify patterns in the data regarding the difficulties and needs of users after the release of the latest update. You've never done this type of activity before and decided to seek assistance in conducting this inspection."

4.2 Execution

The study involved 32 professionals who worked in different companies in Brazil. Of these professionals, 16 were employed in startups and 16 in established companies. The research was conducted through online meetings using the Google Meet platform[2]. R1 and R2 followed the same script to ensure the unbias of the study execution with each session having an average duration of 30 minutes.

The researchers welcomed the participants in each session and briefly outlined the study's objectives. Participants agreed to the informed consent terms for using their data and recording the meeting for academic purposes, and they completed the profile questionnaire. The participants engaged in a warm-up exercise to familiarize themselves with GURiP tool. Participants could freely navigate the tool to level their knowledge of the catalog. The warm-up lasted approximately 5 minutes for each participant.

Once the warm-up was completed, we presented the different scenarios to the participants. Each participant's proposed solutions were expressed verbally using the think-aloud method, in which participants speak aloud any words in their mind as they complete a task (Charters, 2003). The participants' screens and audio were recorded with their permission while utilizing the tool. Based on the participants' responses or speeches, we collected information on which guidelines each professional would use to solve the given scenarios. After the guidelines usage, participants could provide comments or opinions about using the guidelines. Finally, participants were invited to respond to the TAM online questionnaire (Dias et al., 2011).

4.3 Analysis

We considered three sources for data analysis. We conducted a qualitative analysis by considering the feedback responses from open-ended TAM questions and the comments made by participants at the end of the scenario implementations. For the quantitative analysis, we utilized the responses to closed-ended questions from the online questionnaire. R1 and R2 were responsible for the data analysis. Besides, a senior researcher with 20+ years of experience in empirical studies in industry and User Experience research supervised and discussed all results with R1 and R2.

The qualitative analysis followed three steps. First, we utilized closed coding, which involves identifying text excerpts and categorizing them within a pre-established codebook (Corbin, 1998). This technique helped us to explore all responses more thoroughly. Our research involved using a codebook that included three codes to represent the dimensions of TAM (Dias et al., 2011), as well as three codes to identify different professional experiences: those with less than 3 years of experience, those with between 3 and 5 years of experience, and those with more than 5 years of experience. We classified participants' feedback using two codes: 'positive feedback' and 'negative feedback'. Additionally, we assigned open codes to the excerpts. We applied open codes as a second technique to allow the researcher to identify new codes from the analyzed data (Gibbs, 2018). This technique enables the assignment codes and their definitions from a common meaning of the grouped extractions (Charmaz, 2006). We code what the emerging topics are concerning positive and negative feedback. The R1 developed open codes during data analysis, which were later validated and refined by R2.

Finally, we explored participants' acceptance responses regarding using guidelines in the dimensions of *perceived of usefulness*, *perceived of ease-of-use*, and *intention to use* use using the objective questions from the TAM questionnaire (Table 4). In the questionnaire, participants responded on a 4-point Likert scale. We applied a scale without a neutral point to favor a more accurate response and prevent the participant's choice of a neutral point, avoiding a conflict of opinion with the researcher (Garland, 1991; Johns, 2005). We also analyzed whether their profiles influenced technique acceptance.

Table 4: TAM Questions.

Construct	ID	Question
Perceived of Ease-of-use	E1	I find the guidelines easy to understand.
	E2	I consider that interacting with the guidelines demands minimal mental effort.
	E3	I find it easy to apply the guidelines.
	E4	I find that using the guidelines makes my work easier.
Perceived of Usefulness	U1	Using the guidelines helped me in performing UX Research activities.
	U2	Using the guidelines made it easier to perform UX Research activities.
	U3	Using the guidelines improved my performance in UX Research tasks.
	U4	I consider the guidelines useful for performing UX Research tasks.
Perceived of future use intent	F1	Given access to the guidelines, I plan to utilize them.
	F2	Given access to the guidelines, I foresee using it.

[2]https://meet.google.com/.

4.4 Threats to Validity

We adopted the four elements (i.e., conclusion, construct, internal, and external) to discuss the threats to validity (Wohlin et al., 2012) and outlined our strategies to mitigate the study issues. To ensure the reliability of our *conclusions from the results*, we relied on multiple sources of data (i.e., profile questionnaire, scenarios with verbal feedback, and TAM questionnaire that included open-ended questions), as well as a mixed-methods approach for data analysis. Both types of analysis were conducted by the first author and reviewed by the other authors, who are experienced in qualitative and quantitative analyses. During the open and closed coding activities, the first author frequently communicated with the second author, who guided the conducting of the qualitative analysis.

To avoid problems in the *construction validity*, we followed a consistent script in all study sessions and provided the same scenarios to every participant. Furthermore, we included a preliminary scenario to leverage participants' previous knowledge. We also emphasized various guideline categories to reduce the effects of misunderstandings of UX Research and the guidelines as a whole.

We set a maximum duration of one hour for each study session to evade potential participant fatigue, which can threaten *internal validity*. By using the GURiP tool, the participants employed less effort in handling the guidelines usage. All necessary information for implementing the scenarios was available in the tool, including the guidelines' objectives and benefits.

Our study involved 32 participants from startups and established companies, which ensured diversity in their professional experience and roles. This approach helped us obtain a representative sample for our research objectives, securing *external validity*.

5 FINDINGS

The profile of the participants is summarized in Table 5. We observed a balanced representation of professionals from both startups and established companies, as well as various experience levels and job roles.

We will present findings in the two next sections: guidelines acceptance and the influence of participants' profiles on the results.

5.1 Acceptance of the Guidelines

The participants' responses are shown in Figures 2 and 3. In the figures, we see that participants from startups and established companies highly accepted the guidelines in general. However, a different result can be observed in Figure 3 about the *Perceived of Usefulness* dimension. By crossing the participants' profiles with the results, we saw that Participant P04, who works for a startup with over 5 years of experience, assigned low scores to all questions for that construct. Unfortunately, we could not find an explanation for the low scores because the participant did not point out the reasons.

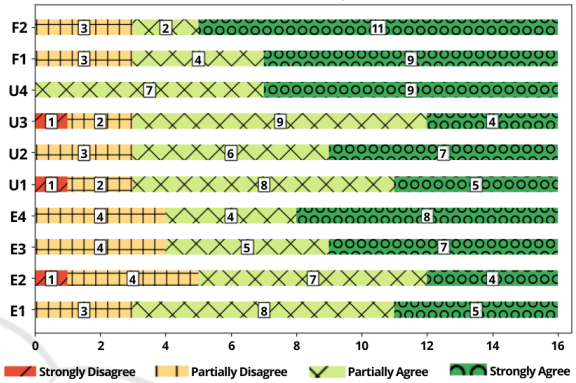

Figure 2: Acceptance results of professionals from established companies.

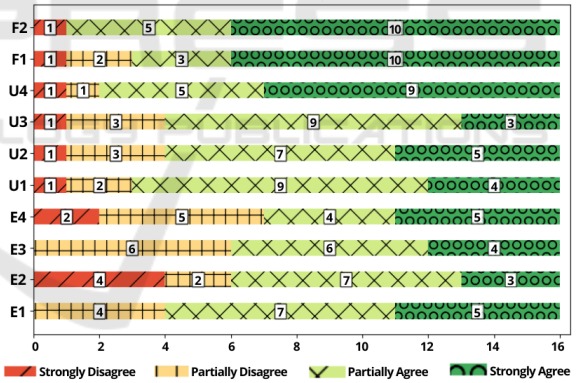

Figure 3: Acceptance results of professionals from startups.

To provide a supplementary view of the TAM results, we examined the comments made by the participants and their relationship with the TAM constructs. Figure 4 shows a Sankey diagram[3] that illustrates the link of the open codes (on the left side) and their association with the corresponding TAM construct (on the right side). The open codes emerged in the qualitative analysis and expressed the positive or negative feedback provided by the participants. In Figure 4,

[3]Sankey diagram is a flow diagram in which the width of the arrows is shown proportionally to the flow quantity. It helps locate dominant contributions to an overall flow (Schmidt, 2008).

Table 5: Participants' profile.

Id	Group*	Position	Experience	Market segment
P01	EC	UX Researcher	<3 years	Data and credit granting
P02	EC	UX Coordinator UX	<3 years	Tourism / Services
P03	SS	UX Researcher	>5 years	Venture Capital
P04	SS	UX Researcher	>5 years	Fintech
P05	EC	UX Designer, UX Researcher	>5 years	Product and Design Consulting
P06	SS	UX Designer, UX Researcher	<3 years	Healthtech
P07	EC	UX Designer, UX Researcher	3 to 5 years	Information Technology
P08	SS	Product Manager	<3 years	Fintech
P09	EC	UX Researcher	>5 years	Edtech
P10	SS	UX Researcher	3 to 5 years	Agtech
P11	SS	UX Researcher	<3 years	Tourism / Services
P12	EC	UX Designer, UX Researcher	3 to 5 years	Information Technology
P13	EC	UX Researcher	>5 years	Fintech
P14	SS	UX Researcher, Product Designer	<3 years	Information Technology
P15	EC	Software Engineer, Tech Lead	3 to 5 years	Edtech
P16	SS	UX Designer	3 to 5 years	HRtech
P17	SS	UX Researcher	>5 years	Accounting
P18	SS	Research Project Consultant	>5 years	Logistics
P19	EC	UX Designer	<3 years	Information Technology
P20	EC	UX Researcher	3 to 5 years	Telecommunications
P21	SS	Product Designer	<3 years	Information Technology
P22	SS	UX Designer	>5 years	Information Technology
P23	SS	UX Designer, UX Researcher	<3 years	Information Technology
P24	SS	Developer	<3 years	Accounting
P25	SS	UX Designer, UX Researcher	3 to 5 years	Digital and In-person Events
P26	SS	Software Engineer, UX Researcher	>5 years	Logistics
P27	EC	Project Manager	<3 years	e-Commerce
P28	EC	R&D Analyst	<3 years	R&D Consulting
P29	EC	SAP Business Consultant SAP	<3 years	Information Technology
P30	EC	Project Manager	3 to 5 years	e-Commerce
P31	EC	Software Developer	3 to 5 years	Information Technology
P32	EC	Software Engineer, Tech Lead	>5 years	Information Technology

**Legend: SS to Software Startup; EC to Established Company.*

the width of the arrows illustrates the number of quotations and helps identify each column's main contributions toward the overall flow. For each open code, we indicate whether the feedback was positive, negative, or both by using the labels **+**, **-**, and **+/-** for both), respectively. Besides, the number of the participant's quotations for each open code and TAM construct is informed between brackets in the figure. By looking at Figure 4, we observe that positive feedback is mostly related to the constructs of *Perceived of Usefulness* and *Intention to Use*. In contrast, negative feedback is primarily linked to the *Perceived Ease-of-use* of the guidelines.

Regarding the *Perceived Ease-of-Use* construct, we identified 15 instances of the label *quantity of text*, predominantly associated with negative feedback. Participants noted that excessive details about the content of the guidelines made it more challenging to find guidelines that were useful for each scenario; it can be seen from P27 comment: *"Some long texts make it challenging to quickly understand each block of information."* On the other hand, the open code *division of categories* emerged as a recurring theme related to positive feedback in the *Perceived Ease-of-Use* construct. It was observed that adopting categories to group the guidelines made finding the suitable guidelines easier as expressed by P03: *"The breakdown of training, collection, analysis [categories]... feels more intuitive."*.

Considering the constructs of *Perceived of Usefulness* and *Intention to Use*, participants expressed a favorable view of the guidelines' content, particularly emphasizing its high quality for newcomers in the UX research area: *"The tool, I think it's pretty cool, especially helpful for someone who's just starting in the career or even those who sometimes need to conduct research without much guidance."*, commented P16. Additionally, participants recognized the value of the content of the guidelines as an introductory resource for beginners and a valuable tool for seasoned professionals seeking to explore and adopt innovative methods and techniques in their work, as mentioned by P20: *"Method visualization helps a lot when we have complex research to conduct and end up getting stuck in using method X or Y. This way, we can freshen up our ideas a bit"*.

5.2 Influence of Participants' Profile in the Results

We conducted two tests to investigate the potential influence of participants' profiles on the results. First,

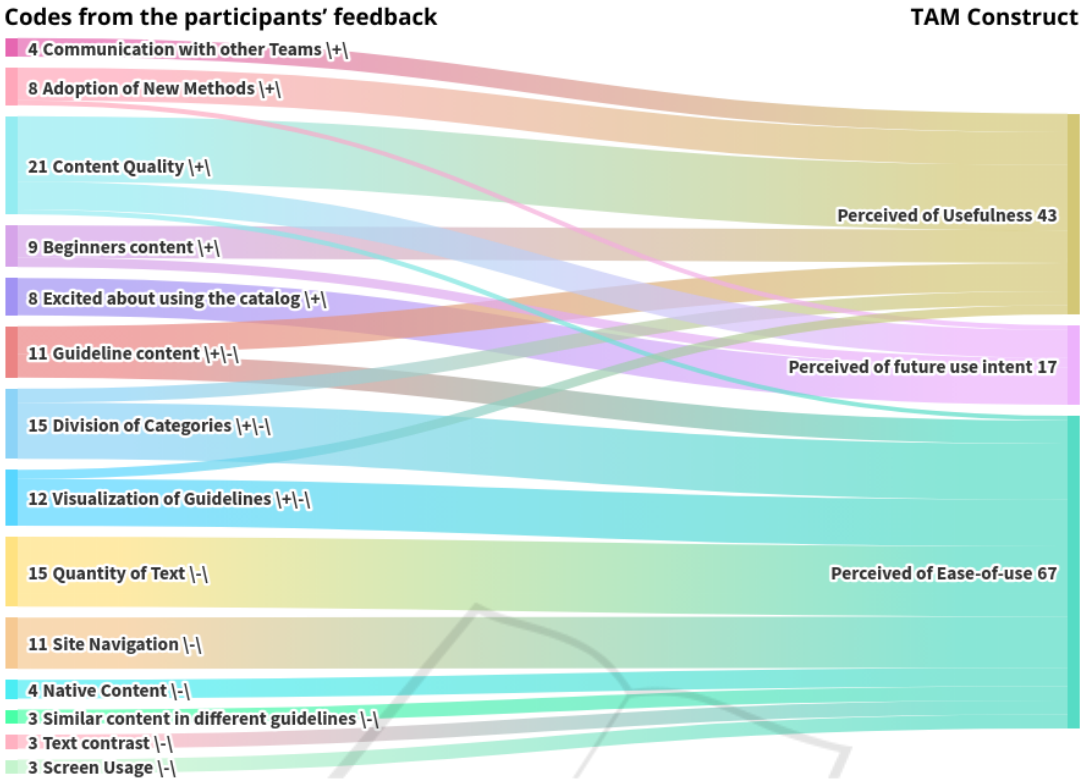

Figure 4: Relation of the participants' feedback (open codes) and the TAM constructs.

we explored whether the fact that the professionals are working in startups and established companies could affect the participants' responses about acceptance of the guidelines. We carried out this verification because startups and established companies present different dynamics in their workplace and consequently, their professionals usually have different perspectives about the work. To conduct the verification, we computed the mean and median values for each TAM construct, splitting the professionals' responses into two groups, i.e., startups and established companies (see Table 6 and the boxplots in Figure 5). We see a small difference in the average when comparing the values of startups and established companies. In particular, by looking at Figures 2 and 3, we see a difference in the *Perceived of Usefulness*, i.e., in E2 and E4 questions. The results showed that some participants considered they should employ mental efforts to use the guidelines (i.e., E2) and also that the guidelines will not make their work easier (i.e., E4).

We performed the Independent Samples T-Test test[4]. This choice was based on the paired and independent nature of the samples and the observed normal distribution. The latter was confirmed through the Shapiro-Wilk test (Shapiro and Wilk, 1965). Shapiro-

[4]https://www.statstest.com/independent-samples-t-test

Table 6: Mean and Median for each group.

Construct	Group	Mean	Median
Perceived of Ease-of-use	Startup	2.8	3.0
	Estabilished Company	3.1	3.0
Perceived of Usefulness	Startup	3.06	3.0
	Estabilished Company	3.21	3.25
Perceived of future use intent	Startup	3.43	4.0
	Established Company	3.43	4.0

Wilk test was conducted at a significance level of 95% (i.e., 0.05) to assess the distribution of samples for each TAM construct. The results indicated that samples from established companies and startups demonstrated a normal distribution as outlined in Table 8. To conduct the Independent Samples T-Test, we defined the null hypothesis (H0) and alternative hypothesis (H1) as follows: *H0 - There is no influence of workplace type on the acceptance of the technique.*, and *H1 - There is an influence of workplace type on the acceptance of the technique.* Table 7 presents the results (see *p-value*) and they indicate that no significant evidence supports the idea that the fact of the professional works in a startup or an established company influenced the acceptance of the guidelines.

After, we verified whether the participants' expe-

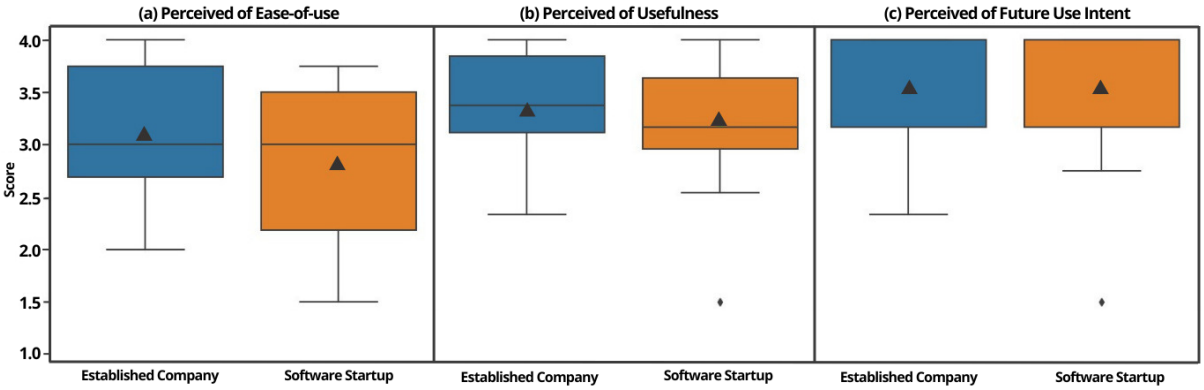

Figure 5: The scale ranged from 1, indicating 'strongly disagree,' to 4, representing 'strongly agree'. The median: a horizontal line inside the 'box'; the mean: a black triangle.

Table 7: Independent Samples T-Test.

Influence of the type of company		
Construct TAM	**t value**	**p value**
Ease-of-Use	-0,894	0,379
Perceived of Usefulness	-0,085	0,933
Use intent	-0,096	0,924

Table 8: Shapiro test.

Construct	Group	p value	Normal Distribution
Perceived of Ease-of-use	Startup	0.06	Yes
	Stabilished Company	0.16	Yes
Perceived of Usefulness	Startup	0.07	Yes
	Stabilished Company	0.14	Yes
Perceived of future use intent	Startup	0	No
	Stabilished Company	0	No

rience influenced their acceptance of the guidelines by performing Fisher's exact testing [5]. We divided the participants into three groups based on their experience level: <3 years, 3 to 5 years, and >5 years. The Fisher's exact test compares categorical data from small sample sizes. This test accurately calculates the significance of the deviation from a null hypothesis using the p-value, providing a more reliable result than other methods. Unlike alternative methods, exact significance tests do not require a well-distributed or balanced sample, which aligns well with the characteristics of our sample (Mehta and Patel, 1996). We established a 95% confidence interval (i.e., 0.05) to reduce errors in the findings. To perform the Fisher exact test[6], we formulated the hypotheses as follows: *H0 - The experience of the professional does not affect the acceptance of the guidelines.* and *H1 - The experience of the professional affects the acceptance of the guidelines*. The *p-value* results for each TAM question are presented in Table 9, which leads us to accept the null hypothesis for all questions. The results suggest no statistical evidence that professional experience affects the acceptance of the guidelines.

Table 9: Exact Fisher test results.

TAM	Professional experience	1	2	3	4	p-value
E1	<3 years	0	2	7	4	0,2602
	3 to 5 years	0	1	3	5	
	>5 years	0	4	5	1	
E2	<3 years	2	4	4	3	0,5129
	3 to 5 years	0	1	6	2	
	>5 years	3	1	4	2	
E3	<3 years	0	3	5	5	0,6531
	3 to 5 years	0	2	4	3	
	>5 years	0	5	2	3	
E4	<3 years	1	1	5	6	0,0948
	3 to 5 years	0	4	0	5	
	>5 years	1	4	3	2	
U1	<3 years	0	2	8	3	0,2849
	3 to 5 years	0	0	4	5	
	>5 years	2	2	5	2	
U2	<3 years	0	4	4	5	0,0801
	3 to 5 years	0	0	3	6	
	>5 years	1	2	6	1	
U3	<3 years	0	4	6	3	0,2274
	3 to 5 years	0	0	6	3	
	>5 years	2	1	6	1	
U4	<3 years	0	0	5	8	0,2355
	3 to 5 years	0	0	2	7	
	>5 years	1	1	5	3	
F1	<3 years	1	2	0	10	0,0364
	3 to 5 years	0	0	4	5	
	>5 years	0	3	3	4	
F2	<3 years	1	1	1	10	0,2248
	3 to 5 years	0	0	2	7	
	>5 years	0	2	4	4	

[5]https://www.statstest.com/fischers-exact-test/.
[6]We ran tests from https://astatsa.com/.

6 DISCUSSION

This article proposed a catalog of guidelines to help professionals select and apply UX research. The guidelines were developed from an SLR previously published by the second author (Martinelli et al., 2022). This approach of constructing guidelines based on experiences extracted from the literature and categorizing them is similar to the work (Kervyn de Meerendré et al., 2019). Additionally, similar to the (Oliveira et al., 2023) proposal, our catalog is a tool to assist professionals in selecting UX practices. However, our proposal is more comprehensive than the cited works, as it presents more than guidelines and categories. The catalog joins a set of useful information to adopt UXR practices, such as the professionals involved in that practice, UXR methods that can be adopted, as well as suggestions on how to implement the practices (see an example in Figure 1).

In contrast to previous studies (Alhadreti, 2020; Kieffer et al., 2019) our guidelines are not strictly tied to software development stages, allowing for more flexibility in their implementation. Our guidelines are intended to address the lack of knowledge about UX methods and the incorporation of UX Research into agile practices, topics discussed by literature (Majrashi and Al-Wabil, 2018; Rivero and Conte, 2017; Meingast et al., 2013). The catalog serves as a source of knowledge that can help professionals in companies to find the practices that best suit their needs, as evidenced by the results of the catalog evaluation (see Section 5.1).

Considering the evaluation, we see that the participants generally found the guidelines useful for conducting UX Research activities and expressed interest in utilizing them in the future (see Figures 2 and 3). This overview suggests a positive reception of the guidelines and the catalog among professionals in the software industry. Our results also revealed that novices recognize the guidelines and the catalog as a valuable resource to assist them in their daily work (see Section 5.1).

We also verified whether the participants' professional profiles impacted the guidelines' acceptance. We considered the company type they worked for, i.e., startups or established companies, and their years of experience (see Section 5.2). From statistical tests, we concluded that the participants' profiles did not significantly impact the acceptance of guidelines. This confirmed that the guidelines can be adopted by professionals of different job positions and from different companies.

7 CONCLUSION AND FUTURE WORK

In this paper, we presented a set of 14 guidelines to support software professionals in the implementation of UXR practices. The guidelines were elaborated based on extractions from the literature that considered UXR practices applied in the industry. The guidelines were grouped into categories and presented recommendations for applying UX Research methods and techniques. We developed an online interactive catalog to make it accessible from the web. We evaluated the acceptance of guidelines with 32 UX and software professionals who worked from both startups and established companies.

The results showed that our guidelines were useful for professionals from startups and established companies, regardless of their experience levels in the software industry. Participants from both groups expressed positive feedback about the tool's ease of use, perceived usefulness, and use intention. As positive points, the professionals were enthusiastic about using the catalog and highlighted the quality of the content in the GURiP tool. However, the amount of text in the guidelines, the navigation of the catalog, and the color contrast of the texts are negative points of the GURiP tool from professionals.

As contributions, our study provides evidence that the guidelines are beneficial for professionals engaged in UX Research activities, particularly for beginners. These initiatives aim to address an identified gap in the literature by offering practical support and guidance to professionals, especially those in the early stages of their careers. In future work, we plan an assessment to check whether the suggested practices, methods, and techniques can meet the needs of UX Research. Besides, we will conduct a usability evaluation of the online catalog.

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