

# Current State of Agile User-Centered Design: A Survey <sup>\*</sup>

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**Abstract.** Agile software development methods are quite popular nowadays and are being adopted at an increasing rate in the industry every year. However, these methods are still lacking usability awareness in their development lifecycle, and integration of usability/User-Centered Design (UCD) into agile methods is not adequately addressed. This paper presents the preliminary results of a recently conducted online survey regarding the current state of the integration of agile methods and usability/UCD. The survey was responded by 92 practitioners throughout the world. The results show that the majority of practitioners perceive that the integration of agile methods with usability/UCD has added value to their adopted processes and to their teams; has resulted in the improvement of usability and quality of the product developed; and has increased the satisfaction of the end-users of the product developed. The top most used HCI techniques are low-fidelity prototyping, conceptual designs, observational studies of users, usability expert evaluations, field studies, personas, rapid iterative testing, and laboratory usability testing.

**Keywords:** Agile Methods, Extreme Programming, Scrum, Usability, User-Centered Design, Survey.

## 1 Introduction

Agile software development methods are quite popular nowadays and are being adopted at an increasing rate in the industry every year. Recently, Dyba and Dingsoyr [1] presented a good review on the empirical studies of agile software development. However, agile methods are still lacking usability awareness in

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their development lifecycle, and integration of usability/User-Centered Design (UCD) into agile methods is not adequately addressed. Holzinger [2] points out the need of the awareness of various usability methods by software practitioners and applying them according to the context of a project.

The efforts of integrating usability/HCI into software engineering have already been carried out for many years, e.g., IFIP WG 2.7/13.4<sup>3</sup> working group has been formed [3]. A recent work is compiled by Seffah et al. [4] in the form of book containing chapters about various aspects of the integration of usability into the development process. However being recent and emerging idea of agile methods, there has not been much work carried out regarding the integration of usability/UCD into agile methods. The research carried out and presented in this paper aims at filling out this gap and presents the preliminary results of a recently conducted online survey regarding the current state of the integration of agile methods and usability/UCD. The data was collected from 92 practitioners throughout the world. The results show that the majority of practitioners perceive that the integration of agile methods with usability/UCD has added value to their adopted processes and to their teams; has resulted in the improvement of usability and quality of the product developed; and has increased the satisfaction of the end-users of the product developed. The top most used HCI techniques are low-fidelity prototyping, followed by conceptual designs, observational studies of users, usability expert evaluations, field studies, personas, rapid iterative testing, and laboratory usability testing, respectively.

The next section thoroughly describes related literature studies. Section 3 describes details about the research method. Section 4 describes the results. Section 5 concludes the paper with future work.

## 2 Related Literature Studies

This section presents related work into two sub-sections: Related studies on agile usability/UCD in general and studies regarding surveys on agile methods and usability/UCD.

### 2.1 Related Studies on Agile Usability/UCD

In 2002, Kent Beck and Alan Cooper discussed the integration of XP, one of the popular agile methods, and interaction design and concluded that both approaches have strengths that can be integrated [5]. The focus of both methodologies on delivering value and on customers/users, as well as their iterative nature and continuous testing make it possible to integrate them and reduce the shortcomings of each methodology, as agile methods need to know their true end-users and UCD benefits from a flexible and adaptive development methodology which runs throughout the project life-cycle [6]. Several studies exist that examine various aspects of the integration of agile methods and usability/UCD.

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<sup>3</sup> <http://www.se-hci.org/>

Patton [7] gives details about the way of integrating interaction design into an agile process. Recently, Patton [8] describes the twelve best practices for adding user experience (UX) work to agile development. In their ethnographic field study, Chamberlain et al. [3] have described a framework for integrating UCD into agile methods. Armitage provides the guidelines for designers to work within agile methods [9]. Hodgetts [10] reports about his coaching experience for the integration of user experience design with agile methods. McNerney and Maurer [11] report positive results when they interviewed three UCD specialists for integrating UCD within agile methods. Miller [12] describes her experience about parallel tracks of interaction designers and developers that are highly connected and interleaved so that interaction designers were always one iteration ahead. Blomkvist [13] describes the core principles of agile methods and UCD and outlines a model for bridging agile methods and UCD. Sy [14] describes about her company's process of integrating agile methods with UCD in detail. Using Grounded Theory qualitative method, Ferreira et al. [15][16] have investigated several projects for the integration of UI design and agile methods. Fox et al. [17] also conducted a Grounded Theory qualitative study and describe the integration of agile methods and UCD in the industry.

Approaches to integrate agile methods and HCI practices vary. Constantine and Lockwood [18] focus on models in their agile usage-centered design. Kane [19] suggests integrating discount usability with agile methods. Beyer et al. [20] describe how Contextual Design, a UCD method, fits with agile methods. Meszaros and Aston [21] report to introduce usability testing based on paper prototypes into agile methods. Lee [22] describes combining scenario-based design, a usability engineering process, into agile methods. Obendorf and Finck [23] have described the integration of XP and scenario-based usability engineering. Brown et al. [24] report about using various artefacts like stories, sketches, and lists between interaction designers and agile developers. Ungar [25] describes the benefits of introducing Design Studio into the agile UCD process. Broschinsky and Baker [26] report about the successful use of personas in the XP process. Ambler [27] discusses strategies for tailoring user experience into agile methods using agile model-driven development. Wolkerstorfer et al. [28] and Hussain et al. [6], [29] have reported about the integration of various HCI techniques, e.g., field studies, personas, usability tests, paper prototypes, usability expert evaluations, etc., into their agile process. In the report of the special interest group regarding agile user experience, Miller and Sy [30] have drawn upon uncovering the best practices for agile UCD. Budwig et al. report about the experience of UX teams working in Scrum, one of the popular agile methods, and describe the challenges, issues, and their solutions that they implemented to resolve those issues. Sy [31] describes "a framework for creating multi-sprint designs and getting them implemented without violating the Agile taboo against big design". In their case study Federoff et al. describe the struggle of UX teams when transitioning to agile development [32]. Many of the studies mentioned above provide only anecdotal views and there is a need for quantitative as well as qualitative research in this area.

## 2.2 Related Studies regarding Surveys on Agile Methods and Usability/UCD

There are few survey studies exclusively regarding agile methods which cover various aspects including their effectiveness and the potential problems [33][34][35][36][37]. Recently, two surveys were conducted among agile professionals for evaluating the success factors in agile software development projects and practices [38],[39]. None has mentioned usability/UCD.

There are various survey studies regarding usability, usability professionals, and user-centered design dating back to 1993-94 [40],[41]. In the survey of Gunther et al. [42], the highly rated HCI techniques were usability testing followed by prototyping and heuristic evaluations. The survey results of Vredenburg et al. [43] show that UCD methods are gaining extensively acceptance in industry. Gulliksen et al. [44] conducted a survey of usability profession in Sweden, showing that usability and user involvement has low priority in commercial projects. The highly rated HCI techniques were thinking aloud, lo-fi prototyping, interviews, field studies, and scenarios, respectively. In their survey study, Jerome and Kazman [45] point out the lack of coordination between developers and HCI practitioners. Surprisingly, heuristic evaluation was the least used technique. Ji and Yun [46] also conducted a survey in Korea among developers and usability practitioners, showing that both practitioners have difference between the type of output and customer requirements, and practitioners perceive that usability/UCD methods have improved the usability of the product developed. In Switzerland, Vukelja et al. [47] conducted a survey among developers regarding the focus on design and development of user interfaces. Their results show that without the involvement of HCI practitioners, developers frequently develop user interfaces, and usability tests are rarely conducted. Zhou et al. [48] conducted their UCD survey in China showing that UCD methods can improve users' satisfaction and the competitiveness of products developed. Recently in Norway, Bygstad et al. [49] conducted their survey regarding the integration of software development methods and usability. Their results show that usability testing is perceived less important than usability requirements, and companies perceive that both software development methods and usability are integrated. Most companies use their own software development methods, followed by RUP, and Microsoft solution framework, while XP/agile methods were the least used methods. This study does not specifically focus on the integration of agile methods and usability. In a recent study, Dayton and Barnum [50] have conducted two surveys regarding the impact of UCD within one company before and after moving to agile methods. Focusing mainly on usability testing, the results show that after transitioning to an agile process, the company perceives that the use of informal usability tests fit better with the agile process and are as effective as the formal usability tests conducted in a laboratory. This study mainly presents the results from a technical communicator's point of view, focuses on usability tests, presents views from just one company, and does not address other usability/HCI techniques.

To the best of our knowledge, no survey study has been conducted which specifically addresses the integration of agile methods and usability/UCD, focuses on both developers and usability professionals working in agile methods throughout the world, the HCI techniques used into agile methods, and their impact on the increased quality/usability of the products developed. Our research aimed at filling out this gap by conducting a survey and analyzing its results.

### 3 Method

This study used the online web-based survey methodology while covering both quantitative as well as qualitative research methods. A questionnaire was designed containing both close-ended multiple-choice questions and open-ended questions. A 5-point Likert scale was used for the close-ended multiple-choice questions. In total, there were 28 questions ranging from demographic questions to agile methods and practices, as well as HCI techniques and the impact of the integration of agile methods and usability/UCD. For the validity, usefulness, and readability of the survey content, feedback was received from two of the pioneers and experts in the field of agile usability/UCD.

The survey was targeted at practitioners (mostly usability professionals and also developers) working in agile methods that integrate some HCI techniques, or where the role of a usability professional is practiced by someone in their agile team, or who have some usability/UCD awareness in their processes. The survey was posted and distributed to agile-usability and XP Yahoo groups, CHI mailing list, Austrian HCI-UE group, British HCI group, and through personal networks. The survey was implemented by using the open source survey tool “LimeSurvey”. The survey was started in the second week of June 2009 and was closed after five weeks with 92 responses. Table 1 shows the various job titles of the respondents. The job title ‘Other’ includes a product manager, an analyst, a technical writer/usability, a business analyst, an academic researcher in HCI, and a researcher/programmer/student.

Job title	Frequency	Percent
Executive / Director	14	15.22%
Project / Program Manager	12	13.04%
Developer / Software Engineer / Programmer	16	17.39%
Usability Engineer / UI/UX/Interaction Designer	33	35.87%
Consultant	11	11.96%
Other	6	6.52%

**Table 1.** The various job titles of the 92 respondents

Table 2 shows the location of the respondents.

Table 3 shows the experience of the respondents in agile methods.

Location	Frequency	Percent
Europe	42	45.65%
North America	35	38.04%
Australia & New Zealand	6	6.52%
South & Central America	4	4.35%
Asia	3	3.26%
Africa	2	2.17%

**Table 2.** Locations of the 92 respondents

Experience	Frequency	Percent
1 Year	21	22.83%
2 - 5 Years	47	51.09%
6 - 10 Years	11	11.96%
11 - 20 Years	5	5.43%
No answer	8	8.70%

**Table 3.** Experience of the 92 respondents in agile methods

## 4 Results

This section presents the preliminary results.

**Agile Software Development Methods:** Scrum is highly used among various agile software development methods followed by Extreme Programming (XP), proving the consistency of their growing adoption in industry. Table 4 shows the various agile methods used. Note that multiple answers were possible to select. The 'Other' option in agile methods contains TSP/Agile Fusion, agile UCD, and home grown methods within the company.

Method	Frequency	Percent
SCRUM	62	67.39%
Extreme Programming (XP)	44	47.83%
Lean Development	17	18.48%
Agile Unified Process/ Open UP	9	9.78%
Pragmatic Programming	7	7.61%
Crystal Methods	5	5.43%
Adaptive Software Development	3	3.26%
Other	11	11.96%

**Table 4.** The various agile methods used (multiple answers possible)

**HCI Techniques Used:** As can be seen from Table 5 top most used HCI techniques are low-fidelity prototyping, followed by conceptual designs, observational studies of users, usability expert evaluations, field studies, personas, rapid iterative testing, and laboratory usability testing, respectively. Note that multiple answers were possible. The 'Other' option in HCI techniques used contains contextual inquiry, non-formal usability tests (in person), participatory design, thorough UI specifications, high-fidelity prototyping, and model-driven inquiry. The use of low-fidelity prototyping, usability expert evaluations, and rapid iterative testing easily fit within the fast moving iterations of agile methods. The results are slightly different from those of [41][42][43][44][46][48].

HCI Techniques	Frequency	Percent
Low-Fidelity Prototyping	63	68.48%
Conceptual Designs	55	59.78%
Observational Studies of Users	52	56.52%
Usability Expert Evaluations	47	51.09%
Field Studies	43	46.74%
Personas	41	44.57%
Rapid Iterative Testing	37	40.22%
Laboratory Usability Testing	36	39.13%
Needs Analysis	33	35.87%
Goal-Directed Design	27	29.35%
Remote Usability Testing	24	26.09%
Conceptual Inquiry	24	26.09%
Ethnographic Research	21	22.83%
Automated Usability Evaluations	7	7.61%
Other	11	11.96%

**Table 5.** The various HCI Techniques used (multiple answers possible)

### **The Impact of the Integration of Agile Methods and Usability/UCD:**

The majority of the respondents perceive that the integration of agile methods with usability/user-centered design has added value to their adopted process and to their teams, as most have selected 'Strongly Agree' or 'Agree' options. Table 6 shows the answers in frequency and percent. Only 4 respondents have selected 'Disagree' or 'Strongly Disagree'.

In Table 7, it is clear that most respondents perceive that the adoption of the agile user-centered design process by their teams has resulted in the improvement of usability and quality of the product developed.

In connection to the usability of the products, the majority of the respondents also perceive that due to the agile user-centered design process adopted by their teams, the resulting product has increased the satisfaction of its end-users (See Table 8).

Answer	Frequency	Percent
Strongly Agree	27	29.35%
Agree	40	43.48%
Neutral	7	7.61%
Disagree	2	2.17%
Strongly Disagree	2	2.17%
Don't know / no answer	14	15.22%

**Table 6.** The integration of agile methods with usability/UCD has added value to the adopted process and to the teams

Answer	Frequency	Percent
Strongly Agree	19	20.65%
Agree	41	44.57%
Neutral	10	10.47%
Disagree	6	6.52%
Strongly Disagree	2	2.17%
Don't know / no answer	14	15.22%

**Table 7.** The adoption of an agile UCD process has resulted in the improvement of usability and quality of the product developed

Method	Frequency	Percent
Strongly Agree	20	21.74%
Agree	38	41.30%
Neutral	5	5.43%
Disagree	5	5.43%
Strongly Disagree	2	2.17%
Don't know / no answer	22	23.91%

**Table 8.** The resulting product has increased the satisfaction of its end-users due to the adoption of an agile UCD process



## 5 Conclusion

Agile software development methods are flexible, iterative, and lightweight, so it is easy to integrate usability/HCI techniques into them. The focus of both methodologies on delivering value and on customers/users, as well as their iterative nature and continuous testing make it possible to integrate them [6]. The survey results support this as the majority of respondents perceive that the integration of agile methods with usability/user-centered design has added value to their adopted process and to their teams. They also perceive that the adoption of agile user-centered design process by their teams has resulted in the improvement of usability and quality of the product developed and has also increased the satisfaction of its end-users. The results are consistent with [46][48].

The top most HCI techniques used are low-fidelity prototyping, followed by conceptual designs, observational studies of users, usability expert evaluations, field studies, personas, rapid iterative testing, and laboratory usability testing, respectively. The use of low-fidelity prototyping, usability expert evaluations, and rapid iterative testing easily fit within the fast pace of agile methods. Other techniques can be adapted using two parallel tracks of interaction designers and developers [14].

The preliminary results are presented in this paper. Detailed statistically analyzed results will be provided in future covering broader aspects of the integration of agile methods and usability/user-centered design. The results are promising and increase the hope that both communities of usability professionals and agile practitioners can work even closer for creating successful products so that the use of those products can be brought to their full potential.

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