COMPARING USER-CENTERED PRACTICES IN AGILE VERSUS NON-AGILE DEVELOPMENT

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ABSTRACT

A large variety of methods and techniques are being used within user-centered design. This article explores the differences in methodology and strategy when doing user-centered design within agile versus non-agile development processes. Methods and techniques reported in user-centered agile development is analyzed and compared with those used in non-agile processes. The findings indicate systematic differences, pointing to the fact that the term “user centered” does not carry the same meaning when used within the agile framework compared to the non-agile design methodology. This discrepancy is something we believe is of interest to the IxD/UX-community as well as the agile community.

1 INTRODUCTION

Interaction design (IxD) is a multidisciplinary field, encompassing a variety of approaches. Systematic investigations of work practices and knowledge on the effect of these are areas of interest for interaction design research. As agile development has in recent years had a growing popularity (AgileScout, 2013), more of the interaction designer’s work is done within the framework of agile process models. A study conducted by VersionOne (2013) report a significant increase in the number of companies employing agile development strategies, and using agile teams. Scrum – as perhaps the most well known method – is the most forward trend. At the same time, the focus on user interactions, user experience and employing user involvement as a strategy to ensure usability has increased.

User-centered design (UCD) is a widely used design strategy within IxD today, with a broad range of methods, strategies and techniques being employed. Agile process models are mainly developed with regards to software engineering (AgileManifesto), but with the increased interest in user-centered processes, it has recently been attempted to integrate the methods of UCD into agile development processes. In 2011 Silva da Silva et.al. conducted a systematic review to shed light on what practices for UCD was used within agile development processes (Silva da Silva et.al. 2011). Their review identified some common strategies and topics, and they suggested an agile process model they deemed fitting for integrating UCD into agile development. The agile user-centered methodology suggested based on their literature survey appear somewhat different than the values and focus of traditional user centered design methodology. We found this an interesting topic to study further. This article therefore investigates methods utilized in user-centered agile processes compared to those reported used in non-agile user-centered processes. Our starting point is an update of Silva da Silva et.al.’s review (2011) to verify the agile UCD method use, with a subsequent survey on methods reported used in non-agile user-centered development and finally an analysis and comparison of the findings.

2 METHODOLOGY

By discussing what is already known, one can point out shortcomings and contradictions surrounding the existing knowledge (Jesson et.al. 2011). Machi and McEvoy (2009) describe how a literature survey may provide distinct contributions through creating new perspectives. The research question for this study was whether or not there are differences in the user-centered methodology utilized in “traditional”, non-agile processes compared to those being used when user-centered design are mated with agile development processes. Thus, a review of literature is a fitting research method for investigation (review research).
A systematic review is a type of literature survey that attempts to identify, assess and systemize all empiric evidence adhering to the pre-determined selection criteria for the study (The Cochrane Library). Silva da Silva et al.’s is such a systematic overview (2011). This article is however less ambitious in terms of the number of databases and search-string keywords. It is more aligned with a comparison study, looking into methods reported in published literature on user-centered but not agile processes compared to the methods used in cases reported as user-centered and agile. The article categorizes and compares the methodological approaches. In addition, the focus of the literature is analyzed - whether reporting using only expert-driven methods versus also including user-involved techniques, whether using only low-contact methods versus utilizing medium to high-contact methods also (see Figure 1) and whether focusing solely on interface usability design and testing versus emphasizing all four phases specified in the ISO 9241-210 standard for human-centered design (see Figure 2).

2.1 Terminology

Agile development is terminology used for strategies that rely on an incremental approach to development (Sommerville 2011). An incremental process develops a larger system by partial deliveries. An iterative process describes a strategy where something is produced, then evaluated, and next refined. Agile processes have several similarities to models for user-centered design, as both recommends incremental and iterative strategies. Scrum is an example of an agile process model practicing incremental and iterative development; the model suggests sprints typically lasting from 2-4 weeks where partial deliveries are produced and tested/evaluated (Scrum Alliance 2013). In this literature survey, agile covers development strategies such as Scrum, XP and lean.

The term user centered design (UCD) is used for processes focusing on users’ needs and abilities in design, development and evaluation of systems and solutions. According to Usability Professionals’ Association, UCD is “an approach to design that grounds the process in information about the people who will use the product”. The term is however quite loosely defined and used. Hartson and Pyla (2012) explain UCD as focusing on people, not technology – thus surpassing usability and including focuses on user experience and user-interactions.

There are different degrees of user involvement included within user-centered strategies. UCD includes strategies were the knowledge of users needs lies within the designer and developer. Here, the user has no physical presence in the process, and does not give explicit contributions. On the other hand, UCD includes participatory design (PD) strategies, were the user is considered part of the design team. User representatives are included throughout the process, and users’ ideas and opinions are clearly voiced. As a middle ground we find strategies that include users to some degree, where users provide input and are somewhat involved. Figure 1 illustrates the different degrees of user involvement within UCD; from knowledge of the user gathered by the designer, via direct feedback and input from users, to users actively participating with their own ideas as co-designers.

![Figure 1: Different degrees of user involvement within UCD](image_url)

Further, specific methods may have different degrees of user contact, often categorized as of “high”, “medium” or “low” contact. The degree is defined through the amount of direct/indirect contact one has with the user. Methods that provide in-depth, direct contact with users and involve users actively in a process are “high contact”. Examples are PD techniques and workshops with users. In the “low” category is methods were one does not, or only indirectly, meets and involve users – such as web-analysis, and surveys, or personas and scenarios where a fictitious, representative user is created. Of “medium” contact are methods with some direct contact and/or indirect user involvement, such as using probes and design provocations. Note that categorizations may vary depending on specific usage in a case, for example different variants of interviews, observations and usability evaluations. Processes including high-contact methods will become more user-involved than those mainly utilizing low-contact methods.
UCD processes are commonly conducted based on the ISO 9241-210 standard (Figure 2), consisting of 4 phases; understanding context, specifying needs, producing design and evaluating solution. The first two phases are aimed at user research and analysis, while the latter two are aimed at producing design solutions. The standard specifies 6 principles: UCD as 1) based on explicit understanding of users, tasks and environments, 2) involving users throughout the design and development, 3) in an iterative process, 4) driving and refining the design through user-centered evaluation, 5) addressing the whole user experience and 6) multidisciplinary design team.

![Diagram of UCD process](image)

*Figure 2: ISO 9241-210:2010 - Human-centred design for interactive systems*

### 2.2 Methods Used in Agile UCD

An update on the 2011 Silva da Silva et.al. review was conducted to ensure findings are current and comparable, limited to the timespan 2011-2014 and completed in 2014. The following 5 databases were searched for new publications; IEEE Xplore Digital Library, Elsevier ScienceDirect, CiteSeer, ACM Digital Library and SpringerLink (the same as in Silva da Silva et.al. (2011) with the exception of the Scopus database). The search returned 30 articles (including Silva da Silva et.al. 2011). 16 of these are considered relevant; describing methods used in agile user-centered design and discussing agile/UCD integration. All included articles have been peer-reviewed. Table 1 lists these as used. Each of the paper authors have read and analyzed all the included articles from this search at least twice. Findings were subsequently shared, discussed and aligned. The results indicate there have not been substantial changes in methods used in user-centered agile processes in recent years.

<table>
<thead>
<tr>
<th>Database</th>
<th>Articles</th>
<th>Discarded</th>
<th>Used</th>
</tr>
</thead>
<tbody>
<tr>
<td>IEEE Xplore</td>
<td>8</td>
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<tr>
<td>ScienceDirect</td>
<td>1</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>CiteSeer</td>
<td>1</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>ACM</td>
<td>11</td>
<td>7</td>
<td>4</td>
</tr>
<tr>
<td>SpringerLink</td>
<td>9</td>
<td>2</td>
<td>7</td>
</tr>
<tr>
<td>Total</td>
<td>30</td>
<td>14</td>
<td>16</td>
</tr>
</tbody>
</table>

*Table 1: Search results for agile UCD 2011-14 update*

In Silva da Silva et.al. (2011) the keywords agile, “agile method”, “agile development”, “agile practice”, “agile project”, “agile lifecycle”, scrum, “extreme programming”, “lean development”, “feature driven development”, “dynamic system development” and “agile unified process” are used to search for agile processes. This article uses the same keywords in the search strings for agile processes. Further, Silva da Silva et.al. (2011) defines articles with any of the following keywords as within user-centered design; usability, “human-computer interaction”, “computer-human interaction”, “human factor”, “user experience”, “user-centered design” or “user interface”. Thus, in relation to methods used in user-centered agile processes, “user-centered” was defined as focusing on UX, IxD, HCI, usability or UCD.
This provides a broad search, but was successful when screening for papers combining any of the above keywords with any of the keywords listed under search for agile processes.

2.3 Methods Used in Non-Agile UCD

When looking for articles on methods used in user-centered but non-agile processes, the search string suggested by Silva da Silva et.al. (2011) to capture UCD is too broad. As you see from Table 2 on search results in IEEE Xplore database only, refining the search by limited to articles from 2007 and 2010 respectively do not affect the search results substantially. A more specific search string is however arrived at if omitting the more general keywords usability, human-computer interaction and user experience. Including articles mentioning “user-centered design” AND “user interface” appears a reasonable search string. This search string emphasizes user-centered methods as related to the design and evaluation of an interaction or interface.

Further, articles on UCD in non-agile development processes is negatively defined in this survey – i.e. articles that do not mention the use of an agile approach. The excluding keywords are condensed to the following 4; agile, scrum, “extreme programming” and lean. Keywords and terminology limiting the search for agile, non-agile and UCD is not standardized (Silva da Silva et.al. 2011). This is a challenge. For example, asking for “NOT agile” in the search string may accidentally omit relevant articles using the term “non-agile”. Note, that these search limitations may cause non-symmetry in the data sets that may negatively affect the strength of the validity in the comparison between agile and non-agile results.

<table>
<thead>
<tr>
<th>Search string</th>
<th>Articles</th>
<th>&lt; 2007</th>
<th>&lt; 2010</th>
</tr>
</thead>
<tbody>
<tr>
<td>usability OR “human computer interaction” OR “computer-human interaction” OR</td>
<td>28,214</td>
<td>16,385</td>
<td>9,802</td>
</tr>
<tr>
<td>“human factor” OR “user experience” OR “user-centered design” OR “user</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>interface”</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>NOT agile NOT scrum NOT “extreme programming” NOT lean</td>
<td>34</td>
<td>23</td>
<td>14</td>
</tr>
<tr>
<td>“user-centered design” AND “user interface”</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>NOT agile NOT scrum NOT “extreme programming” NOT lean</td>
<td>2</td>
<td>3</td>
<td>2</td>
</tr>
</tbody>
</table>

Table 2: Non-agile UCD search in IEEE Xplore (metadata)

The survey uses the databases IEEE Xplore Digital Library, CiteSeer and Elsevier ScienceDirect. In IEEE the search is limited to metadata, in CiteSeer to abstract and in Science Direct to the area of Computer Science. The final search results from these databases can be found in Table 3.

<table>
<thead>
<tr>
<th>Database</th>
<th>Articles</th>
<th>Discarded</th>
<th>Used</th>
</tr>
</thead>
<tbody>
<tr>
<td>IEEE Xplore</td>
<td>34</td>
<td>24</td>
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</tr>
<tr>
<td>CiteSeer</td>
<td>66</td>
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<tr>
<td>ScienceDirect</td>
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<td>25</td>
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<tr>
<td>Total</td>
<td>129</td>
<td>109</td>
<td>20</td>
</tr>
</tbody>
</table>

Table 3: Final search results for non-agile UCD methods

Some of the 129 resulting articles were discarded through screening due to lack of a consistent user-centered focus. Evaluation is an important part of user-centered design, however articles completely lacking a user-centered focus in design and development were not considered user centered even if they ended with user evaluations. The literature survey have thus placed emphasis on articles describing methods for UCD in the process towards becoming a product or system over those that solely focus on users in an evaluation phase. All included papers have been peer-reviewed. The two authors have gone through the included 20 articles independently for analysis and classification, each article from this search being viewed at least 3 times per researcher. Findings were iteratively shared, discussed and aligned.
3 RESULTS

3.1 Methods Used in Agile UCD

The analysis of agile UCD methodology before 2011 and from 2011-2014 indicates that methods and focuses are consistent and constant. The 2011 Silva da Silva et.al. review included 58 papers discussing the integration of UCD and agile development. Their information was grouped into 15 content related categories (Figure 3) on methods and strategies used in agile user-centered processes. A bottom-up approach was used for categorization in the survey update (Figure 4), which did not produce the exact same categories as in Figure 3. Still, the 16 new articles align themselves well with previous findings as discussed in 3.1.1-3.14. The most common topics within agile UCD seems to be: 1) arguments for little design up front (LDUF) or some design up front (SDUF), 2) the UCD team working one sprint ahead of the developers, 3) how agile/UCD integration improve collaboration between designers and developers, 4) using user stories to capture usability issues, 5) the use of low fidelity (lo-fi) prototypes and 6) the use of usability evaluations.

![Figure 3: Content categorized by Silva da Silva et.al. 2011](image)

![Figure 4: Methods reported used in our 2011-14 update](image)
3.1.1 LDUF/SDUF

Only one of Silva da Silva et.al.’s 58 papers suggests big design up front (BDUF), all other argues against. 31 of the 58 included papers recommended strictly limited DUF (53 %). Of the new 16 papers, 9 recommend LDUF/SDUF (56 %). As such, the topic focus remains constant.

3.1.2 One Sprint Ahead

15 of the 58 review papers suggest the design-team work one – or two or three – iterations ahead of the developers (26 %). Some suggests starting the design work in Sprint 0. Likewise, in the survey update several new articles suggest the need for the interaction designer to work one or more sprints ahead of development, for example by Felker et.al. (2012) and Isomursu et.al. (2012). Descriptions of how designers work on the overall design in a sprint 0 is also quite frequent. Thus, the topic remains constant.

3.1.3 Team Collaboration

While Silva da Silva et.al. found information on how agile/UCD integration improves collaboration between designers and developers, the survey update finds collaboration described as more problematic. Thus, the focus on this third topic seems increased. Working one sprint ahead may in practice mean the development teams are working on implementing user-stories that the UX designer has long finished, while the UX designer works on other issues – e.g. user testing prior implementations (Isomursu et.al. 2012). Some articles even describe UX and implementation as two separate teams within the agile team. For example, Raison and Smith (2013) experienced in their study that several companies view UCD as an optional add-on, or even a blocker to the “real” development work. When not co-located, UCD was seen as irrelevant or purely a checkbox ticking exercise. Kuusinen et.al. (2012a) describe how lack of time for design may result in getting UX designs for implementation too late. Allowing SDUF and overall concept design in a phase 0 is a strategy to avoid “blocking” implementation work, but results in a less interconnected team.

A common argument is that it is key that UCD, IxD, UX and UI designers are highly integrated into or fully part of the agile team (Silva da Silva et.al. 2013a, Kuusinen et.al. 2012a, Silva da Silva et.al. 2013b, Kuusinen et.al. 2012b, Nielsen et.al. 2012, Raison et.al. 2013, Ferreira et.al. 2012). The role of the designer seems unclear – even when all members of the team understand UX as a discipline. To improve lack of co-operation between UX specialists and developers, more face-to-face time is suggested. In addition, a “culture gap” between designers and developers (Kuusinen et.al. 2012a, Kuusinen et.al. 2012b, Nielsen et.al. 2012, Raison et.al. 2013, Ferreira et.al. 2012) must be bridged. Kuusinen et.al. (2012b) describe how decisions as to when and how UX works was needed were not made by UX specialists, and how this led to the consideration of UX issues occurring too late in the process, as well as too inefficient utilization of the UX resource. Isomursu et.al. (2012) conclude that the integration of software engineering and UX design through working sprints ahead is not optimal, and that the desired levels of interactivity and agility are hard to achieve.

3.1.4 Methods Used in Agile UCD

Concerning specific design methods used, both surveys show use of prototyping and user stories are common along with personas and scenarios. Further, inspections and user tests are frequently conducted. Methods related to understanding the user and the context of use are not emphasized in studies or the proposed agile UCD process models. In the review, 7 out of the 58 papers (12 %) mention methods such as contextual inquiry and interview techniques (related to SDUF). 6 of the 16 update articles mention user research as a task to be included in the agile process (Silva da Silva et.al. 2013a, Kuusinen et.al. 2012a, Silva da Silva et.al. 2013b, Kuusinen et.al. 2012b, Nielsen et.al. 2012, Jia et.al. 2012). But, only 4 of the 16 articles specify concrete methods (Silva da Silva et.al. 2013a, Kuusinen et.al. 2012b, Nielsen et.al. 2012, Jia et.al. 2012] (25 %) – these are interviews, observation and field studies. The lack of focus on methods for understanding thus remains a constant.

From the update survey, 6 papers report user-centered (but not user involved) methods related to specifying usage (Silva da Silva et.al. 2013b, Kuusinen et.al. 2012b, Jia et.al. 2012, Raison et.al. 2013, Asuncion et.al. 2011, Isomursu et.al. 2012) (38 %). Techniques used here are user stories, user journey maps, storyboards and scenarios. A few of these also mention personas and user profiling (Silva da Silva et.al. 2013b, Jia et.al. 2012]. This fits well with the Silva da Silva et.al. findings where user stories are
commonly used (20 of 58 papers; 34 %), and personas and scenarios somewhat used. The topic of user stories to capture usability issues is thus continued.

Related to producing design solutions, 25 of the 58 papers (43 %) in Silva da Silva et.al. report the use of lo-fi prototyping and 9 of the new 16 (56 %) (Silva da Silva et.al. 2013a, Kuusinen et.al. 2012a, Silva da Silva et.al. 2013b, Kuusinen et.al. 2012b, Nielsen et.al. 2012, Jia et.al. 2012, Isomursu et.al. 2012, Felker et.al. 2012, Ferreira et.al. 2012). Based on the descriptions in the 9 most recent articles, the common approach is using paper prototypes, mock-ups, wireframes or sketching. In some cases, the prototypes evolve from lo-fi to higher fidelities during the process. None of the reviewed articles report use of user involved or collaborative design approaches such as for example design provocations (medium contact) or user-involved workshops or PD techniques (high-contact). The strong focus on lo-fi prototyping thus remains a constant.

Prototyping is usually linked with methods for evaluation in an iterative manner. The most common approach is user testing, for example user testing paper prototypes (Silva da Silva et.al. 2013a). Some also make use of expert usability inspections. 22 of Silva da Silva et.al.’s (2011) 58 review papers user tests (38 %) and 6 of our survey 16 (Kuusinen et.al. 2012a, Nielsen et.al. 2012, Jia et.al. 2012, Asuncion et.al. 2011, Isomursu et.al. 2012, Felker et.al. 2012) (also 38 %). The types of tests are often unspecified, but are usually formative and exploratory in nature. Some mention the use of the think-aloud protocol. For expert usability inspections, 19 of the 58 (33 %) report this strategy. In the follow up survey, 2 of the 16 (Silva da Silva et.al. 2013b, Faulring et.al. 2012) (13 %) use inspections. Both also do user testing. Specified expert inspections are heuristic evaluations and cognitive walkthrough.

Methods use and topics in the conducted update survey thus align well with Silva da Silva et.al. (2011):

- Overall, methods linked to understanding of users, tasks and environments are not receiving focus. Nielsen et.al. claim there is a push from doing user research to focusing solely on design (2012). This fits well with the findings.

- Further, methods used in design do not involve users.

- Focus is on integrating user testing and UX evaluations iteratively throughout the agile process through lo-fi prototyping one sprint ahead. Main challenges related to this seem to be collaboration between the developing team and the designer, clarifying/merging the role of the designer in the team and allowing the necessary time and culture for UX work. The findings indicate such challenges receive increased focus in newer literature.

- Processes are not seemingly grounded in in-depth understanding of user needs – at least not from the start. Step 1 in the ISO 9241-210 model (Figure 2) receives little focus in the overall processes.

- In general, the methods and strategies described indicate UCD processes to the left-hand side of Figure 1 (low to medium degrees of user involvement). Any extensive user contact is likely to first occur in the evaluation phase.

### 3.2 Methods Used in Non-Agile UCD

From the 20 included articles in this literature search, as many as 51 different methods were identified. Methods with strong similarities with respect to purpose, type and process stage used where thus grouped using a bottom-up approach to encoding, resulting in 10 categories of methods (Table 4) in order to facilitate data analysis. Most categories include several methods, techniques and variations. Some articles mention specific methods, while others do not specify what specific type of method is being used, e.g. stating interview and usability tests are used (Heisakari et.al. 2009). For those not specifying a type, the description of the execution usually enables a classification. If not, the label “other” is assigned to the specific type of method within a category. The categories Survey, Interview and Observation and Insight are closely linked to understanding the user and the context of use – step 1 in the ISO 9241-210 model (Figure 2). The methods in these categories are considered within user research. 3 articles report the use of surveys (Slagle et.al. 2010, Granic et.al. 2006, Plaisant et.al. 1997). 9 articles use interviews and 9 observations (Figure 5). 10 papers report other methods for gaining more insight and understanding (Figure 6). In total 13 out of the 20 articles included in the survey (65 %) conduct user research.
<table>
<thead>
<tr>
<th>Category</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Survey</td>
<td>Use of surveys sometime in the process</td>
</tr>
<tr>
<td>Interview</td>
<td>Use of interviews, from early contextual interviews to phone interviews.</td>
</tr>
<tr>
<td>Observation</td>
<td>Any use of observation in the process.</td>
</tr>
<tr>
<td>Insight</td>
<td>Other analyzing and specifying methods to further insight, e.g. user analysis. Often utilized in early phases.</td>
</tr>
<tr>
<td>Scenario</td>
<td>Use of scenarios, use cases, storyboards or other narrations specifying usage.</td>
</tr>
<tr>
<td>Workshop</td>
<td>Use of workshops and user involved group work through different techniques. Commonly used in the design-phase.</td>
</tr>
<tr>
<td>Prototypes</td>
<td>Visual or functional design realizations from lo-fi mock-ups and paper sketching to more advanced medium/high fidelity (hi-fi) clickable wireframes and testable interactive prototypes.</td>
</tr>
<tr>
<td>User testing</td>
<td>Person(s) from user groups tests product.</td>
</tr>
<tr>
<td>User evaluation</td>
<td>Direct or indirect input from user(s), without user testing tasks.</td>
</tr>
<tr>
<td>Expert evaluation</td>
<td>Evaluations and inspections conducted by experts (non-users).</td>
</tr>
</tbody>
</table>

Table 4: Description of the 10 categories of methods

Figure 5: Interview and Observation techniques

Figure 6: Other methods providing Insight (analysis/research)
Regarding **specifying usage** (step 2), 13 articles (65 %) reported use of Scenario-related methods (Figure 7). Related to step 3 **producing design solutions**, 16 articles (80 %) reported use of prototyping techniques (also Figure 7). Here, use of paper prototypes, mockups, wireframes etc. is considered lo-fi. Medium/hi-fi prototyping is grouped and defined as prototypes that are more advanced, and clickable or interactive. Within the prototyping articles, 7 also included user-involved design methods (Figure 8) (35 %). Here, half did not have a PD approach, but used group work and discussions, brainstorming, moodboards and more in design-related workshops. The other half conducted PD, also utilizing a variety of techniques.
Finally, related to methods for evaluation and the ISO 9241-210 model step 4, 14 articles (70%) report user testing. Figure 8 presents the overall user test approaches. Next, 5 articles (25%) report the use of other user evaluations such as user inspections and pilot use feedback in addition to user tests (also Figure 8). Figure 9 presents the use of specific test techniques and protocols. A final 5 articles (25%) utilize expert evaluations (Figure 10), but only a somewhat dated paper (Plaisant et.al. 1997) relies solely on expert inspection (no user testing).

### 3.3 Comparison of Methods Used

Looking at the methods in non-agile UCD processes compared to those in agile processes, many similarities can be identified. However, there are indications of a difference in methodological repertoire and user-centered practice. First, methods with a high degree of user contact (“high-contact methods”) are very rarely described in reviewed articles on agile UCD. This is especially evident when looking at the methods employed for producing design solutions. Here, agile papers never mention the use of workshops or user involvement, while 35% of the non-agile articles utilize the users input.

Though prototyping should perhaps not be classified as a user-centered method in itself, it is evident that it plays an important role in development processes and IxD/UX/UCD, both agile and non-agile. Prototyping is typically paired with usability evaluation in an iterative process. But, while agile processes mainly use prototyping and user testing iteratively to ensure usability, non-agile processes also place more emphasis on involving users in phases other than usability evaluations. Here, just over half of the articles use high-contact methods such as participatory design and workshop techniques, field studies and contextual in-depth user research strategies. High-contact methods do not replace prototyping and user testing, as Table 5 displays. Rather, non-agile user-centered processes include more user-centered methods, in earlier phases and increase user contact and user involvement.

Second, the methodological richness reported in non-agile articles seems quite a bit larger than in agile processes. This seems to be particularly true for methods related to understanding users and providing insights, where agile UCD heavily rely on personas while non-agile UCD has a richer method spectrum. Agile and non-agile UCD processes differ less in methods utilized for specifying usage and evaluation.

<table>
<thead>
<tr>
<th>Method:</th>
<th>Agile</th>
<th>Non-agile</th>
</tr>
</thead>
<tbody>
<tr>
<td>Prototyping</td>
<td>55% (41:74)</td>
<td>80% (16:20)</td>
</tr>
<tr>
<td>Scenarios/user stories</td>
<td>35% (26:74)</td>
<td>65% (13:20)</td>
</tr>
<tr>
<td>Observations/field-studies</td>
<td>14% (10:74)</td>
<td>45% (9:20)</td>
</tr>
<tr>
<td>Interviews</td>
<td>15% (11:74)</td>
<td>45% (9:20)</td>
</tr>
<tr>
<td>User profiling/personas</td>
<td>5% (4:74)</td>
<td>35% (7:20)</td>
</tr>
</tbody>
</table>

**Table 5: Use of common, specific method types**

<table>
<thead>
<tr>
<th>Methods used for:</th>
<th>Agile</th>
<th>Non-agile</th>
</tr>
</thead>
<tbody>
<tr>
<td>User Research/Insight</td>
<td>15% (11:74)</td>
<td>65% (13:20)</td>
</tr>
<tr>
<td>User-centered specification</td>
<td>35% (26:74)</td>
<td>65% (13:20)</td>
</tr>
<tr>
<td>User-involved design/PD</td>
<td>0%</td>
<td>35% (7:20)</td>
</tr>
<tr>
<td>User evaluation</td>
<td>38% (28:74)</td>
<td>70% (14:20)</td>
</tr>
<tr>
<td>Expert evaluation</td>
<td>28% (21:74)</td>
<td>25% (5:20)</td>
</tr>
</tbody>
</table>

**Table 6: Use of methods related to their purpose**

Third, there seems to be a difference in focus or values. Many of the agile papers focus on suggesting a model for integrating design work related to implementation of features. In this suggested integrated process models few specific methods are mentioned. Aside from user-centered scenario-based techniques and user evaluations, agile papers seem to focus more on a model for integrating design work related to implementation of features, than to user research and analysis. Thus, even though agile methodology
strives to merge with user-centered, it seems the IxD and interface design aspects are given focus over UCD values such as in-depth user knowledge, user involvement and contextual design. Even though half of the more recent agile UCD articles do mention user research, as Table 6 shows, it appears this part of the UCD process is given much more emphasis in non-agile processes. Here, the category “user research” has expanded from one into three new categories; methods for observations (used by 9 articles), interview techniques (used by 7 articles), surveys (3 articles) and other analytical strategies (11 articles).

4 DISCUSSION

Within UX studies and UCD there is usually an initial phase where some in-depth activities related to identifying and understanding the user and the context of use. Based on the survey findings, such methods have little focus in agile processes, as Adikari et.al. also notes (2013). Instead, early agile work is more focused on developing interface design solutions. The methodology typically applied in agile UCD is narrower than non-agile UCD methodology, and mainly focusing on rapid evaluation/design iterations – not on anchoring the process is user needs. Methods aiming at providing and maintaining an understanding of users, context and requirements are somewhat neglected. User-centered methods in agile processes aside from testing are mainly linked to elaborating user stories into scenarios on use. This strategy makes sense, as the scenarios and stories may be utilized as test cases and in expert reviews later on. However, there should be awareness of the fact that agile processes in general do not include or involve users in the design process aside from tests. High-contact methods and user involvement are rarely being reported used. Some do report to use personas and user profiling, but these methods are also not directly involving contact with users. Methods on user profiling should be based on user research and user knowledge according to user-centered methodology, but the reviewed articles do not emphasize user research methods in their processes. Thus, agile UCD seems to break with the traditional values of UCD.

A core value of UCD is to start with an understanding of the users needs, and keep the focus on the user throughout the design and development process. While most of the articles describing the non-agile processes support a strategy where users are regularly contacted for input, reviewed agile articles are more focused on process aspects. It could be argued that the reviewed agile processes are more customer-focused than user-focused compared to their non-agile counterparts. The focus is instead towards integrating iterative design and prototyping practices with development, allowing usability evaluations prior to implementation. Thus, within agile UCD it seems to be a strong focus on design practices and iterative development and evaluation of design solutions, e.g. the latter two phases of ISO 9241-210, and less focus on user research and understanding. Isomurso et.al. warn of the danger that user stories evolve and start to live their own lives, and the connection to original UX targets lost (2012), in such processes.

Another core principle in UCD is involving the users in the design process, from start to finish. The possible different degrees of user involvement in a UCD process, and differences in user contact between specific methods are however not considered in agile UCD, and are not a part of models or recommendations. The overall degree of user involvement throughout agile UCD processes is less than in non-agile processes, and possibilities for participatory strategies and in-depth analyses seem limited. Non-agile user-centered processes on the other hand, often use high-contact methods throughout the design process. Thus, while reported non-agile UCD processes spans the whole range in Figure 1 from centered, through involved and to participatory, agile UCD processes all remain user-centered.

Compared to Silva da Silva et.al. (2011), more recent agile UCD trends are discussing challenges relating to collaboration issues and cultural differences between developers and designers. There might also be an increase in focus on user research. Still, the initial UCD step of understanding needs is not emphasized. Methods related to understanding and specifying context of use and analyzing and investigating user needs seems to be downplayed in agile user-centered processes compared to non-agile UCD. Overall, agile UCD seem to have low levels of user involvement throughout the processes. A possible explanation may be that the customer (client) replaces the role of users in agile UCD, and especially in early phases.

A key challenge reported in literature on agile UCD is to create good communication and collaboration within the cross-disciplinary team, specifically between designers and programmers. It is portrayed as hard to accomplish an ideal collaboration through the current integration strategies of one (or more) sprint(s) ahead and SDUF (Sprint 0 overall concept design). It is recommended to fully integrate any IxD/UCD/UX-person(s) in the agile team, and methods and process recommendations aim to ensure the
iteration of design solutions and multi-disciplinary teams, even when time is pressed. These are topics debated in the articles, however there are few reflections on how the core principles in UCD are attended to in the agile framework. There do not seem to be a UCD culture across the agile team within “agile UCD”. Instead, from our point of view, agile UCD is integrating visual design and interaction design into the agile process, but not reflecting upon the differences between an IxD and UCD design approach. Our survey indicates issues related to agile and UCD integration are deeper than collaboration issues. There are indications that “user-centered” does not carry the same meaning and values when used within the agile framework compared to the traditional non-agile UCD methodology.

5 CONCLUSION

The comparison indicates systematic differences in methodological practices in agile versus non-agile user centered processes with regards to the breath of methods used, degree of user contact and the type of strategies employed. The non-agile papers align themselves well with traditional user-centered methodology, with early user contact and the use of user-involved techniques and medium-to high-contact methods as part of the process. The agile papers systematically point to projects less focused on grounding the process in an in-depth understanding of user needs, knowledge of the context of use and on active involvement of users throughout the process – even though these are among the core principles within UCD. In papers proposing UCD and agile integration there seems to be little reflection on the degree of user contact and user involvement throughout the process. The focus of design-work integrated into agile UCD processes seems to be focused on visual design and interaction design disciplines. The initial Sprint 0 start-up phase appears to be treated as a phase for expert work on overall design, which is related to visual design and interaction design, instead of being viewed as a phase for user research and UCD. As such, agile UCD seems more expert-driven and costumer-focused. Though the term “user-centered” is the same, agile processes utilizes a more limited part of the traditional UCD methodology.

Findings from Silva da Silva et.al. (2011) on agile UCD methodology appears consistent with updated findings. This strengthens the validity of the findings, and of the indications that there are systematic differences between agile and non-agile UCD. A key challenge discussed by published literature in relation to agile UCD success is on the communication and collaboration between the designer(s) and the developers implementing the design. This survey indicates issues related to agile and UCD integration are deeper than collaboration issues. The findings may contribute to increased awareness and be useful in the on-going discussions on integration of agile development and user-centered strategies and the recommendations on agile user-centered design best practices and models. A next step would be to validate findings in relation to methods usage. Further, to investigate reasons for the differences – for example whether they are due to a lack of awareness of user-centered principles, different epistemological views or available resources and external constraints.

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7 REFERENCES


Scrum Alliance. We iterate... So Are We Agile? http://www.scrumalliance.org/community/articles/2013/march/we-iterate-so-we-are-agile


