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The importance of integrating Thinking Design, User Experience and Agile methodologies to increase profitability

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Abstract: *Since every company wants to make a big profit, it is necessary for every company to focus on the customer and his requirements. This paper discusses the advantages of the methodologies Design Thinking, User Experience Design and Agile and based on other research shows that their connection is important in practice because it leads to greater creativity, innovation and profitability. Various researches and considerations (from scientific papers) on the integration of design thinking, User experience and agile development are presented, and conclusions are made as to why it is good to use combined methods. The author of the paper created a picture, which is a key contribution of the paper, which shows the key features of each of the methodologies where a cross-section shows the importance of using all three methodologies together. Through the cross-section it can be seen that in practice all three methodologies focus on meeting the needs of product users (customers) because companies aim to keep customers satisfied because in this way they would provide a profit. User Experience focuses on making products usable and useful, desirable and affordable to customers (users). Design Thinking methodology offers the possibility of aligning the goal of a highly innovative project with maximum utility for users.*

Keywords: *design thinking; user experience; agile; user centered;*

1. Introduction

Design Thinking (DT) is a people-oriented model that focuses on creativity to create a product (McKay, et al., 2008) or service for the customer. Improves the innovation of a new product, designs a simple solution to a complex problem or involves the whole team in generating design ideas (Nedeltcheva., & Shoikova, 2017; Nedelthceva, & Shoikova, 2018). User Experience (UX) is based on digital experience and empathic research to define the problem to be solved and find a way to innovate. It is used to continue designing, testing, replicating, and building a product or service. These two methodologies are very similar, but the aspect of DT cooperation is not always done in the UX process in practice. There is research interest in integrating UX and agile software development. "User experience deals with how the user feels about the artifact when using it in the real world" (Preece, et al., 2004). The goal of UX is to create a

positive user experience through satisfaction, joy, excitement, fun, attitudes, emotions and added value when the user interacts with the artifact (Kuniavsky, 2010; Adikari, et al., 2013). As mentioned before, the focus is on the user and is due to user interaction with products and reactions to products that go beyond efficiency, effectiveness and conventional interpretations of satisfaction. The point of agile software development is to deliver a quality software product in an economical way for the appropriate time through a series of iterative and incremental development cycles (Adikari, et al., 2013; Chamberlain, et al., 2006). Client is the main source of information. Developers talk to customers because the goal is to meet all requirements (Adikari, et al., 2013). Agile methods help decide what exact characteristics are needed to meet the basic needs of customers. This is importance especially for innovative projects that require a detailed understanding of customer needs (Przybilla, et al., 2018; Corral & Fronza, 2018).

The contribution of this paper indicates the importance of DT, UX design and agile methodology and the need for their integration. It is crucial to emphasize that Design thinking starts with a problem and seeks a valid solution, and Agile is a method for solving pre-defined problems. The user experience starts with the solution and makes it work in the user context. Agile UX is trying to integrate UX practice with Agile software development teams. Agile UX aims to bring an iterative approach to the design and improvement of functions that are built through teamwork and customer feedback management.

2. Research methodology

2.1 Subject and problem of research

The problem of the research is how to increase profitability and innovation in companies with the use of the mentioned three methodologies, and therefore the subject of the research is to consider the advantages of each of the methodologies as well as their integration.

2.2 Research goal

The aim of this research was to collect all existing studies that indicate the advantages of integrating methodologies and how they affect the success of companies in practice.

3. Literature review

A review of the literature discusses the integration of Design Thinking and agile development, as well as the integration of User experience with agile development and the combination of all three methodologies together. The purpose of the literature review is to see what are the strengths of combining methodologies.

3.1. Design thinking and agile methodology

Agile methods have gained great popularity (Miller & Sy, 2009). and many empirical studies suggest that agile methodologies are necessary to increase project success (Przybilla, et al., 2018)., useful when project objectives are known to the product owner. In agile software development, it is important to understand the needs of the end user, to include user feedback in the software development process. The Design Thinking methodology (Przybilla, et al., 2018). offers the possibility of aligning the goal of a highly innovative project with maximum utility for users. There are different definitions of design thinking. When all mentioned definitions (Cross, 2010; Dunne & Martin, 2006; Adikari, et al., 2013; de Paula et al., 2014; Brown, 2009; Zhu et al., 2020; Rowland, 2004; Voogt & Roblin, 2012) are taken into account, it can be said that design thinking implies the study of cognitive processes that are manifest in the action of design and represents the way designers think and apply their mental judgments to the design of an object, service or system as opposed to the end result of elegant and useful products. It represents an approach to human-centered innovation that uses the sensibilities and methods of designers to align people's needs with what is technologically feasible and what sustains business strategy can be turned into customer value and market opportunity. It is very important that designers progress in the design process with a creative mind towards design solutions and that they discover new possibilities that lead to the development of software that will suit the customers. Designers need to be innovative and creative and put themselves in the role of the customer, i.e. to know what the customer would like.

The main characteristics of design thinking are (Adikari, et al., 2013; de Paula et al., 2014): Empathy, Integrative Thinking, Optimism, Experimentalism, Collaboration. The stages of the process can be grouped according to Brown (Brown, 2009)., who emphasizes the importance of innovation. Figure 1 shows the Brown model:

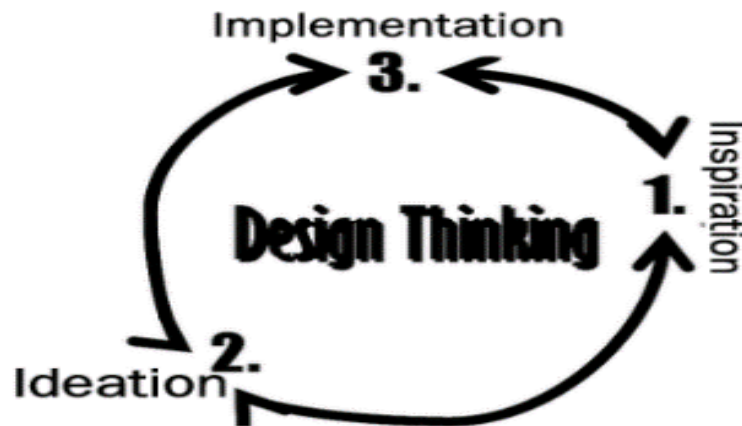


Fig. 1. Design Thinking model (de Paula et al., 2014; Brown, 2009)

The DT fits well into the Agile model of digital design. There is a lot of literature written on how to report DT and its phases (Corral, L., & Fronza, I. (2018), how to incorporate UX into the Agile process, how to innovate and how to apply them in a project in practice (Nedeltcheva., & Shoikova, 2017; (Adikari, et al., 2013). Figure 2 shows the DT phases. The first phase in DT aims at an in-depth analysis of the needs, desires, opinions and aspirations of the end user. In second phase it is very important to differentiate the existing facts about the challenge from the data collected during interviews and observations in order to fully objectively view the information. The ideation phase aims to research and find ideas for solving problems, in accordance with all defined needs of the person. In third phase, a prototype is created, which is actually a cheaper and simpler version of the product that reflects all the key features of the final product, with the aim of revealing possible problems related to the proposed solution. In fourth phase the prototype provides an opportunity to bring the idea to life, test it, test the practicality of the current model, and potentially explore on a small sample of users how they think and how they use a product or service. It is important to note that it can return from the prototyping phase to the ideation phase if the inapplicability of certain aspects of the product or service is discovered. In the final phase, the product that was identified as the best solution during the previous phases is tested. However, in an iterative process such as Design Thinking, the results generated in the testing phase are often used to redefine the problem, idea, or as a trigger to return to the empathy phase.



Fig. 2. Phases in Design Thinking Process (Nedeltcheva & Shoikova, 2017; Nedelthceva & Shoikova, 2018)

The phases are not necessarily sequential and the ultimate goal is to solve them. The good thing is that you can always go back to the phase where it is needed and correct mistakes. DT provides a solution, and then needs to determine how those solutions will be delivered to the market, and Agile works by focusing on smaller parts of a larger project, quickly delivering value and adapting or changing based on real-time feedback (Nedeltcheva., & Shoikova, 2017). DT and Agile offer great benefits for innovation, creativity and profitability, and are not limited to software development itself. They combine to make the process work better. DT helps to understand what needs to be done, Scrum helps to decide how to do it. DT and Scrum are iterative (Kuusinen et al., 2012) and the mentality and approach required for successful implementation are similar. They require adopters to develop sufficient insight to recognize early successes/failures through continuous evaluation and adjustment. Agile's iterative approach allows project teams to better respond to changes and challenges and deliver the finished product in a shorter period of time. Company combine DT and Agile processes to identify the right solution, and then focus on building a better product. Understanding the problem is necessary to find more creative and useful solutions (Burba, 2016). The integration of DT and Agile approaches helps organizations find the right user-focused solution. Agile methodology seeks different ways to solve problems innovatively, giving priority to working together in teams.

In one paper (Nedeltcheva & Shoikova, 2017) where it was presented how to best apply the principles of Design Thinking and Agile practice by giving examples with IBM Design Thinking framework and Autodesk use case, the main advantages are that they can be used by any type of business and can be implemented in all possible levels. More satisfied customers have been generated, so it can be said that the focus is on customers and their needs and desires, which coincides with other literature that emphasizes the importance of the customer. So, designers need to make a product that customers will like.

3.2 Agile user experience design

As already pointed out, the user experience refers to the feeling that a person has while communicating with the product under certain conditions. According to Yong (Yong, 2013), the user experience is a study of how users feel about the product, before, during and after the interaction. The user has the following psychological spheres: values, emotions, expectations and previous experiences (Arhippainen & Tähti, 2003). Therefore, it can be said that it is very important to notice which product characteristics provoke emotions in users, because it is crucial to discover positive emotions and make a product accordingly, while it is also necessary to know what negative emotions are.

Agile user experience is a project management principle for the development of software based on Agile values and principles related to user-oriented design (UCD) and supported by good practices and methods of UCD (Maguire, 2013; Kollmann et al., 2009). Many experiments show its value (Chamberlain, et al., 2006; Armitage J. 2004; Ferreira et al., 2007; McInerney & Maurer, 2005; Nummiahho, 2006; Schwartz et al., 2011; Singh, 2008; Sy, 2008; Schwartz, 2013). The integration, called Agile-User Experience Design or Agile-UX, is related to the interesting performance of the Agile method to quickly provide software that meets the needs of users with a certain level of quality (Kuusinen et al., 2012; Schwartz, 2013). Just as the goal of every company is to make as much profit as possible, so it is necessary to make an appropriate effort to make the product suitable for the user. According to the ISO 9241 human-centered design standard (ISO 9241-210, 2010), there are four basic actions to be taken to include user needs in the software development process: understand and specify the context of use, specify user and organizational requirements, produce design solutions and evaluate design requirements (Maguire, 2013). There are a reasonable number of studies dealing with integration, as can be seen in (Da Silva et al., 2012; da Silva et al., 2011). Improving the understanding of coordination and integration of the work of UX designers and Agile programmers contributes to bridging the gap between software engineering and HCI disciplines (Patton, 2002; Obendorf & Finck, 2008; Ferreira et al., 2011). According to the authors, Agile methods mainly describe activities related to code creation or project management, and UX design methods describe activities for designing product interaction and/or user interface (Preece, et al., 2004; Fox et al., 2008). Agile methods tend to deliver software prototypes as quickly as possible in short iterations and therefore it is not bad to use a combination because in addition to quality software it is important that the software arrives on time, when it suits the client. "Ferreira et al. (Ferreira et al., 2007) state that the integration of user interface design

and agile development is not well understood and cite a qualitatively grounded theoretical study of Agile projects involving significant user interface design." (Singh Beyer, 2010). suggests a process, U-Scrum, promotes usability (Da Silva et al., 2012). UX design methods allow software development teams to create user-friendly software. It is also seen that HCI techniques bring a holistic view of the product (Ferreira, 2007; McInerney & Maurer, 2005) and express conceptual notions about the product in some physical form (Lievesley & Yee, 2006). Agile development provides opportunities for feedback on UX design at regular intervals [Ferreira et al., 2007; Miller, 2005]. Fitzgerald interviewed participants from eight different organizations and found that none of them rigorously followed the methods (Fitzgerald, 1997), and Gason also showed that in practice he deviated from the planned user-centered design process due to unforeseen circumstances (Gassonm, 1999).

The integration of Agile and User experience designs can cause the problem of synchronizing their activities and practices (Ferreira, 2012). It can also be a problem because the collaboration between UX designers, Agile developers and other teams needs to be improved through a large amount of communication. Communication between UX designers and developers is important because each group will have different priorities, goals and processes (Lee & McCrickard, 2007; Jurca, et al., 2014). In one paper, the authors explored the role of user experience in agile software development where the results show that there were difficulties in integrating UX design and software engineering in an agile and iterative way and that there was a clear need to establish new ways of collaboration between UX professionals and software designers (Isomursu et al., 2012). In some companies UX designers cannot work closely with developers (Da Silva et al., 2012) because UX designers work on multiple projects, and also UX designers cannot work ahead because they are too busy with too many projects at the same time. Some recommendations often suggest that UX design should be performed in parallel with Agile development. UX and Agile can coexist well, provided that the organization's management understands and supports UX work, UX practitioners display leadership and spend time on outreach their colleagues, the Agile workflows are flexible enough to accommodate the needs of the UX, and UX people are part of the product teams, where they can build respect and rapport with developers.

4. Discussion of coupling Design thinking, User Experience and Agile

Many papers deal with the integration of all three methodologies, so one paper (Nedelthceva & Shoikova, 2018) argues that the collaboration of Design Thinking, User Experience design and Agile is important in practice because it leads to greater creativity, innovation. and profitability. It can be concluded that the analyzed methodologies are not limited to software development in order to satisfy customers, ie. that these methodologies can be applied in other disciplines as well. The results of a study (Ferreira, et al., 2012) show that integration in practice is achieved through mutual awareness, expectation of acceptable behavior, negotiation of progress and mutual engagement, while in some papers the authors (McCarthy & Wright, 2004). present the results of a study on the role of UX practitioners in agile projects. The authors found that, from the point of view of UX designers, their understanding and attitude towards agile development influences their successful integration into the team. This is followed by a study which investigated how many different settings in which Agile developers and UX designers work together and how these settings shape their work. The results suggest that the values and assumptions of non-team decision makers shape UX/Agile practice (Ferreira et al., 2010). Most studies have investigated the integration of usability (Chong Lee & McCrickard, 2007; Dayton, & Barnum, 2009) user interface (Sohaib &Khan, 2010) or interaction design (Ferreiraet al., 2007), with agile software development, or how UCD can be used in agile software development (Chamberlain, et al., 2006; Blomkvist, 2005; Detweiler, 2007). UCD is one of the most commonly used methods to ensure that the focus of users is at the center of development activities (Dayton & Barnum, 2009). User interface and design interactions as well as agile development were analyzed and found to have much in common. Both emphasize the importance of iterative development (Chamberlain et al., 2006; Hussain, et al., 2009) and emphasize the role of collaboration with various stakeholders, including clients and business professionals, in development work (Blomkvist, 2005; Ferreira et al., 2007). Both support fast feedback cycles and testing (Hussainand et al., 2009) and accept, and even accept, change as a natural phenomenon (Kollmann et al., 2009; McCarthy & Wright, 2004).

Based on other studies, it can be concluded that Agile and DT are complementary and that DT is particularly suitable for situations where the problem is not clear, focusing on defining the problem, shaping the problem and clarifying requirements and it relies on identifying end-user needs and discovering solutions to meet those needs. Agile methods are for projects where requirements are subject to change (McInerney & Maurer, 2005). DT places great emphasis on a clear understanding of the problem and helps to understand what needs to be done, and Agile

(Scrum) gives autonomy to decide how to do it. Agile uses the DT approach in identifying problems and challenges, as well as in generating ideas and innovative solutions. UX designers need to be actively involved in giving design proposals to improve software at all stages and they have the task of helping to develop solutions that are easy to use. Agile is efficient in fast software delivery because it is a repetitive process and allows user requirements to change over the life of the project, allowing it to be completed on time. Scrum development teams have been a part of the design process from the beginning, which allows them to better understand the needs and requirements of customers. Table 1 lists the essential characteristics of each methodology (Spiring Pixels, 2021; You X Ventures, 2020).

By applying a combination of DT, UX and Agile approaches, in a good way, company can reduce risk and make higher profit (Nedelthceva & Shoikova, 2018). So it's not bad for a company to be aware that:

- Agile and UX work well together when management values UX and when UX is embedded in teams. UX designers should be actively involved in providing design proposals to improve software at all stages. Agile is efficient in fast software delivery because it is a repetitive process and allows user requirements to change over the life of the project so that changes are possible over the life of the project.
- DT and Agile emphasize people in relation to processes, Scrum development teams are part of the design process from the beginning that can lead to product improvement. DT places great emphasis on a clear understanding of the problem and helps to understand what needs to be done, and Agile gives autonomy to decide how to do it.

Figure 3 shows the sets where each set represents the appropriate methodology. DT strives for creativity where the goal is to see the desires that the end user of the product strives for, as well as to objectively see what feelings the product would provoke in the user, and then a prototype should be defined where there is an opportunity to test the idea. It is crucial to say that due to the agile methodology, it can be returned to each of the phases and corrected if there is a change. With both DT and UX, it is important to get an easy-to-use product. The UX methodology is important because care is taken to make the products usable, desirable and useful to customers. It is crucial to emphasize that UX together with agile methodology is well applied in practice because agile methodology implies that the product is delivered on time.

Through the cross-section, it can be seen that all three methodologies (combined) focus on meeting the needs of product users (clients) through an innovative approach to delivering new

and quality products on time. An agile (iterative) approach is important, which allows the project to be divided into smaller parts where it is constantly checked how the project is progressing and changes are made if necessary. It should be noted that teamwork and good communication are key to achieving the project goal. Designers should successfully cooperate with developers in order to complete the complete product that the customer needs, all in order for the company to have a higher profit.

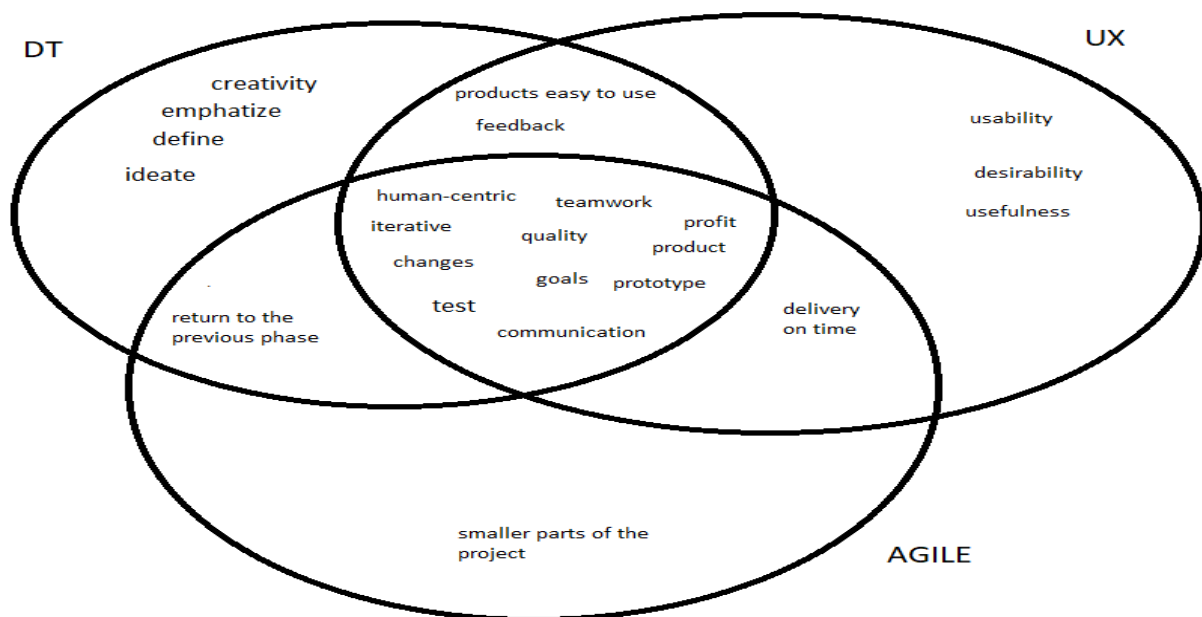


Fig. 3. Methodologies presented using sets

6. Conclusion

Based on a review of the literature, it can be concluded that Design Thinking and Agile offer great advantages for innovation, creativity and profitability. It is important to note that both DT and Scrum emphasize people and companies must ensure that the right people are appointed for each project. User Experiences focuses on making products usable and useful to customers, but also that they are desirable and affordable. UX designers need to consider what users expect. Users do not like when the interface does not behave in accordance with their expectations. Agile UX brings Agile software development along with product design and interactions done by UX experts. It incorporates UX experts into the Agile team and requires an understanding and evaluation of the role of UX. Good communication between developers and designers is also important and that is why it is important to take care that designers are not too busy, i.e

that they are not in charge of many projects, because then they will not be able to do their job on time. Work on the entire project will slow down and developers will also wait for designers to do product design. This is bad for the company because it has an agreement with the customer to deliver the right product on time. The goal of every company is to deliver a quality product that will suit the customers, but the agreed time should be taken into account. In the future, we could investigate whether IT companies in the Republic of Serbia combine methodologies, in what way and to what extent it is successful.

References

- Adikari, S., McDonald, C., & Campbell, J. (2013). Reframed contexts: design thinking for agile user experience design. In *International Conference of Design, User Experience, and Usability* (pp. 3-12). Springer, Berlin, Heidelberg.
https://link.springer.com/content/pdf/10.1007/978-3-642-39229-0_1.pdf
- Arhippainen, L., & Tähti, M. (2003). Empirical evaluation of user experience in two adaptive mobile application prototypes. In *MUM 2003. Proceedings of the 2nd International Conference on Mobile and Ubiquitous Multimedia* (No. 011, pp. 27-34). Linköping University Electronic Press.
<https://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.99.7147&rep=rep1&type=pdf>
- Armitage J. (2004). Are Agile methods good for design?. *Interactions*, vol. 11, no 1, 2, pp. 14-23. <http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.482.3384&rep=rep1&type=pdf>
- Beyer H. (2010). *User-Centered Agile Methods*. Morgan & Claypool Publishers, Pennsylvania. <https://doi.org/10.2200/S00286ED1V01Y201002HCI010>
- Blomkvist, S. (2005). Towards a Model for Bridging Agile Development and User-Centered Design. *Human-Centered Software Engineering — Integrating Usability in the Software Development Lifecycle*. *HumanComputer Interaction Series, Volume 8, IV*, 219-244.
<https://doi.org/10.1007/1-4020->
- Brown, T. (2009). *Change by Design how design Thinking transforms organizations and inspires innovation*. HarperCollins, New York <https://cpb-ap-southeast-2-juc1ugur1qwqqo4.stackpathdns.com/thinkspace.csu.edu.au/dist/9/311/files/2014/09/PLeeItem4-blog-u2bdz2.pdf>
- Burba, D. (2016). Agile by Design: Integrating Design Thinking and Agile Approaches Helps Organizations Find and Build the Right Customer-Focused Solution. *PM Network*, 30(10), 58–63.
- Chamberlain, S., Sharp, H., & Maiden, N. (2006). Towards a framework for integrating agile development and user-centred design. *International Conference on Extreme Programming and Agile Processes in Software Engineering* (pp. 143-153). Springer, Berlin, Heidelberg.
<https://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.208.9468&rep=rep1&type=pdf>

Chong Lee, J. and McCrickard, D.S. (2007). Towards Extreme(ly) Usable Software: Exploring Tensions Between Usability and Agile Software Development. *AGILE 2007*, pp. 59-71. https://d1wqtxts1xzle7.cloudfront.net/54388690/leej-sbd_xp-with-cover-page-v2.pdf?Expires=1640169055&Signature=gZbWx1q3OD2zNar93lpgPfq7Env3Swbw7tTSp7gbXycXDnMHaKUBzLhujfnq-C~r2xvw9nesyzlGTTFFy5ChxAqZ0A5XYem5zLLyao~cnV8IJ2paZDnLtdezi5ulZF3TUgbokv6cbVZyRG2jcTJGUzu-ThQGPMpVpB5CwcacwMxIYzjIR8q2dh50pY4zdRHYEzhzIV5Jjo7wRcFCc1IPn1kocSt1~ZFdJV~NYNpHwsyMaCDOt-ob4VhZHuDdPb2kQ6sZPh-x3CKldgxhdPLTIK63shjIE24aAXnX-CgoZUWsxWtiCGXL68~D04sUTI23LmISUOmgDGjulEljAGcOca__&Key-Pair-Id=APKAJLOHF5GGSLRBV4ZA

Corral, L., & Fronza, I. (2018). Design thinking and agile practices for software engineering: an opportunity for innovation. *19th Annual SIG Conference on Information Technology Education* (pp. 26-31). <https://doi.org/10.1145/3241815.3241864>

Cross, N. (2010). *Design Thinking: Understanding How Designers Think and Work*. Berg Publishers, Oxford (2011) <https://lib.ugent.be/en/catalog/rug01:001696034>

da Silva T. S, Martin A., Maurer F. and Silveira M. (2011). User-Centered Design and Agile Methods: A Systematic Review. *Agile Conference*, Salt Lake City, 7-13 pp. 77-86. doi: 10.1109/AGILE.2011.24

Da Silva, T. S., Silveira, M. S., Maurer, F., & Hellmann, T. (2012). User experience design and agile development: From theory to practice. *Journal of Software Engineering and Applications*. <http://dx.doi.org/10.4236/jsea.2012.510087>

Dayton, D. and Barnum, C. (2009). The Impact of Agile on User-centered Design: Two Surveys Tell the Story. *Technical Communication* 56(3). https://www.researchgate.net/profile/Carol-Barnum/publication/291792853_The_Impact_of_Agile_on_User-centered_Design_Two_Surveys_Tell_the_Story/links/5c2657eb299bf12be39f1ee8/The-Impact-of-Agile-on-User-centered-Design-Two-Surveys-Tell-the-Story.pdf

de Paula, D. F., Menezes, B. H., & Araújo, C. C. (2014). Building a quality mobile application: A user-centered study focusing on design thinking, user experience and usability. *International Conference of Design, User Experience, and Usability*, pp. 313-322. https://link.springer.com/content/pdf/10.1007/978-3-319-07626-3_29.pdf

Detweiler, M. (2007). Managing UCD Within Agile Projects. *interactions* 14, 3 40-42. <https://doi.org/10.1145/1242421.1242447>

Dunne, D., Martin, R (2006). Design thinking and how it will change management education: An interview and discussion. *Academy of Management Learning & Education* 5, 512–523. <https://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.193.9908&rep=rep1&type=pdf>

Federoff, M., & Courage, C. (2009). Successful user experience in an agile enterprise environment. In Symposium on Human Interface (pp. 233-242). Springer, Berlin, Heidelberg. https://link.springer.com/content/pdf/10.1007/978-3-642-02556-3_27.pdf

10/publication/4270500_Agile_Development_Iterations_and_UI_Design/links/5b84a1d9a6fdcc5f8b6c5cf3/Agile-Development-Iterations-and-UI-Design.pdf

Ferreira J. (2007). Interaction design and agile development: A real-world perspective. Master's Thesis, Victoria University of Wellington, New Zealand, 74–75. <https://core.ac.uk/download/pdf/41336193.pdf>

Ferreira J. (2012). Agile Development and UX Design: Towards Understanding Work Cultures to Support Integration," in Advanced Information Systems Engineering Workshops. https://link.springer.com/content/pdf/10.1007/978-3-642-31069-0_51.pdf

Ferreira J., Noble J. and Biddle R. (2007) Agile Development Iterations and UI Design. Proceedings of the AGILE, Washington, pp. 50-58. https://www.researchgate.net/profile/James-Noble-10/publication/4270500_Agile_Development_Iterations_and_UI_Design/links/5b84a1d9a6fdcc5f8b6c5cf3/Agile-Development-Iterations-and-UI-Design.pdf

Ferreira, J., Noble, J., and Biddle, R. (2007). Up-Front Interaction Design in Agile Development. in: Agile Processes in Software Engineering and Extreme Programming. Lecture Notes in Computer Science. [ftp://nozdr.ru/biblio/kolxoz/Cs/CsLn/Agile%20Processes%20in%20Software%20Engineering%20and%20Extreme%20Programming,%208%20conf.,%20XP%202007\(LNCS4536,%20Springer,%202007\)\(ISBN%209783540731009\)\(289s\)_CsLn_.pdf#page=22](ftp://nozdr.ru/biblio/kolxoz/Cs/CsLn/Agile%20Processes%20in%20Software%20Engineering%20and%20Extreme%20Programming,%208%20conf.,%20XP%202007(LNCS4536,%20Springer,%202007)(ISBN%209783540731009)(289s)_CsLn_.pdf#page=22)

Ferreira, J., Sharp, H., & Robinson, H. (2010). Values and assumptions shaping agile development and user experience design in practice. In International conference on agile software development (pp. 178-183). Springer, Berlin, Heidelberg.

Ferreira, J., Sharp, H., & Robinson, H. (2012). Agile development and user experience design integration as an ongoing achievement in practice. 2012 Agile Conference (pp. 11-20). IEEE. doi:10.1109/Agile.2012.33

Fitzgerald B. (1997). The use of systems development methodologies in practice: A field study. *Information Systems Journal* 1997; 7:201–212. https://onlinelibrary.wiley.com/doi/pdf/10.1046/j.1365-2575.1997.d01-18.x?casa_token=pfDBfXtqqVQAAAAA:htRRuL5Qik5M264WPFfe7zRdxmeS0agVm85dJDL__J5T6XWux5I9HNGuF16ttN7xLxdq8QMm6rhTG4Ax

Fox D., Sillito J. and Maurer F. (2008). Agile Methods and User-Centered Design: How These Two Methodologies Are Being Successfully Integrated in Industry," Proceedings of the Agile, Washington, 4-8 pp. 63- 72. <http://ebe.cpsc.ucalgary.ca/uploads/Publications/FoxAgile2008.pdf>

Gasson S. (1999). The reality of user-centered design. *Journal of End User Computing*. 11(4):5–15. <https://onlinelibrary.wiley.com/doi/pdf/10.1046/j.1365-2575.1997.d01->

18.x?casa_token=pfDBfXtqqVQAAAAA:htRRuL5Qik5M264WPFfe7zRdxmeS0agVm85dDJDL__J5T6XWux5I9HNGuF16ttN7xLxdq8QMm6rhTG4Ax

Hussain, Z., Milchrahm, H., Shahzad, S., Slany, W., Tscheligi, M., and Wolkerstorfer, P. (2009). Integration of Extreme Programming and User-Centered Design: Lessons Learned. XP 2009, LNBIP 31, pp. 174-179.

https://d1wqtxts1xzle7.cloudfront.net/30723422/Pekka_Abrahamsson_Agile_Processes_in_Software_E-with-cover-page-v2.pdf?Expires=1640169375&Signature=MjcwWyOm4SXE-fb6BVmuqqIvXVE3gdJSIwSW9vaWq9wxyHr2N20~lwcrMF-4BNGkeNkPzMTqWuhl5wClOirj5s7AYn7JEapQjXFWDj1iucdtr62YzZqRt2hX0xnKtqvCFmw5cIOttRa6Pb462~YHiMZo3TyVe4F-jyzqBGbHyKUXOP-wB7Z9WHNrvxjFRzdMZ1Ye8V3CtX1QK1Sd8A5XZuCQPOd2Idea-tAMBhHYtO1wwsIV9ixgVA1O6h1TT9V~pXQNGpbk6foivBwAHOTWZbwMv4ust9BN536Le7OfZ4GHze5iVoIWxULpD3W5oOg0VzmHHqHX3EYf9QLXK7aneg__&Key-Pair-Id=APKAJLOHF5GGSLRBV4ZA#page=170

ISO 9241-210. (2010). Ergonomics of human-system interaction – Part 210: Human-centred design for interactive systems. Geneva: International Organisation for Standardisation

Isomursu, M., Sirotkin, A., Voltti, P., and Halonen, M. (2012). User Experience Design Goes Agile in Lean Transformation--A Case Study. In 2012 Agile Conference (pp. 1-10). IEEE. <http://www.agilemethod.csie.ncu.edu.tw/agileMethod/download/2012papers/2012%20User%20Experience%20Design%20Goes%20Agile%20in%20Lean%20Transformation%20A%20Case%20Study/User%20Experience%20Design%20Goes%20Agile%20in%20Lean%20Transformation%20A%20Case%20Study.pdf>

Jurca, G., Hellmann, T. D., & Maurer, F. (2014). Integrating agile and user-centered design: A systematic mapping and review of evaluation and validation studies of agile-UX. In 2014 Agile conference (pp. 24-32). IEEE. doi:10.1109/AGILE.2014.17

Kollmann, J., Sharp, H., & Blandford, A. (2009). The importance of identity and vision to user experience designers on agile projects. Agile Conference, pp. 11-18. doi: 10.1109/AGILE.2009.58

Kuniavsky, M. (2010). Smart Things: Ubiquitous Computing User Experience Design. Morgan Kaufmann(2010)

[https://books.google.rs/books?id=sZGtoi7qnqC&pg=PA240&dq=Kuniavsky,+M.:+Smart+Things:+Ubiquitous+Computing+User+Experience+Design.+Morgan+Kaufmann+\(2010\)&hl=sr&sa=X&ved=2ahUKEwiA6IrRu_P0AhUyhP0HHX8pBJwQ6AF6BAGGEAI#v=onepage&q=Kuniavsky%2C%20M.%3A%20Smart%20Things%3A%20Ubiquitous%20Computing%20User%20Experience%20Design.%20Morgan%20Kaufmann%20\(2010\)&f=false](https://books.google.rs/books?id=sZGtoi7qnqC&pg=PA240&dq=Kuniavsky,+M.:+Smart+Things:+Ubiquitous+Computing+User+Experience+Design.+Morgan+Kaufmann+(2010)&hl=sr&sa=X&ved=2ahUKEwiA6IrRu_P0AhUyhP0HHX8pBJwQ6AF6BAGGEAI#v=onepage&q=Kuniavsky%2C%20M.%3A%20Smart%20Things%3A%20Ubiquitous%20Computing%20User%20Experience%20Design.%20Morgan%20Kaufmann%20(2010)&f=false)

Kuusinen, K., Mikkonen, T., & Pakarinen, S. (2012). Agile user experience development in a large software organization: Good expertise but limited impact. International Conference on Human-Centred Software Engineering (pp. 94-111).

https://link.springer.com/content/pdf/10.1007/978-3-642-34347-6_6.pdf

Lee J. and McCrickard D. (2007). "Towards Extreme(ly) Usable Software: Exploring Tensions between Usability and Agile Software Development," in Agile Conference,

Washington, D.C. https://d1wqtxts1xzle7.cloudfront.net/54388690/leej-sbd_xp-with-cover-page-v2.pdf?Expires=1640045328&Signature=WrmYIBWGdfpMDNIYf0pYIN9LoE3S~gm2ER2W1EYjBkliHJfScJHHT1b28Fjd9i7FBqgK0iFNfM9eOi1RDezZ9kPg6G6Pnc0zZiHlarjaLFBHPYfPOmDjKn3HMNZ8WIU-9X7yUij7nODOUQDxHzXqZjSH7pQqOhoXOmJr3mhCfBGYiy2yP68vacPp8fP3w10gtjV~cXG1H0HPWECNq52mIFP2p3ytc-JJgtAO4PIPM84AxBhdTQ4fZ8D82wtBeA-RdtgvZmkhm-LBDefC75YESQCBdbvtViRuFNx3CEoyG4Mbb0Gnbpxrx16ItLMknRdyOitLLTdVoNHq1gtVDSVA__&Key-Pair-Id=APKAJLOHF5GGSLRBV4ZA

Lievesley M, Yee J. (2006). The role of the interaction designer in an agile software development process. CHI '06 Extended Abstracts on Human Factors in Computing Systems. ACM: New York, 1025–1030. <https://doi.org/10.1145/1125451.1125647>

Maguire, M. (2013). Using human factors standards to support user experience and agile design. International Conference on Universal Access in Human-Computer Interaction, pp.185-194. https://link.springer.com/content/pdf/10.1007/978-3-642-39188-0_20.pdf

McCarthy, J. and Wright, P. (2004). Technology as Experience. *interactions* 11, 5, 42-43. <https://doi.org/10.1145/1015530.1015549>

McInerney P, Maurer F. (2005). Ucd in agile projects: Dream team or odd couple? *Interactions* 2005; 12(6):19–23. <http://pages.cpsc.ucalgary.ca/~maurer/uploads/Publications/InteractionsNovDec2005.pdf>

McInerney P., Maurer F. (2005). UCD in Agile projects: dream team or odd couple?. *Interactions*, vol. 12, no. 6, pp. 19-23. <http://pages.cpsc.ucalgary.ca/~maurer/uploads/Publications/InteractionsNovDec2005.pdf>

McKay, JC and Marshall, PH and Heath, G, (2008). An exploration of the concept of design in information systems, 2008 ISF Conference Papers, Canberra, Australia

Miller L. (2005). Case study of customer input for a successful product. Proceedings of the 2005 Agile Conference. IEEE Computer Society: Washington, DC, U.S.A., 225–234. <http://www.jpattonassociates.com/wp-content/uploads/2015/01/Lynn-Miller-Custmer-Input-in-Agile-Projects.pdf>

Miller, L., & Sy, D. (2009). Agile user experience SIG. In CHI'09 Extended Abstracts on Human Factors in Computing Systems (pp. 2751-2754). <https://doi.org/10.1145/1520340.1520398>

Nedeltcheva, G. N., & Shoikova, E. (2017). Coupling design thinking, user experience design and agile: towards cooperation framework. In Proceedings of the International Conference on Big Data and Internet of Thing (pp. 225-229). <https://doi.org/10.1145/3175684.3175711>

Nedelthceva D., Shoikova G., E. (2018). Innovation through Design Thinking, User Experience and Agile: Towards Cooperation Framework. *Electrotechnica & Electronica*

(E+E), [s. l.], v. 53, n. 1/2, p. 42–49. <https://epluse.tceptt.com/wp-content/uploads/2018/04/20180102-07.pdf>

Nummiaho A. (2006). User-Centered Design and Extreme Programming, Software Engineering Seminar, pp. 1-5.

<http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.105.5451&rep=rep1&type=pdf>

Obendorf H, Finck M. (2008). Scenario-based usability engineering techniques in agile development processes. CHI '08 Extended Abstracts on Human Factors in Computing Systems. ACM: New York, 2159–2166.

Patton J. (2002). Hitting the target: Adding interaction design to agile software development. OOPSLA '02: OOPSLA 2002 Practitioners Reports. ACM: New York, NY, U.S.A., 1–7. doi: <http://doi.acm.org/10.1145/604251.604255>.

Preece, J., Sharp, H., & Rogers, Y. (2004). Interaction design. Oltre l'interazione uomo-macchina. Apogeo Editore.

http://www.inf.ed.ac.uk/teaching/courses/hci/1213/lects/Lecture05_DesignTaskAnalysis_201213.pdf

Przybilla, L., Schreieck, M., Klinker, K., Pflügler, C., Wiesche, M., & Krcmar, H. (2018). Combining Design Thinking and Agile Development to Master Highly Innovative IT Projects. Projekt management und Vorgehensmodelle 2018-Der Einfluss der Digitalisierung auf Projektmanagementmethoden und Entwicklungsprozesse.

https://dl.gi.de/bitstream/handle/20.500.12116/18905/PVM2018_11.pdf?sequence=1&isAllowed=y

Rowland, G. (2004). Shall we dance? A design epistemology for organizational learning and performance. Educational Technology Research and Development, 52(1),33-48.

<https://link.springer.com/content/pdf/10.1007/BF02504771.pdf>

Schwartz L., Vagner A., Kubicki S., Altenburger T. (2011). Feedback on the definition and design of innovative mobile services. 13th International Conference on Human Computer Interaction with Mobile Devices and Service, ACM, Luxembourg, pp. 525-528.

<https://doi.org/10.1145/2037373.2037453>

Schwartz, L. (2013). Agile-User Experience Design: an Agile and User-Centered Process?. 8th International Conference on Software Engineering Advances, pp. 346-351.

https://www.researchgate.net/profile/Lou-Schwartz/publication/271384513_Agile-User_Experience_Design_an_Agile_and_User-Centered_Process/links/54c67d9f0cf219bbe4f86899/Agile-User-Experience-Design-an-Agile-and-User-Centered-Process.pdf

Singh M. (2008). U-SCRUM: An agile methodology for promoting usability. AGILE'08, Conference, Tonronto, pp. 555-560. doi: 10.1109/Agile.2008.33

Sohaib, O., Khan, K. (2010). Integrating Usability Engineering and Agile Software Development: A Literature Review. International Conference on Computer Design and Applications, IEEE.

<http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.454.331&rep=rep1&type=pdf>

Spiring Pixels. Zašto je UX važan? <https://www.spiritpixels.com/sr/zurnal/why-ux-design-is-important>

Sy D. (2008). Adapting usability investigations for Agile user-centered design, *Journal of usability Studies*, vol. 2, no. 3, pp. 112-132.

<http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.437.6793&rep=rep1&type=pdf>

Voogt, J., & Roblin, N. (2012). A comparative analysis of international frameworks for 21st century competences: Implications for national curriculum policies. *Journal of Curriculum Studies*, 44 (3), pp299-321. <https://doi.org/10.1080/00220272.2012.668938>

Yong, T. (2013). User Experience Evaluation Methods for Mobile Devices. Faculty of Computing and Informatics. Third International Conference on Innovative Computing Technology (INTECH 2013). doi:10.1109/INTECH.2013.6653647

You X Ventures (2020). What is agile development?. <https://withintent.com/blog/how-ux-design-fits-into-agile-methodologies/>

Zhu, D., Liu, W., Tang, S., Wang, M., Liu, Y., & Sheng, J. (2020). Landing UX Design Thinking Tools and Strategies in a Chinese Context. *International Conference on Human Interaction and Emerging Technologies* (pp.63-68). https://www.researchgate.net/profile/Di-Zhu-40/publication/343482133_Landing_UX_Design_Thinking_Tools_and_Strategies_in_a_Chinese_Context/links/60488214a6fdcc9c7825a48e/Landing-UX-Design-Thinking-Tools-and-Strategies-in-a-Chinese-Context.pdf

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