

# Social Practices of Creating and Using UX Artifacts in Agile Organizations

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## Abstract

*This study conceptualizes UX activities as social practices emerging from how agile software development (ASD) team members create and use UX artifacts in a real-world software development setting. We sought to understand what social practices emerge when integrating UX and ASD activities in an organization. To this end, we observed the use of three UX artifacts: affinity diagrams, personas, and prototypes. Our findings showed that two social practices were established: the creation and use of UX artifacts. We provided insights into how ASD stakeholders possessing different competencies attach meanings to materials (i.e., UX artifacts) and thus form social practices. Also, we found that the two social practices share the same materials, while the stakeholders construct meanings associated with materials depending on their job role.*

**Keywords:** UX artifacts, social practices, user experience, agile stakeholders.

## 1. Introduction

Agile software development (ASD) and user experience (UX) design are complementary practices with a common objective, i.e. producing more usable and enjoyable software that brings value both to organizations and users. ASD is a value-driven approach to software development whereby planning is continuously adapted and value is demonstrated by delivering working software to customers. ISO 9241-210 defines UX as “a person’s perceptions and responses that result from the use and/or anticipated use of a product, system or service”. The topic of integration of ASD and UX has been widely investigated in the scientific literature (Brhel et al., 2015; Kashfi et al., 2017). Organizations increasingly adopt UX practices as a way to improve their customer and user satisfaction and increase innovation (Djamasbi and Strong, 2019).

However, communication between UX and non-UX

practitioners is challenging (Kashfi et al., 2017). For example, UX designers and software developers might struggle to communicate due to differences in their mindsets and vocabularies, and developers’ insufficient knowledge about UX (Choma et al., 2015; Rose and Tenenberg, 2016). This communication gap is a paradox in ASD, as communication is considered a fundamental aspect and a key success factor of ASD (Hummel et al., 2013). This misalignment could lead to communication issues and power struggles between developers, UX practitioners, and product owners (POs) due to differences in their respective responsibilities, motivations, and understandings of technical and user requirements (Kashfi et al., 2019; Kashfi et al., 2017). In turn, achieving efficient and effective levels of communication remains a challenge, as ASD stakeholders often have different knowledge backgrounds and do not share a common vocabulary and mindset. Creating UX artifacts such as personas, wireframes, sketches, and prototypes helps solve these issues as they ground and structure face-to-face discussions between ASD stakeholders, and help them bridge boundaries between their mindsets (Garcia et al., 2017, 2019).

### 1.1. Context and motivations

This research was conducted within the scope of three projects in a large automotive organization that is undergoing a UX transformation aiming at becoming more user-centered. User-centered design (UCD) is an approach that actively involves users and integrates their needs into the design and development process (Mao et al., 2005). The organization went through a transformation from waterfall to agile in the early 2010s and adopted agile development practices to optimize software delivery time, as well as respond to increasing project complexity. However, the organization does not fully apply all agile principles. For example, although teams use Jira for organizing sprints and backlogs, they do not implement the iterative and incremental design

or use continuous integration, which is descriptive of an organization working on long-term projects with predefined software specifications. Therefore, the organization could be described as agile in a non-agile environment, as teams still heavily adopt waterfall software development practices.

Further, before this research started in 2018, UX practices were only partially considered in a limited number of projects and too late in the product development lifecycle, thus failing to produce the expected return on investment of UX (Bias and Mayhew, 2005). In this context, our mission was to facilitate the integration of agile and UX practices and support the adoption of a UCD approach within a subset of projects. To achieve this goal, we first attempted to introduce personas, but we experienced strong resistance from ASD stakeholders. We attributed this resistance to the “no upfront design” agile principle (Adikari et al., 2009), as purposefully creating personas requires collecting user data. Second, we introduced usability testing of prototypes with representative users to limit late design changes. This showed no resistance from ASD stakeholders, as prototypes are considered a useful artifact in ASD (Garcia et al., 2017). Third, we introduced affinity diagramming to address two issues: 1) a slow and unstructured UX process, particularly the prototype evaluation-redesign loops, and 2) a misalignment between project partners on the product vision.

## 1.2. Research statement

While previous research extensively documented the use of UX artifacts in ASD, little is known about *how* ASD stakeholders actually use UX artifacts in their work. Brhel et al. (2015) described artifact-mediated communication as an organizational practice for integrating ASD and UX, shedding light on the role of UX artifacts in the communication process between stakeholders. However, to the best of our knowledge, despite ASD-UX integration being a highly social activity, it has not been studied through the lens of social practices theory. Shove et al. (2012) define social practices as interdependent relations between their constitutive elements: materials, competencies, and meanings. The social practice concept can help describe the lifecycle of UX artifacts and identify how their meanings to ASD stakeholders evolve over time. Knowing this can help understand whether and how organizations improve their UX practices. This study provides the first account of empirical evidence regarding social practices in UX. We believe these findings should benefit practitioners to better understand

how different ASD stakeholders perceive and use UX artifacts. Also, researchers could use this theory as a new avenue for understanding the artifact-mediated communication principle in ASD. Specifically, the competencies to create UX artifacts and the meanings attached to them are still relatively unexplored in the ASD literature.

This gap led us to formulate the following research question: *What competencies and meanings do ASD stakeholders associate with UX artifacts?* Addressing this question contributes to the understanding of how ASD stakeholders work together in the context of integrating ASD and UX activities by 1) identifying the social practices that emerged, 2) describing what information ASD stakeholders exchange and with whom, and 3) describing the role of UX artifacts in the ASD-UX integration. This study aimed to enhance communication between software developers, project managers, and UX staff during ASD-UX integration. It documented the evolution of UX practices in the ASD context, identified supporting UX artifacts, and explored stakeholder adaptation to this evolving scenario.

We report our findings related to the use of three UX artifacts created and used by ASD stakeholders: affinity diagrams, personas, and prototypes. We tracked their use by means of survey and observation methods.

## 2. Background and related work

### 2.1. Social practices

Social practices, defined by materials, competencies, and meanings as their constitutional elements (Shove et al., 2012), are the theoretical underpinnings of this study. The unit of analysis is broad and represented by the practice itself, wherein individuals take part and share social norms and behaviors. This theoretical lens was useful as it allowed us to describe how ASD stakeholders attach meanings to UX artifacts when using them in a shared way, and how the ASD-UX practice was constructed in the context of an organization that builds its UX competencies. The three-part social practices model enabled us to describe how ASD stakeholders construct the materials they use, build shared knowledge and competencies, and assign symbolic meanings to establish a meaningful ASD-UX practice geared toward more successful collaboration.

Based on previous work, we adapted the definitions of materials, competencies, and meanings as follows:

- Materials encompass physical objects (table), digital objects (PowerPoint presentation, Miro board), infrastructure (usability lab), tools (sticky notes), hardware (laptop), etc. used in the social

practice. Materials refer to the outcomes of UX activities, namely the UX artifacts such as affinity diagrams, personas, and prototypes.

- Competencies encompass skills and techniques for creating and using the UX artifacts. They include multiple forms of understanding and practical know-how to create UX artifacts (e.g. purpose, structure, required data) and how to pass the knowledge between different stakeholders.
- Meanings describe forms of association between materials and competencies, the social and symbolic significance of participation in the social practice at a given moment. Meanings encompass the reasons why ASD stakeholders create UX artifacts and the valuable actions they take when using UX artifacts in relation to their work role.

Establishing social practices implies making links between materials, competencies, and meanings by engaging in creating and using certain materials in a specific manner. Further, we translated this argument to the idea that social UX practices are defined by UX artifacts (materials) used in a certain way (competencies) to achieve ASD stakeholders' goals (meanings). This study describes the established social practices of creating and using the UX artifacts, and how the materials between them were shared.

## 2.2. UX artifacts

In line with the Agile manifesto (Agile Alliance, 2001), ASD prioritizes delivering working software as a demonstration of completed work to customers, while reducing documentation to a minimum. Nevertheless, UCD and UX activities rely heavily on documentation and artifacts that specify user interaction and system design. Artifacts are a central means for the communication of product and design concepts among teams in agile and user-centered development (Choma et al., 2015). UX artifacts contain knowledge about users, user behavior, product design, and findings from UX evaluations. UX artifacts are outputs or work products of UX activities, such as user research or UX design (Kieffer et al., 2020). For example, personas depict key user profiles based on user research, prototypes represent product ideas, whereas affinity diagrams group large amounts of prototype evaluation data into meaningful categories, and it is often applied to prototype evaluations (Lucero, 2015).

## 2.3. Artifact-mediated communication

Communication in ASD implies that stakeholders agree to a common project goal, share and provide information and coordinate their activities (Dreesen et al., 2016; Pikkarainen et al., 2008). Agile principles encourage informal, face-to-face communication between ASD stakeholders, which can also be achieved via audio or video conference tools. ASD stakeholders include the development team, users, management, customers, enterprise staff, and support staff (Pikkarainen et al., 2008). In this study, we only focused on the development team (i.e., developers and UX staff) and management.

Brhel et al. (2015) introduced the artifact-mediated communication principle in user-centered ASD practice: *“in user-centered agile approaches, tangible and up-to-date artifacts should be used to document and communicate product and design concepts and should be accessible to all involved stakeholders”*. Artifacts support communication in the absence of detailed documentation and enable collaboration between designers and developers. For example, basic artifacts such as sketches, lists, and stories enable the interaction between developers and designers in agile-like contexts (Jurca et al., 2014). Further, the literature identifies prototypes, central design records, mock-ups, wireframes, user stories, personas, and scenarios as UX artifacts that document and communicate product and design concepts (Brhel et al., 2015) and mediate communication between designers and developers in agile events (Garcia et al., 2017). For example, prototypes communicate user interface design solutions and enable developers to assess their technical feasibility (Garcia et al., 2019). Also, coded prototypes are the most often used artifacts in UX evaluation (Alves et al., 2014; Garcia et al., 2017). Moreover, artifacts should be lightweight to align with agile timelines and be accessible to all stakeholders involved (i.e., stored in central repositories or linked to the user stories).

Existing evidence highlights the importance of UX artifacts like personas and prototypes for information exchange among team members. However, there is a lack of empirical data on the competencies ASD stakeholders are required to have to build UX artifacts, and the specific meanings they attach to UX artifacts when using them to achieve their work objectives (Garcia et al., 2017, 2019). In our study, we explored the social practices that emerged in an ASD context within an organizational setting as developers, UX staff, and project managers collaborated, leveraging UX artifacts to apply the principle of artifact-mediated communication.

### 3. Methodology

This study includes three projects in which both UX and ASD activities took place. We adopted an action research (AR) approach in which the researcher was directly involved in the creation and use of UX artifacts in the organization. The AR approach aimed at improving the communication and exchange of UX-related information between ASD and UX practitioners by means of creating and using UX artifacts. We adopted the Cooperative Method Development (CMD) by Dittrich et al. (2008) to conduct this research. CMD consists of three phases: understanding practice, deliberate improvements, and implement and observe improvements. The first phase consisted of informal discussions with ASD stakeholders about their project goals. In the second phase, we recommended an appropriate UX artifact that could meet their needs (e.g. affinity diagramming for collaborative user data analysis). In the third phase, we observed how ASD stakeholders created and used UX artifacts on multiple occasions. In this paper, we document how the changes introduced through the AR approach established new social practices for the ASD stakeholders, and how these social practices came to improve the ASD process. Below, we describe the projects, artifacts, participants, and data collection methods we used in the AR approach.

#### 3.1. Participants and projects

Table 1 shows the study participants comprising cross-disciplinary members including software engineers, data scientists, R&D engineers, UX researchers, product owners, and technical leads. Some members were physically distributed, occasionally visiting the organization to participate in meetings and UX activities, although communication primarily relied on online tools like Slack, Microsoft Teams, and email. Study participants were selected based on their involvement in creating or using UX artifacts. For instance, team members from three stakeholder groups (developers, UX staff, and project managers) who participated in artifact creation workshops completed the questionnaire. Overall, there were four developers, two UX practitioners, and three project managers.

Project 1 was a one-year project aiming at developing a carbon emissions management solution. Project 2 was a three-year research and development project involving several organizations aiming at jointly developing a voice interface for semi-autonomous vehicles targeting older drivers. Project 3 aimed at developing a new safety feature for vehicle passengers.

#### 3.2. UX artifacts studied

This case study addressed the creation and use of affinity diagrams, high-fidelity prototypes, and personas. We focused on these three artifacts as they became part of the regular ASD-UX practices in the organization, unlike other UX artifacts such as stories or sketches that were not used regularly and thus do not fit the requirement to be considered as materials used in social practice. Affinity diagrams were created and used within the scope of two projects for analyzing prototype evaluation data (Figure 1). Personas were created and used within the scope of two projects to align stakeholders' understanding of the users. A high-fidelity prototype was created and used in three projects for user testing and customer demonstration purposes.

To create affinity diagrams, we organized dedicated workshops and invited the entire project team (i.e., developers, UX staff, PO, technical lead, scrum master) to participate. In affinity diagramming workshops, we worked on discovering usability issues with the prototype and the gaps in the interaction design. Then, we identified ways to improve the prototype in the next sprint. The affinity diagramming technique was used to analyze the usability testing data and prioritize usability issues for prototype improvement. At first, no specific procedure for affinity diagramming was followed, meaning that the team organized the data by grouping the notes according to their natural relationships and naming the emerging clusters. After two iterations, the UX researcher proposed to follow a more structured procedure, mainly based on the method by Lucero (2015). Working this way enabled the team to reduce the sprint duration from 1 month to 2 weeks.

To create personas in Project 2, we organized a persona writing workshop and invited the PO, technical lead, scrum master, and three developers. As Project 2 targeted older drivers, the UX researcher conducted interviews with six people fitting the user profile and questioned them about their driving habits, issues they were facing while driving, their attitude toward driving assistance systems, and general usage of technology. In Project 3, personas were provided by the customer.

To create prototypes, the team of Project 3 collaborated in an agile manner so that the developers implemented requirements and features validated in UX evaluations, while the UX staff prepared the next round of user tests. The UX staff informed the project managers about the specified prototype features to ensure they were in accordance with the customer's request.

**Table 1. Participants in the study and data sources.**

Stakeholders	Role	Projects	UX artifacts	Survey	Observation
Developers	HMI engineer	1	affinity diagram	x	x
	R&D engineer	2	affinity diagram	x	x
	software developer	2	affinity diagram	x	x
	embedded systems engineer	3	prototype	x	x
UX staff	UX lead	1,2	affinity diagram, persona	x	x
	UX researcher	3	prototype	x	
Project management	agile coach	1,2	affinity diagram	x	x
	product owner	1,2	affinity diagram		x
	domain expert (technical)	1,3	persona, prototype	x	x



**Figure 1. Cluster of the affinity diagram from Project 1.**

### 3.3. Data collection

**Survey** The survey data collection took place between November 2021 and December 2022. In total, we collected 14 entries from 10 participants. We used the questionnaire to collect data about stakeholders’ use of artifacts to reach their goals regarding their role. Questionnaire data gave us insights into stakeholders’ perceptions about the creation and use of the artifacts. The ASD stakeholders completed a questionnaire using LimeSurvey each time the team created or used one

of the three UX artifacts. For affinity diagrams and prototypes, the ASD stakeholders completed the questionnaire on multiple occasions to enable tracking of their use of the artifact. For personas, they completed it once. They answered the following questions: 1) What did you learn in this workshop/activity?, 2) Describe the problem or an issue you were trying to solve using this method/artifact/activity, 3) Was this activity/method/artifact useful for you?, 4) How does this affect your job?, 5) How will you use this after in your work? (if applicable to your work).

**Observation** The first author worked with three project teams and conducted observations between June 2021 and December 2022. During this time, six affinity diagramming workshops, each lasting around two hours, and one persona workshop took place. Also, three prototypes were built through several iterations. Additionally, the first author’s active participation in the creation and use of the UX artifacts enabled us to assess the competencies of ASD stakeholders for creating and using the UX artifacts. Further, the first author had access to projects’ documentation, emails, reports, and internal communication platforms. Qualitative data collected from observation comprised of meeting participation, workshops, and informal discussions. We compiled these data in an Excel sheet and coded it by assigning field notes to either materials, competencies, or meanings. Observational data enabled us: 1) to report on different activities in which the ASD stakeholders used and created the artifacts, 2) to construct the communication lines between ASD stakeholders created when using the UX artifacts and 3) to understand the meanings UX artifacts had for ASD stakeholders in social practices.

## 4. Findings

We identified and described two social practices: the creation and usage of UX artifacts. The creation of UX artifacts describes how agile teams worked together to produce UX artifacts. It refers to the competencies applied to collecting data needed for constructing the artifacts, following the procedure to construct them, and producing an output (i.e., the UX artifact). The usage of UX artifacts describes how stakeholders use previously created UX artifacts and the ways ASD stakeholders consult or refer to UX artifacts for their work purposes.

We linked the work goals of ASD stakeholders to meanings. This practice describes how the UX artifact is inserted into the stakeholder group's work. These two practices relate to one another by means of sharing the same materials (i.e., UX artifacts) for different purposes (Figure 2). In the following, we describe the two practices, their relations, and points of view for the three ASD stakeholder groups. Different stakeholder groups were engaged in the two social practices, where they share the same material, but their competencies or meanings might differ. In addition, the two practices share a significant portion of the same materials (i.e., the artifact) but the creation of the artifact involves materials that its use does not. For example, to create affinity diagrams ASD stakeholders use whiteboards, sticky notes, pens, or markers.

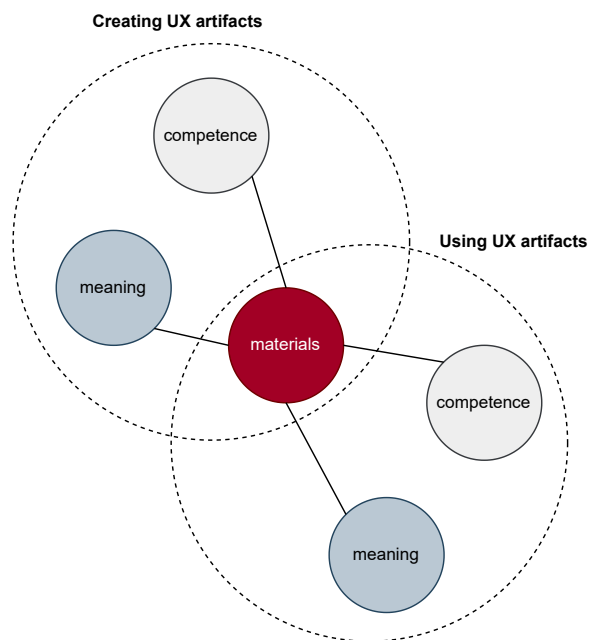
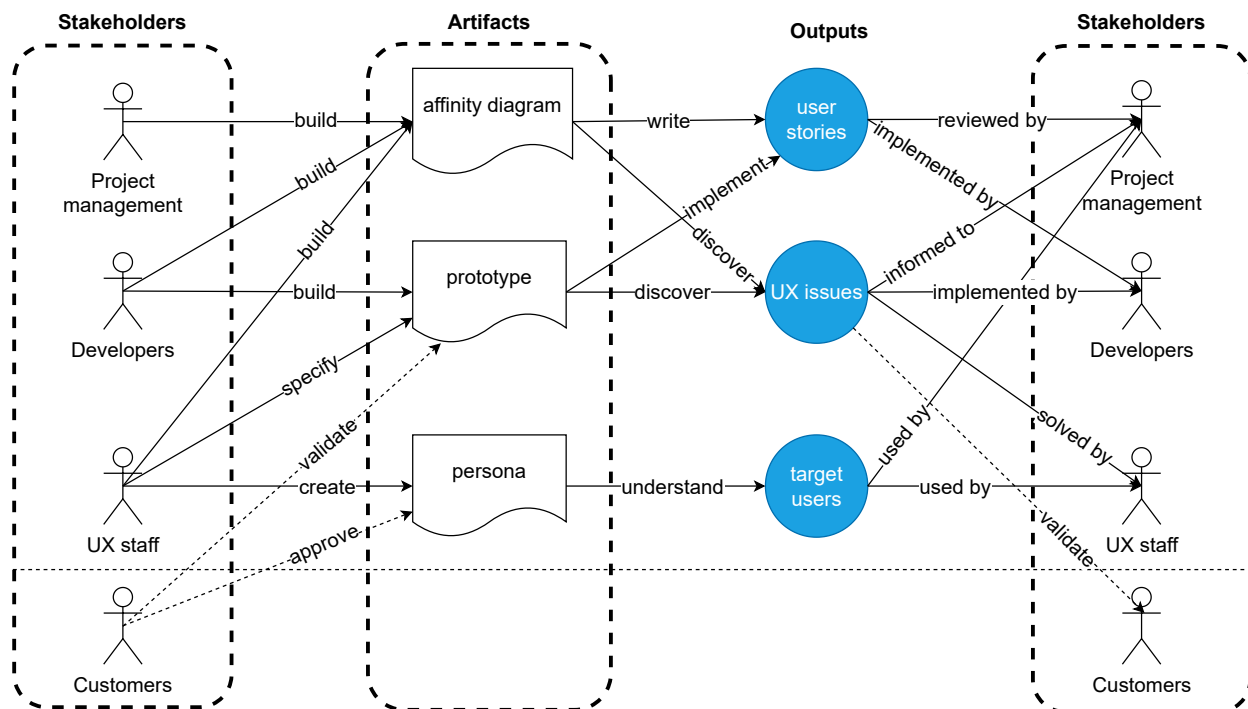


Figure 2. UX social practices.

### 4.1. Creation of artifacts

**Affinity diagrams** Project stakeholders created affinity diagrams to improve the UX process and agree on the product vision. In affinity workshops, developers, UX staff, and project managers collaboratively analyzed prototype evaluation data to deliberate prototype improvements and specify the sprint backlog. The root cause for starting this practice in Project 1 was the long duration of UX evaluation and data analysis activities, which was incompatible with the ASD principle of frequent software delivery and made sprints last over a month. Concretely, the UX team and developers struggled to synchronize their activities as the development, UX evaluation, and prototype redesign were happening sequentially, instead of in parallel. This directly violated the agile principles. Therefore, affinity diagramming was a suitable solution to reduce the time to analyze the data and involve the whole team in this activity. Also, affinity diagramming helped associate the meaning of user feedback to product development for two ASD stakeholder groups (i.e., developers and UX staff). Using the affinity diagram afforded to reduce sprint duration and respect agile principles. At the beginning of Project 2, affinity diagrams were not used. After introducing affinity diagramming, the team was able to analyze the data within 1-2 days and decide what prototype improvements were necessary. The affinity diagramming technique evolved over time as the team's competencies grew with experience. Concretely, the two first affinity diagramming workshops were focused on note clustering but did not provide actionable summaries to the team. In later iterations, the team identified the need to not only group the data but also identify the concrete actions could they take out of it. To solve that issue, the team decided to write user stories for each sub-cluster in the affinity diagram (see green notes in Fig. 1). Finally, affinity diagramming practice for identifying the UX issues with prototypes was transferred to Project 1 and has been established in the organization and practiced regularly.

**Personas** Project managers did not need to know how to build personas and what data it entailed to build one. Their competence is limited to understanding the final outcome of the persona workshop and being able to consult the personas for project purposes, such as justifying project requirements. UX staff, on the other hand, led the activities related to collecting the necessary user data, organizing the workshops, and helping other stakeholders understand the purpose of personas. Developers did not participate in persona creation in any way.



**Figure 3. Interactions and communication flows between ASD stakeholders and UX artifacts.**

**Prototypes** In Project 3, the prototype was a next-generation camera-based safety system for passenger vehicles. Prototypes served as demonstrators of work to internal project stakeholders as well as external ones, such as customers and business partners. In addition, these prototypes demonstrated how to build products based on real user needs. To build the prototype, the project team including developers, UX staff, and POs worked together to assemble different components such as the technical platforms needed for simulating prototype functionalities during user tests. Therefore, the prototype was a joint work of developers and UX staff over two weeks. The organization regularly created high-fidelity prototypes.

#### 4.2. Usage of artifacts

**Affinity diagrams** Each stakeholder group found different aspects of the affinity diagram useful. Developers used affinity diagrams to verify correct requirements implementation. One developer wrote in the questionnaire: *“I like to refer to the affinity diagram board when working on the voicebot, try and make sure what I implement is in line with what the participants seem to think or expect. Having this in the background and having the possibility to check things out whenever you need it is invaluable”*. The PO in Project 1 wrote: *“As a product owner of*

*the research project, this is a valuable input for me because it contributes to building the sprint backlog.”*. We observed that before introducing affinity diagrams, the team lacked a common development vision, as the project team consisted of members from different organizations whose objectives diverged and they did not know how to combine their skills to focus on delivering one single product. UX staff demonstrated to the team that conducting frequent and data-heavy UX evaluations can also yield results quickly. Also, the UX team used affinity diagramming results to maintain a UX-driven prototype design and challenge PO’s decisions. Therefore, collaborative user data analysis fostered a common product vision and aligned objectives focused on solving real user problems.

**Personas** Observation data showed that developers did not consult or use personas. UX staff primarily used personas to facilitate workshops and align with PMs on who were the target users. In Project 1, personas were frequently mentioned during meetings and discussions about product improvements, and when recruiting participants for UX evaluations. In these discussions, UX staff and PMs referred to the personas using their names, *George* and *Marie*, to discuss user needs, foster empathy with users, and address user requirements in the product’s development.

**Table 2. Summary of main findings of the study.**

<b>Materials</b>	<b>Competencies</b>	<b>Meanings</b>
<b>Project managers</b>		
Affinity diagrams	categorize affinity notes, interpret user feedback, write user stories from user feedback, select user stories for the backlog	organize sprint planning, build a user-centered product
Prototype		proof of work, a means to promote achievements to other departments about ongoing projects
Persona	understand the persona	establish project focus and identify user frustrations to motivate product development
<b>UX staff</b>		
Affinity diagrams	write affinity notes during user test moderation, organize and moderate the affinity diagramming workshop, categorize affinity notes	understand user needs, challenge the technical requirements, thorough user test data analysis, understand user needs, understand UX with the prototype
Prototype	create UI design, user flow, functionalities. represent a solution for a user problem, discuss the functionality, design, and content of the prototype and objectives of the user tests, pass the requirements to developers who coded the functionalities	representation of how to solve real user problems
Persona	collect user data, organize persona workshops, disseminate personas to the team	representation of a typical user, their needs, goals and behaviors. brings stakeholders' focus on addressing the needs of real users.
<b>Developers</b>		
Affinity diagrams	participate in affinity diagramming workshops, categorize affinity notes, write user stories from clusters	understand user needs, challenge technical requirements, prioritize design improvements, identify prototype improvements for next sprint
Prototype	write programming code, understand use-cases, evaluate the robustness of the algorithm, implement UX issues identified during user tests	
Persona		

NB. Empty cells were left blank intentionally and indicate that limited or no data was collected to describe the elements of social practice for certain stakeholder/material combinations. For developers, we found no interaction with personas. For project managers, they did not need to apply any competencies to create or use a prototype.



**Prototypes** The UX staff used the high-fidelity prototype in user tests to discover UX issues and then shared them with developers, project managers, and customers. Subsequently, the UX staff conducted several iterations of redesign and user tests to solve the identified UX issues. The UX staff had regular meetings with the technical lead and the two developers to test the coded prototype. Their discussions focused on ensuring the UX issues were correctly fixed in the final prototype. Developers faced issues reaching performance levels simulated during user tests. Thus, additional data collection and algorithm adjustments were needed. Further, the UX staff required that some user interface elements be redesigned to improve their readability. PMs used the prototype as proof of work, thus engendering the meaning of the prototype as a demonstration of successful collaboration between the organization and the customer. This enabled the negotiation of business goals. This was in line with the agile principle of valuing working software as a measure of progress making the prototype the main communication artifact toward customers. PMs also associated the prototype with solving a user problem that is valuable to the customer and as a means to communicate their achievements to other teams in the organization. The UX staff, the customer's UX team, and the PMs of both organizations discussed the functionality, design, and content of the prototype to agree on the features to test and the user test objectives.

## 5. Discussion

This study described how UX social practices emerged from organizing work in ASD and UX when using and creating UX artifacts. Table 2 summarizes the main findings of the study showing how ASD stakeholders relate to the three elements of the social practice. Clearly, ASD stakeholders attached meanings to UX artifacts that stem naturally from their job roles. For example, UX staff associated the meaning of prototypes with solving real user problems and aimed to communicate them to other stakeholder groups. Project managers, on the other hand, associate prototypes with demonstrating completed work and showing value to customers. Developers and UX staff communicated with each other to establish how UX findings from prototype evaluation activities should be reflected in the final product. Competencies varied in each stakeholder group and they were not required to build the same competencies to successfully use UX artifacts. The existence of social practices does not impose that kind of requirement either. Figure 2 shows that UX artifacts (i.e., materials) are constitutive to the two social

practices, thus linking them while suggesting that the competencies and meanings of those UX artifacts to ASD stakeholders differ. Affinity diagrams illustrate these differences in the example of where PMs did not have any competencies in building affinity diagrams, however, they could still participate in workshops and benefit from its outputs (e.g. sprint planning). Within the same stakeholder group, the artifacts had different purposes. For example, the prototype was useful to all stakeholders, especially to PM roles. On the other hand, the affinity diagram was created and used only by the UX team and occasionally by developers. This finding is not surprising considering that affinity diagrams support data analysis, compared to prototypes that serve for internal and customer demonstration purposes.

## 6. Conclusion

This study addressed the UX activities in the ASD context through the lens of social practices. We showed that ASD teams engage in creating and using UX artifacts as two social practices to bridge the gap between developers, UX staff, and project managers. We also showed that different stakeholder groups do not need to have the same competencies and build the same meanings for the UX artifacts to be useful. Each stakeholder selected data from UX artifacts relevant to their job roles. Further, this demonstrates the usefulness of UX artifacts as information carriers allowing stakeholders to exchange knowledge along different communication lines. Nevertheless, once established, maintaining these social practices depends on the stakeholders. Finally, establishing new social practices is a long process that requires organizational change.

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