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MINIMUM VIABLE USER EXPERIENCE: DEVELOPING A GOAL SETTING TECHNIQUE FOR STARTUPS

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ABSTRACT

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User experience can provide a range of opportunities for start-ups. These include higher earnings, employment creation, exports, competitive advantages, being profitable, among others. However, it is a challenge to develop a UX with low resources and no UX skills especially when the product or target user may still change completely.

This research aims to relate UX maturity and support MVUX goal setting through the interview of three start-ups and the development of a questionnaire to support their goal setting.

The case studies show that all start-ups interested in the study present a maturity level of at least 4 and up to 5 according to Nielsen's scale. At the same time, goal setting through a questionnaire is achievable in a short period of time and can lead to having concrete goals for a minimum viable user experience, can present which goals to not focus on and can help visualize the perception of team members in order to understand their product better and develop a concrete vision as a company.

The results conclude that the questionnaire could be a viable tool for start-ups that already understand the value of UX but do not have the maturity level to allocate resources to User Experience. It also presents over 5 possible different approaches for the questionnaire to be used.

Keywords: User Experience, Start-ups, Entrepreneurship, Minimum Viable User Experience, MVUX, UX Maturity.

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1 Introduction

This section presents the background for the thesis, the research gap and motivation for the research, the hypothesis and how it was tested along with a thesis outline for each section.

1.1 Background

Publications from the last years have started to investigate start-ups. In 2014, York and Danes concluded that the environment for software start-ups has sped up development due to competitive markets, internet distribution and rapid prototyping. According to Sutton (2000), for the start-ups, the main activities to improve their chances of survival are speed to market, partnerships and marketing. He also emphasizes, that with scarce resources, start-ups are reactive to competitors, partners, investors and customers. Therefore, they constantly pivot what and how they do (Sutton, 2000).

User Experience (UX) is the outcome in perception and response from the use or anticipated use of a product, system, or service (ISO, 2010). Empathizing with, and understanding the target user group (Laurinavicius, T., 2017) requires upfront UX work. However, start-ups pivoting (Sutton, 2000) means for UX that design work done up front often needs to be redone (Hokkanen & Väänänen, 2015).

As described by Coleman and O'Connor (2008), start-ups work in way in which processes within the start-ups are highly influenced by team members' backgrounds. Therefore, their experience and background are important in order to meet milestones and deadlines (Coleman & O'Connor, 2008) because a key capability of start-ups is that they are able to execute (Sutton, 2000). At the same time, this time pressure shows at the moment of making decisions, which tends to rely on intuition and, therefore, it may result in biased, poor decisions (York & Danes, 2014). Because of this, a lightweight approach is required (Hokkanen et al., 2015) not only to enable them to reach make better decisions, but also do so in an unbiased manner.

User Experience can support start-up survival because those that have an informed approach to design generate more money and exports (Kretzschmar, 2005), are financially sustainable (Schreiber et al., 2017) and operate in a profitable way (Crow, 2005) as well as create more successful products due to the better experience and reputation that it creates (Renzi et al., 2015). However, it is important that start-ups understand the value of

UX and transition, through new activities and capabilities, from seeing it as an expense (Hokkanen et al., 2016) into an asset that is directly related to higher performance in earnings, exports and employment creation (Kretzschmar, 2005).

The explored lightweight approach (Hokkanen et al., 2015) consists on developing a practical goal setting method in order to use a Minimum Viable User Experience (MVUX) framework that supports product design in start-ups (Hokkanen et al., 2016). As Hokkanen et al. (2016) describe, this framework allows UX to be developed at early stages and by doing so, to gain insights from data and feedback that allow the product idea to be validated and further developed.

In this study, the start-ups were interviewed regarding their UX practices and beliefs in order to set their UX maturity and gain insights into their skills and ways of working. Followed by this, they answered a questionnaire where they could set the importance of statements from the MVUX framework in a five-point scale. This allowed users to determine which factors from MVUX were important for them in under 5 minutes.

1.2 Research Gap

Whilst there are multiple publications about user experience, especially approaches, frameworks and methodologies, most methods are not explored despite being widely accepted (Hokkanen et al., 2015). Those that are explored in an academic manner, are generally specific to one product. At the same time, when it comes to start-ups and their use of UX, there is not much academic research which translates into no recognized best practices (Hokkanen, 2017). What is recognized, is the experience and background of team members (Coleman & O'Connor, 2008) determines their approaches, frameworks, processes, methods and tools. This has influence on that despite Start-ups saying that UX is important, when no team member has a UX background, they have almost no knowledge of UX (Renzi et al., 2015) and often end up with solutions for a non-existing problem (Crow, 2005).

Once start-ups decide to focus on UX, they will encounter design practices that are heavy and require high amounts of upfront work (Hokkanen et al., 2015). These practices are, therefore, not suitable for start-ups that have no experience in UX. The lack of resources for start-ups becomes a barrier when it comes to UX, since it is considered as an expense despite the value of it being recognized (Hokkanen et al., 2016). This changes as start-ups progress in the user experience maturity scale, which reflects the level of UX work

performed in a company (Möller, 2018). However, there are barriers that stop start-ups from progressing in the scale, such as low resources.

The lack of an easy to understand and implement valid approach for start-ups presents yet another barrier. In 2016, a framework was developed with a bottom up approach specifically for start-ups (Hokkanen et al., 2016). However, there are no validated tools to implement it. This becomes in the thesis's motivation: To propose a low resource way of using the MVUX framework, in order to provide UX value and further advance on UX maturity stages.

1.3 Thesis Outline

The rest of the thesis is structured as follows. The second section presents the theoretical background. The third section includes, an overview of UX practices followed by the fourth section, which represents three case studies. The fifth section is composed by findings, limitations and possibilities of future work. The sixth and final section contains the conclusions of the thesis. Below is a brief description of the topics presented in each section.

2 Theoretical Background

The following sections introduce disciplines and concepts that are related to this research. It presents the available material in user experience (UX), start-ups, how UX and start-ups currently match, as well as two scales which allow for measuring how integrated UX is in a company. There is a limited number of publications that study start-ups and a lower number that link start-ups and UX. To the best of my knowledge, no publications have been made linking start-ups and UX maturity levels. The purpose of this section is to provide a theoretical background on UX, start-ups, UX work in start-ups and UX maturity levels.

2.1 User Experience

User Experience (UX) is defined as “a person’s perceptions and responses that result from the use or anticipated use of a product, system or service” (ISO, 2010) in contrast with usability, which covers easy-to-learn, efficient to use, pleasant and objective (Renzi et al., 2015). Therefore, it is a key element to empathize and understand the target audience (Laurinavicius, T., 2017) as the UX also corresponds to the user’s capabilities, approach, character predisposition and past experiences (ISO, 2010). Consequently, ideas, projects and features are generally approached from the user’s perspective (Laurinavicius, T., 2017) which may lead to services being aligned with expectations and experiences guaranteeing not only a competitive advantage but also financial sustainability (Schreiber et al., 2017). Finding a solution by approaching them from the customers perspective with what is commonly referred as a holistic approach takes into consideration the exchange between sensations, emotions, intellects and actions within a determined environment and time (Pucillo & Cascini, 2014). Some of these may include usability, enjoyment, learnability and aesthetic appeal as elements (Laurinavicius, T., 2017) as well as “functionality, system performance, interactive behaviour, and assistive capabilities of an interactive system” (ISO, 2010). However, other qualities to take into consideration are those that support user goals. These may be related to do-goals which are commonly referred to as pragmatic, or be-goals, which are hedonic attributes (Pucillo & Cascini, 2014).

2.2 Start-ups

Start-ups are seen as companies with low maintenance costs that can grow rapidly with high lucrative results, which gives them an advantage over traditional companies (Renzi et al., 2015). They are referred to as “a group of people looking for repeatable and scalable

business model working in conditions of extreme uncertainty” (Schreiber et al., 2017). Within the start-ups, entrepreneurs do not usually limit to performing a single role (Laurinavicius, T., 2017) and have a significant influence of the product’s development (Hokkanen & Väänänen, 2015). It is important for executives and managers to keep the company focused and moving forward, towards a defined technical strategy which may constantly shift. Therefore, these directors need to be responsible to shape, direct, implement strategies but also lead and navigate, since technical survival and success depends on them (Sutton, 2000). Implementing controls and structures for software development management presents a challenge for start-ups (Coleman & O’Connor, 2008) as well as navigating uncertainty (Schreiber et al., 2017).

Start-ups are characterized as being young and inexperienced (York & Danes, 2014), developing highly innovative products which deliver value (Schreiber et al., 2017) and being reliable on the background of team members to determine the processes (Coleman & O’Connor, 2008). Even where founders have software experience, they present scarce resources and lack a business model (Coleman & O’Connor, 2008). However, a sustainable business model and problem/solution fit can be achieved by experimenting with different ideas when little risk is still involved (Hokkanen & Väänänen, 2015) and by incorporating the customers early in the product development lifecycle reduce investment risk (Crow, 2005).

Because of the scarcity of time resource, start-ups are highly active and rely heavily on intuition for decision-making. Start-up decision-making is fast, automatic, effortless, implicit and emotional. Therefore, it may result in poor decision-making skills due to biases (York & Danes, 2014). It is possible to design situations with the aim of avoiding biases and, therefore, supporting better choices (York & Danes, 2014).

Whilst there are not many academic publications regarding the success of Customer development or the Lean start-up methodology, it is typically used by incubators, accelerators and university entrepreneurship courses (Olsson et al., 2013). Despite the lack of academic publications around accelerators, there is a high demand for them from start-ups (Cohen et al., 2019) and also the belief that the influences and opinions of meetings and/or interviews with investors may help hinder the potential biases (Mansoori et al., 2019). The lean start-up methodology presents coaches as neutral facilitators who help entrepreneurs to take this approach. However, this was not in line with research where they “were seen as authority figures whose opinions were often valued more highly than the data” (Mansoori et al., 2019). Another potential issue in line with this was an approach of “spend and grow” due to a focus on building wealth and rush to market in order to

receive a high valuation rather than emphasizing profitability and why customers buy (Crow, 2005). It is still considered that one of the main activities that improve their chances for survival are speed to market, along with partnerships and marketing (Sutton, 2000) but also learning to execute properly, listening to customers and deliver products/services that provide real value (Crow, 2005). This is in line with the observed transition from focusing on costs, product and process quality, speed and efficiency to co-creation of value by involving users in the process (Schreiber et al., 2017).

As of 2014, development cycles have sped up due to competitive markets, internet distribution and rapid prototyping (York & Danes, 2014). Start-ups generally operate in within a varying environment (Hokkanen & Väänänen, 2015) and due to their scarce resources act reactively to competitors, partners, investors and customers. This often leads them to constantly pivot what they do and how they do it (Sutton, 2000). This influences the way start-ups need to approach user experience, which is explained in more detail in the next section.

2.3 UX in Start-ups

Start-ups run within a varying environment which is matched by their practices (Hokkanen & Väänänen, 2015). They also work in an uncertain environment, which can be managed by adopting certain practices (Renzi et al., 2015). However, despite being managed, it is still a part of the process since there are no guarantees that a business model will work (Schreiber et al., 2017). Therefore, UX work must also match the uncertainty level by being fast, since it may be redone multiple times (Hokkanen & Väänänen, 2015). Eric Ries (2011) proposes to optimize productivity by quick tests in an iterative and low-cost manner aimed at validating market hypotheses and investigating users. Having a good UX can provide a competitive advantage (Hokkanen et al., 2016) and integrating a comprehensive approach to design can increase revenue, exports and job creation (Kretzschmar, 2005).

A study shows that companies that adopt a comprehensive approach to design are capable of generating more money and a higher amount of exports and those that do not (Kretzschmar, 2005). This may be because the success of the product can be influenced by user experience of the user and the reputation derived by it (Renzi et al., 2015). The mentioned experience can be tangible from as early as the form of request of contact (Schreiber et al., 2017).

In order to delight the users, having good usability along with user experience must be the focus when proposing, conceptualizing and developing projects (Renzi et al., 2015). At the same time, user satisfaction and business success are affected by value creation (Hokkanen et al., 2016) where poor customer experience can lead to the decline of dot com companies (Crow, 2005). Having a culture that is aligned with customer expectations and experiences, guarantee not only a competitive advantage, but also financial sustainability (Schreiber et al., 2017) since building a company that can operate profitably is the goal of any successful venture (Crow, 2005).

Despite UX being seen as a critical component of a business success, it is also seen as an expense (Hokkanen et al., 2016). The study shown by Renzi et al. (2015) reports that nearly $\frac{3}{4}$ of the start-ups that participated in the study did not have any knowledge about UX and after getting to know about it, nearly $\frac{1}{3}$ of them felt the need to rethink their solution from the users point of view reflecting that UX understanding can lead to start-ups taking a step back from their idea and redesigning the whole concept (Renzi et al., 2015). When companies do not do so, they may end up with the perfect solution to a problem that did not exist, for a market with no customers (Crow, 2005).

Executives and managers on start-ups often allow their developers to have a significant influence over the way they work in the same way processes within the start-ups are highly influenced by team members' backgrounds (Coleman & O'Connor, 2008). Therefore, this experience is important in order to meet milestones and deadlines (Coleman & O'Connor, 2008) because a key capability of start-ups is that they are able to execute (Sutton, 2000). This is in line with other research that suggests that ownership of processes motivates software process improvement success (Baddoo & Hall, 2003), because instructions may create an additional barrier where speed is an important factor (Sutton, 2000). It may seem obvious then, that start-ups will select the process based on their next milestone (Coleman & O'Connor, 2008) while focusing on flexible processes rather than structure (Sutton, 2000). This may apply in the form of start-up UX by defining standards for graphical interfaces that can be applied across several products as well as generic review processes and test plans that can be applied for each product family or recurring development activities, such as design reviews (Sutton, 2000). However, because of the fast-paced, reactive and innovative environment, highly systematic and measured approaches may not be compatible. Therefore, start-ups should adopt a lightweight set of methods for user research (Sutton, 2000) and other UX practices. This is in relation with the trend that whilst start-ups aim to provide good usability, they need a more comprehensive approach (Hokkanen et al., 2016). This may be due to the high amounts of design work required in the traditional approach to UX design because it is

not possible to do high levels of upfront work when the product might still change significantly (Hokkanen & Väänänen, 2015).

2.4 UX Maturity

UX maturity can be described as the extent to which UX work takes place within an organization (Möller, 2018). Failing to recognize the gap regarding the current activities and capabilities performed by the company, and the ones required in order to enter or progress in the experience market, can cause them to repeat processes instead of moving forward (Hokkanen et al., 2016). This can be influenced by skills of team members processes (Hokkanen & Väänänen, 2015; Coleman & O'Connor, 2008), as well as opinions from mentors and trends can highly influence start-ups ways of working (Mansoori et al., 2019), when no team members or mentors have experience in UX this one may be inexistent, specially at the beginning of teams entrepreneurial journey (Nielsen, 2006, April). When companies seek to enter the experience market, it is important they realize that such transition requires new activities and capabilities (Hokkanen et al., 2016) as well as the realization that change does not happen overnight and in order to reach a level where UX is integrated and established change will need to be gradual (Möller, 2018). However, advancing on the stages is directly related to higher performance in earnings, exports and employment creation (Kretzschmar, 2005).

In order to understand a start-ups UX maturity level, two different scales are presented below.

2.4.1 Nielsen's Model

Nielsen's UX Maturity model is a sequence of 8 stages (Nielsen, 2006, April) which describe the level in which an organization is. Each level is based on the commitment to user experience (Nielsen, 2006, May). These stages are described below.

STAGE 1: Hostility Toward Usability

In this stage, start-ups want to focus solely on building working features. Users and their needs are ignored.

STAGE 2: Developer Centred UX

During this stage, teams start to rely on their intuition. Usability is considered important, but no budget or efforts are in place.

STAGE 3: Skunkworks UX

Organizations notice that relying on intuition is not a great approach and know they should use external users, however, there is no process or budget and it is done mostly ad hoc by advocated and not professionals. Results will help the company advance to the next stage.

STAGE 4: Dedicated UX Budget

A small budget is allocated and UX is planned for. The main UX effort is user testing to improve a user interface which has already been partially implemented. One or some UX specialist forms part of the organization. More and bigger results are required to advance to the next stage.

STAGE 5: Managed Usability

There is a dedicated UX team that works across the organization. User testing is still the main method which means it is still done during the development of the project, rather than early. Methodologies and guidelines start to be in place as well as usability reports. However, because of a stretched budget, only particularly promising projects can be prioritized.

STAGE 6: Systematic User Centered Design Process

The need for a user-centered design process is accepted as well as the benefits of iterative design. Early user research is conducted and there exists a UI design standard as well as a process for tracking user experience quality throughout design projects and across releases. They are checked as any other business indicators. The budget is also large enough to conduct a range of user research in key projects and those that don't get a lot of UX resources have some form of design review. Projects are prioritized based on the business value of their UX.

STAGE 7: Integrated User Centered Design

The development lifecycle is carried out based on user data, project definition and requirements. UX quality is tracked quantitatively and usability goals must be surpassed before release. In contrast with previous stages, the company does not use usability to improve what they are building, but to decide what to build.

STAGE 8: User Driven Corporation

User data defines what projects are funded and determine direction and priorities. This means that methods that were used to improve projects, is now used at a strategic level.

The data is based on observations and not what users say. UX moves from screen to physical spaces and interaction.

2.4.2 Danish Design Ladder

The Design Ladder was built in 2001 based on the hypothesis that “there is a positive link between higher earnings, placing a greater emphasis on design methods in the early stages of development and giving design a more strategic position in the company’s overall business strategy” (Danish Design Center, 2015). This was later reinforced when companies that work systematically with design present bigger exports and higher earnings than those that don’t (Kretzschmar, 2005).

The ladder has 4 stages to it in which each company is ranked based on how it uses design as showcased below in Figure 1 (Danish Design Center, 2015):



Figure 1: Danish Design Ladder (Danish Design Center, 2015).

STEP 1: NON-DESIGN

Design is an invisible part of, e.g., product development and the task is not handled by trained designers. The solution is driven by the involved participants’ ideas about good function and aesthetic. The users’ perspective plays little or no role in the process.

STEP 2: DESIGN AS FORM-GIVING

Design is viewed exclusively as the final form-giving stage, whether in relation to product development or graphic design. Many designers use the term ‘styling’ about this process. The task may be carried out by professional designers but is typically handled by people with other professional backgrounds.

STEP 3 DESIGN AS PROCESS

Design is not a result but an approach that is integrated at an early stage in the development process. The solution is driven by the problem and the users and requires the involvement of a wide variety of skills and capacities, for example, process technicians, materials technicians, marketing experts and administrative staff.

STEP 4: DESIGN AS STRATEGY

The designer works with the company’s owners/management to rethink the business concept completely or in part. Here, the key focus is on the design process in relation to the company’s business visions and its desired business areas and future role in the value chain.

2.5 Summary

Schreiber et al. (2017) emphasizes the importance of being aligned with expectations and experiences in order to gain a competitive advantage and be profitable. However, new start-ups have often not reached a product market-fit until they pivot multiple times. This leads to questioning: how can a start-up align themselves with these factors when the customer is still unknown?

Although the value UX can provide to a company is clear, it is not surprising start-ups see it as an expense when traditional UX requires that the team empathizes with users which, after pivoting, may not be the target users anymore and render the performed UX work useless. Whilst strategies could be adopted to minimize the level of work, this is not the case with the available UX material and if team members, mentors, or accelerators adopt or recommend these approaches they may be doing more harm than good.

At the same time, there are recommendations to view things from the customer’s perspective with a holistic approach (Pucillo & Cascini, 2014) but having a holistic approach to UX is the highest maturity stage for a start-up (Nielsen, 2006, May) which requires high resources (including a dedicated UX team) which start-ups do not have. It seems more plausible, that once companies decide to make this change and benefit from UX in the way of competitive advantages, financial sustainability, increase revenue, exports and job

creation (Schreiber et al., 2017; Kretzschmar, 2005) they implement new activities and capabilities (Hokkanen et al., 2016) in a gradual manner (Möller, 2018). Sutton (2010) also places importance on start-ups defining standards for graphical interfaces that can be applied across several products as well as generic review processes and test plans that can be applied for each product family or recurring development activities, such as design reviews. The requirements outlined, correspond to a stage maturity of level 6 (Nielsen, 2006, May) which also requires resources most start-ups don't have.

When start-ups are starting to explore the solution to an identified problem, they can progress towards a sustainable business model and achieve the problem/solution fit by experimenting when there is still little risk (Hokkanen & Väänänen, 2015) and reduce financial risk by incorporating the customers early in the product development lifecycle (Crow, 2005). This can be done by rapid prototyping and testing ideas in a quick and cheap manner as recommended by Ries (2011). This way, start-ups can pivot based on data and not assumption until reaching product market fit. However, start-ups may need to learn to present this data to mentors in order to get more accurate feedback, since regardless the results of the tests, opinions from mentors are often more valued than data (Mansoori et al., 2019).

In addition to the need to experiment with low information regarding the final product and user, the recommended practices to do so should not have highly detailed instructions, since these may hinder performance where speed-to-market is important (Sutton 2000). However, when no team members or mentors have experience in UX, specially at the beginning of teams entrepreneurial journey (Nielsen, 2006, April), the lack of instructions could lead to performing such practices in an inaccurate manner, resulting in making the wrong decisions. Which leads to questioning what level of instructions is required?

3 UX Practices

This section presents an overview of Approaches, Frameworks, Methodologies, Methods along with Tools. The main goal of this is to clarify terminology by explaining different UX practices and present some of which may be beneficial to start-ups.

In multiple academic papers, the following terms are used interchangeably:

- approach
- framework
- methodology
- method
- process
- process activity

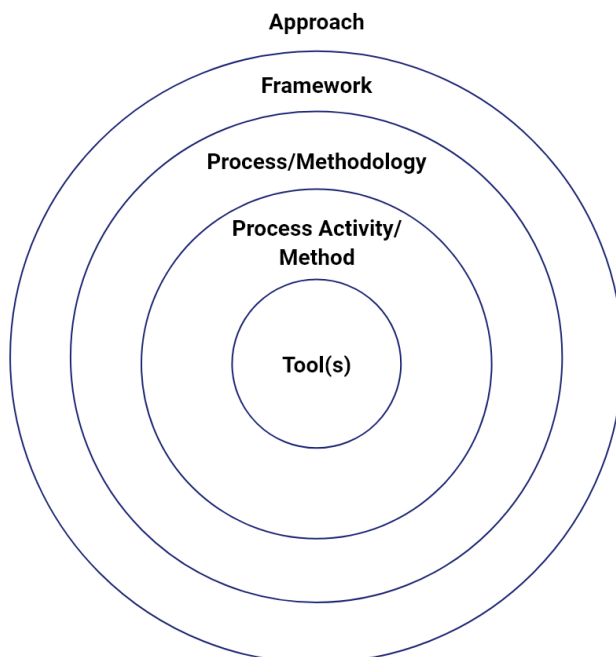


Figure 2: Terminology Clarification

For the purpose of this research, as illustrated in Figure 2, an approach is considered as a high-level way of working. Followed by a framework used to define a process or methodology. Each process or methodology is followed then by process activities or methods. Within those process activities and methods different tools are used.

For further clarification, a process is defined as “a set of interrelated or interacting activities that use inputs to deliver an intended result” (ISO, 2019) whilst a process activity, is defined as “an activity that, when consistently performed, contributes to achieving a specific process purpose” (ISO, 2019).

In this research, a tool is understood as a resource that contributes to the completion of a process activity. Because of processes, process activities and tools being considered quite personal to each start-up, only approach and framework are included in the study within this thesis, mainly because in order to provide a lightweight way of ‘doing UX work’ for start-ups, they must have enough freedom to accomplish these goals with a familiar tool.

3.1 Approaches

The definition of approach according to the Cambridge dictionary is “a way of considering or doing something” (Cambridge University Press, 2020). In UX and more specifically in this research, an approach is considered as a high-level way of working.

In the design and development of systems which interact with an end-user, a human-centred approach may yield economic and social benefit (ISO, 2010). However, these approaches are still limited, despite the benefits of striving at experiences (Olsson et al., 2013) and supporting design goals that address meeting quality requirements (ISO, 2019). In addition to being limited, they require high amounts of upfront work (Hokkanen & Väänänen, 2015; Hokkanen et al., 2015).

Some of these approaches, which may be beneficial to start-ups are:

- a) HCD is defined as “an approach to system design and development that aims to make interactive systems more usable by focusing on the use of the system and applying human factors/ergonomics and usability knowledge and techniques” (ISO, 2010).
- b) Design thinking has multiple definitions (Gobble. 2014). The most commonly accepted one is that of IDEO, which divides this approach into 3 overlapping and iterating domains: inspiration, ideation and implementation (Luebkeman, 2015).
- c) Experience Driven Design is an approach which focuses on designing with the goal of evoking an experience or a set of them. It has 3 layers: aesthetic, meaning and emotional (Ahtinen et al., 2015).
- d) Researcher Introspection is proposed as a controversial yet powerful approach in which a number of researchers use techniques for “self-interviews”. Besides this, it is recommended to include other methods for triangulation, confirmation, or rejection of the insights or knowledge generated (Xue & Desmet, 2019)

Each of these approaches have been widely adopted by professors, design professionals and accelerators. Whilst they all provide a different focus and benefits, they are also flexible enough to allow start-ups to implement them as it suits them best and according to their own capabilities. These capabilities may be influenced by the UX maturity stage of

each team. For example, a version of researcher introspection may start to be applied during stage two, or so called “Developer Centred UX” (Nielsen, 2006, April) when they rely on intuition to design the system.

However, the same level of freedom may also result in uncertainty or confusion in how to implement such approaches due to the lack of skills from team members. In the same case, where the developer is performing researcher introspection, the experience of the individual will highly influence the results. This could be positive if the developer is being objective and is close to the target group. However, if the developer’s experiences are very different from the ones from potential users, the results may be harmful to customer acquisition.

3.2 Frameworks

A framework is defined as “a system of rules, ideas of beliefs that is used to plan or decide on something” and “a structure around or over which something is built” (Cambridge University Press, 2020). Because of the wide range of target audiences and products within the start-up ecosystem, certain domain specific frameworks may be of benefit to particular start-ups. These include mobile learning (Lui et al., 2008), gamification (Mora et al., 2015), sports consumers, amongst others. For the purpose of this research, the focus is on generic user experience frameworks applicable across multiple domain star-ups. Four of these are briefly described below.

- a) Experience Design: This framework is the result of integrating accessibility, usability, and engageability within user centred design. As shown in Figure 3, it takes into account principles, elements, processes and methods in a human-centred way. The model includes usability principles and user experience models (Jordan, 2000).

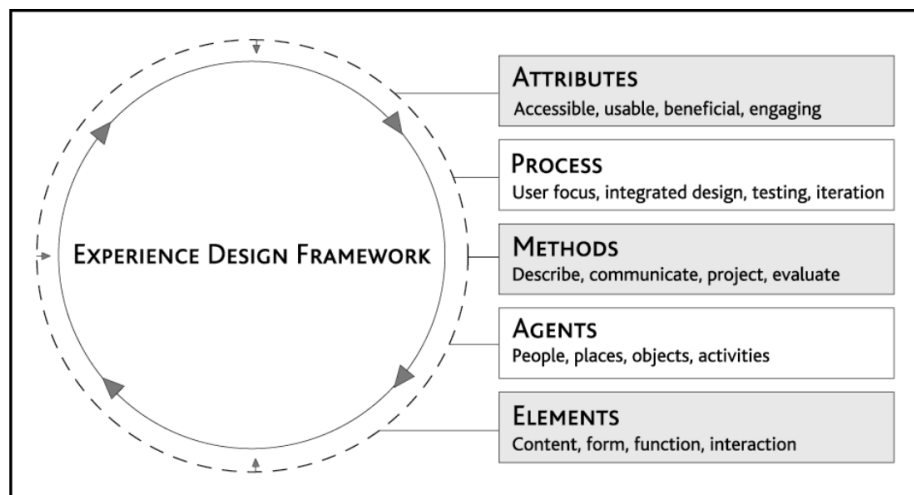


Figure 3: Experience Design Framework (Jordan, 2000).

b) Science Design (Adikari et al., 2011): Science Design based on the three science research cycles and in practical terms, HCI artifact creation and evaluation follow an iterative approach similar to that explained in Science Research as demonstrated in Figure 4. This framework aims to create new knowledge to the body of scientific research by directing its efforts towards the creation and evaluation of new and improved IT items as a solution for relevant organisational problems.

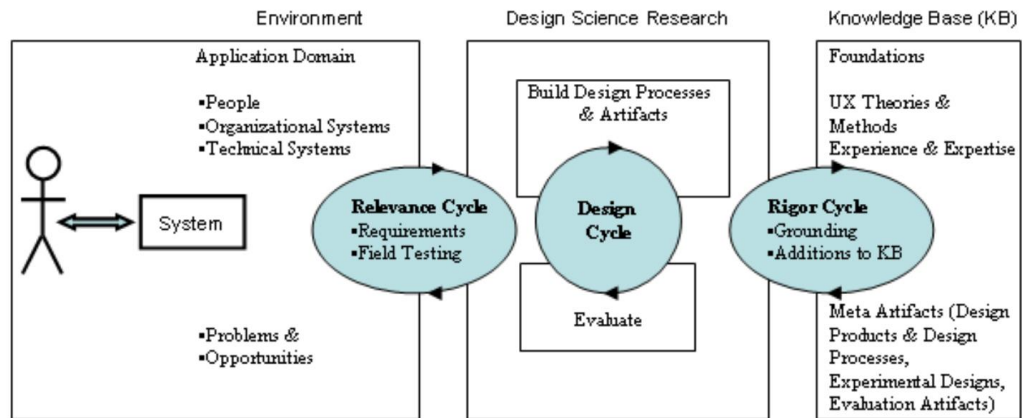


Figure 4: Science Design (Adikari et al., 2011).

c) Empathy Framework (Kouprie & Visser, 2009): This framework aims to provide insight into the process of empathy by focusing on how it is supported in design. It does so by helping structure current approaches in empathic design, being especially useful when the team is not part of the target user group. It consists of four phases which are (1) discovery, (2) immersion, (3) connection and (4) detachment as represented in Figure 5

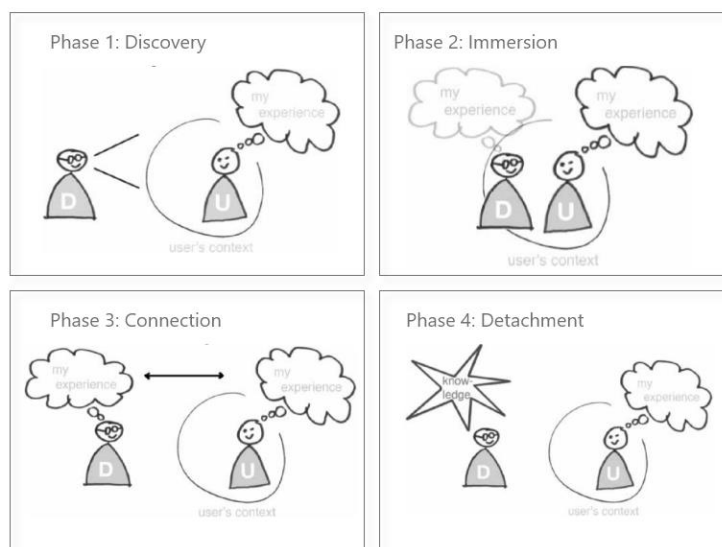


Figure 5: Phases of Empathy Framework (Kouprie & Visser, 2009).

- d) Minimum Viable User Experience (MVUX) is a framework for user experience, needs and affordances. It aims to enable start-ups to find focus for UX on early product stages (Hokkanen, 2017) and thus have a satisfying UX that is capable of communicating the product idea to users. This allows them to collect meaningful feedback and data to validate and further develop the product idea (Hokkanen & Väänänen, 2015). As shown in Figure 6, it consists of 12 possible UX goals grouped in 4 categories.

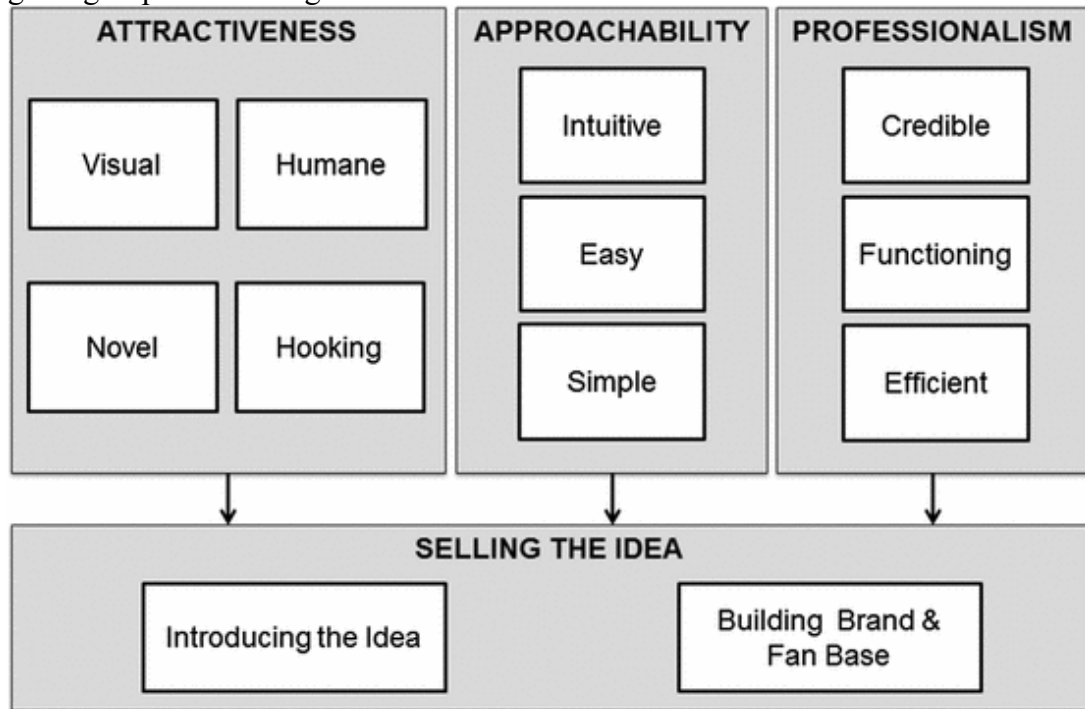


Figure 6: Minimum Viable User Experience Framework (Hokkanen, 2017).

These frameworks, or “sets of rules” provide start-ups with a visual way to adopt a systematic approach in their design. At the same time, it provides enough freedom that allows for creativity while keeping certain requirements. Start-ups are generally familiar with canvases that help them develop their business goals and product offering, therefore, a framework may result familiar to them.

3.3 Methodology

For the purpose of this research, a methodology or process is defined as “a set of inter-related or interacting activities that use inputs to deliver an intended result” (ISO, 2019). The ones explained below are the most popular ones when it comes to academia publications, but also popular in practice.

- a) Service Design: Defined as a methodology that consists of three phases: observation, understanding/thinking, and implementing (Marquez & Downey, 2015). Service design is a process in which the designer focuses on creating optimal service

experiences (Interaction Design Foundation, 2020). Throughout these phases, a design team and users work together to co-refine existing services or co-create new ones. The final product or goal of service design is to “ensure that service interfaces are useful, usable, and desirable from the client's point of view and effective, efficient, and distinctive from the supplier's point of view” (Mager, 2008). There are 5 principles (Interaction Design Foundation, 2020):

- a. User-centered
 - b. Co-creative
 - c. Sequencing
 - d. Evidencing
 - e. Holistic
- b) Towards Heuristics (Quiñones et al., 2018): This methodology focuses on 8 well-defined steps in order to develop domain specific heuristics. This enables the heuristics to be understandable, useable and/or effective in evaluating the usability/UX of a specific application. The above-mentioned steps are: Exploratory, Experimental, Descriptive, Correlational, Selection, Specification, Validation and Refinement Stage.
- c) Idea Generation (Moon & Han, 2016): The proposed methodology focuses on the creation of novel ideas for radical innovation. It is divided into four successive phases and one supportive phase called ideation control. The four successive phases are Future Envision, opportunity identification/analysis, idea generation and idea expansion.
- d) Agile UX: The agile methodology is considered a popular software development methodology which is focused on the four following factors:

a. Individuals and interactions over processes and tools

b. Working software over comprehensive documentation

c. Customer collaboration over contract negotiation

d. Responding to change over following a plan

This methodology, on its own, presents challenges when attempted to combine with UX work (Laubheimer, 2017; Loranger, 2017). Therefore, Agile UX aims to solve this by taking into consideration those factors and adding the following (Laubheimer, 2017; Loranger, 2017):

- management understands and supports UX work
- UX people show leadership and advocate for UX work
- Agile workflow is flexible when it comes to UX
- UX people are part of the product teams.

- e) Lean UX: This methodology for UX Design (Gothelf & Seiden, 2013) is characterized by three main influences (Liikkanen et al., 2014): Design Thinking, Lean Production and Agile Development. The goal of Lean UX is to end up with a product that satisfies customer's needs and to do so in a manner that uses minimal resources and is as quick as possible (Gothelf & Seiden, 2013). The Lean UX framework presents by Gothelf & Seiden (2013) has fifteen principles, which are considered lengthy and with the presence of overlaps (Surakka, 2017) but can be summarized into six (Liikkanen et al., 2014):
 - a. Early customer validation vs. releasing products with unknown end-user value
 - b. Collaborative cross-functional design vs. lonely hero design
 - c. Solving user problems vs. adding cool features
 - d. Measuring key performance indicators vs. undefined success metrics
 - e. Applying appropriate tools flexibly vs. following a rigid methodology
 - f. Nimble design vs. heavy wireframes or specifications.

Once the star-up has decided where to focus their efforts on, a methodology can help them clarify the steps to accomplish their goals. However, adopting a methodology will require the team to allocate resources towards the learning of these, even if only timewise. However, by adopting repetitive process, they can save time in the long run and become experienced in the selected methodology. This expertise may translate into better performance, error reduction and higher team coordination.

3.4 Methods

A method or process activity is one part of a methodology or process and is defined as “an activity that, when consistently performed, contributes to achieving a specific process purpose” (ISO, 2019). Each of these process activities will contribute to the overall process/methodology. Depending on the selected approach, framework and methodology the methods can vary, and more than one process activity can support a step from the process. Below, are briefly discussed some UX design methods by category. These categories are defined by the commonly present stages from different methodologies. However, these are highly interchangeable and will be dependent on what is trying to be analysed.

Research

- a) Observations: During an observation, the researcher(s) meet with participants in the environment where they would normally use the product or service (Rohrer, 2014). The goal of this, is to gain insights regarding how the user interacts with the system first-hand in an active (asking questions) or passive way (no interaction) (Eid, M., 2015).

- b) Surveys: A survey is composed by a set of questions which should be concise and not too long. This method can help gather high amounts of information from multiple participants and from different parts of the world (Eid, M., 2015).
- c) Interviews (Eid, M., 2015) (Young, R., 2002):
- d) Focus Groups: In a focus group, 3-12 participants discuss a topic, which could be the service or problem at hand, providing verbal and written information (Rohrer, 2014). These meetings can last between few hours to a few days and are designed to encourage consensus (Young, R., 2002).
- e) Analysing Existing Document: Eid (2015) describes this method as a focus on reviewing the current process and documentation. The results of this analysis, may include figuring out who the stakeholders are, noting questions for interviews, finding redundancy or missing information and helping understand what users do during an observation (Eid, M., 2015). In contrast, Young (2002) refers directly to the analysis of documents such as business plans, market studies, existing guidelines, procedures, amongst others. The difference in both definitions can lead to one approach focusing on inspiration for further analysis whilst the other looks for more tangible information.

Ideation

- a) Brainstorming, Braindrawing and Brainwriting: They are an individual or group method focused on the generation of ideas that may solve problems (Wilson, 2013) as well as idea reduction (Moon & Han, 2016; Young, R., 2002). It is performed ideally groups of 3-10 people with different backgrounds that understand the problem, questions or topic (Quiñones et al., 2018). It is considered powerful due to the original, unusual and/or effective results of possible combinations of ideas (Moon & Han, 2016). The method includes generating multiple ideas with no criticism followed by a stage where these suggestions are discussed, criticized or prioritized (Young, R., 2002). The difference is that in one they are said out loud, in the other drawn and in the other written (Quiñones et al., 2018).
- b) Mindmap (Friis & Yu, 2019): Method in which the participants write the problem or topic in the middle of a paper and a web of relationships around such concept or problem statement.
- c) Worst Possible Idea: Worst Possible Idea or WPI. Is a method that behaves the opposite way to brainstorming (Friis & Yu, 2019). By finding the worst idea, rather than the best, it can help the team relax, boost confidence, increase creativity (Lose, 2019) and reduce pressure and anxiety (Friis & Yu, 2019)
- d) Affinity Diagram: When used for idea generation (Geyer et al., 2011; Miura et al., 2011), affinity diagrams can help organize and make sense of qualitative data

(Hartson & Pyla, 2012) by externalizing it in the form of written or drawn sticky notes and then clustering them (Lucero, 2015).

Besides the mentioned techniques, there are others which have become popular as a design practice for ideation. The most common ones include Crazy's Eight, Mission Impossible, Negative Brainstorming, Mash Up, Unintended Consequences and provocations (Friis & Yu, 2019).

Prototyping

Prototyping is essential for concept evaluation (Lim et al., 2006) and for visualizing ideas at early stages (Sefelin et al., 2003) as shows in Figure 7, without much investment in development, especially when looking to evaluate different design alternatives (Rudd et al., 1996). It can help build a quick and rough version of the system in general or parts of it (Rohrer, 2014; Rudd et al., 1996). Since it has high involvement of users (Eid, M., 2015) it can serve as a communication channel for users, designers and reviewers (Rohrer, 2014) by often instantly allowing the users to see the results and clarifying/adjusting information in an iterative manner (Eid, M., 2015). At the same time, it allows for stakeholders to understand the interactions with the system due to the visualization of capabilities of the system (Young, R., 2002).

It is estimated that “up to 80% of major interface problems can be solved with rapid prototyping” (Heaton, 1992). These issues can be identified in low and high-fidelity prototypes regardless of being computer based, paper based, fully functional (Sefelin et al., 2003), however, the issues identified in each will be different ones and therefore it is important to determine what you are trying to evaluate before selecting one (Lim et al., 2006).

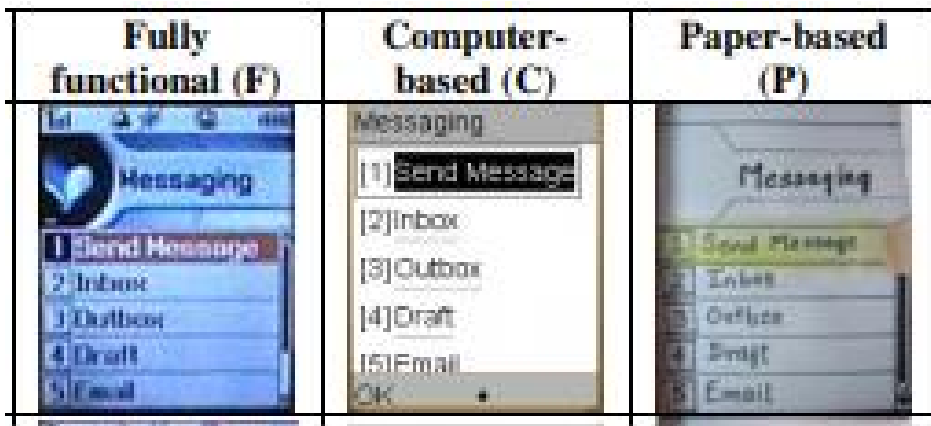


Figure 7: Different Prototypes (Lim et al., 2006)

- a) Low Fidelity: Prototypes that are simple and do not require much time (Sefelin et al., 2003) or other resources. They can help provide design direction, but without much detail and limited or no functionalities (Rudd et al., 1996). The fastest way to make them is pen and paper, however, users prefer computer-based prototypes over paper ones (Sefelin et al., 2003). This may be due to their abstract nature or unclear images (Rudd et al., 1996). However, they still help identify key issues (Rudd et al., 1996), enhance communication between stakeholders (Rohrer, 2014) and evaluate early design ideas (Rudd et al., 1996; Lim et al., 2006; Sefelin et al., 2003).
- b) High Fidelity: Usually fully interactive will mimic the real product (Rudd et al., 1996). It helps identify problems such as physical handling and operation, comments on the concept itself, comparison with similar products and performance-related issues (Lim et al., 2006).
- c) Storyboard: It is a common method for representing in a graphic manner how a system works within the context of use in the form of a narrative (Wilson, 2013; Truong et al., 2006). They are drawings or pictures in a vignette style and typically include images of the interface, speech, toolbars, and elements that are considered necessary for the solution (Wilson, 2013). It is recommended to include the use of text, inclusion of people, level of detail, number of panels (3-6 being optimal), and representation of the passage of time (Truong et al., 2006). Such variation are represented in Figures 8 and 9. These factors should be discussed until there is a common understanding of what the system provides, the main benefit being that they help reduce risk and are inexpensive (Wilson, 2013); even more than prototypes (Young, R., 2002).

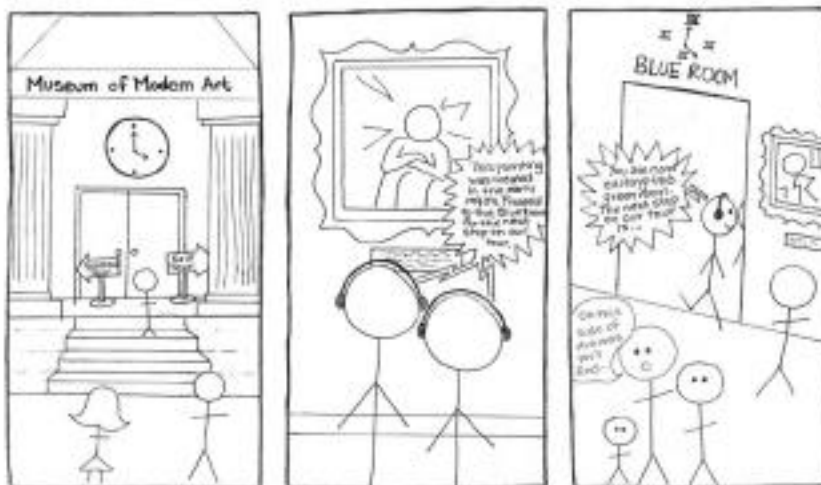


Figure 8: Storyboard with text, speech and time indicators (Truong et al., 2006)



Figure 9: Storyboard with photos and text (Truong et al., 2006)

- d) Wizard of Oz: Is a method common in HCI used for prototyping complex interfaces that require challenging hardware, software (Dow et al., 2005), speech and language processing or multimodal system technologies (Bernsen et al., 1994). These issues are solved by having a person who is designated the “wizard operator” to act like an intelligent part of the system with the help of mock-ups (Dow et al., 2005) ideally without the user knowing (Bernsen et al., 1994). These actors and actions are visualized in Figure 10.

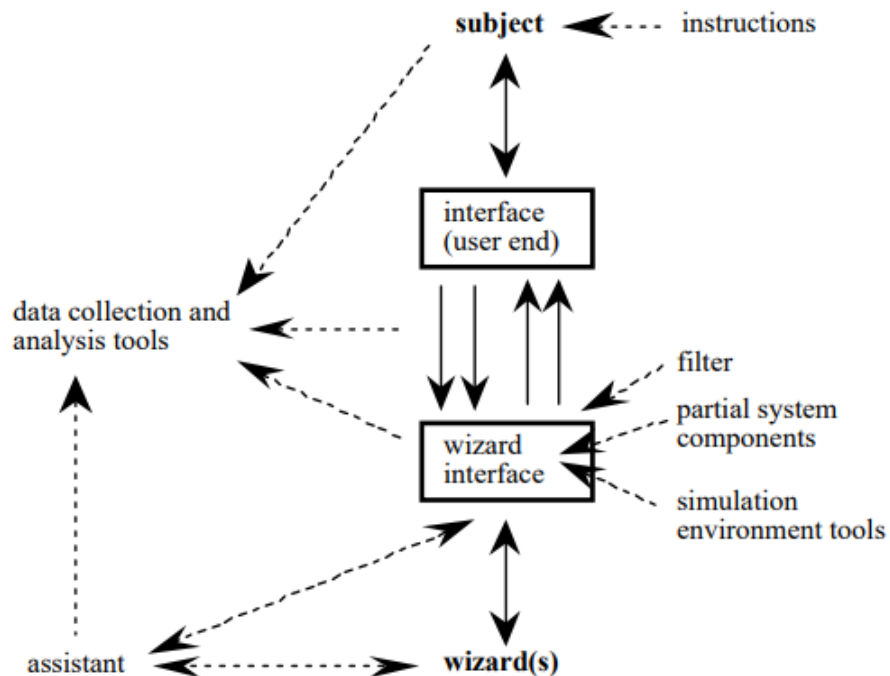


Figure 10: Wizard of Oz general setup (Bernsen et al., 1994)

- e) Co-Op Prototyping or participatory design: Users in general are involved in the prototyping phase when it comes to evaluating the item in question but not so

much when it comes to the design itself and modifications (Kvam, 2015). It has been argued by Bødker & Grønbæk since 1992 that users should not only evaluate the system but influence it and that this involvement will help the solution fit user's needs (Bødker & Grønbæk, 1991). It is possible to do so by providing participants with materials and elements that allow them to express what they consider most important in a concrete way (Rohrer, 2014) as visualized in Figure 11.

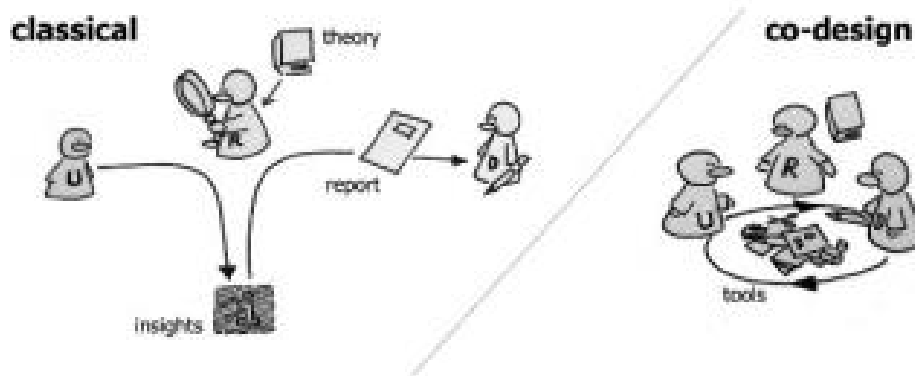


Figure 11: User role difference in classical and co-design method (Sanders and Stappers, 2008)

- f) Card Sorting: Method used to structure a site or product in the form of functionalities, navigation, menus, taxonomies and information (Spencer & Warfel, 2004) as shown in Figure 12. It asks users to organize items into groups and name them (Rohrer, 2014) when performing open card sorting (generally for new systems) or with names (when adding to an existing system) (Spencer & Warfel, 2004). Using the mental model to organize the information (Rohrer, 2014) is a simple, cheap, quick, established, user centred methods that provides a good foundation. However, it does not consider user tasks, can be time-consuming to analyse, results can vary across participants and may only record what is the overall idea of the content (what is put in the card), rather than the info it contains (Spencer & Warfel, 2004).

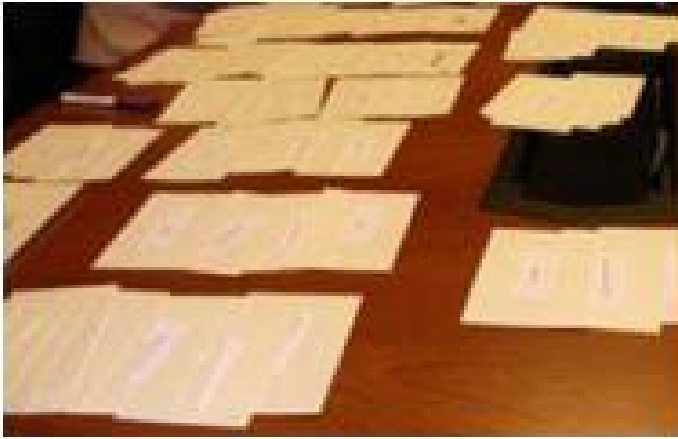


Figure 12: Card sorting example from (Spencer & Warfel, 2004)

Evaluation

As of 2010, 96 methods for evaluating the user experience were collected and characterized based on individual attributes (Vermeeren et al., 2010). There are multiple methods for usability evaluation as well as more heuristic ones which include also the user experience. However, due to the lack of some of them present in academia and the limited capabilities of this thesis, only nine will be described below. Whilst these methods are consistently performed with good results, it is also possible to pair them with research methods in order to gain more insight to qualitative or quantitative data. These include the already discussed interviews, observations and surveys amongst others.

- a) **Laboratory Tests:** The study is conducted by a moderator inside a laboratory. In the laboratory the participant is given a set of tasks that have to do with the use of the solution (Rohrer, 2014). Whilst this will provide mainly usability testing results, it can be paired with the think-aloud method, an interview, a survey or other validated questionnaires in order to provide insights to the user experience.
- b) **SAM:** Is a method which measures pleasure, arousal and dominance on a 9-point scale. Each of these skills are represented in doll images which users can identify with (Lim, 2013).
- c) **A/B Testing:** Is known as a method of where different variations a design, or multiple designs are tested with users by measuring the effect of these on user behaviour (Rohrer, 2014).
- d) **Expert Evaluations:** Is an examination of the product or service done with a professional of the user experience field. The most popular one is a heuristic evaluation which is based on Nielsen's principles (Nielsen, 1994), but others include walkthroughs and accessibility evaluations. (Petrie & Bevan, 2009)
- e) **Biometrics:** Consists of recording users biometrics while they interact with the product or service. Whilst multiple body measures could be monitored, a common

one is eye tracking. It precisely identifies where participants look during the evaluation. (Rohrer, 2014)

- f) Technology Acceptance Model (TAM): Consists of psychometric scales for perceived usefulness and perceived ease of use. Measuring usefulness is important since even if ease of use is high, users are discouraged from systems that they do not perceive as useful. (Davis, 1989)
- g) Emocards (Desmet et al., 2015): A method which presents the user with 16 cartoon faces (male and female) representing 8 emotions. The main goal is to serve as a communication channel between the designer and the user.
- h) Attrakdiff (Feng & Wei, 2019): This method serves to evaluate both pragmatic and hedonic qualities along with the attractiveness of the product at hand. Whilst both qualities are independent of one another, they contribute equally to attractiveness. They are evaluated in the form of a questionnaire which measures semantic differentials on pair of opposite adjectives. It was developed by Hassenzahl et al. (2003).
- i) Desirability: This method can be used for qualitative or quantitative data gathering. Participants can view alternatives and associate them with a set of attributes. These attributes associations are later analysed. (Rohrer, 2014).

Depending on the design stage from each start-up, their resources, goals and team members experience, adopting method can give them actionable steps to perform. Adopting such methods allows for repetition and as the team gains experience, it may provide better, faster and more accurate results.

3.5 Tools

Tools are defined as instruments used to perform a method (Rohrer, 2014). As previously mentioned, start-ups are highly reliable on each team members abilities (Coleman & O'Connor, 2008). Therefore, it is recommended for start-ups to use those tools they are familiar with or comfortable with learning. These tools can range from software to pen and paper. Interaction Design Foundation (2019) makes reference to certain online tools which allow for remote work of techniques that often required a physical meeting space. It (Interaction Design Foundation, 2019) also describes that certain techniques such as eye tracking require a hardware (as a tool) which is no longer as bulky or invasive and that prices have lowered. The same is applicable for conducting remote usability tests.

Rohrer (2014) in contrast refers to analytical tools in order to analyse results and handle data and also refers to tools (“screen sharing software and remote-control capabilities”) that can support remote usability tests. Other software tools mentioned are video recording and data collection. Besides this, the reference to using a diary (pen and paper) in

order to record and describe certain aspects is mentioned. For customer feedback it refers to feedback links, buttons, forms or email tools.

Observations, interviews and focus groups are, to the best of my knowledge, often performed live and can be recorded (video or voice) with professional equipment. Notes can be taken on either some software or with pen and paper. Either of these options can fit the situation but one must not only rely on the observer's memory.

In the case of brainstorming, because it is quick and aims for quantity, often pen and paper (or post it notes) are used. However, software is suggested for digital collaborations.

When it comes to prototyping, pen and paper are common tools for low fidelity prototyping (Marcus, 2014) whilst software such as AdobeXD and Sketch are popular for High-Fidelity Interactive Prototypes. For storyboards, pen and paper is an option but in the case of images a physical or digital picture and a printer may be of use (Truong et al., 2006). For Wizard of Oz (Bernsen et al., 1994) it is highly dependent on the type of prototype, available technologies and materials. Since prototyping tends to be done in an iterative manner, tools may also act this way, starting from very basic to more complex ones. However, for card sorting, pen and paper or post it notes may be of use since they allow for re arrangement. However, there are also available software for this as well as for affinity diagrams.

Most evaluation methods have their own tools available. Attrakdiff, SAM, TAM and emocards have their own questionnaire and/or images used for measuring different items in order to evaluate the product. Whilst laboratory tests often rely on a microphone, camera, computer and/or mobile phone with screen recording. Biometric measurements tools will depend on what is being measured, but generally involves software and hardware. An expert evaluation will often result on a document but the expert in question may use more than one tool.

3.6 Summary

The possible approaches, frameworks, methodologies, methods, and tools are multiple. Each of them has different ways in which they can provide valuable insights at varied stages of development as well as UX maturity. A wide range of UX practices provides the necessary flexibility for start-ups to select those that can help them reach their next milestone. However, the abundance of these tools may overwhelm start-ups, especially when they are inexperienced in the matter and the terms are used interchangeably.

However, by including these into the start-up's way of working, they may not only further advance on the UX maturity stages but also become experienced in the selected practice. By including the user with a human-centered approach, there are economical, social and quality benefits (ISO, 2010). These benefits are in line with research previously presented in Chapter two (Schreiber et al., 2017; Kretzschmar, 2005) and can therefore be profited for as early as from Stage 3 (Nielsen, 2006, April) by including users in the process. When including the use of frameworks and methodologies, start-ups are already implementing a systematic approach to UX, therefore, these are most likely to be present in companies that have a maturity stage of level 5 (Nielsen, 2006, May). However, methods and tools (such as user testing) are present as early as stage 3 (Nielsen, 2006, April).

4 Results

This section presents the background of the participants, followed by the methodology. The section later presents three case studies which highlight the industry of each start-up along with their UX Maturity level and results regarding UX goals.

4.1 Participants

3 start-ups based in Tampere were recruited through Business Tampere and entrepreneurial hubs such as Tribe Tampere and Y-Kampus. The start-ups received an email with an invitation to participate in the study. The invitation explained that the study was a two-step program to potentially 'Boost' their UX through answering two questionnaires and an interview. Two start-ups described themselves in the Health Tech and the third in Educational Tech. In all 3 occasions the study was conducted with the CEO. They each had different backgrounds such as service design, computer science and medical studies. All start-ups had less than 10 people working in them and were under 4 years old.

4.2 Methods

Participants were invited to the study through direct emails. The email offered them to be part of a two-step program to potentially boost their UX. After email exchanges, some of them decided to directly take part in the study or to first book a 15-minute slot to discuss the study. After this, 3 start-ups decided to go forward with the process.

A semi structured interview and two questionnaires were conducted with each start-up. The semi structured interview consisted of questions to determine their maturity level based on Nielsen's 8 stages of User Experience Maturity. This decision was made due to more details being presented in each stage, and each stage being more detailed than those described by the Danish Ladder. These details were considered crucial to determine the interview questions and analyse the results and because although the model is meant to be used to determine an organizations current stage, it can also work as an indicator of how to reach a higher state of maturity (Möller, 2018).

Regarding the questionnaires, one of them consisted of background information and the second one presented them with a set of characteristics where they could select the level of importance, on a 5-point scale, of each for their software product. Each question is based on the answers used to develop MVUX (Hokkanen et al., 2015). The reason for using a questionnaire was that it would be a quantitative way to select their goals without

the bias of looking at the model first. Based on the rating of each characteristic from not important to very important, one goal from each category from the MVUX model was assigned to them. When there were more than one response, the selected goal was based on the highest average sum from the individual statements from each goal within the categories. If there was only one person responding the questionnaire, the statement with the highest score was the selected one.

4.3 Case Study 1

The start-up is in Educational/Research Technology. It has 6-10 people working for it and it has 1-2 years. They consider their product to be mildly validated.

UX Maturity

The start-up performs some research before feature implementation in the form of collecting user feedback from their target user group. They have also performed over 100 usability tests with users that were available but outside their target group. They have performed rounds of testing (2-3) and would like to do more UX work or even have a dedicated UX professional. However, they do not have a budget for it.

Based on the findings described above, the company is considered to be on the third level of UX maturity according to Nielsen's scale. This is because whilst they do use external users, there is no process or budget and is mostly done in an ad hoc manner.

However, the company does see the value of UX. They consider doing more 'UX work' and having a UX designer very important as well as documenting their findings, having a usable system and performing research before projects. On the other hand, they do not consider having a set of UX guidelines, tracking UX or having predetermined usability goals that important.

The items they place value, may help them advance to stage 4 to the point where they have one UX specialist perform their user tests and improve their user interface. The Specialist will require to work with a small budget and advocate for future UX work. This may pose a challenge because the next stage requires the start-up to understand the value of methodologies and guidelines. However, because of the value they place on UX, after showing some results from UX work it may not be so difficult. In order to show those results, some tracking may be required, which the star-up does not place value on either. It is important the UX professional advocates for UX and delivers measurable results that will help them advance to the next stage.

UX Goals

As summarized in table 1, within the attractive category, the start-up got a score of 3,6 regarding visual characteristics, in comparison with a 4,2 in humane and a 5,0 on novelty. In the approachable category, the start-up scored a 3,7 in intuitiveness, a 5,0 in ease and a 2,7 in simplicity. For the professional category, they scored a 4,5 in credibility, a 4,3 in functioning and a 2,7 in efficiency. When it comes to ‘Selling the Idea’ they scored a 4,6 in ‘Introducing the idea’ and a 2,3 on ‘Building a Brand and Fan Base’.

<u>Attractive</u>	<u>Approachable</u>	<u>Professional</u>
Visual 3,6	Intuitive 3,7	Credible 4,5
Humane 4,2	Easy 5,0	Functioning 4,3
Novel 5,0	Simple 2,7	Efficient 2,7
<u>Selling the Idea</u>		
Introducing the Idea 4,6		Building a Brand/Fan Base 4,3

Table 1: MVUX Results Case Study 1

4.4 Case Study 2

The start-up has 1-5 people working for them and is between 2-4 years old. Their product is an application that supports patients and those around them. They are in the industry of Health Technologies.

UX Maturity

The company has a clear interest in UX. At the same time, design is not only based on self-intuition, but it is planned for in the form of focus groups. Whilst the company does not currently have a UX designer, they required the company who developed the software to have one, which for the purpose of this research is considered as having one throughout application’s development. The star-up understands the importance of UX, particularly in the way of expanding and/or narrowing their application down to what feedback they receive from users. They understand the differences between that users say and do, since they have conducted interviews and pilots. The company is considered to be currently in Stage 4.

However, the company also presents traits from Stage 6 and 7, which are closer to a holistic approach of UX. The company places the user at the centre with the existence of User Personas and development of Use Cases. The next steps for the company to reach stage 5 would be to have a dedicated UX professional to implement methodologies and guidelines. The company currently documents their UX findings, so they already have started moving towards this stage. If the company would want to further move to Stage 6, which represents having a systematic User Centered Design Process, a process for ensuring UX Quality would also need to be developed. Implementing this process, as well as early user research would require a dedicated UX Budget. The company would also need to perform more early research. This presents a big challenge for start-ups, because of the amount of upfront work required.

UX Goals

Table 2 presents the results for the MVUX of case study 2. Within the attractive category, the start-up got a score of 4,6 in regard to the visual characteristics, and a 5,0 for humane and novelty. In the approachable and professional category, the start-up scored 5,0 in all six subcategories: intuitiveness, ease, simplicity, credibility, functioning and efficiency. When it came to ‘Selling the Idea’ they scored a 4,8 in ‘Introducing the idea’ and a 5,0 on ‘Building a Brand and Fan Base’.

<u>Attractive</u>	<u>Approachable</u>	<u>Professional</u>
Visual 4,8	Intuitive 5,0	Credible 5,0
Humane 5,0	Easy 5,0	Functioning 5,0
Novel 5,0	Simple 5,0	Efficient 5,0
<u>Selling the Idea</u>		
Introducing the Idea 4,8		Building a Brand/Fan Base 5,0

Table 2: MVUX Results Case Study 2

4.5 Case Study 3

The company is on the field of Health Technologies. The start-up has an age of 1-2 years and 1-5 people working in it. Their product is focused on daily monitoring of mental health patients.

UX Maturity

The company understand the value of UX. It is considered that UX directly influences business value as well as the development of the project, the project scope and the requirements. The start-up has based their decisions on tests and demos/pilots and performed interviews, surveys and user tests. UX is implemented on their software and on their website. Currently, they do not have a dedicated UX professional or budget at the moment and consider of mild importance 'doing more UX work'. However, they have allocated resources for it in the past.

Despite UX work being done 'sporadically', it is due to the lack of resources as a start-up and not because of a lack of maturity. Therefore, the company is ranked in stage 5. Mainly because the company sees the value of UX and is currently having some pilots in order to measure certain factors of their product. The company sees the importance of having a UX designer, documenting the findings and developing guidelines and methodologies. The company has performed workshops and tests for their prototype and is currently running pilots of their MVP. This means UX and product development is done in an iterative manner and based on customer feedback. However, they do consider of mild importance having UX research before and during projects as well as predetermined usability goals. They also use UX mostly in the form of testing some design already, even if early. In order to advance to stage 6, the company needs to not only understand the value, but implement a systematic approach to UX tracking and conduct UX research before any design takes place.

UX Goals

As portrayed in table 3, the third case study got a score of 3,7 regarding the visual characteristics, in comparison with a 3,5 in humane and a 3,1 on novelty within the attractive category. In the approachable category, the start-up scored a 4,0 in intuitiveness, a 4,5 in ease and a 3,8 in simplicity. For the professional category, they scored a 3,9 in credibility, a 3,3 in functioning and a 3,1 in efficiency. When it comes to 'Selling the Idea' they scored a 3,8 in 'Introducing the idea' and a 3,4 on 'Building a Brand and Fan Base'. Whilst the same study was performed with this company, the MVUX questionnaire was accidentally filled by all three founders. This allowed us to gather more data on how each of them see their product and average these, in order to get more accurate data.

<u>Attractive</u>	<u>Approachable</u>	<u>Professional</u>
Visual 3,7	Intuitive 4,0	Credible 3,9
Humane 3,5	Easy 4,5	Functioning 3,3
Novel 3,1	Simple 3,8	Efficient 3,1
<u>Selling the Idea</u>		
Introducing the Idea 3,8	Building a Brand/Fan Base 3,4	

Table 3: MVUX Results Case Study 3

4.6 Summary

As early as during the recruitment phase, it was possible to analyse start-up UX maturity. All three participating start-ups already understood the value of UX but did not have a dedicated team member or budget to perform UX work. It is possible that other start-ups are not yet at a maturity stage where they would care about UX work. One start-up did show interest to participate, but later declared to not have time for it due to the current pandemic, therefore their case study was excluded from the thesis. This may have been the case for other start-ups too.

During the two-month duration of the study, the start-ups also presented traits not only from the category that was assigned to them, but from higher level stages. However, all three start-ups said that they did not have the budget for UX work.

Based on what was discovered regarding their UX maturity, whilst the interest for UX exists and they acknowledge the importance and benefits from UX, it is still seen as an addition, a nice-to-have, or something to do sporadically. This is in line with most of the research.

Whilst each start-up had done some level of UX work, they had used different UX practices. It is not uncommon for start-ups to take this approach, since how they accomplish their next milestone is based on team members experience. However, start-ups are also

influenced by the opinions of mentors, coaches and accelerator programs. Therefore, it is possible to assume that the practices adopted or suggested by these entities will be adopted when start-ups have little to no background in the present subject.

The two companies who were at an earlier stage got the same result ('Introducing the Idea') of the MVUX category 'Selling the Idea'. The older start-up got the category 'Building a Fan Base'. It is possible that start-ups at an earlier stage may need to 'Introduce the Idea' in order to achieve product-market fit and once they have done that their focus may shift to 'Building a Fan Base', possibly in the form of customer growth. It may be also the case with other start-ups who have not yet launched or have only launched on a test/pilot phase.

The results from one start-up were inconclusive due to getting the same score in multiple categories. However, two subcategories were able to be excluded due to having a lower score. By reducing the number of categories, it may be possible to provide some guidance to the start-up regarding what not to focus on until a higher level of clarity or prioritization can be reached.

5 Discussion

In the following sections the findings, limitations and possibilities for future work are discussed. The section also presents additional qualitative information from the interviews.

5.1 Findings

During the study, all the start-ups that participated seem to already understand the value of UX which may be a key factor when deciding to join, since participating in the study required them to allocate some time resources towards potentially boosting their UX. They also did not have a dedicated UX professional in the team, which may be why they are keen to accept external UX work.

Whilst they were all able to complete the study, one of the start-ups got inconclusive results due to considering most factors of extreme importance and rather than finding out what to focus on, it helped see what not to focus on in two of the four categories.

Two of the start-ups, which were younger, got the same goal of 'Introducing the Idea' within 'selling the idea' whilst the older start-up got the result of 'Building a brand/fan base' which may mean they are further down the development line. It may also be the case that as they transition from 'Introducing the Idea' to 'Building a Fan Base' they are achieving product market fit.

It was also a factor that although all start-ups recognized the importance of UX and even one of the founders having a background in product design, they were not able to do as much UX work as they would like to, due to lack of resources. Neither of the start-ups had a dedicated UX professional but had had some level of UX work done either by an external UX designer, expert evaluations or ensuring the development team of the company they were working with had a UX designer.

When setting MVUX goals, it was possible to see that all start-ups were able to complete the questionnaire with few questions and that in only took a few minutes. The start-up where all team members completed the questionnaire showed that although some answers were different, they were aligned and gravitated towards the same goals.

5.2 Limitations

The questionnaire was designed for setting the UX goals in the MVUX model based on the responses from 8 start-ups from Finland. Therefore, it is not validated and may not be applicable for a broader sample of start-ups. All participating start-ups were based in Finland.

The questionnaires were also filled by CEOs in two cases and in one by three team members which included the CEO, the CTO and the CFO. The questionnaire, therefore, is based on assumptions (some of them which may be accurate and others which may not be) and may yield different results if the answers were coming from real customers or potential customers within the target group.

The MVUX framework, was also modified to exclude a subcategory called 'Hooking' from the 'Attractive' category. This was due to it only containing two statements and the category containing 4 subcategories. By removing one subcategory, it was possible that three of the MVUX categories that lead to 'selling the idea' presented three subcategories, creating a more homogeneous grouping.

At the same time, due to factors external to the start-ups, such as Covid-19, the focus of start-ups may be different than it was before or that it would be after the pandemic occurs. Due to the same pandemic, all invitations, meetings, interviews and questionnaires were done online. Recruiting had been planned for at different networking events in order to capture more attention, however, this had to be done by hubs recommending certain start-ups and then sending them a virtual invitation. The form only took start-ups a few minutes, which may have given different results that if we had sat at a table together and discussed the why of each statement. The environment that participants were in (mostly their homes) could have also provided a different atmosphere than if the interviews had been conducted at an office.

5.3 Future Work

There are considered to be multiple applications for the results of this research, most of them related to future UX work in start-ups. Some of them include reincorporating the subcategory of 'Hooking' and validation of the goal setting questionnaire.

It is also a possibility to use the questionnaire not only for goal setting in order to develop an MVUX but also for teams to get clarity on what is important for their product success. Both cases, goal setting for developing MVUX or for team clarity, could be implemented

in the form of a workshop in order to allow for term clarification and discussion. One more application could be to not only perform the study with start-up members, but to allow real or potential customer to place value on the different statements and get them to guide the start-ups UX from the very beginning.

It may also be interesting to generate workshops where the UX maturity stages can be explained along with the benefits each of them can bring start-ups, since most start-ups understand the value of UX but do not really understand what it is, how to apply it or have the resources for it.

Another potential application for this study is to perform it on multiple start-ups from the same field and explore if any correlations exist.

Based on the UX practices section from this thesis, there is a lack of clarification regarding what is an approach, a framework, a methodology, a process, a method and a process activity. Being able to define these on an academic level would make multiple publications more understandable.

Even outside this study, there is a lack of academic papers on start-ups and UX. Leaving multiple areas available to be covered.

6 Conclusions

During the study, start-ups that presented an understanding of UX saw the value in it. This means they were past the stage 1 and 2 (Nielsen, 2006, April) and were already trying to do some level of UX work. However, Start-ups that have not heard of UX can face challenges (Renzi et al., 2015) specially if no one in the team is aware that UX even exists. At the same time, those start-ups that are not aware of UX will perceive UX based on the explanation received from accelerators, mentors and coaches. The practices they adopt will also be dependant on either suggestions from these entities, or based on team members experience. Therefore, UX practices can variate highly from one start-up to another. These variances can therefore be attributed not only to background and training, but also be based on their next milestone due to the lack of resources and being focused on survival and performance.

Once start-ups understand the how UX can help their revenue, exports and growth (Kretzschmar, 2005) they may want to do more 'UX work' but will still find it hard to allocate resources towards it. This is in line with the research that suggests UX is seen as an additional expense (Hokkanen et al., 2016) rather than a necessity. It appears to be that start-ups do not do UX because of lack of interest but due to the current practices requiring high resources which may go to waste. It has been mentioned by Nielsen (2006) that based on the results of UX companies may or may not advance to the next UX maturity stage. Therefore, if the UX practices are consuming resources and without clear benefits the UX maturity progress may plateau. It can be concluded that a low resource, high performance UX practice is required.

Another finding is that UX start-up maturity can not only be place on one level. Regardless that there is one level that the start-ups are predominantly on, they may present traits from higher stages. However, they did not present traits from previous stages which may mean that a systematic approach to it is required and that a stage must be fully fulfilled before they can advance to the next. However, start-ups will not be able to reach further stages until they have the resources for a dedicated UX professional, which seems to be a great barrier to overcome. It may be possible than, that an easy approach to UX which does not require in depth knowledge in order to yield results could benefit these types of companies.

Setting MVUX goals can be a lightweight way to help start-ups direct their UX efforts at early stages and help them advance in maturity stages by removing existing barriers, such

as lack of resources and how-to knowledge. More specifically, it may be a way to ‘disguise’ UX work practices as strategic goal setting meetings.

In the case of the MVUX category ‘Selling the Idea’, younger start-ups appeared to be focused on ‘Introducing the Idea’ whilst older start-ups were at a stage of ‘Building a Fan Base’. It is possible that this transition can be influenced by reaching product market fit after experimenting (Hokkanen & Väänänen, 2015) and they are ready to grow their audience since they have more knowledge about their product, market and customers.

Once product market fit has been identified, there exists higher clarity and it is possible for companies to focus on being aligned with the expectations is suggested by Schreiber et al. (2017). By aligning themselves, they can get the competitive advantage and become profitable. However, this does not mean that potential customers should be excluded from UX when ‘Introducing the Idea’ but rather that UX practices should be exceptionally lightweight then or easy to apply to multiple customer segments. As suggested by Hokkanen (2017), it may be beneficial that at such stage they leverage their personal connections.

However, there is further validation and improvements to the questionnaire are required in order to know if this method would work in reality and not only in theory.

It is also a possibility that because the questionnaire only took a few minutes, respondents did not give much thought to their answers. However, the decision-making in start-ups is usually fast, automatic, effortless, implicit and emotional (York & Danes, 2014) and therefore, this method may present an alternative.

The possibilities to apply this research are multiple. They include using the questionnaires to provide an internal understanding of the product, to set MVUX goals in a manner that does not require high resources, to set these goals based on team understanding or real users, to be able to get the benefits from a designer for user experience from the beginning, amongst others. Therefore, it can be adjusted to fit the abilities and way of working of each start-up, and thus, provide a lightweight approach to UX until resources can be dedicated to it.

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