ACCELERATING THE ADOPTION OF A USER-CENTERED AND INNOVATION-ORIENTED PROCESS

Piloting the venture accelerator training program for development teams

Abstract

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Abstract

This study focuses on a Venture Acceleration program that is based on the Lean Startup method and its impact on a specific development team's way of working. The scope of the program included training of corporate personnel to embrace a customer-centered and business-oriented mindset. The phenomenon related to this development study is the organization's work culture transformation. The implementation of the focused training, in the form of an internal venture accelerator program, seeks to specifically speed up this transformation. The purpose of this thesis is to implement an action research approach to find out if development work can be accelerated by accepting certain tools and a process, together with a user-centered mindset. According to the synthesis of these findings, an improvement proposal was created to establish a better competence within the development team.

The results are based on observation and interviews with the project team and the development work stakeholders. The observation findings show that the project team was able to improve their way of working and successfully deliver the digital assembly instructions project accordingly. The interview findings state that the development team will require more concrete ways to embrace the user-centered approach in their daily work. The reflection of the analysis indicates that the accelerator program will present an opportunity to both individual teams and organizations to embrace a new way of working. This type of growth of personnel capabilities is likely to benefit organizational transformation. The results point out that the impact of this type of training program speeds up the development process. Compared to the project team in this study, it also produces more direct results than the development team's earlier working methods.

CONTENTS

ABBREVIATIONS

AR – Action research

CTO – Configured to order

ETO – Engineered to order

HCD – Human-centered design

MVP – Minimum viable product

PAR – Participatory action research

ROI – Return of investment

TID – Technical information development

TPS – Toyota production system

UCD – User-centered design

UX – User experience design

VA – Venture accelerator

1   INTRODUCTION

The challenges within development work are demanding new ways to deliver better solutions with a faster pace. Customers and users that are involved with the outcomes of development work face countless different solutions. Not all of these solutions are desirable or viable for their needs, nor are they even feasible for the company that are utilizing them. This thesis studies a pilot of an internal venture accelerator (VA) training program and a project team participating in it. The VA program aims to help the company's personnel gain a customer-centered and innovation-oriented mindset, and the capability to implement this thinking within development projects. The goal is that integrating this thinking into practice would present strategic benefits for future development projects of the organization. The concrete training in this pilot was done by introducing the participants to a six-phase process based on the Lean Startup method. The training was based on exploring methods through workshops, where personnel implemented the methods and the tools to real projects. This VA program is based on the idea that the corporation can try to accelerate its internal development work culture transformation with the external program related to startup company culture. Transformation is expected to occur as personnel change their ways of thinking and acting during their daily work, as they move towards the methods used in a typical startup company. (Startup coordinator 2020, CEO of the Maria 01 2020.)

The program took place in Maria 01 startup campus. Maria 01, the non-profit startup incubator organization, was responsible for the facilitation related to the program. The client company and the facilitating organization collaborated to create this training program. An opportunity for this development study was presented when the researcher participated in this program as a one of the members of the development team. There were several teams participating in this program at the same time. These teams were all development teams from the same organization. The idea was to explore a specific project team's path and experiences to adopt the presented process and the tools linked to the program. This formed a promising foundation to conduct a development study.

The company referred in this thesis is a large industrial corporation and one of the corporate-level supporters of the Maria 01. The VA training program was the result of a collaboration between these two organizations. This development study will follow the six-phase VA training program. The projects in the program are developed in a similar process that startups use to accelerate innovative solutions. The direct client of this thesis is the technical information development team (TID), which is part of the technology-oriented unit of the client company. According to the TID team manager (2020), the TID team is

responsible for the development and management of the global technical documentation-related processes and tools in the client organization. The study aims to provide a pro-posal of actions related to improving the TID team's way of working. The proposal is formed through the analysis of the findings when following the VA program's integration to the TID team's work. It will be presented from the project team's perspective to enable a more concrete approach to the initial adoption of the new ways of working. The improved capabilities are expected to benefit the TID team in forthcoming development projects and to help gain a deeper understanding, establish a learning experience and provide better abilities to lead and direct development processes.

2 DEVELOPMENT STUDY RESEARCH APPROACH

2.1 Description of the research approach

The research framework of the development study approach was based on action research (AR) methodology. This methodology was introduced as a specific approach to situations related to team development. This methodology is expected to present an appropriate way to implement this development study and present the required results of the activities. The role of the researcher in AR methodology is to actively participate in the development project as part of the project team. AR is a suitable approach to conduct research that is focused on improving an existing process or way of working. McNiff & Whitehead (2001, 202) states that the action researcher typically begins the research by forming a question in relation to the subject of the research: How do I improve my work?

AR discusses the relationship between action and research in practice and in theory. This has been a challenge for traditional scientific research in the development of social practices. Development requirements within the premises of social and business practices have significantly increased scientific research around them. The requirements crave to perceive a wider research base of the development work than plain evaluation ever would accomplish. (Kuusela 2005, 9.)

According to Swan (2012), AR comprises a description of both the action and the research results. Swan (2012) also states that AR is a priority activity and that participants have a significant role to play in the research. This is validated through the idea that participants are trying to collectively achieve some intended outcome, instead of individual efforts. Kananen (2014) states AR as a process of professional learning and development that focuses on detecting and resolving practical problems where the participants can act from both the employee's role and those in management positions.

Ojasalo et al. (2018) points out that in AR it is essential for the team members to actively participate in the development of work, with a focus on both research and practical change. AR is interested in how things should be, not just how they are. The future state of things is not only described, but the aim of the approach is to change the current reality. In addition to the researcher, the participants of AR are also active actors and within this process of creating the change. The results of the activities are analyzed, and the operation is then improved. Kananen (2014) defines AR as an internal action and force generated by the participants during the improvement process, compared to externally given instructions that are required to be followed. Kananen (2014) adds that coworking is an important part of AR, as it is conducted by the participants involved with the problem. The

common goal will conduct as a guiding and combining force for the group to actively perform the improvement even if there are disagreements between the participants.

According to Suojanen (2004), AR approach is based on continuous interpretation and reflection. The final analysis will happen in the last phase of the research, where retrospective reflection takes place. McNiff (2013) states critical self-reflection as the heart of AR. This can be seen in the way the researcher and participants are conducting research on themselves. The participants are personally accountable to themselves in AR. They will improve their actions towards the goal by discussing and making decisions together. McNiff (2013) also states that AR involves learning from and through action and reflection, and it is conducted in various contexts. This makes it an especially powerful method to be implemented within learning.

The reflection's connection on learning and action can be demonstrated with single-loop and double-loop learning theory (FIGURE 1):
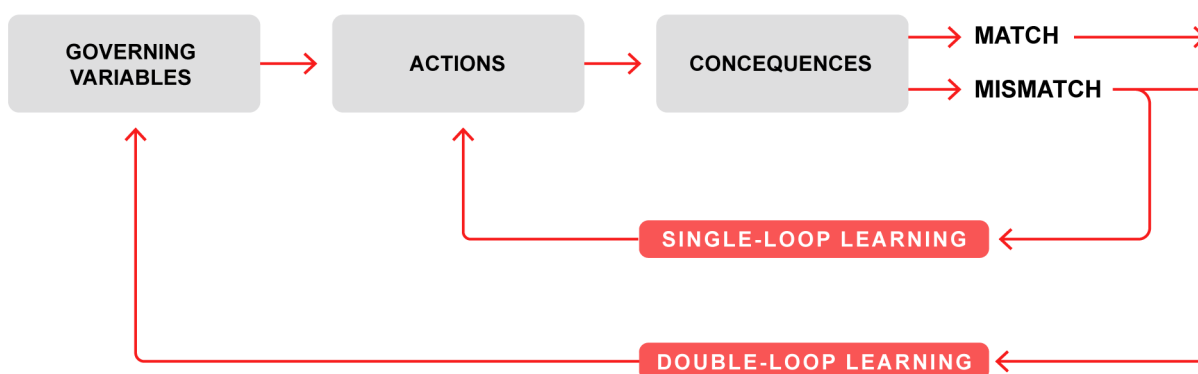
FIGURE 1. Single-loop and double-loop learning theory (Argyris 1992, 68).

Argyris (1992, 67-68) divides the theory of learning into two types. The first type, is based on learning from successfully executed, intended activities that form the expected consequence. The actions are corrected to enable success in case of a mismatch. This is called single-loop learning. The second type, is based on the identification of outcomes that differ from those expected. These unwanted outcomes are prevented from occurring by examining and configuring the governing variables. This is double-loop learning.

Kuusela (2005,10) notes that AR can be divided into several trends. None of these trends are directly accepted as a primary definition of methodology. However, the definition is

easy to approach by looking at the content of the concept. This content is based on studying the action and there is no distinct differentiation between the action and the research. The research is conducted together with research subjects who also are active participants within the research.

Main trends of AR according to Kuusela (2005, 17-20):
1. Traditional action research
2. Critical action research
3. Action science
4. Action learning
5. Participatory action research
6. Socio-ecological action research
7. Communicative action research
8. Social constructivism
9. System theory functional research
10. Clinical trial
11. Appreciative research

2.2   Participatory action research

The participatory action research (PAR) is the preferred form of AR to be implemented in this thesis. This method was chosen based on the research situation and the goals of the study. PAR is referred to as a team-based approach to development where the research is generally conducted in collaborative manner. The participants strive together towards a common goal. In this thesis study, the project team participates in the VA program to gain experience and to learn from it. This kind of learning experience and collaboration towards a common goal is more valuable to the team and the researcher. The collaborative effort is more valuable than individual efforts because the team members can elaborate on ideas and means of action, and can also find out possible reasons for a lack of outcomes. (Alana et al. 2012, 3-7.)

McTaggart (1997) states that PAR is focused on improving participants lives concretely and not only to present the possible options or actions to that outcome. The learning experience is far more effective when the group is experiencing the phenomenon together and reflecting upon it. To enable change within participants, they must accept and embrace learning.

Lawson et al. (2015, ix) define PAR as a special investigative methodology which connects and integrates five priorities. The method enables the democratic participation in

real-world problem solving where participants lack formal research training. This participation occurs in iterative cycles and the new knowledge and understanding is formed based on local problem-solving. The practice-generated, useful knowledge of policy and practice is derived from practitioners' and policymakers' and for their own benefit. Lastly, this method provides a safeguard against practice and policy homogenization that is often associated with globalization.

Kuusela (2005, 53) defines that the success of PAR is in relation to the common agreement of participants involved in the research and their efforts towards this agreement to improve their social practices. Tripp (2005) states that AR has typically a co-operative and collaborative nature, even as it can be implemented at an individual level, but the practical effects are never limited to one person in an organization.

2.3 Role of the researcher

The researcher must have the will and appropriate skills to activate the group to co-create, discuss and enable the improvement actions within the context. The researcher is required to have some expertise to provide reasonable efforts to the team's work. The researcher will be able to relate more deeply to the study concept and its different sides by being an empathetic person within the group. The researcher must remember that it is not acceptable to just be around and observe or concentrate on writing research content. The researcher must participate, build trust and communicate with the participants while conducting the development work. The researcher will ensure the research data is valid and usable in the study by having a direct and real relationship with the group members. (Kuula 1999, 208-209.)

Kananen (2013, 67) states that in the case of AR, the researcher and the participants cannot be passive. There must be interaction between the team within the research. The researcher must have some knowledge about the subject matter or the subject of the development work, to be able to fully contribute to the cause. To successfully proceed with the research, all participants must be responsible for themselves and each other and treat each member equally despite their status or rank.

2.4 Action research process

AR proceeds in cycles of planning, acting, observation and evaluation stages (FIGURE 2). The various stages are usually repeated during the research. This process is based on practical evaluation of the current knowledge of the state of the subject. The practical action is conducted and then reflected upon to generate a common understanding by

participants. The last stage is to enable an evaluation of the required improvement of actions for the next cycle. Every stage of the research process is carried out systematically and critically, step by step. The cycles are repeated as many times as necessary to reach the required or planned situation. Reflection is an essential part of each stage and is not included as a separate one. (McNiff & Whitehead 2001, Tripp 2005, Kuusela 2005, Kananen 2014, Ojasalo et al. 2018.)
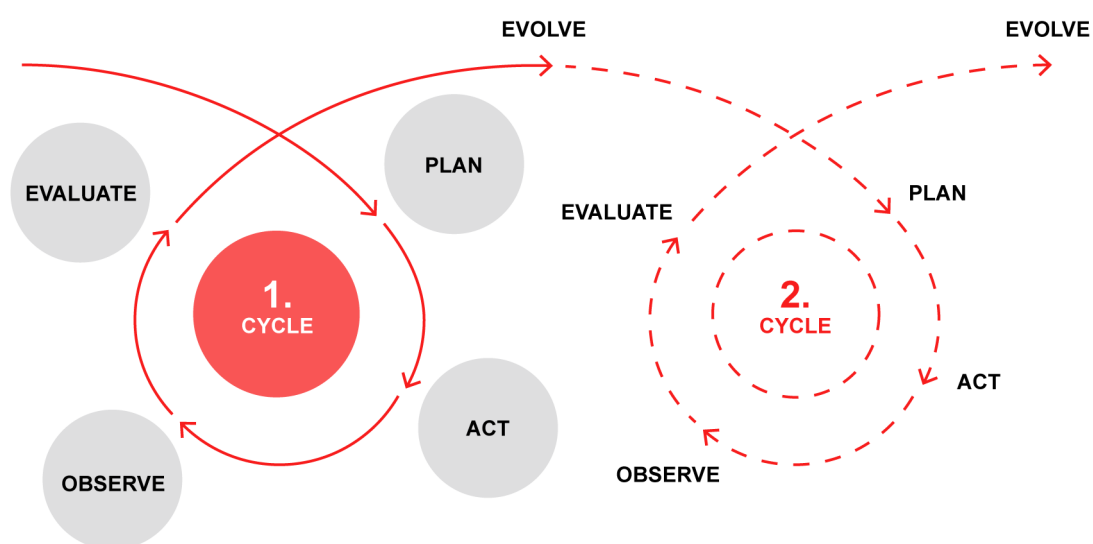
FIGURE 2. The action research process diagram (adapted from Kember 2000, 26).

AR's first planning phase is a situational analysis that produces a broad overview of AR context. It includes current practices, participants, and concerns (Tripp 2005, 9-10; McNiff 2013, 91). The actual action phase related to the work includes experimenting and researching the phenomenon (Ojasalo et al. 2018, 61). The observation phase consists of monitoring the participants, keeping a research diary and gathering data (McNiff 2013, 106-110). In the evaluation phase, the gathered data is analyzed and interpreted, and the evidence is created based on the findings (McNiff 2013, 111; Ojasalo et al. 2018, 61). Kananen (2014) states that within AR there is always a requirement of change within the research process. The affecting phenomenon and related factors should be known to the participants to enable the change. Swann (2012) says that the research process should be made visible to all participants in AR. Self-reflection is essential to the process and should also be visible to all in order to enable dialogue between the participants.

2.5   Multiple method approach

The researcher should always choose the methods of empirical research based on the requirements set by the expected results. The researcher should also pay attention to the various criteria of the study to validate the properties of the chosen methods (Hirsjärvi, Hurme 2008, 34). This development study relies on multiple methods, so validated research results can be presented. McNiff (2013, 104-105) states that in AR, both the researcher and the participants should be monitored to have data for analysis. The main activities within the process of AR are monitoring, gathering, analyzing, and interpreting the data. This diversity of methods is used to form data-based evidence.

The quantitative methods are often useful to show the situation before and after transformation. These results should not mix the before and after strategy with the cause and effect. The transformation should also not be mixed with stimulus and response strategies. The research will easily shift towards behavior management if this type of comparison is present. (McNiff 2013, 106-109.)

Kananen (2013, 78-79) defines the qualitative data gathering methods related to AR approach as: observation, interviews, and documents. Observation methods are divided to indirect observation, participatory observation and inclusive observation. Interviews are divided to structured interviews, semi-structured interviews, theme interviews, and open interviews. Field notes and diaries can be utilized and analyzed to reveal additional findings that can support the overall research.

Observation

Observation is one of the most important methods of data gathering. Observation is the systematic monitoring of a predefined target within the natural environment of the related phenomenon. Observation can be divided into direct and indirect observation, and into structured and unstructured observation. Indirect observation differs from direct as the observer is hidden from the participants or the target group. Structured observation is predefined before the actual observation takes place. Unstructured observation is more open and may give room for unique events to happen and be documented. (Kananen 2013, 79-80; Ojasalo et al. 2018, 61.)

Observation is typically focused on behavioral and linguistic expressions. Observation is not limited to either the quantitative or the qualitative research's direction. It can be used with both orientations. (Hirsjärvi, Hurme 2008, 37).

Suojanen (2004) states that planned observation is the main distinguishing factor of AR approach. This activity is not present in practical work. Kananen (2013, 81) states that observation can always be seen as reactive towards the research. The observer is always affecting the target groups behavior in some way if he participates. Observation cannot be used to document thoughts and feelings.

Kananen (2013, 82-84) states the research and observation diary as the main tools for the observation phase. Kananen (2013) lists the elements of an observation diary:

1. Space: culture, group, location of the target, room size, color of the furniture?
2. Operators: who the phenomenon is affecting, what are their physical and ethnical attributes?
3. Actions: what are the participants doing?
4. Objects: what objects and artefacts are present?
5. Situation: what is the situation?
6. Objectives: what are the goals of the participants?
7. Feelings: how do the participants appear to feel about the situation?

Kananen (2013, 85-86) says that in addition to the diary, the researcher should make field notes during observation or as soon as possible after observing the situation. Observation requires a lot of focus from the researcher during participation, so using recorders is recommended. The main problem related to the recorded material is that the amount of gathered data to be analyzed can be overwhelming.

McNiff (2013) defines the observation method's quantitative artefacts included in AR as follows:

1. Record sheets of actions that occurred
2. Record sheets of contributions made
3. Questionnaire with Likert-scale

The qualitative documentary artefacts related to AR process are (McNiff 2013):

1. Field notes
2. Diaries and logs
3. Reports
4. Questionnaires
5. Surveys interviews, discussions and focus groups
6. Live and online discussion forums and virtual worlds

Interview

Kananen (2013, 87) and Ojasalo et al. (2018,106) declare that interviews are used to generate a preliminary review related to the research, open new points of view to the research, deepen the knowledge of the subject, and to evaluate the affection and effectivity of the change. They agree that interviews are a good way to quickly gather in-depth information about the subject of development. This is especially apparent in a situation where there is little knowledge about the phenomenon.

Kananen (2013, 90-91) classifies typical interview types into single or group interviews. These can be divided to structured interviews, semi-structured interviews, theme interviews, and open interviews. Structured interviews are equal to inquiry forms, where the questions and answers are strictly planned. The semi-structured interview has pre-planned open-ended questions. The theme interview has only pre-defined topics and the interview can flow freely within them. The open interview contains only the main topic of the interview and the rest is up to the interviewer. The type of the interview used is defined by the data related to the phenomenon. Ojasalo et al. (2018, 106-107) states that interviews should be linked to other methods to support the research.

Documents

Kananen (2013, 101-102) divides documents into public and private documents. These documents can be used as literature material to support the interviews, or the research as a whole. Documents can be viewed as a reliable research source for the research, as they supersede people's memory and can provide another perspective to the analysis of the data. Documents are written material, or audio-visual recordings.

Ojasalo et al. (2018, 136) states that documents are valuable to the research. Their importance is often seen, especially in the analysis phase. They can present a new perspective to the research. Ojasalo et al. (2018) divides the document analysis method into two main methods: content analysis and content separation. Content analysis focuses on describing the content verbally, and separation analysis is based on presenting the quantifiable content.

3   THE DEVELOPMENT STUDY FRAMEWORK

3.1   Knowledge base

This development study was established around three topics: The project team's current development task, the VA training program and the user-centered design (UCD). At the intersection of these topics is the project team. The team connects each topic to one another and is influenced by them. These topics frame the themes that are meaningful for the study. The knowledge base and theory behind the practice is referenced from them. The improvement themes are human-focused, technology-focused, and business-focused solutions. These three themes explain and define the theoretical landscape of the study. This thesis is expected to deliver improvement ideas and include all three perspectives to the proposal. The visual reference frame of this thesis presents these three themes in relation to each other in figure 3.
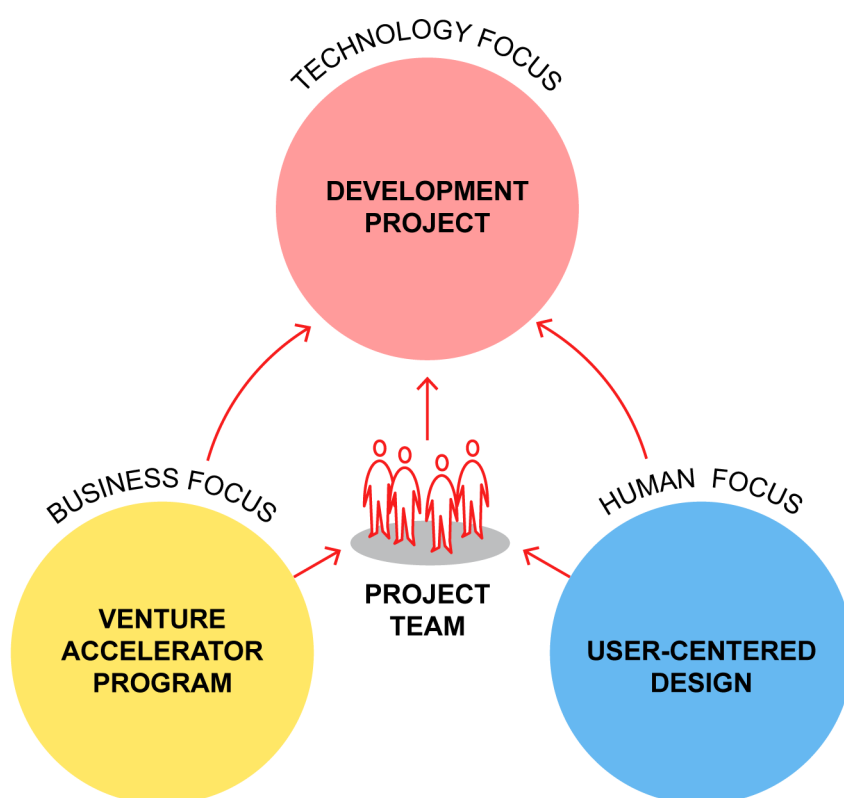
FIGURE 3. Visual reference frame of this thesis (Korpi 2020).

The TID team's current internal development project was focused to deliver a user-centric concept, that would present an innovative approach to improve a product assembly process. The project team's efforts and PAR-based study within the development project form the basis for developing the human-centered solution, as well as enabling the transformation of the TID team's own work culture. The VA training program concentrates on training the client organization's personnel to embrace the customer-centered and business-oriented mindset, and to encourage them to follow, in general, the startup way of creating customer value. This training establishes the foundation for implementing the business-oriented solution for the TID team's development process. The user-centered design is expected to link these two other themes together. UCD also introduces certain methods that would concretely enable the TID team to implement the development expectations in a practical and process-focused way. This would be expected to ease the integration steps of UCD within the team.

3.2   The technology focus theme

With the content of the technology theme, the researcher also seeks to present a valid understanding of this topic as a required basis of the research outcome. The technology focus theme includes the concept of innovation that is present within the core of each main theme and is seen as the linking factor amongst them. Technology theme is also part of the TID team's daily work in the form of agile methodology. This methodology is included in this study in the forms of Scrum method and Lean methodology.

3.2.1   Innovation

According to Ojasalo et al. (2018, 83), a new product, service, process, operating model, or similar subject that produces economic or other benefits can be described as an innovation. Innovation requires that the results should be able to be commercialized or implemented in some other way to address the difference against a plain idea or a research result. Innovations are separated into two different types, revolutionizing ones that usually last longer in the market and lesser ones, which are more effective in the short-term. Hasso-Plattner-Institute (2020) defines innovation as a combination of three essential components: technical feasibility, economic viability and human desirability in figure 4:
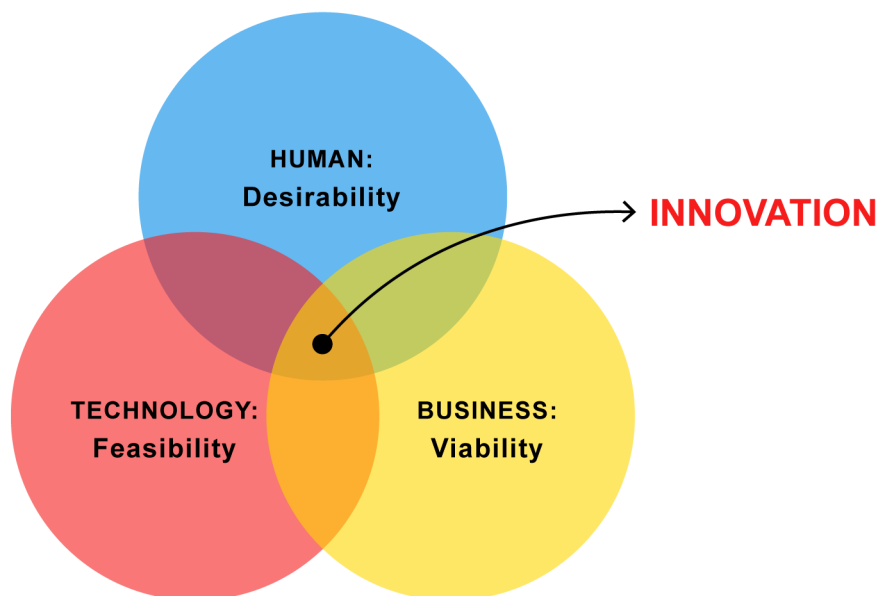
FIGURE 4. Criteria for successful innovation (Hasso-Plattner-Institute 2020).

Innovation begins with a deep understanding of the present situation and by gaining insights from the user research data. After gaining the understanding it is time for ideation, where identified patterns and, insights are specified in to design criteria that enables the identification of new possibilities. Following ideation, concepts are considered as hypothesis and are evaluated against the design criteria. Then the selection of the decisions, filters the most promising concepts to the next stage. Eventually, the chosen concepts and assumptions are tested by prototyping them with users. This shows if the concepts would work as expected. (Liedtka et al. 2017.)

Ries (2011, 28) describes that innovation is at the heart of startup companies, so the term innovation is profoundly related to them. Within the startup scene, innovation is related to making a groundbreaking scientific discovery to implement, re-targeted use for certain technology, establishing a new value for a company based on rearranging its business model, and by creating new customers from a poorly served segment or by relocating the business to a new area of interest.

3.2.2 Agile methodology

This section will discuss the agile principles related to the Lean Startup method. The concept that was created during the VA training program by the project team does not follow the typical TID team's development process. The TID team's typical development process implements an agile Scrum method. The client organization processes also implement

Lean thinking. The study's effort to introduce a UCD approach to TID team's development process requires the establishment of a basic understanding of these agile methods.

Rigby, Sutherland and Takeuchi (2016) see that across business and industries, agile methodology is forming from radical and new values, principles, practices, and benefits against command-and-control style management. Gothelf and Seiden (2016) define the agile development as a means to constantly deliver customer value, reduce production cycle times, and enable continuous learning. Moreira (2017, 22) defines the agile culture and practices as an additive and cyclic process of adaptive mindset, where the aim is to discover and deliver customer value. The frequent iteration within the development work, based on the customer feedback is at the center of the agile way of working.

The agile methodology is based on certain principles that frame the approach. The agile manifesto presents the 12 agile development's grounding principles that frames the methodology, embracing the working itself, and the delivery of products and services. These principles rely on continuous collaboration and focus on the outcome over the output. (Agilemanisfesto.org 2001.)

There are several different frameworks that are defined as agile methods. The most common are Scrum, Extreme Programming, and Dynamic-System-Delivery Methodology. Lean Startup is also seen as one common framework for working in an agile way. (Moreira 2017.) Gothelf and Seiden (2017, 7-11) states that agile methodology is a dominant process model (FIGURE 5) in software development. It works in small batches and guides its process with continuous market feedback, unlike the linear process model (FIGURE 6).
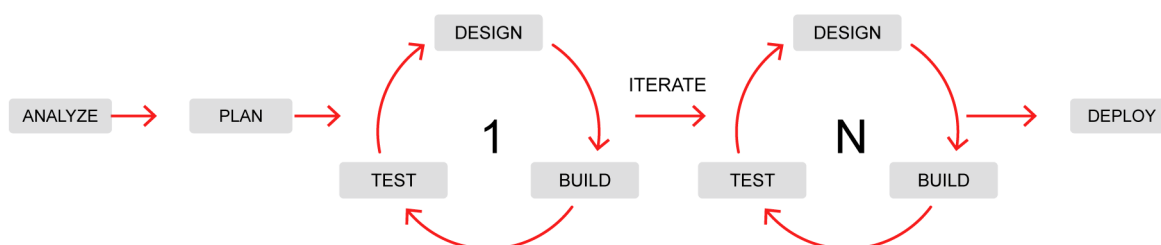

FIGURE 5. Adaptation of Scrum methodology (adapted from Schwaber 1995, 10).
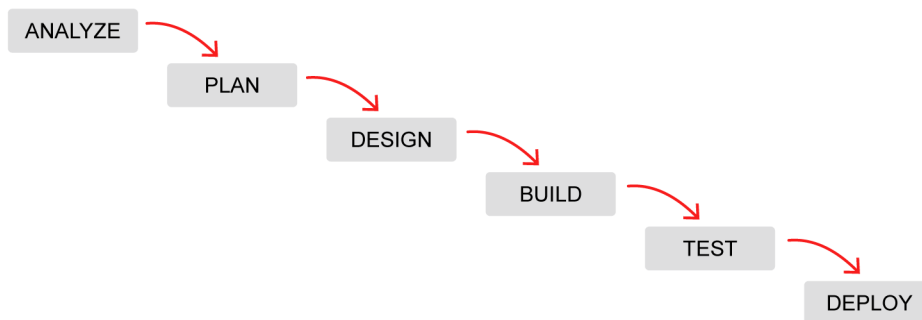
FIGURE 6. The Waterfall product development process (Blank and Dorf 2012, 5).

Gothelf and Seiden (2017, 7-11) see the agile model's difference against the legacy waterfall model in the way the work process progresses. The waterfall model lacks response to a feedback loop, focus on outcomes, collaboration, and learning. As the waterfall method tends to move forward, one process phase at the time, the agile method has an iterative and cyclic approach to the process, and to the delivery of the project. Blank and Dorf (2012, 5) describe the waterfall model related to product development, as an incremental process of interlacing steps, focused to minimize the development risk of a defined feature set. According to IBM (2018, 4), the agile delivery model enables design changes significantly better than the waterfall model. Agile or not, each project delivery model has similarities in the form of increasing costs and resistance to change towards the end of the project.

Lean methodology

This thesis includes an overview of the Lean methodology based on a knowledge that it is adopted and implemented widely across the client organization related to this study. The Toyota Production System (TPS) is seen as the founding methodology for Lean manufacturing or Lean thinking (Ries, 2011; Lean Enterprise Institute 2020). This overview is expected to enlighten the foundation of this value creation focused methodology that also is linked to many other methodologies presented in this study like Lean Startup. Lean Startup is formed by following the TPS model is part of the foundation of the VA training program.

The TPS model is based on removing all waste from production, building quality products according to customer demand, and creating demand-based pull to the system. Various additional, foreign functions, steps, and errors are considered as waste. The TPS method

has been developed based on experiments and experience using the just-in-time concept to achieve a more efficient production method. (Toyota 2020.).

According to Lean Enterprise Institute (2020), the Lean methodology can be understood as a way of thinking, and as a process to minimize the time to create customer value by minimizing the waste in the initial production cycle and in the output.
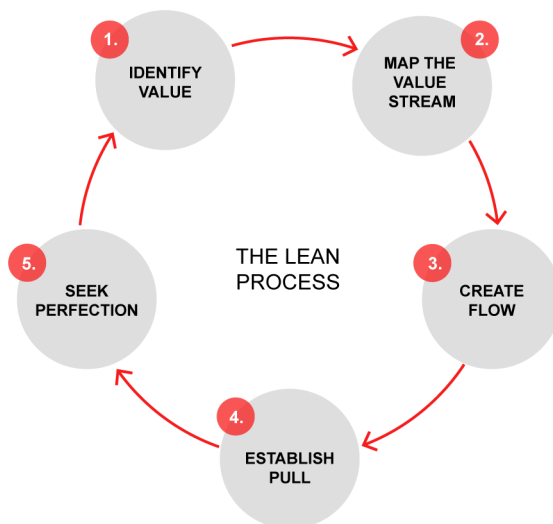
FIGURE 7. The five-step thought process of Lean (Lean.org 2020).

The five-step thought process (FIGURE 7) for guiding the implementation of Lean techniques are (Lean.org 2020):

1. Address the value to the end customer through the product family
2. See which phases of the value stream do not create value and should be removed
3. Enable the fast-paced product flow cycles
4. Let the customer generate pull as needed
5. Iterate the process, to reach the perfect state

Scrum method

The TID team utilizes the Scrum process in their daily work regarding software and system integration development. The Scrum method is also one of the central topics of the improvement proposal. Sutherland and Schwaber (2018) describe the Scrum method as a framework for product development (FIGURE 8). The framework's purpose is to help people to work on problems in a productive and creative way. The types of problems are not

easy to define and affect multiple systems and stakeholders. The Scrum method aims to deliver the highest possible value to the customer. At the heart of the framework is the self-organizing team's collaboration when working with unpredictable and complex products. According to Sutherland and Schwaber (2018), this method is widely used for products, services, and the management of the parent organization.
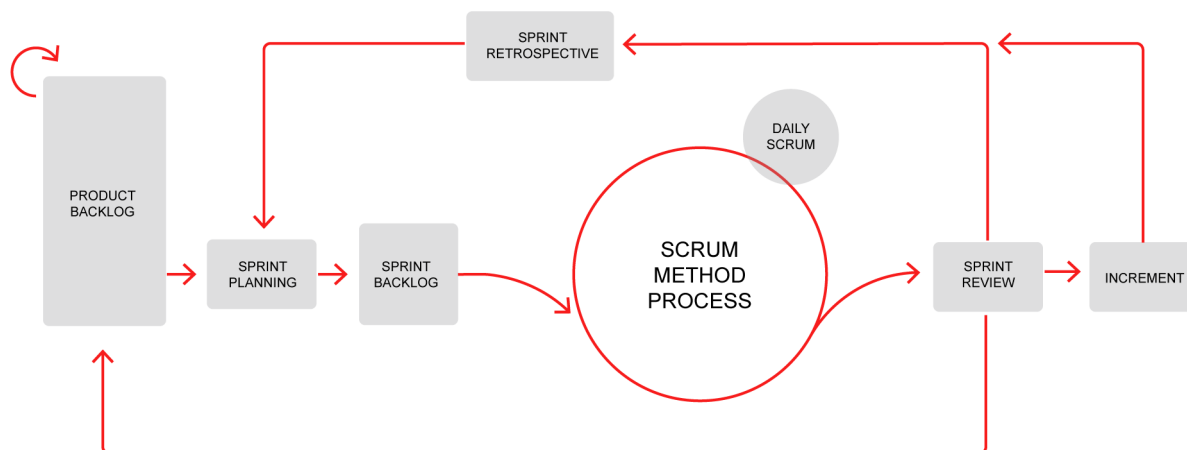
FIGURE 8. The Scrum framework (Scrum.org 2020).

Sutherland and Schwaber (2018) state that the Scrum framework includes certain events, that forms the iterative nature of the method, and generate regular structure to daily activities. The events form the actual Scrum sprint, whose length cannot be changed during the event. The initial sprint consists of sub-sessions: sprint planning, daily scrums, development work, sprint review, and sprint retrospective. The sprint planning is where the actual planning takes place in collaboration with the whole Scrum team. The daily Scrum session where each member's past and upcoming activities are described to the team. At the end of each sprint, a separate sprint review session is held to collaboratively review the work done, and to give and receive feedback. In this informal meeting, the possibilities to optimize the produced value are also discussed. After the sprint review, or before next sprint planning, the Scrum team inspects its ways of working and plans improvements to the next sprint. By using the concept of working in sprints, the Scrum team aims to deliver products and services in short cycles that enable:

1. Fast feedback
2. Continuous improvement
3. Rapid adaptation to change

4. Accelerated delivery

Agile alliance (2020) and Laubheimer and Loranger (2017) describe the features or Scrum items as user stories. These stories contain the documentation of the planned functionality or feature. The user story is usually a single sentence: "As a [type of user], I want to [goal], so that [benefit]." These stories are collected into the Scrum backlog to be prioritized. User stories have attributes containing estimated effort, which are identified as story points. This measure is purely relative by nature and does not indicate the required time.

Sutherland and Schwaber (2018) define the parts that are involved in the Scrum framework: product backlog, sprint backlog and the increment. The product backlog is a collection of items or user stories that forms the actual product. The sprint backlog is the selection of items included in the current sprint. The increment is a sum of items from the product backlog that were accomplished during the sprint.

By Sutherland and Schwaber (2018), the Scrum team's foundation is built on a self-organizing and cross-functional group of certain professional roles. The typical roles are product owner, development team and Scrum master. The responsibility of the Scrum product owner is to ensure the maximation of the value that the development team is creating while working on the project, and to manage the product backlog. Normally, the cross-functional development team's aim is to deliver the product by collaborating and solving problems related to the project implementing the iterative process of the Scrum. The success of their actions affects the outcome of the sprint. The Scrum master helps and supports the Scrum team and others to understand the theory, practices, rules and values of the method. The Scrum master is the key role, that helps the external stakeholders to interact with the Scrum team. The Scrum master also supports others to understand their roles in relation to the team.

3.3 The business focus theme

The business focus theme concentrates on the VA training program and its foundation method, the Lean Startup. In addition, the learning topic that is related to all three focus themes is presented here. Learning is seen as a function that is a profound factor within each topic and it is the aim of their iterative processes.

3.3.1 The venture accelerator program

The VA program was arranged and its content was defined by the non-profit entrepreneurial organization called Maria 01, in collaboration with the client company's startup collaboration-focused personnel. The client company is also one of the corporate partners of this

organization. Maria 01 is described as a Nordic leading startup campus for technology startups, venture capitalists and large enterprises. The startup campus is formed from separate instances that have synergy with each other. Maria 01 describes its campus as an ecosystem of startups, venture capitalists, business accelerators and large corporations that is a unique combination even in the global scale. (Maria 01 2019b, CEO of the Maria 01 2020.)

The VA training program is a part of the client company's strategy to invest in work culture change, to accelerate innovation and development capabilities within the company. Work culture transformation is seen as an effort to shift the focus of developed solutions towards customer-centered and business-oriented outcomes. The foundation of the VA training program is based on Lean Startup. This methodology is embraced by actual startup companies that are following a similar process, to be able to build the business from the ground up, with scarce resources and at a rapid pace. (Startup coordinator 2020, CEO of the Maria 01 2020.)

This training program is based on Lean Startup and customer development methods that was implemented into the program's own process. The goal of the teams participating in the program is to design solutions for specific problems within the scheduled assignments. These assignments consist of various canvases and different tools that are designed to approach a problem so that their results are aligned to bring concrete outcomes that contribute to the total solution formed during the program. (Maria 01 2019a, CEO of the Maria 01 2020.)

The VA program's process is presented as a linear model, which is formed from six main phases (FIGURE 9):

maria 01

FIGURE 9. Venture Accelerator training program's process (Maria 01 2019a).

Every process phase contains the actual main event and separate sparring session together with the team and facilitators. The first phase, inspiration, includes the first workshop and sparring session. Other phases are the problem identification, problem /

solution, product iteration, product / market phase and pitch preparation. After the pitch preparation phase, there is the final pitch session where all the teams present their program outcomes, either completed or at a certain stage of the project, to the company representatives and their own customer. Then, each project's future is in the hands of their customers, who decide either to continue with the project or not. (Maria 01 2019a, CEO of the Maria 01 2020.)

The six-phased VA training program is a facilitated series of workshops and sparring meetings combined with lectures or presentations (FIGURE 10). It also includes, expert mentoring reviews from different startup companies related to the Maria 01 campus. Sparring sessions are considered optional but beneficial to the team and project. The process-derived VA training program is scheduled over 12 weeks. This consists of a twice a month arranged, 3-hour workshops and a 30-minute sparring session. The workshop sessions include a briefing of the current session's tasks and assignments, a review of part of previous session, and current session-related startup founder's presentation. The sparring sessions are optional. In these sessions the facilitator offers support to the teams with their project and assignments. (Maria 01 2019a, CEO of the Maria 01 2020.)

maria 01

| Innovation Day | 1-1 sparring | Workshop 1 | 1-1 sparring | Workshop 2 | 1-1 sparring | Workshop 3 | 1-1 sparring | Workshop 4 | 1-1 sparring | Workshop 5 | 1-1 sparring | go / no go |
| week 1 | week 2 | week 3 | week 4 | week 5 | week 6 | week 7 | week 8 | week 9 | week 10 | week 11 | week 12 | |
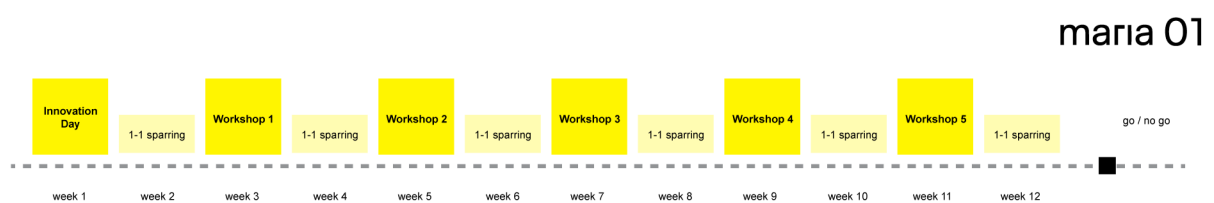
FIGURE 10. Venture Accelerator program schedule (Maria 01 2019a).

According to Maria 01's (2019a) program agenda, each session utilizes particular tools and canvases related to the current topic. The exception is the last workshop, where the focus is on the presentation of the final solution. The program session contents are based on the facilitator's material that was delivered to each participant before the first session. Each session's main topic is aligned with a document, tool or canvas. These objects establish the base for each assignment that the teams develop at the workshop or during their own time. The Maria 01-facilitated workshop sessions are described as follows:

Innovation Day

This initial session of the program includes a warm-up exercise and three program stages: idea sketching, initial concepting and idea scoping. As pre-work for the program, each team is required to prepare a project briefing document. The document includes details like project name, team members, description of the project and its current stage, the goals of the project and a description of the activity or similar detail that would improve the outcome of the project.

The theme for innovation day: Introduction to the ecosystem, Maria 01, the program and project scoping.

The innovation agenda:

1. Introduction: Maria 01 team
2. Participants introduction and warm-up
3. Guest startup founder presentations
4. Project scoping:
    1. Idea sketching
    2. Initial concepting
    3. Idea scoping
5. Wrap up
    - Introduction to the program
    - Prep material for the next session

(Maria 01 2019a.)

Workshop 1

This workshop involves a warm-up exercise, a persona drafting part where the teams prepare their user persona with a description of its pains, gains, and goals. The next canvas is the customer journey mapping, where the customer's or end user's tasks, different phases, activities, touchpoints, thinking and feeling are mapped to form a visual representation of the whole situation. The last part is to estimate the size of the problem and provide a validation process for the problem.

The theme for the workshop: Problem identification.

The agenda of the workshop:

1. Introduction
2. Startup business founder presentation about problem finding

3. Main part, identifying the problem:
   1. Drafting the persona
   2. Mapping customer journey
   3. Estimating the problem size
   4. Problem validation process
4. Wrap up
   - Formulating the problem
   - Check with mentor X
   - Prep material for the next session

(Maria 01 2019a.)

Workshop 2

This workshop resides on the definition of the solution's vision, the practice of thinking of an alternative solution, the validation of solution's scalability and the problem / solution design.

The theme for the workshop: Problem / Solution fit.
The workshop agenda:

1. Introduction: Solving the problem
2. Startup business founder presentation about pivoting
3. Main part, identifying the solution:
   1. Solution vision
   2. Alternative thinking
   3. Scalability validation
   4. Problem / solution design
4. Wrap up
   - Formulating the problem
   - Check with mentor X
   - Prep material for the next session

(Maria 01 2019a.)

Workshop 3

This workshop includes the mapping of the assumptions related to the project and after assumptions are ready, the team can begin the experiment planning.

The theme for the workshop: Product iteration.
The workshop agenda:

1. Introduction: Solving the problem
2. Startup business founder presentation about building minimum viable product (MVP)
3. Main part, preparing for product validation:

    1. Mapping assumptions

    2. Experiment planning
4. Wrap up

    - Formulating the MVP scope

    - Check with mentor X

    - Prep material for the next session

(Maria 01 2019a.)

Workshop 4

This workshop introduces several topics. This session includes the creating of a problem / market canvas. Based on the information created and the knowledge gathered, the business model canvas is created. The business model canvas enables execution of the product value estimation.

The theme for the workshop: Problem / Market fit.
The workshop agenda:

1. Introduction: Finding a market fit
2. Startup business founder presentation about business model / market fit
3. Main part, working out the business model:

    1. Problem / market canvas

    2. Business model canvas

    3. Product value estimate
4. Wrap up

    - Formulating the ballpark figures (= rough numerical estimate of business value)

    - Check with mentor X

    - Prep material for the next session

(Maria 01 2019a.)

Workshop 5

This workshop is about the creation of the pitch presentation. Each team presents their personal pitch to an audience that consists of the other teams, facilitator and experts. The

audience then gives feedback about the presentations, presentation skills, pitch structure, and presentation material.

The theme for the workshop: Pitch preparation
The workshop agenda:

1. Introduction: Presenting the product
2. Startup business founder presentation about pitching
3. Main part, workshop on pitching with mentor:

   1. Basic presentation skills

   2. Pitch structure

   3. Presentation material

   4. Practice
4. Wrap up

   - Next steps

(Maria 01 2019a.)

Pitch presentation

The VA training program's final session includes every teams' presentations that they have prepared and adjusted, based on the feedback of workshop 5. In the final session, the audience consists of each project's actual customer and other stakeholders that are interested or involved in the project. The final session ends with the retrospective feedback from the facilitator, other teams, and stakeholders. (Maria 01 2019a.)

3.3.2 Lean Startup

There is direct relation from the Lean Startup model to the study as it has direct connection to the VA training program foundation. The method also has relations to design thinking, and agile methodologies, which share their frameworks with Lean Startup. Ries (2011) defines that in the startup world, the vision of the founding member is the most important part of the company's existence, and it is the foundation of the whole business. Ries (2011) states this methodology as the means to find the quickest and fastest solution to develop a product for a targeted market, with minimal financial investment. Lean Startup encompasses operating models that enable small startups, non-profit organizations, government agencies and companies, to achieve customer-driven and successful solutions. Ries (2011, 48) describes that Lean Startup is designed to eliminate waste in the process, like the Lean thinking and agile methodologies, but the difference to these

approaches is that Lean Startup perceives the customer benefit as a value and everything else as a waste.

Ries (2011, 27; 2017, 14) defines the term startup by describing the situation, where the entrepreneur is operating, innovating, and learning. It can be characterized as an unsure and volatile situation as the actor's contest with external forces and factors that will greatly affect the outcome and overall success of the attempt. Blank and Dorf (2012) define startup as an organization that seeks a scalable, repeatable and profitable business model based only on ideas and guesses, without existing customers. Blank and Dorf (2012) and Ries (2011, 2017) also agree that the size or number of active partners is not the countable measure for a startup, as it can be anything from a single person to a non-profit organization, government agency or profitable and financially stable company.

Five principles of Lean Startup (Ries 2011, 8-9.)

1. Entrepreneurs are everywhere
2. Entrepreneurship is management
3. Validated learning
4. Build-measure-learn
5. Innovation

The goal of a startup is to seek out and build, as quickly as possible, the right thing that customers need and are willing to pay for. This means that Lean Startup presents an approach to look and emphasize simultaneously the development of new products, expects fast iteration and relies on customer insights, requires excessive vision, and sees that success is reached through great ambition. (Ries 2011, 20.) The Lean Startup's foundation can be linked to Blank's (2006) customer development methodology (FIGURE 11):
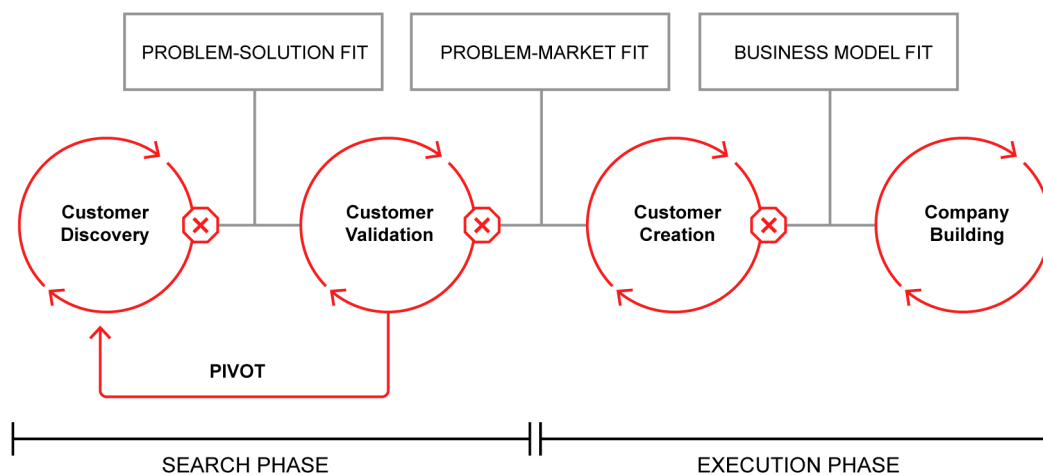
FIGURE 11. Customer development process (Blank and Dorf 2012, 23).

The structured process for validating a startup business model's hypothesis is seen as customer development. The process steps are defined as customer discovery, creation of a business model hypothesis that tests these customer reactions against the intended outcome. Customer validation refers to the testing of the scalability and repeatability of the business model. Customer creation contains the actual execution, building the end user demand. The company building phase focuses in transforming the organization from a startup to a real company through a validated model. (Blank and Dorf 2012, 25-30).

Blank and Dorf (2012, 57-58) define the transition-enablers between the customer development process phases as follows:

1. Problem-solution fit determines if the startup's value proposition match the customer.
2. Product-market fit determines if the startup's products or services match the customers' needs within the segment it plans to target.
3. Business model fit determines if the startup's business model matches the customer segment it plans to target.

Basic methods

According to Ries (2017), the Lean Startup methodology is based on making leap-of-faith assumptions that are related to product or service expectations of a customer's need. The methodology focuses on establishing the minimum viable product to test the assumptions, with minimum investment and effort. The basic methods of Lean Startup are:

1. Identify the assumptions that must prove to be true for a startup to succeed.

2. Run an experiment to test the validity of these assumptions as quickly and cheaply as possible. This is the Minimum Viable Product phase.

3. Think like a researcher, treat every experiment as an opportunity to learn what works and what does not. The experimenting phase can be identified as validated learning related to the methodology.

4. Take advantage of what you have learned from your experiments, start a new MVP, and start the whole process from scratch. This is the Measure-Build-Learn feedback loop phase.

5. Evaluate and decide on a regular basis whether you change strategy or continue on the same course. This phase is the phase for strategic decision, also known as the pivot or persevere phase.
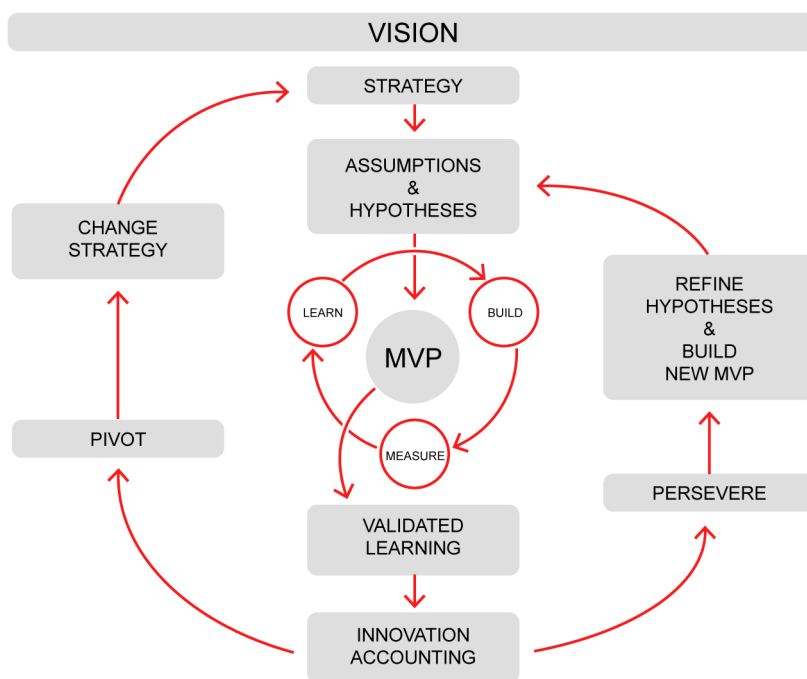
(Ries 2017, 86.)

FIGURE 12. Adapted Lean Startup process (Korpi 2020).

The steps included in the Lean Startup process (FIGURE 12) are describe next. These steps also present a more in-depth understanding for of the VA training program's process.

Leap-of-faith assumptions

Lean Startup is designed for situations where we are facing extreme uncertainty and cannot predict what the future will bring. In this situation, the best thing to do is to create a collection of hypotheses about what we would like to happen. These hypotheses are called leap-of-faith assumptions. In a traditional business plan, these include the company's current guess as to what might happen if the strategy succeeds and the vision is realized. Lean Startup requires these assumptions to be expressed accurately, so we can only recognize what is true and what is not. It is tempting to ask customers directly what they want in order to test the assumptions, but the correct way is to design experiments to test and verify the assumptions in practice. (Ries 2017, 89-90.)

According to Ries (2017, 91), the following things should be tested for assumptions:

1. What assumption should be true for a project to succeed?
2. Are the assumptions about customers, partners or competitors?
3. How much do we really know about customer behavior, preferences, and whether or not our solution is available to them?
4. What evidence do we have that customers have a genuine problem that we can solve, and that customers have a strong desire (and are willing to pay for it) to resolve it?
5. What do we really know about what customers want from a solution?

However, when making assumptions, try to avoid over-analysis and validate only the most important assumptions and focus on doing things that provide the greatest learning opportunity. Ries (2017, 94) describes the value hypothesis, test of the desirability of a product, the growth hypothesis, the possibility of scaling the product or service customer base as the fundamental hypotheses to startup. Ries (2011, 114) expects the startup to measure its current position, plan and execute experiments to learn and to be able to move towards the ideal status described in the business plan based on the hard facts that the testing reveals.

Minimum viable product (MVP)

The early version of a new product or service is referred to as the minimum viable product, MVP. The MVP is an experiment that is targeted to gather information about customers and establish the validated learning milestones. The conducted experiments with MVP present certain points of evolution that are important for measuring and validating success. The goal of MVP in Lean Startup model is to validate the leap-of-faith assumptions. The faster this experiment can produce results, the less time, effort and money will be

spent on learning. Lean Startup aims towards faster feedback loop cycle times for better problem or market fit solution creation. (Ries 2017, 96.)

Ries (2011, 119) states that there can be different types of MVP for different purposes and experiments regarding the requirements of the company and its strategy. Learning might be acquired through one single MVP, or sometimes it might be good idea to create several MVPs to be experimented on at the same time. Experimenting with an MVP is useful for tracking a company's growth, as the first MVP usually sets the baseline against which the success of following experiments are evaluated.

Feedback loop

The Lean Startup process aims to have a continuous feedback loop (FIGURE 13) with customers to experiment and learn with testing the MVP. This Build-Measure-Learn loop is set to provide a means to enable learning in an iterative manner. Ries (2017, 105-107) states that the MVP is in a key role regarding the feedback loop. It is important to be able to speed up the cycle, testing and experimenting with the MVP to be able to measure and analyze the results to develop the idea further.

FIGURE 13. Build-Measure-Learn cycle (Ries 2011, 75).
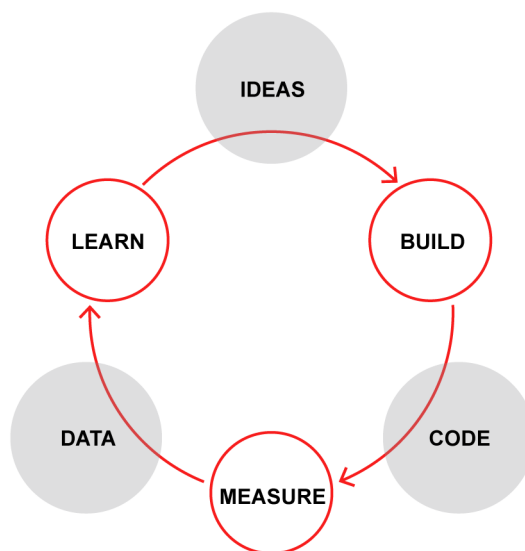
Validated learning

Ries (2017, 101-104) explains the Lean Startup's most important endpoint, the validated learning, as an exchange of value that comes from switching from experiment to experiment. This is seen as learning based on real data instead of guessing. To reach this value or data, Ries (2017) expresses the need for actionable, accessible and auditable metrics.

The key features of these indicators are the demonstration of clear causal relationships, easy to understand and accessible to all involved.

Innovation accounting

Ries (2011, 116-118) also proposes a method called innovation accounting to enable startups to prove their gained learning by assumptions to the quantitative financial model to establish the drivers of a company's growth model. This method has three steps. The first step is to establish data-driven knowledge of a company's current status. The second step is tuning the growth towards the ideal through exploiting word of mouth; the early adopters, or as a side effect of product usage, or through funded advertising, purchase or use. The third step is to pivot or persevere after the changes and optimization of the product.

Ries (2017, 268-270) outlines the innovation accounting as a framework related to measuring a startup's progress and eventually its ability to reach its goals, and ultimately its vision. Innovation accounting tries to quantify learning in terms of future cash flow. Innovation gives a model of variables of startup valuation: asset value, probability of success, and magnitude of success. Innovation accounting has three levels:

1. Dashboard, metrics that are important to the team.
2. Business case implements the leap-of-faith assumptions to the business case as inputs of long-term retention.
3. Net present value, the learned values of experiment to present the way things have changed during the existence of the company.

Pivoting

Ries (2017, 107-110) states that experimenting with MVP leads to learning that enables true evaluation of the strategy. After evaluation, the decision to pivot is imminent and then the learning and data define whether the startup continues as planned or if it will change its strategy to be able to fulfil its vision. Ries (2017) states vision as the company founders target, so the strategy to get to vision does not need to stay the same. Pivoting affects the strategy in the way that it changes some part of it and creates a new series of hypotheses, but the vision and the related problem stay the same. Ries (2017) continues that every company needs to pivot sometimes. By creating a concurrent event from the pivoting, it is a more beneficial and less stressful situation for the company. Concurrent pivoting makes it a more systematic procedure than forced operation under crisis.

Teams

Ries (2011, 253-256) defines that innovation teams must be structured correctly in order to succeed the way the Lean Startup method expects. Startups with venture capitalist involvement have naturally some of these structural attributes because they are small, independent companies. These structures are: Scarce but secure resources, independent authority to develop the team member's business, and personal stake in outcome. In large companies, the internal teams often require support from senior management to create similar structures, which also increases complexity. Ries (2011) states that within a startup environment, the teams that have only limited resources, can function the most efficiently. Ries (2011) states that when the startup team is required to build and ship actual functioning products and services, they need to be able to experiment autonomously, and to develop and market the new products, without a continuous approval cycle. The team should also be as diverse as possible, so that every functional department is involved in the creation or launch of their early products. Ries (2011) states that personal stake is especially important to the teams. The outcome of the team's co-creation will be more successful when the members are devoted and then the team itself is determined to invest their efforts into product or service development.

Ries (2017, 64-68) describes the benefits of a small team that is typical of startups as follows: The smallest number of people assume as much responsibility as they can bear. A small team focused on one thing has been proved in startup observation to be able to do the impossible continuously. The strength of a small team lies in its extreme commitment and effective communication with each other. Each participant in this kind of situation is doing the work needed and is starting from financial and career risks. The team is also extremely adaptable and is not constrained by extra bureaucracy. In addition, the challenges of leadership do not exist in a small team that is physically and emotionally close to each other. These kinds of teams can also easily change strategy, pivoting as needed to better achieve their goals.

The startup way

Ries (2017, 52-53) states that non-entrepreneurs are as important to the experimental culture as internal entrepreneurs. Lean Startup presents tools that are useful in any experiment situation where uncertainty is present. Learning from experience is a powerful way to gain knowledge. Persons who are responsible for managerial operations should be aware of their business environment and the organization culture should help new ideas to surface. The management should encourage new ideas and allow them to flourish for the benefit of the whole business by supporting internal entrepreneurs. Ries (2017, 57-62)

states that new skills are needed in organizations to enable a new way of working. This is important in a situation where there are limited resources, a certain amount of people and a controlled amount of money to make something happen.

The five key principles of the startup way are (Ries 2017, 9-10):

1. Continuous innovation: managers are required to support long-term commitment to find new innovations in a cyclic manner, instead of putting effort into a search for single key innovation.
2. Startup as atomic unit of work: teams need experiment to find new sources of growth. The organization must support them in this search and enable continuous innovation.
3. The missing function: organizations are required to have entrepreneurial function as a core discipline to enable the organization's capability to transform in order to handle challenges.
4. The second founding: organizations are required to enable their organizational structure to change, as they would do when founding the company from scratch.
5. Continuous transformation: organizations need to be prepared to respond to future challenges by making companywide transformation possible.

According to Ries (2017, 123-124), Lean Startup only works if the founders or management are capable of building an organization that is as adaptable and fast as the challenges it faces. This requires tackling the human challenges inherent in this new way of working. In figure 14 Ries (2017) describes four different levels and influence factors that define the Lean Startup mindset:

1. Accountability describes the systems of compensation and rewarding
2. Process is about the tools and tactics that are used every day.
3. Culture of the beliefs that determine what is believed to be possible; how organization has been operating in the past.
4. People are the most important resource of the organization.

FIGURE 14. The levels of influencers in the startup way (Ries 2011, 205).

Ries (2011, 253) states that it is possible to build an organization that learns how to balance the needs of existing customers with the challenges of finding new customers. By serving and managing existing lines of business and exploring new business models, balance can be achieved at the same time. Ries (2011) thinks that even large corporations can make changes in their management philosophy and shift towards this kind of portfolio thinking as described. Ries (2017, 318) defines that the startup way should be seen as a management system that enables its own evolution by cherishing the employees' abilities and opportunities, and by embracing internal entrepreneurship.

3.3.3 Learning

The VA training program is about embracing a new mindset, accelerating innovation and experimenting with products while keeping the customer in focus. Learning these techniques and tools is beneficial from the project team's perspective and eventually from the client organization strategy's point of view. The concept of learning is also an important factor of each theme in this thesis, human-focused, technology-focused, and business-focused. Learning is included within these themes as a motivational factor and an enabler of iterative cycles. The concept of agile learning deals with the context of learning by experimenting and sharing this knowledge with the rest of the team. Mansoori (2016, 4-6) employed Argyris and Schön's theory of action, the single-loop and double-loop learning and espoused theory (expected behavior) and theory-in-use (actions in reality), to establish an understanding of actual learning. Mansoori (2016) also states that learning by doing is a

critical element of internalizing processes, by validating the conducted actions within the phenomenon. Ries (2011. 2017) states that Lean Startup also highly values the methodology of learning from the iterative experiments of a minimum viable product. McTaggart (1997) mentions that AR also discusses learning from the experiences of activities completed during the learning experience.

Agile learning

Otala (2018, 138) states that learning and self-renewal has an iterative nature, which occurs in small steps and without any formal learning process. She states that within the organization, where learning realized, the role of the personnel and the way knowledge is distributed through different policies and structures, is also significant. Otala (2018) also defines that agile learning has several different levels that define the context of learning. The agile learning levels are personal, team, and organizational.

Today's expectations and demands of working life, require that all employees embrace the agile learning way and expectations of continuous improvement. Agile learning can take the form of personal or group learning sprints. These sprints can be experiences, received feedback, gained insights, anticipation of the future actions, or just intuitive learning. Combining information technology with learning is also considered agile learning. Enabling personal agile learning requires the right attitude not only to knowledge and skills but also to support of environmental structures. (Otala 2018, 29-30). Teams and organizations be seen as agile learners when people are performing as agile learners within them (Otala 2018, 129).

Buxton (2007) states that good team is formed from people with the right attitude towards learning. People within the design team either learn from rational criticism that rejects their ideas or strengthen their confidence to proceed with their ideas. Otala (2018, 125) states that the task assigned to a team is a good starting point to make a great team and the need for successful completion of the task together determines which team best meets this need. As a result, the best teams are multidisciplinary and adapt to different tasks by changing their setup and formation. A team's work is influenced by its ability to work together, mutual trust and the team member's different capabilities that level up the total skills of the team. Otala says these qualities affect the team's ability to learn in an agile way.

Otala (2018, 140) lists the factors related to a team's agile way of learning:

1. Collective intelligence
2. Psychological security

3. Self-regulation
4. Interaction
5. Effective team practices
6. Team agile learning
7. Structures for agile learning and knowledge sharing
8. Agile Leadership
9. Agile operation

Otala (2018, 155) notes that as teams learn to see the importance and interdependence of factors that influence a team's operation, teams can learn how to improve their performance. According to Otala (2018, 157), the team learns in the same agile way as an individual or organization. The team can gradually build on its expertise by gathering information, sharing it within the team, and by reflecting on its suitability for the team's operation. The team can evaluate and learn from its operation. It can brainstorm new ideas and enrich these ideas with more information. It can try to solve problems, improve its performance and help others to learn. The responsibility for learning can be shared among the team by agreeing on the different areas of expertise within the team. Then all members of the team can share this knowledge and discuss it and the possible implementation of it to the team's way of working.

Argyris (1992, xiii-xv) states that the better the organization is focused on learning, the more likely it is to be successful in the future. This means that the learning organization can detect and correct its problems proactively, and in this way, prove to be more efficient and innovative. Argyris (1992) sees the policy, practice and action as the defenses or obstacles of organizations ability to learn. These prevent personnel from learning from experiments and discoveries that are embarrassing by nature when failing for example is not tolerated. Argyris (1992) encourages implementing a form of causal and scientific thinking together with productive reasoning and continuous practical testing to enable learning within the organization.

The features that support organizational learning are flat and distributed organization structure. There should also be information systems for public feedback regarding the whole organization's performance. In addition, different mechanisms, performance indicators and systems that support learning should be established. The ideologies that the organization relies on, should be aligned to according to the actions and concepts of total quality, continuous learning, excellence, openness and boundary-crossing. (Argyris 1992, 6.)

Otala (2018) lists an organization's agile learning building blocks:

1. Agile people with an attitude of growth
2. A clear purpose and objective that is known to all
3. Teams as a basic unit of the organization
4. A knowledge strategy to guide activities
5. Policies to promote agile learning and the sharing of knowledge and skills
6. Structures for agile learning and knowledge sharing
7. Agile leadership
8. Agile operation

3.4 The human focus theme

The main approach of the study from a project perspective, is the user-centered design methodology, where the user is put in the center of all design actions. Within this study, the user-centered design focuses on laying out the ways to find the right problem and to describe the user-centered approaches and disciplines linked to the study. These approaches are the development project and the methods included in the implemented VA training program. The user-centric solution expectation laid upon the development project by the organization also addresses the requirements to define the user-centered principles and approaches that will affect the outcome of the study.

3.4.1 User-centered design (UCD)

As this study is biased towards adopting the user-centered process, it is valid to explore and define some development study related user-centered design (UCD) focused processes and methodologies. Norman (1998) and Brown (2008) explain that the approach is based on knowing the user, its pains and gains. But the methodology does not rely on thinking that users would design the optimal solution themselves. Instead of being a single factor in the process, the user is either in the center of the focus of the design or the design is made in collaboration with the user. Brown (2008) states that the human-centered approach (HCD) should also take into account any unexpected findings from user observation. These findings should be considered as important factors of innovation, not just of business and technology perspectives alone.

UCD, or HCD is seen as synonyms of each other, despite there being some differentiation between these two terms. HCD is seen as a holistic approach to solving certain product, service or process and people-related problems. UCD is focused more on the requirements, pains and gains, or latent needs of a specific category of users. (Norman 1998; Brown 2008.)

According to ISO standard 9241:210 (2019), the main features of user-centered design are:

1. The design has an understanding of the user's role and environment
2. Users are also involved in the design.
3. User-centered evaluation guides and refines design.
4. The process itself is iterative in nature.
5. The design team is made up of multidisciplinary experts.
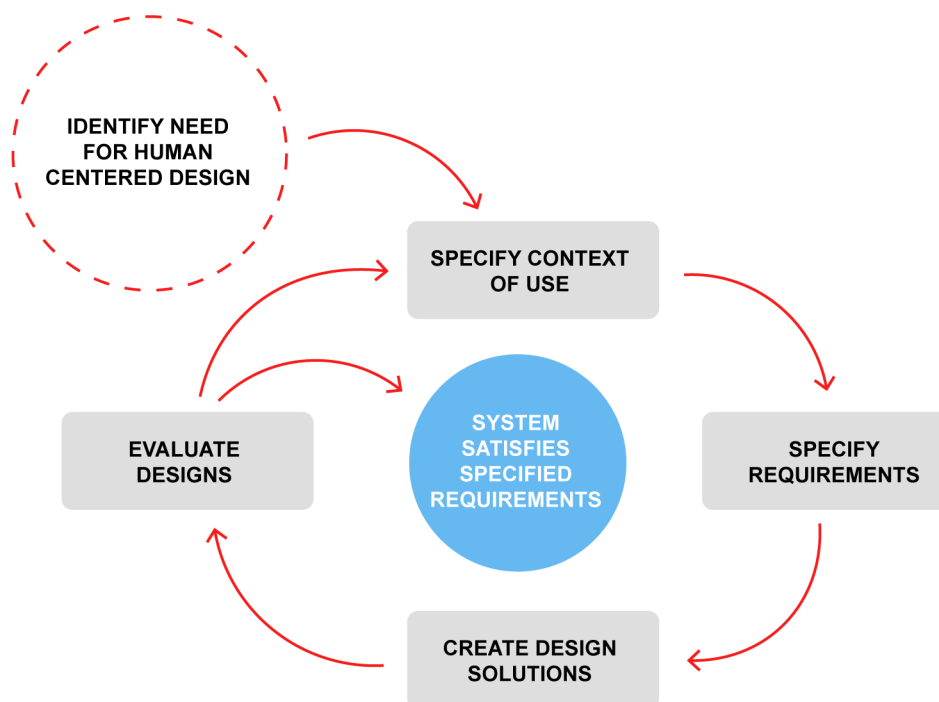
FIGURE 15. User-centered design cycle (UXPA.org 2020).

The four activities of the main UCD design cycle (FIGURE 15) are (UXPA.org 2020):

1. Identify the individuals or groups that are expected to use the product. When users are known their motivations, ways and conditions regarding the usage of the product should be recognized.
2. Specify the business requirements and the user goals related to the product based on the user findings.
3. Create the designs in stages that support the requirements from concept to completion.

4. Test the product with real users to evaluate the success of the design process

Norman (1998, 188-189) defines that the user-centered design is seen as a philosophy based on emphasizing the user needs and interests to make products more usable and understandable. Norman (1998) sees that this is possible by implementing several principles, including use of constraints, making things visible, designing for error, assessing the current system between resulting errors, and enabling the visual information and system status to be available to the user.

UCD incorporates design thinking as a key ingredient of the development process from a strategic thinking and innovation point of view. This method relies on embracing the user empathy and projecting that knowledge to design actions. Sangiordi (2010) states that the role of design today has shifted more towards designing corporate and public organization services than products alone. The design of services is increasingly linked to solving societal problems and redefining the welfare society through innovations.

The user-centric perspective of this thesis supports the definition of the user experience design (UX). The concrete and practical solutions for implementing the user experience design in the development projects, is something that is expected from this study's outcome by the TID team. The user experience is also part of a wider concept of customer experience (CX), which was one of the main topics in the VA training program and part of the strategy of the client company. The UX focuses on interactions between the user and the company's products and services. The CX, as Schwager and Meyer (2007) describe it, is the indirect and subjective interaction between a company and its customers at the different touchpoints throughout the entire customer lifecycle. The TID team's impact to the organization's customer experience improvement will be presented through the project team's effort to embrace the user-centered mindset. This sets up a meaningful relationship between the client organization's strategy and the VA training program.

3.4.2 User experience design (UX)

The user experience design discipline is profoundly related to user-centered design. The discipline has its roots in UCD as the actual design work contains designing products or services focused on people, in other words, the users (UXPA.org 2020). The ISO:9241-210:2010 states the user experience is "a person's perceptions and responses that result from the use or anticipated use of a product, system or service".

The creation relevant and meaningful products and services for users is a process that is considered as user experience design. The discipline's process includes aspects of

branding, design, usability and function together with the procedures related to acquire-ment and integration. (Interaction Design Foundation 2019.)

Valtonen (2018) says that it almost impossible to interact with products or services without having any experience of them. Valtonen (2018) points out that developers should focus their efforts when creating products and services, by thinking about the experience related to those products and services. Developers should think about this in more detail as the experience is becoming more and more important. Investing in experience creation should be seen as an opportunity to stand out from the masses. Especially now, when products and services are created by increasing numbers of developers, and the optimal differenti-ation method of products and services is an excellent overall experience. According to Nielsen and Norman (2020), the UX includes look, feel and usability (FIGURE 16). The look is the visual and aesthetic part of the output, the feel represents the emotional aspect of the output, and the usability is the part that defines the quality of the output and how easy the target of use is to operate or interact with.

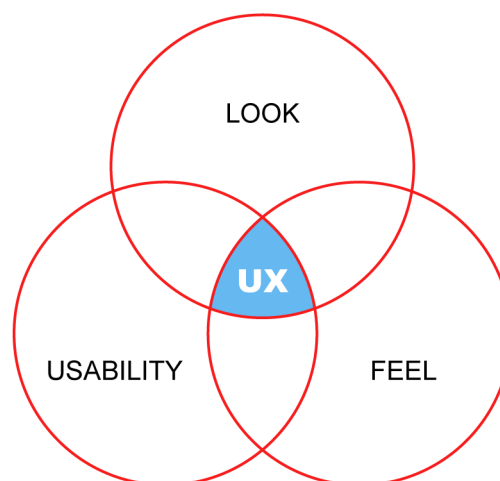FIGURE 16. The definition of UX design (Interaction Design Foundation 2019).

Morville (2004) defines the qualities of UX as:

1. Useful: design should aim towards a creative outcome and question the existing solutions in order to deliver more innovative outcomes.
2. Usable: is a required feature but cannot be the only quality.
3. Desirable: the brand elements and emotional design outcomes should not be un-derestimated.

4. Findable: design outcomes that ensure the goals of users by helping them to access the information they are after.

5. Accessible: it is required to consider disabled people to enable them to use and experience the design correctly and expectedly.

6. Credible: the user should be able to trust and believe the content

7. Valuable: the user experience is required to support the customers tasks, outcomes of the actions and overall satisfaction within this process

The UX covers a wide range of disciplines, including visual and audio design, human-computer interaction, data architecture, and interaction design. Each of these separate disciplines defines its own part of the experience so that the total experience is simple, efficient, accurate and most of all, as enjoyable as it can be. (Interaction Design Foundation 2019.)

Garrett (2000) divides the UX into task-oriented and information-oriented concepts. Both these include similar UX roles, but implementation depends on whether the context is a user interface or system. Garrett (2000) lists the various disciplines related to practice of user experience design as:

1. User research: the definition of the user needs, objectives and content requirements.

2. Functional specifications: the detailed descriptions of functionality related to subject.

3. Information architecture: the structural design of the information space to facilitate intuitive access to content.

4. Interaction design: the design of user interaction based on user tasks.

5. Information design: the design of the way information is presented.

6. Interface design and Navigation design: the design of interface elements to facilitate the user's movement through the information architecture.

7. Visual design: visual approach to define the look of the subject.

Schell and O'Brien 2015 see that the return of user experience design is maximized when developing a digital product or service front-end, conducting formative and evaluative user research, and synthesizing the strategy and product definition through the user's perspective. Design of information architecture, interaction design, and even visual design should be considered and implemented from the user's perspective.

According to Travis and Hodgson (2019, 14), a user experience designer should be able to define user-research based hypotheses related to the foundation of the design: the knowledge of human behavior, technology advances, market trends and the company's

business goals should be known. Travis and Hodgson (2019) also state that based on the user research and hypotheses formed from that knowledge, the innovation and development teams should create models, personas, scenarios and stories that answer certain topics to overcome the gap between their own thinking and what the user actually does or has problems with:

1. The primary goals that people have
2. The workflow of tasks people carry out
3. The mental models people build
4. The tools people use
5. The environments people work in
6. The terminology people use to describe what they do

3.4.3 Design thinking

A strategy to innovate collaboratively with all stakeholders is known as design thinking. It is a way of thinking, a methodology and an approach to design in more innovative way. Design thinking involves methods that enable empathy with a subject, users or people in general. Brown (2008) describes design thinking as innovation powered by insights from studying people's needs in their own environment and activities. Moreira (2017) explains that the design thinking is seen as applying divergent thinking to come up with options for problem solving. The typical process of design thinking combines analytical and creative thinking approaches:
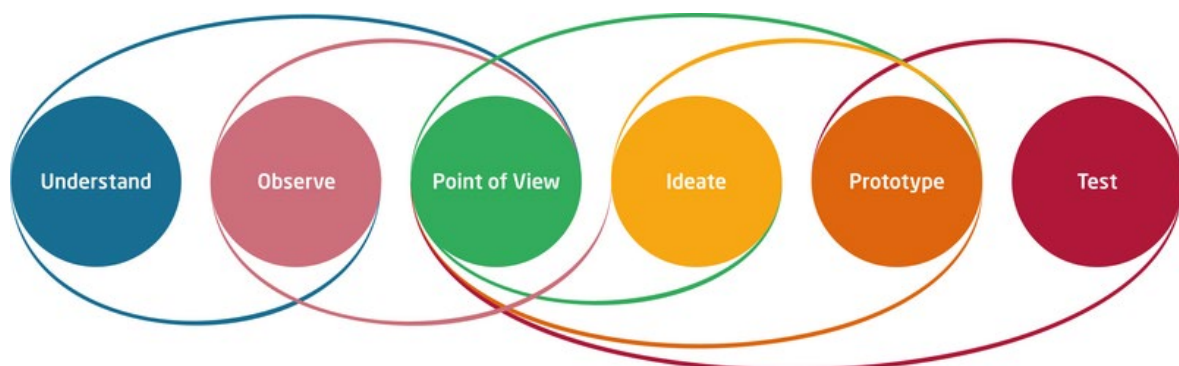

FIGURE 17. Typical design thinking process (Hasso-Plattner-Institute 2020).

The design thinking process in figure 17 presents the steps from generating the common understanding regarding the problem through establishing empathy for the user and

stakeholders. The gained point of view allows to collaboratively gather the knowledge, generate various solutions and reframe the challenge. The process iteration ends with the creation of a practical prototype and the testing of this experiment with a target group. This non-linear process allows and even expects, the participants or the outcomes to return to a previous phase to adjust the challenge framing, certain idea or prototype based on the findings and experiences. (Hasso-Plattner-Institute 2020.)

Design thinking is often seen as a strategic thinking process that originates from design discipline, and combines analytical and creative thinking approaches but is now embraced by much wider audience than designers. From a creative point of view, design thinking is a user-centered way of solving problems by relating to a deep understanding of needs and constraints in a certain situation (Mootee 2013, 35).

Kälviäinen (2014) also states design thinking as an innovation process, where a designer acts more like a facilitator than an expert in any particular field. The requirement of the facilitator's role is clearly visible when executing the innovation process with multidisciplinary teams that optimally incorporate cross-functional expertise, as there is a need to steer the team towards solving the common problem defined in the current context or case.

Liedtka et al. (2017, 7) describes design thinking as a revolutionary change in the innovation paradigm. The change affects those who act in the design process, the composition of the team, stakeholder collaboration, problem framing and the expected solution. Now the involved participants collaborate with all the stakeholders and form diverse teams. These teams iterate the design work and develop the problem framing to match the circumstances. The solution is based on small experiments tested in the real world for validation, and to learn, present insights and opportunities.

Design thinking is often seen as agile methodology due to its iterative nature of the process, which is based on responding to user feedback, focusing on outcomes, collaborating and learning (Gothelf and Seiden 2016). IBM (2018) states that incorporating the design thinking method as a framework into the design process design thinking enables helping the company to focus on the end users through team collaboration and work efficiency.

4   THE PARTICIPATORY ACTION RESEARCH STUDY

4.1   The reliability and validity of the study

There are two main activities in the scope of this thesis that were expected to validate the study's purpose. One is the empirical research phase of the study. This includes the research implementation within the VA training program, where the efforts and outcomes of the project team are documented. The other is to form a proposal of improvement based on the outcome of the documented research and experiences of the project team. To be able to form an improvement proposal, the researcher must gather the required evidence together with the team, as an outsider would not get the same view to the collaboration as the participant does. This active participation is expected to raise usable insight from the analysis and the project team's feedback. The first cycle of the participatory action research will be conducted within this study. This is expected to provide evidence as a baseline for the improvement proposal. The final conclusion proposes the optional next round of the development cycle.

This study's scope is framed by the VA training program, the nature of the development project and related activities. The scope of this development study is restricted to the case-specific project team and to specific development work. The TID team has a wider spectrum of deliverables and responsibilities other than concepting projects. These other deliverables and responsibilities are not included in the scope or the content of the proposal. The TID team will decide if they will begin to implement the findings of this study to other areas.

The context of user-centered and innovation-oriented process improvement is compared to the TID team's current way of working and to the VA training program model and the Lean Startup method. The used knowledge base builds on the VA training program content and also on various toolkits, books, articles and studies within the context of the study. This content is mostly related to implementing the Lean Startup method. The study explores and compares the VA training program content and Lean Startup to similar innovation-focused methodologies. Mueller and Thoring (2012) compare Lean Startup to design thinking and propose a new methodology that would include parts of Lean Startup and design thinking to form a new synthesized methodology, Lean design thinking. Mansoori (2016) researched the Lean Startup accelerator's affection to entrepreneurs and their organizations. Harju-Villamo and Pihlaja's (2016) bachelor's thesis examined Lean Startup and the traditional product development process discussing the potential application of Lean Startup thinking in the engineering industry. Lean Startup has been adopted

by other Lean and design thinking related methodologies for example Lean UX (Gothelf and Seiden 2016, 2017), Lean service creation handbook (Sarvas et al. 2017), and Forrester's study on the effects of the design thinking implementation to the design process (IBM 2018).

The first significant aspect of the study is the project team's gained experience and possibility to improve their team's way of working. This is done by embracing more deeply the user-centered design methods together with the innovation and business-oriented mindset. The second significant aspect deals with the wider context in the form of gained experience of the organization's business development and management's point of view. The personnel's activity towards embracing new customer-centered and business-oriented innovation capabilities are highly valued as this has a direct connection to executing the company's strategy. There are no certain ways or proven methods that guarantee a successful outcome of any development action. The constantly changing business landscape, economic situation and shifting customer needs, can change even the most promising odds in the execution. The company seeks out different ambiguous options to source new ways to handle the situation. The Lean Startup methodology's tools and processes is one way to handle the implementation. This study is also significant from the researcher's point of view, since it challenges the acknowledged user-centered design knowledge gained through recent studies. The study presents an opportunity to the researcher to participate in the early stages of the transformation of the work culture within the client company.
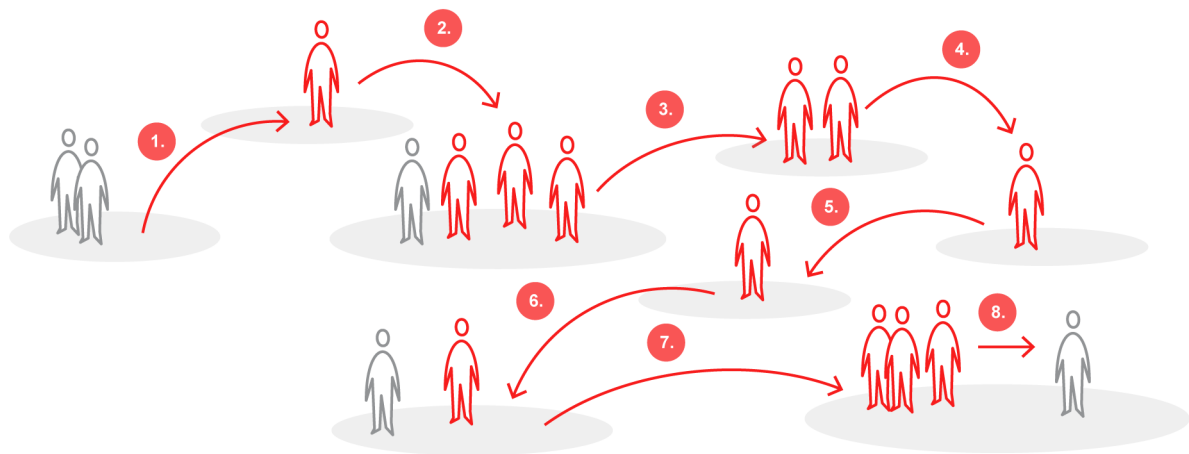
FIGURE 18. The TID team's development process (Korpi 2019).

Setting a baseline for the TID team's improvement requires definition of their typical, earlier development process (FIGURE 18). The TID team's typical development work-related process is:

1. Briefing phase: the request from an internal business organization is formed into a project briefing by the team.
2. Team formation phase: a specific project team is chosen based on the team's internal expertise, person in charge or team member's familiarity related to the current development challenge.
3. Ideation phase: the chosen team defines the required implementation activities and discusses the concept that would meet the requirements stated in the project briefing.
4. Concepting phase: the team begins to create a concept for the customer and the implementation phase begins soon after the concept is presented and approved.
5. Development phase: the initial implementation is conducted within the team utilizing the agile Scrum method.
6. Testing phase: the implementation ends with the testing operations, where the solution is validated with the customer.
7. Documentation phase: in some cases, user instruction documentation is required.
8. Release phase: this is the initial delivery phase where the team transfers the final product or service to the customer or to a specific system.

(Project team and TID team manager interviews 2020.)

The primary goal of the development study was to find out, if the project team's participation to the VA training program presents any applicable methods or tools that could be incorporated to their development work processes. The usefulness of this action research is based on organization-wide efforts as well as a review of the team's approach. A team-specific approach does not clearly express a certain kind of incompleteness or missing elements. This study's goal is to understand the TID team's situation regarding user-centered development projects, and to validate learning new ways and methods that support this. The goal is aligned with the VA training program's goal to include more customer-centered and concrete innovation method-based studies against the typical desktop studies that the development teams conduct for the foundation of the product innovation. The organization seeks to add capability and enable a new mindset for personnel with the successful outcome of the VA training program. The researcher's goal was to learn new ways to inherit development and innovation strategies to improve the knowledge and skills required to successfully manage new projects from a user-centered point of view.

The study tries to answer whether the project team's experiences from the development project demonstrate results that present concrete benefits to the TID team itself. The study also tries to answer if those benefits should be integrated into the TID team's work process. These results and findings may also prove to be beneficial to much broader audience, like business units or cross-organizational functions. One of the most significant success factors will eventually be the team's willingness to embrace this new method and their ability to implement the change in their own way of working. This ability to implement new techniques to the daily work is especially important when working with internal projects where old ways and attitudes often limit the outcomes. The VA training program and the UCD approach present ways to enable the development of processes, innovating new products or services and projects that are related to the customer experience. The TID team was involved in a research-based development study that was to take place during the VA training program to validate the outcome of the program and to be able to get viable evidence from the success of project team's actions and contributions towards the facilitated development project.

This development study's research approach follows the AR methodology. This methodology is often linked to co-designing and business development-related improvement focused research. The researcher is not acting alone in this study, the project team is collaborating within the VA training program and they are finding out the optimal benefits together. The researcher only collects the information and formulates it into a proposal. The success of the research in this case has many sides that should be acknowledged when the results are analyzed, and the conclusion is given. The first indication of success is

properly conducted action research. This is presented as the researcher overcome the obstacles in a situation where several issues are outside of the control of the researcher. An important thing related to the research is the researcher's and participants ability to work out the options to enable a change in their way of working. The second indication of a carefully conducted analysis is based on the gathered research validated data, which shows clear results and allows a successful outcome in the conclusion phase. The third indication is the researcher's ability to present personally gained learning from the project, program and research, and to be able to utilize the achieved skills and experience in future challenges. This last indication of a solution's success is difficult to present within this thesis timeframe as the operative side is now in the hands of the TID team.

4.2   The development work culture

The client organization of this thesis is one of the world's leading manufacturers of lifting equipment. According to the company's 2020 annual review, it has around 18,000 employees and 600 service outlets in 50 countries. The company's leading business role is based on great numbers of customers in the engineering and process industries, shipyards, ports and terminals. The company provides operational lifting solutions and maintenance services for all crane brands, along with product sales. The company states that its strategy is based on five main topics: growth, profitability, customers, people and technology. The company aims for profitable growth that exceeds market growth in the long term. This objective is aligned with the company's goals to achieve customer satisfaction, employee engagement and innovative offering and services, and its aims are to attract and attain the best talent and to consistently deliver a world-class customer experience. The strategy is directly aligned with the company's mission and vision. The strategy defines the organization structure and management practice, which affect the success of the organization in achieving the mission (Steers and Bhagat 2009, 75). The company strategy of the company is seen as a part of the motivation for this thesis. This is seen in the form of the VA training program and the expectations laid upon it.

The company has executed certain efforts to motivate company personnel to utilize available technologies and innovations. The focus of these efforts is to create more value to customers and shareholders. The organization states that adopting innovation, customer and user-centered ways of working with development-related projects, helps significantly the organization's efforts to reach its five cornerstones of the strategy. (Startup coordinator 2020.)

The organization's work culture regarding the development of novel ideas for products and services was introduced and explained more clearly to the researcher during the

progress of this thesis and the VA training program. This thesis can also be connected to a greater phenomenon which is the work culture transformation efforts within the company. This phenomenon should be explored further to enlighten the TID team's operational environment. The context of the culture itself can be defined as a complex whole within the context of society. It is structured from knowledge, beliefs, art, morals, law and other capabilities and the habits that are passed from one generation to next. The culture related to organizations consists of many similar aspects but is more focused on the concept of work. The employees' daily hopes, fears, ambitions, attitudes and actions are shaped by values and rules. As culture steers people's personal and professional improvement activities, it also pushes businesses action towards development actions. The work culture grows from a workplace's predefined patterns of interaction that are impacted by a set of shared assumptions, understandings, and beliefs. The overall rules according to sharing information, collaboration and responsibilities, attitudes towards handling the work itself are considered to determine the culture. (Lotze 2004, 9-12.)

The organization model, the rules, and the process models are one perspective to visualize the work culture in an organization. The client organization itself relies on a matrix model (FIGURE 19) to define its internal collaboration and responsibilities within its work culture. The model is expected to enable various cross-organizationally dedicated functions to be available to different business units at the same time.
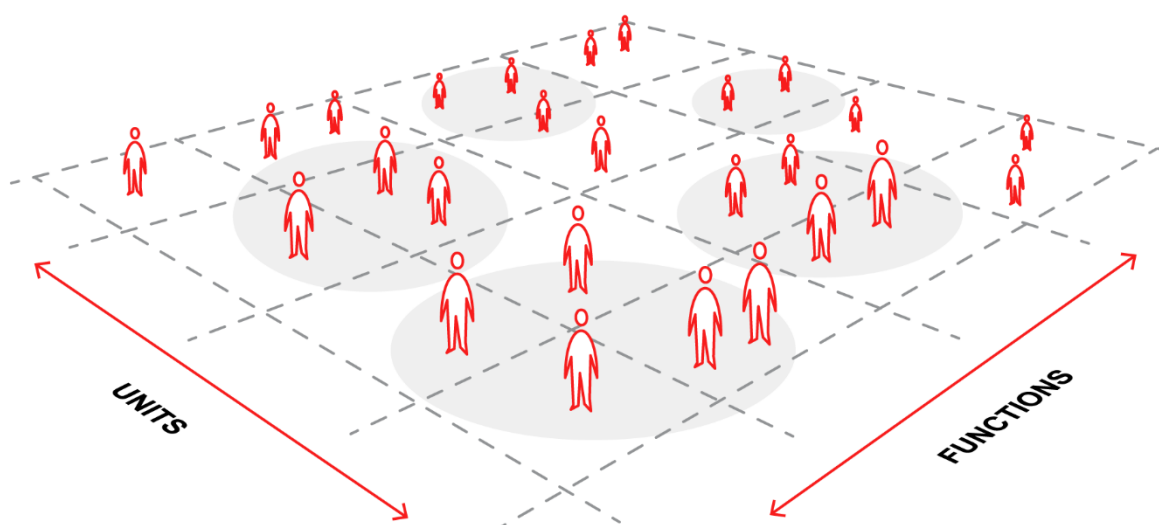

FIGURE 19. The matrix organization model (Korpi 2019).

Bartlett and Ghoshal (1990) explain that the matrix organization is built from the overlapping functions that are to serve several internal units at the same time. According to Bartlett and Ghoshal (1990), this organization model aims to decrease business silos and bureaucracy.

The company in the study's focus operates globally by following processes that define the operation for each unit, team and personnel. These process models indicate certain steps and procedures that are required to be executed to reach the goal of the project. This is important to ensure valid project planning and approval for delivery. Development projects have their own process model. The TID team's work is often connected to the company's initial manufacturing processes by the nature of their role in development. (TID team manager 2020.)

The company's products are manufactured through two main pipelines. These production processes differ from each other by the way the product is being manufactured. The TID team is involved in these production processes by managing and developing the end user documents and related processes. The documentation delivery process is also divided according to the manufacturing processes. These processes are called the configured to order (CTO) and the engineered to order (ETO) delivery processes. The CTO process consists of products that are built from pre-assembled components and the documentation is very consistent throughout the product lines. The ETO process is based on customized products and the documentation set delivery varies from project to project. The development work involves the TID team with numerous systems, stakeholders, and business units. This impacts the TID team's own processes and work culture. (Project team and TID team manager 2020.)

The client organization has well established channels to support innovation and personnel activity. Innovation has a significant role within the company. Nearly every product has been an idea before it has been realized into concrete form and sold to customers. The volatile business landscape and customers lay great expectations on this process. The organization has decided to explore new ways to develop new products and services faster and more efficiently to answer this challenge. The new requirements also motivates company personnel to establish a fresh mindset towards new ways of working with development projects. (Startup coordinator 2020.)

Otala (2018, 135) states that there has already been a transformation to teamwork through-out every corporation. Work-related problems have become more complex and require a team's effort to solve. This has shifted work culture towards teamwork through-out every corporation. Complex problems also require a wider range of experts who form

multidisciplinary teams. Cross-functional collaboration of these professionals helps to achieve goals better and faster.

Sarvas et al. (2017) see that a company's culture and social change can be achieved through a predefined process that embraces uncertainty and collaborates with customers. This process enables the team to address the tools in a way that the holistic view is taken into consideration throughout the whole process, and certain activities and behavior are expected to happen within the process to fulfill the required outcome.

The VA training program is targeted to enable the client company's development teams to work with development projects. This is expected to improve the company's performance and uplift the customer-centricity and business-oriented mindset of the personnel. The way startup companies conduct their business development presents a well-suited method for corporate teams as well. A startup's typical process is to grow products and services from the ground up, with limited resources and expertise. It defines assumptions towards the customer's needs and performs quick experiments, putting emphases on learning to build a sustainable business. (Startup coordinator 2020.)

Humble et al. (2015, xiii) states that modern companies implement methods like design thinking and user experience design to be able to satisfy customers at each step of their interaction with the organization. According to Humble et al. (2015), the success of companies, in the long run, depends on their ability to understand and exploit these cultural and technical forces that enable the acceleration of the innovation cycles.

IBM (2018) pursued organizational change and a user-centered design model. The major factor to overcome was the resistance against its efforts to transform the organization's work culture. Resistance to change can be also seen as one factor to be overcome to enable the change within the client organization's context.

Ries (2017, 317) defines continuous transformation as an organization's ability to test and learn from experiments. This is realized by supporting techniques that are proven to deliver specific outcomes. The ability is validated when these techniques are implemented throughout the organization.

The successful adoption of innovation and a customer-centered process is built on cross-functional teams of experts that incorporate fast experiments. Knowledge is formed from the experiment measurements and are self-supporting when it comes to developing the idea to a customer demanded product or service. This method of enhancing innovative and customer-oriented work requires learning a new way of thinking, application of tools and studying the customers and end-users more deeply. A sufficient amount of innovative

and customer-oriented activity within the personnel helps to enable the transformation in an organization's work culture. (Startup coordinator 2020.)

4.3 The digital assembly instructions development project

This development project was the client organization's internal venture to seek a better understanding of the options available to improve the manufacturing process from a user-centered perspective. The project was chosen to take part in the VA training program as it had several good qualities: it was a development project, the TID team had available re-sources, and the specific project team got permission to participate the VA training pro-gram in this study. The researcher acts in a dual role: both as a designer and as a re-searcher.
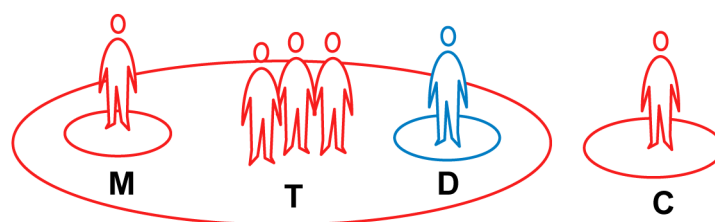

FIGURE 20. The project team structure and customer (Korpi 2020).

The TID team's principal members formed the actual project team presented in figure 20, where the TID team's manager (M), three TID team members (T) and researcher (D) forms the project team. The researcher was included in this project team as an external professional. The team included a total of four members not including the team manager. The roles in the team were not defined but the participants were called as concept owner, product owner, process owner and visual designer. The designer's area of responsibility within the client organization was to maintain and develop the technical documentation re-lated technical illustration process and tools. This was also a direct connection to the de-signer's role in the development project. The team was self-guided, but the team manager was involved especially at the beginning of the development project. The customer (C) of the development project was the manager of an internal unit in the client organization. This specific supply process management unit was requesting the concept for their own purposes, to develop the supply process.

The main business objective of the development project was to develop a concept to present feasible solutions to current challenges related to product assembly efficiency in the factory. The development focus was on the paper documents that are deeply integrated into the product assembly process. The paper documents are seen as a form of bottle neck in the manufacturing process. To manage this issue, the client company's supply process management is seeking utilizable concepts to incorporate the digital documents into the product assembly process. This improvement would most likely enable the factory to abandon the printing of paper documents involved within the manufacturing process. This would be a step towards the real-time monitoring of the status of the product being assembled, and up-to-date instructions would have a direct impact on the reduction of productions failures. In this sense, there are many important aspects to be taken into consideration, and a couple of features that would have a positive economic impact indirectly during the project.

The secondary objective of the project was to conceptualize the digital assembly instructions content creation and delivery. In addition, the development project was expected to present a new, concrete and executable concept to improve the current product manufacturing process related work and assembly instruction from the global perspective. The expectations of the development project were not highly prioritized by management personnel. However, there is imminent anticipation to see significant improvements on performance, safety, feasibility, and thus ensure that there is a steeper learning curve for new assembly line workers globally.

This development project had several stakeholders. The researcher was conducting AR approach-based study and at the same time participating in the team as an external expert responsible for the visual design and technical illustration side of the project. The development project combines two different stakeholder groups, the digital assembly instruction project's stakeholders and the VA training program's stakeholders:
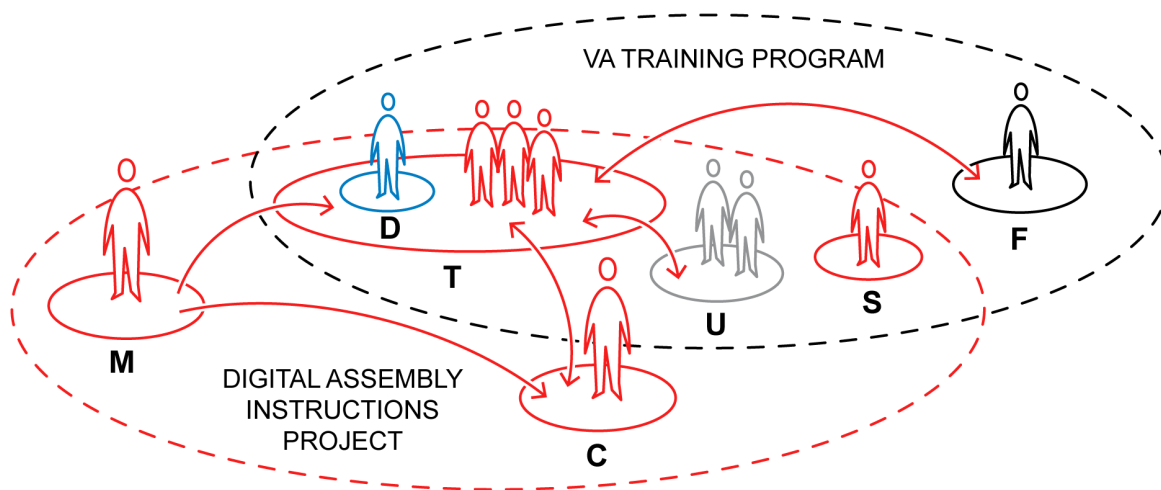
FIGURE 21. The development project stakeholder map (Korpi 2020).

The stakeholders (FIGURE 21) concerning this development project were the project team manager (M), the project team (T) and the development project's customer (C). Stakeholders related to the VA training program were the facilitator (F), the researcher (D), and the end user (U). The startup coordinator's (S) role was to ensure the pilot program's fluent progress on the client organization's behalf. The development project has two different types of end users, the mechanical assembly technician and the electrical assembly technician.

The development project related to this study was originally following a linear project process model where the VA training program was integrated in some of the stages.
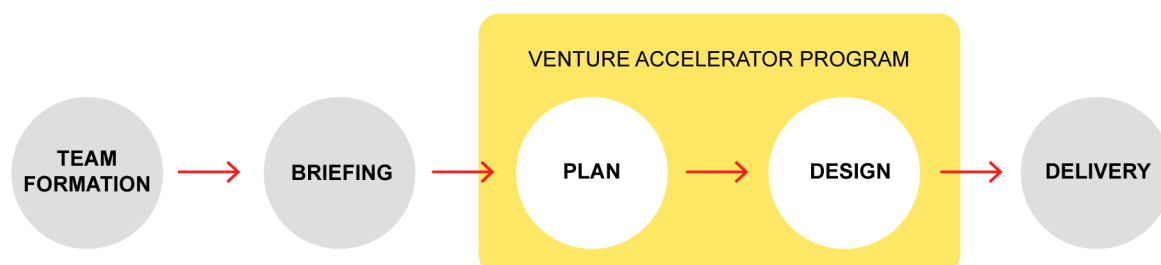

FIGURE 22. The initial work process model of the development project (Korpi 2019).

This process model describes the development process as it was seen at the beginning of the project. In the first phase the project started with the project team's meeting, where the

manager formed the team and discussed the pilot program. The second phase was a briefing phase, a kickoff meeting. In this meeting the project was initiated and discussed more in detail. The customer was also present in this meeting. The VA training program was expected to have specific sub-phases that would concentrate on planning and the actual design of the project. Based on this assumption the third and fourth phases were expected to be conducted during the VA training program. The concept would be finalized after the design phase and it would be approved by the team. At this point the program would also be completed. The last activity in the process was the delivery phase. There the final concept would be handed over to the customer.

4.4   Research hypothesis

Multiple themes affect this study, directly or indirectly: work culture transformation, learning from experience and improvement of the work process and habits. In this situation, some questions were set to frame the study related expectations into concrete form. Due to the nature of the AR approach and conducted development project, the main research questions are:

1. "How might the TID team improve their way of working in development projects towards a more customer and user-centered, and innovative working culture?"
2. "How might the Venture Accelerator program help the project team to embrace the presented methods?"
3. "Can the project team's learning of implementing a UCD approach be validated by AR methodology?"

5 THE ACTION STUDY OF THE DEVELOPMENT PROJECT

5.1 Overview

In the very beginning of this thesis project, the PAR approach was seen to be the most suitable way to conduct the empirical research phase. The main reason for implementing an AR approach was that the study was focused on the project team and the actions towards its improvement. This specific approach well suited to such development. Along with the PAR approach, the observation and interview research methods were important to include to this study. By incorporating these two methods into the research, it was expected to be beneficial in terms of the validity of the research results. Implementation of these methods would ensure the availability of both the quantitative and qualitative information. In addition, the plan was to utilize the implementation of the document analysis. This additional analysis method is directed towards the documents generated within the VA training program and within the development project. This method would also complete the method triangulation which is expected to further ensure the reliability of the information.

5.2 Process phases

The overall PAR study process is based on Design Councils Double Diamond process model (FIGURE 23) (Design Council 2020). This model contains the divergent thinking phase, the explorative action phase, the convergent thinking phase, and the focused action phase. These main phases are described as discover, define, develop, and deliver:
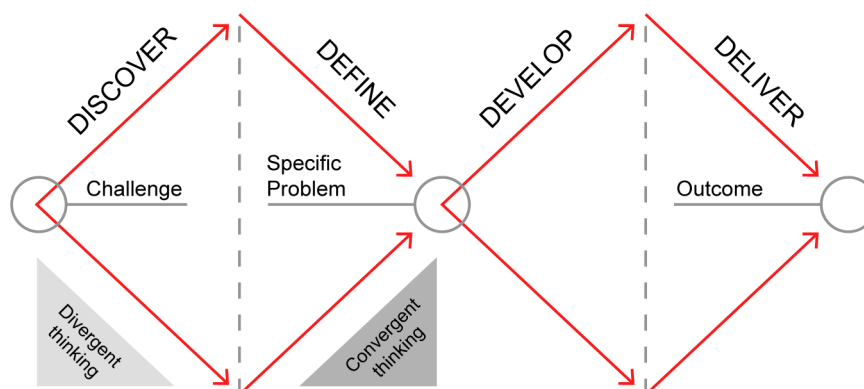
FIGURE 23. The double diamond (Design Council 2020).

The process to investigate the team's activities during the VA training program is divided into several steps:

1. Planning
2. Knowledge base
3. Observation
4. Interview
5. Document analysis
6. Analysis
7. Conclusion
8. Proposal

These steps are part of the main phases, as shown in figure 24.
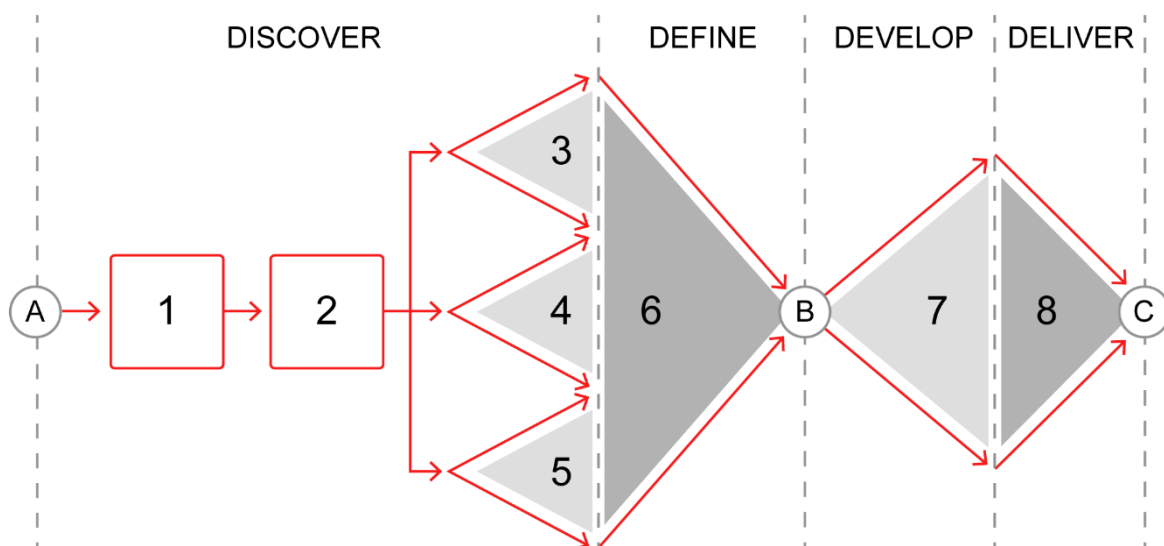
FIGURE 24. Main phases and the steps of the development study (Korpi 2019).

In addition to the steps, the process model includes three milestones. The challenge (A) at the beginning is defined by the scope and purpose of this study. The specific problem (B), in this case, is defined by the challenge but validated by the empirical research. The outcome (C) is the improvement proposal. In the following sections, each phase is described in more detail.

The discover phase

In the planning step, efforts were directed towards gathering knowledge about AR related research methods. These methods were to be implemented within the research steps. The AR approach and study's three main themes-related material mainly consisted of literature, like books, articles and research papers. This phase also planned to include AR related methods like observation, interviews and document analysis. These methods generate both the quantitative and qualitative information for the study. The methods are expected to produce valid and evidence-based information for the analysis phase regarding the team's actions, opinions, experiences and outcomes of these actions. Kananen (2014, 123) and Ojasalo et al. (2018, 105) states that by using several methods, point of views, in research, also known as triangulating, the research data can be well validated. The AR approach steers the overall planning and execution by its natural cyclic process. The cycle, formed from several stages like plan, act, monitor, evaluate, sets the base for research activities. Two levels of AR cycles in this study as shown in figure 25.
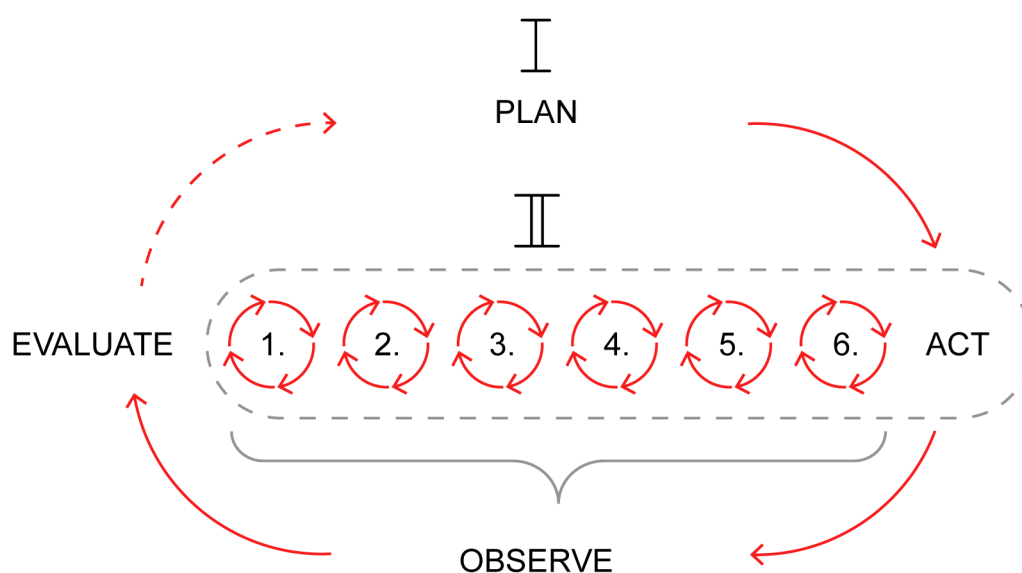
FIGURE 25. The two-level AR process related to the study (Korpi 2020).

The first cycle extends over the whole study. The stages are aligned to the VA training programs agenda and are, in this sense very straight-forward. The second level AR cycle, an array of sub-cycles, takes place during each workshop session and in the act stage of the first level of AR cycle. Regarding these sub-cycles the workshop agenda is the plan stage of the cycle, progressing the development project with the tool canvases is the act

stage, observation during the workshop is its own stage and the quick reflection discussion after the workshop is the evaluation stage.

As these second level cycles are occurring in each workshop, it is clear that the team cannot conduct more than one cycle of first level PAR during this study's timeframe. Instead, the sub-cycles are expected to provide the information for the main AR cycle and enable the final evaluation. The first AR cycle's observation role is towards the analysis of the sub-cycles counter parts. The final main stage, the evaluate, forms the baseline for the next cycles plan stage. This evaluation is presented in the form of the improvement proposal.
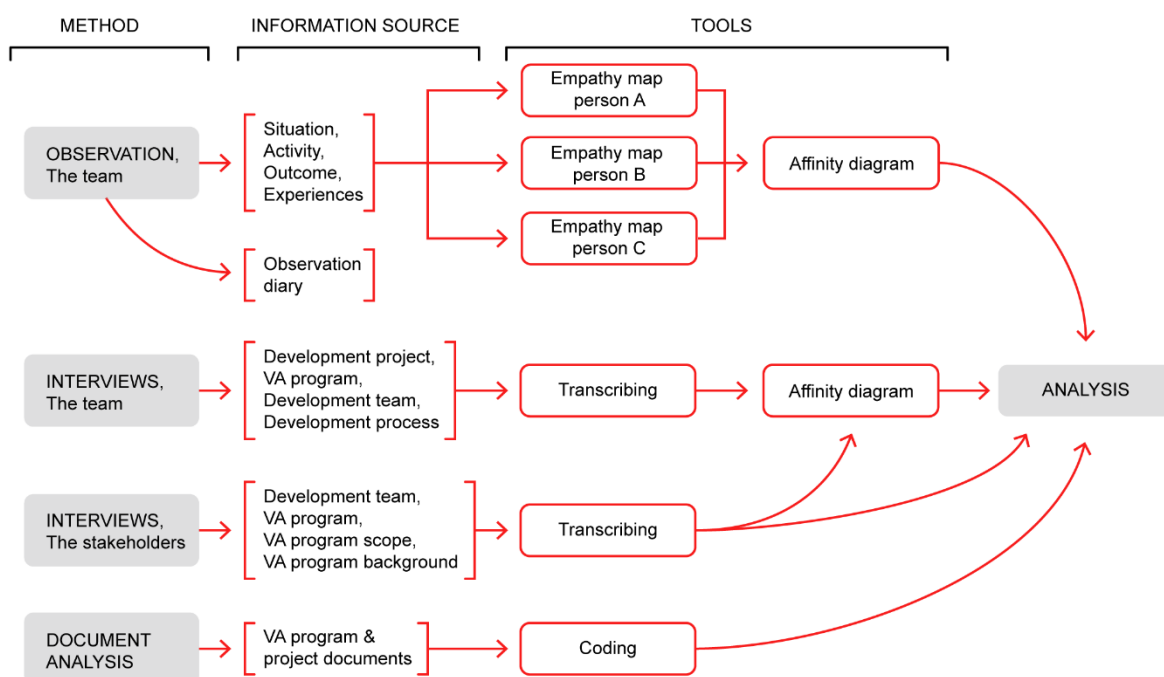
FIGURE 26. Empirical research plan (Korpi 2020).

The empirical research plan in figure 26. displays each research method, and the process to obtain the information. The main method for gathering information was seen to be the observation and reflection discussions afterwards each workshop. This follow-up discussion is connected to the PAR approach, where this operation is the preferred way to validate the observation findings. The observation diary was not seen as a method but as a tool to help the researcher to capture details regarding each workshop and session.

The secondary method was the interviews. This was because the team was required to be interviewed in more depth about their expectations of the development project, VA training program and their current work process related to similar development projects. Also, from the team's development point of view, it was important to clarify their own pains and gains related to their current process, team itself and the improvement agenda.

Observing while participating the team's activities as one of its members was the most important and efficient method related to the PAR approach. Observation was mainly planned to rely on taking notes based on monitoring the team during the workshops and other development project events. Observation was aimed to focus on the team's activities, experiences and outputs of the program. Documentation was created by keeping a research diary and making notes about occurrences during the project. Written notes were to be the only working method, as it would be difficult to record audio or video and be an active member of the group at the same time. Live recordings would have required permissions from over twenty people working with confidential development projects. Related to the PAR approach process, there was a plan to have short follow-up meeting with the team to reflect and validate the observation findings after each workshop.

There was also a requirement to interview the main development project stakeholders. The stakeholders were selected by their role in relation to the development project, VA training program and the project team. The initial customer of the development project and various end users were left out form the scope of the interviews. These persons did not have a direct connection to the project team's improvement plans or the VA training program. Interviewing the stakeholders was also important for the sake of the thesis background, the VA training program, and the facilitation.

The organization's internal stakeholders would provide background information about the company's strategy and its corresponding, innovation and customer-centric activities in the form of participation in the VA training program. In addition, if there was no possibility to interview the manager, then the managerial point of view regarding the intentions towards the project team's improvement, would be difficult to obtain.

The interviews were planned to be semi-structured, as there was a need to get latent information from each subject. The interview material would then enable validating the observation findings, the study related topics and building the improvement proposal for the project team. The interviews were to be recorded for better analysis, as there would not be similar secrecy issues as with the observation. The final method, the document analysis, was to focus on documentation and allow the analysis of the material produced by the

team within the VA training program. This method expected to present supporting information to the observation findings, in a similar way as the interviews.

The define phase

In this phase, the gathered information was prepared into a usable form for analysis. The methods of preparing the information usually involve the team or workshop's participants compiling the results together, but in this study the work was expected to be done by the researcher alone. The plan was to put the observation information gathered from the project team members on an empathy map canvas (FIGURE 27). A canvas was created for each team member, where the researcher planned to put the information for further analysis.
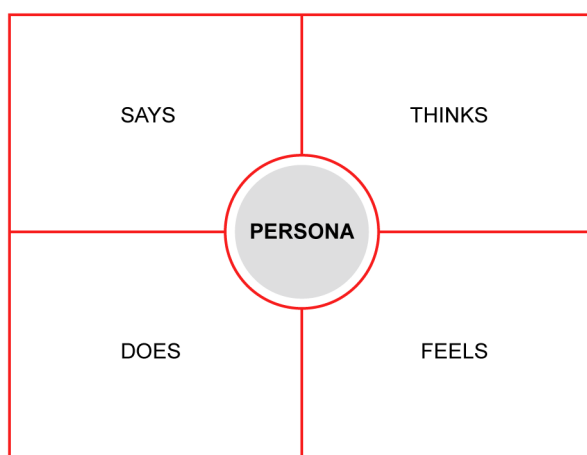
FIGURE 27. Empathy map (Gibbons 2017).

The empathy map is typically divided into four parts: says, thinks, feels and does. This map's purpose is to attribute the findings to a specific user and in that way promote empathy from the designer's point of view. The empathy map sections represent the different aspects of the user research findings or knowledge related to a specific user who was interviewed or observed. These aspects are expected to influence the team member's experience of the process. (Gibbons 2017.)

The plan was to map the interview results to an affinity diagram (FIGURE 28) after the actual information was simplified. According to Scupin (1997) the affinity diagram is a method that aims to collect lots of information pieces and arrange them under themes or topics. The method is also known as KJ or Kawajita Jiro after the developer of the

method. This enables the team to see or find patterns from the data by exploring different setups, and connecting information within the diagram to form new synthesis or insights.
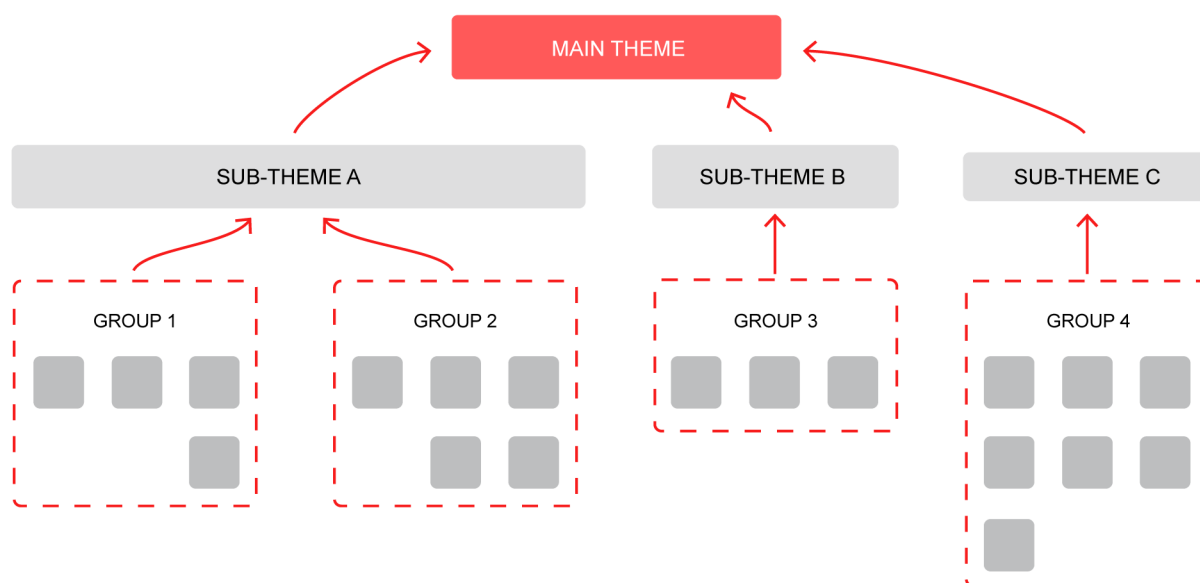
FIGURE 28. Affinity diagram (Korpi 2020).

The document analysis results were to be entered on a form to determine the differences between expected or planned canvases, materials, plans, designs, other documents, and the documents created by the project team. The documents to be explored are the ones that were planned or expected to be created during the VA training program or the development project.

The develop and deliver phases

After the results were presented and the analysis was done, the develop phase was to start. This phase of the thesis includes the conclusion forming step. This is the step, where the summary regarding the development study, development project, the VA training program and the team improvement actions were to be discussed. The final phase includes the proposal creation step. The proposal was to be created from the outcome of the analysis and the conclusion. This proposal was intended to be more detailed and solution specific than the actual conclusion of this study.

5.3 Schedule

The initial schedule of the development study was meant to follow the VA training program. The plan was to include the additional activities like planning, building of the knowledge base and empirical research phases, according to the VA training program. The overall timeframe for this thesis was estimated to take place from November 2019 to the end of April 2020, as shown in figure 29.
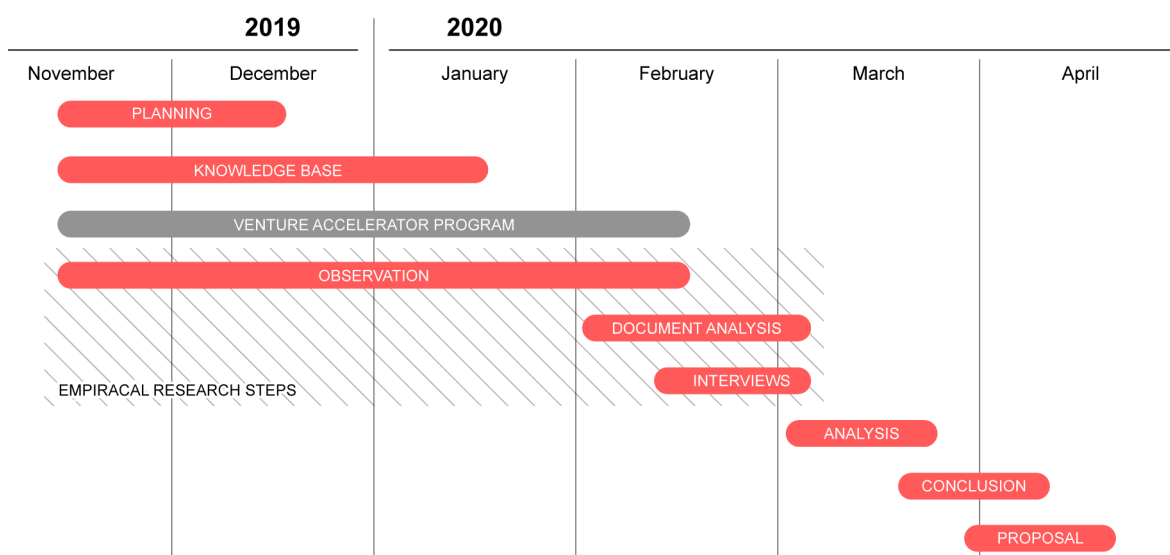
FIGURE 29. The initial development study schedule (Korpi 2019).

The VA training program started a day after the thesis project was confirmed. This meant that there was no time to prepare for conducting the development study at the beginning. As a result, the formation of the knowledge base had to be included in the overall schedule to enable the whole study.

The schedule followed the thesis steps that were expected to be quite straight forward and sequential. The interviews and document analysis were to be conducted after the observation and VA training program. There was some overlapping between empirical research and the analysis steps. The analysis could begin at the earliest when the results of the empirical research became available. The conclusion step was to happen after the analysis step was finished. The thesis last step, the forming of the TID team's improvement proposal was to be done in part with the conclusion step. These improvement proposal and conclusion step share certain similarities with the content's outline.

6   EMPIRICAL RESEARCH

6.1   The observation phase

The plan of how to orchestrate the observation presented some challenges at the beginning of the VA training program. The researcher had no previous substantial experience of such an activity in a research situation. The main issue was the schedule, which caused uncertainty towards the success of the PAR's research methods proper utilization. The main concern was that there was not enough time to become familiar with different observational methods, techniques or tools. In this case, the only option was to improve the knowledge of the practical utilization of the methods or tools while working on a project with the team. The program's schedule made it challenging for researcher to prepare for the practical side of the study before the first program session. The main reason was that the opportunity to conduct the research and the final resolution that enabled the study was granted at short notice, only one day before the VA training program's first session.

The other issue was that there were some doubts regarding PAR-related dual role, where the researcher was conducting the monitoring but also being an active participant within the team. In addition, the study took place in an open space and there were several other teams. The lack of possibility to record audio or video during the session, presented concerns about the success of the observation phase.

However, these challenges did not block the research work from progressing. The researcher was able to participate in the team's work despite these obstacles. The precise understanding of the techniques did not cause any serious kind of issue either. The participating was not an effort itself as it was more like experiencing with the team while working with the development project. These experiences and feedback from the collaboration with the team were acknowledged regardless of full knowledge or understanding of methods. With careful concentration on the situation's most prominent activities, members actions and efforts, the information was successfully collected and written down. The observation was as important part of the research as it expected. A deeper knowledge of methods and previous experience of similar situations would have helped to be more thorough with the procedures, but it was not essential.

The original plan was to observe the team in the program's workshops and have the reflection discussions right after the session. This plan, which included the observation target, location and time definitions regarding the method, was changed after the first two workshops. This was necessary, as the whole team was not able to gather to discuss the

session immediately after it was over. Team members' tight work schedules did set challenges to many team-based activities outside the workshops.

The new observation plan was extended to include the method into team meetings. In this way, the researcher was able to involve the whole team in the feedback discussion about the VA training program related practices, and to get their opinions about the process. This was a good decision, as the members would give their opinions and feelings about the program more directly in these separate sessions. This created a more realistic image of the team's standing regarding the VA training program's scope.

The observation was conducted by participating in all sessions and team gatherings that were arranged. In each session, the researcher carefully followed the team's efforts. After the sessions and meetings, the observations were written down in a specific semi-structured form, and the contents, with descriptions, were added into a diary. In team meetings, the observation details were marked down instantly.

The observation form was improved during the program progression as the researcher was able to see what activities, behaviors and experiences or lack of these were relevant to the study. The base of the form was built on AEIOU framework. Kuniavsky et al. (2012) see the AEIOU framework as a good approach to user observation. The AEIOU stands for five elements that should be included in the observation information source. The elements are activity, environment, interaction, object, and user. These elements of the framework are described here:

1. Activities (A): sets of actions, paths towards things.
2. Environments (E): place where the action happens.
3. Interactions (I): how the activities are performed, and how are the participants connected.
4. Objects (O): the objects that are required for the activities and actions.
5. Users (U): the individuals or group in the target of the study

The observation form implemented, shown in figure 30, was based on AEIOU framework, but it was modified to suit the requirements of the researcher.

FIGURE 30. Observation form (Korpi 2019).

The customized observation form contains several columns:

1. The Person column is reserved for the purpose to identify target person.
2. The Situation column describes the environment, objective, the initial setup
3. The Activity column describes the actions and behaviors
4. The Outcome column presents the results of the actions, success or failure, reached target or misunderstanding.
5. The Experience column is for gathering the abstract feelings and emotions of the person, while acting or after the outcome of the activity.
6. The Other column is for additional markings and summary of the current persons activities.

The observation related diary contained the agenda of each session, description of the workshop's happenings and a summary of the team's efforts. This proved to be valuable information as the program changed from the initial agenda quite significantly with regards to the content that was explored directly under facilitation. Describing, in the diary, the project team's daily actions in a workshop or meeting, was very helpful afterwards. When the

researcher had to recall those events from the notes, the diary provided factual information.

The expected results of observation are mostly related to proven data from each member's activity, outcomes of their actions and attitude towards the program. The results also expected to present the usefulness of the program's tools and way of working with the development project. There were sincere hopes that the team would be willing to embrace and internalize the given tools and user-centered methods. These results would show as successful outcome related to the utilization of the VA training program's tools and techniques in relation to the development project.

Here is the description of the information from the observation notes regarding each workshop, team meeting and user research session. This content is simplified from the research diary and observation forms.

1. The innovation day

The venture accelerator program introduction session was held on 12th of November 2019 at Maria 01 premises (IMAGE 1). A total of four teams were present, but not every participant of each team was able to attend this session. Even though the project team was already introduced in the project briefing, some of them met face-to-face for the first time at this event. The project team's manager attended this first event of the program and participated in the session.

IMAGE 1. Arcade 5 co-working space in Maria 01 campus (Korpi 2019).

The agenda started with two presentations. The opening presentation was related to Aalto university's startup incubator organization and its operation model and experiences of the startup business in Finland. The second presentation was about a startup company's experiences in their business, and generally about working in the Maria 01 campus. After the presentations, all the participants were divided into groups defined by the projects, and the workshop materials were distributed to each group.

The session's objective was initially to start forming an idea and concept. The first team activity was a warm-up exercise, where each group was divided into pairs and one person in the pair was supposed to interview the other without asking anything verbally about 5 minutes. The interview was conducted by gesturing with hands and facial expressions. Then, each pair presented their findings to the other teams. After the exercise, the facilitator introduced the primary tool canvases: idea sketching, initial concept and solution description. Idea sketching consists of making a visual sketch of an idea with a one-sentence description of the original idea, and an explanation of why the idea matters to the customer. Initial concepting includes describing the solution's customer and the end user, and offered the solution's description. This part also contains the planning of the initial idea for the business model, defining the radicality or uniqueness aspect of the solution, and mapping it to the canvas.
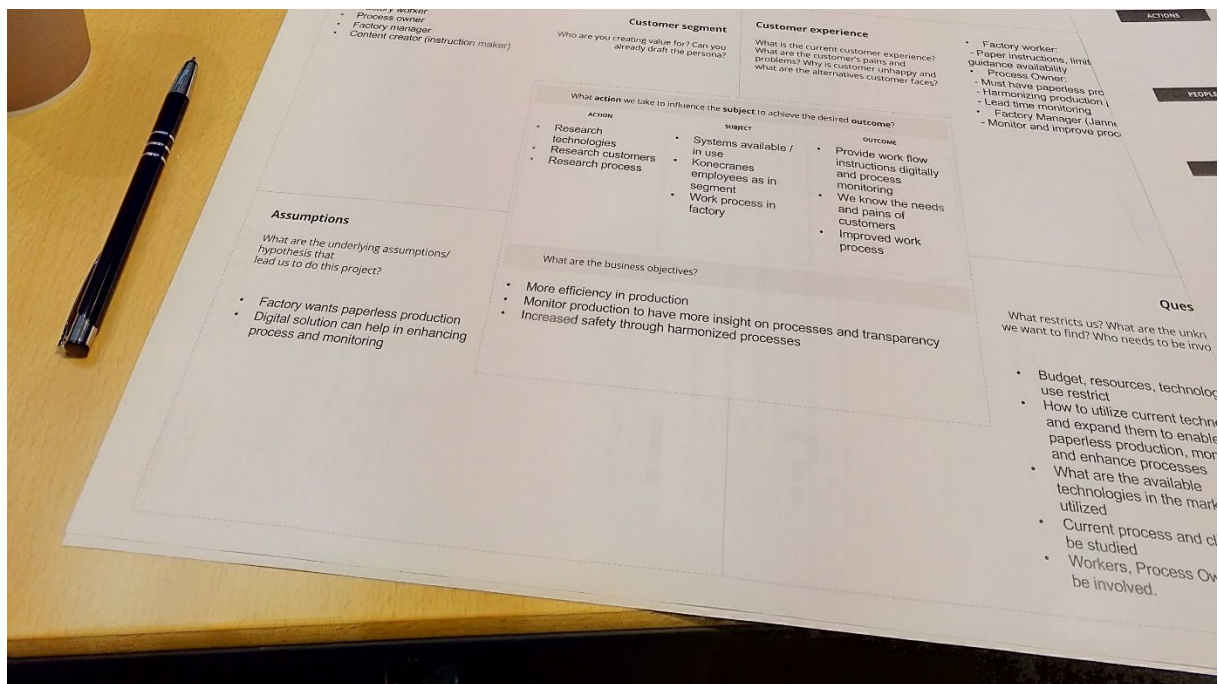
IMAGE 2. The project scoping canvas (Korpi 2019).

The outcome of the workshop was that the team was able to start the project with a concrete objective in the form of tool canvases. There was some confusion related to the project and the VA training program, as none of the team members were sure of the scope and the actual problem to be solved. The new space, other people and the situation seemed to be slightly overwhelming. Everybody was collaborating with the tasks and were actively trying to support the team's efforts to create the required documents. Doing concrete tasks appeared to help the team to concentrate better. Despite starting the work, the team was missing a clear overview of the project: plan, tasks, and goals. It would have been important to define these details at this time. This would have helped the project to progress. Also, the VA training program agenda and purpose seemed confusing at first.

2. Team assignment meeting

The first project team meeting was held on 25th of November 2019 in the Teams application as participants were in different locations. The session's objective was to progress with the previous workshop's assignments. The team activity was a little passive regarding the assignment. Even when the material was available in digital format, the collaboration still felt a bit vague due to existing uncertainties. Conducting meetings through the Teams application does not seem to support co-working very well, when the purpose is to

process a physical document in a collaborative manner. There was also a misunderstanding about choosing the project's main focus between the customer and the end user. This caused some distraction within the team. In addition, the project needed proper planning and scheduling, as it requires effort by the team, and time is limited for collaboration. However, the outcome of the session was a minor success, as there was improvement in defining the project problem and the required, two canvases were finished on time.

3. Workshop 1.

The second session of the VA training program was held on 26th November 2019. The session objective was the problem identification. All the participating teams were expected to create the mapping of a customer journey and present the materials to the mentor. There were some changes in the program agenda, as user persona creation was not included to the workshop. This was not great setback for the team at that time, as there was no user information yet available. However, the user information would have been helpful as there was a requirement for user personas regarding the development project.

In this workshop, the team focused on to the user journey mapping. As the team still did not have any valid information about the user, this session was mainly based on assumptions of what might be included in the journey. There was confusion about the target of the journey map, the user. As a result of this, the first draft included the customer's perspective of the map. After the user journey mapping task, the team presented their project to the mentor. The mentor was a representative from the major venture capitalists in the Maria 01's campus area. This mentoring was a short session and did not actually raise any major issues within the project. The only thing that the team had to focus on was the missing user information and the MVP, to be able to test the assumption with as little effort as possible. This session's main outcome was support for the team's vision, which showed that the team had a project that could add value to the company through its focus on digital assembly instructions.

4. User interview drafting session

The interview planning session was held on 28th of November 2019. The session objective was to create an interview structure to be implemented in the forthcoming end user interviews. Only one team member was able to participate the session due to other priorities. This meant that an additional meeting was required to review and discuss the interview structure. For this reason, the available member prepared an interview structure alone with open ended questions. He also conducted a test interview with a person that had experience from the context of the development project, and the factory assembly line. This person was not included in the development project itself, so was optimal target

for testing. The actual testing of the interview with this person provided validated information of the interview structure.

5. Team meeting

The team meeting was held on 29th of November 2019. The session objective was to review the interview structure with the team. This time, almost everyone attended the meeting. This structure was presented to the team. The members had very little to add to the presented structure, but still some changes were made to the structure, and a couple of new questions were added to it. The next meeting with the customer was planned. In this next meeting, the team would present its expectations of the type of people that would be in the interviewee target group.

6. 1-1 sparring session

The first official sparring session with the facilitator was held on 20th of December 2019. The session's objective was to discuss the team's progress with the project and possible issues related to the VA training program together with the Maria 01 facilitators. This session was a short meeting through the Teams application. The team was a little passive at first, as a majority of the members had no clear idea of the required proceeding phases. The team did not have any proper project plan available in addition to the program schedule. The facilitator tried to get an overview of the team's situation, which the team was able to describe. The team had prepared the interview structure and already conducted one test interview, so it had some kind of an idea about the next steps. The team would seek permission from the customer to interview end users, as it was not possible to ask them directly due to the factory environment and closed premises.

7. Team meeting

The meeting with the customer was held on 8th of January 2020. The session objective was to arrange the actual user interviews together with the development project customer. The team described the requirements to the customer, and what they were planning to do next. This time, all members participated in this meeting. The team presented the requirements related to the gathering of information about the end user and the manufacturing process. This information was to consist of: What pain points has the user got in the manufacturing-related process? How does the process work? What needs are raised in general? What is happening in the assembly line that is not included in the process?

8. Workshop 2.

The third session of the VA training program was held on 9th of January 2020. The session objective was to create a value proposition canvas (IMAGE 3) related to the development project. The agenda also included an expert mentor's review session regarding this canvas.
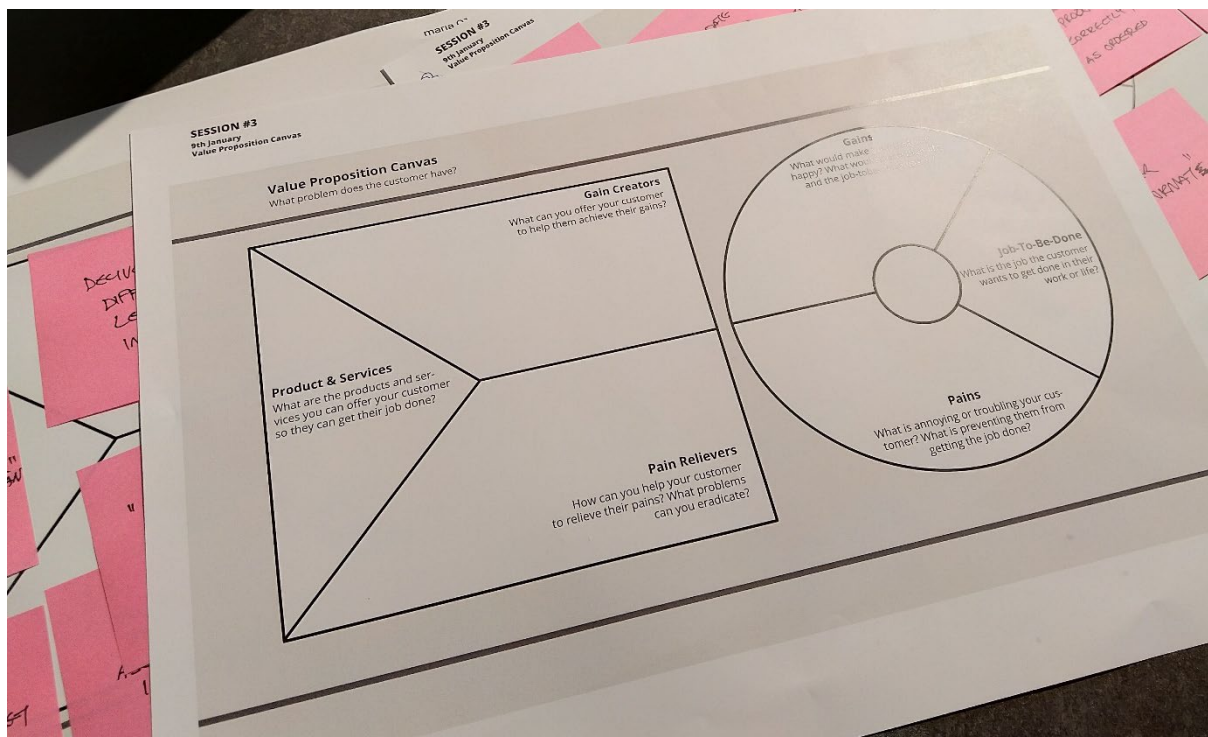
IMAGE 3. The value proposition canvas (Korpi 2020).

Some of the team members were quite motivated after the startup founder's inspirational presentation and the ideas that this presentation raised amongst the participants. The team also seemed focused on the given task to create the value proposition canvas from the development program's point of view. This time, the team was able to create the expected canvas in the workshop. This canvas was then presented to the visiting mentor, UX / UI designer. The mentor supported the plan to conduct the user research next, as the team was still basing their work on the assumptions.

9. ETO factory visit and interview session

The first interview session was held on 14th of January 2020. The team visited the ETO assembly factory, but only two members were able to participate in the activity. The

interview notes were written on paper, as recording audio and video in a factory environment would not have been very successful. The good thing was that both team members were able to take notes.

The session host, a production engineer, was a little confused about what the team wanted from him. The team was able to convince him of the need to map out the operation of the production line for the development work. The interview situation was located within the production line and the team interviewed this host primarily. There were also a few assembly technicians available, but only one of them was briefly interviewed. The pre-planned interview structure proved useful, as the questions were usable for gathering information, although the target group was different than originally planned.

The host was aware of the challenges related to the process, but still, none of the real end users' requirements or pain points found. It would have been good to know in more detail what expectations, hopes, issues there are in the process, from a technician's point of view. Despite the incomplete end user information, the team got an idea of how the ETO-based production line works. The assembly related procedures, systems, and documents were also clearer to the team.

10. CTO factory visit and interview session

The second interview session was held on 17th of January 2020. The session objective was to continue interviewing the end user in relation to the CTO process factory. All but one member was able to participate in the activity. The team toured the CTO process plant to get an overview of the process.

The first interviews were conducted at the electrical assembly line. The person in charge of the line told the team what they were doing and how. In addition, the team was also able to map, in more detail, several technicians' comments and views, their development ideas and comments on production, design, their problems and challenges, and needs. Next, the team visited the mechanical assembly line. The line manager and several technicians were also interviewed there. They had slightly different needs but in many ways they also had similar needs to the previous group. Interviews were conducted by handwriting notes in the same way as the previous time. Most of the team did not follow the interview structure, but instead they asked questions according to their own intuition and based on the topics that arose in the situation.

After the interview rounds, the overall atmosphere of the team was enthusiastic. It was clear to the team what they would do based on the findings. This time, the observation and interviews were more difficult to handle than in the previous session, because now

there were several people on site participating in the interviews. In addition, factory production line environment was quite restless.

11. Workshop 3.

The fourth session of the VA training program was held on 21st of January 2020. The session objective was to create the minimum viable product canvas and to plan the experiments to test the assumptions. After the MVP creation, there was an expert mentor from a venture capitalist company. The mentor reviewed the team's project and gave her proposals for improvements. With the help of previously conducted interviews, the team was finally able to create canvases based on actual research data. The research data was not thoroughly analyzed as there was no collaboration to evaluate the research materials. This shortcut left the possible deeper insights out of the scope of the team's MVPs. Regardless of implementing partial insights to the project, everyone in the team was very active. The team was able accomplish four different MVPs. Each MVP was planned for a certain end user. Afterwards, the team seamed very satisfied with the outcome of the workshop. The project took a great leap forward and the tools became more usable now that there was valid information available.

12. Team meeting

The meeting was held on 29th of January 2020. The session objective was to go through what still needed to be done for the VA training program, and to divide the tasks evenly. Tasks included the format and content of the pitch presentations MVP, the format, scope and content of the concept, and updating and finalizing the program canvases. The team held the meeting in their office, where there were also other team members from outside the project. The space was a bit noisy for a task that required concentration. All team members attended the meeting but not all were present throughout the meeting. The outcome of the meeting was that the draft of the concept was formed and shared digitally to everyone for reviewing purposes. This enabled each member to contribute their part to it and to comment on it as the content would be updated and extended.

13. Workshop 4.

The fifth session of the VA training program was held on 4th of February 2020. The session objective was to create the Lean business model canvas. There was also a mentoring session by an accelerator company that specialized in improving business-related issues. Not all of the team was able to join the day's session, but at least most of the members were available. The main task of the workshop was to fill the business model canvas.

It was easy for the team to establish the business model based on the background information and the previous canvases that had been created.

At the end of the workshop, each team got an assignment for the next workshop. The assignment requested the teams to prepare the pitch presentation for the next time, to be rehearsed and evaluated. The pitch presentation was expected to include the following project information:

1. Name of the product
2. Problem
3. Solution
4. Business model and market
5. Traction
6. Competition
7. Team
8. Next steps + Q&A

14. Team assignment session

The meeting was held on 11th of February 2020. The session objective was to discuss with a subject matter expert, the technical aspects of the MVP that the team was planning to include in the concept. The team described the challenges of getting the related application for MVP experimenting purposes. The expert introduced the team the electrical drawings image viewer application. The expert knew a lot about the program and was involved in presentations organized by the software vendor. This meeting also helped the team with issues related to the MVP, although the viewer application did not present a clear solution for the concept. There were several features that required testing and planning to be implemented into the production environment. Despite the lack of an optimal solution, the team was able to learn new things related to the context of their project, as the expert described the design environment related to the electrical drawings.

15. Team assignment session

The meeting was held on 11th of February 2020. The session objective regarding the development project was to review the concept presentation together with the team. During the meeting, the team went through the concept presentation and the newly added items such as: user personas, updated user journey maps, value proposition map, application wireframe models, and initial project assumptions. In addition, the team considered what should be built into the pitch presentation.

16. Workshop 5.

The sixth session of the VA training program was held on 13th of February 2020. The session objective was to present the pitch and receive feedback about the presentation from the facilitator, other teams, and from the pitching experts. One of the team members volunteered to present the pitch and the others participated in the presentation from the audience. Several updates were made to the presentation during the day by the presenter and team members. The session consisted of a first edition of the pitch presentation, and direct feedback of the positive and negative aspects of the presentation.

According to the discussions during the session, the participants were positive and considered the experience good and useful. After the workshop, the presentation still had some issues that required revision before the final presentation. The revision action was also scheduled during the session.

17. Team meeting

The meeting was held on 17th of February 2020. The session objective was to finalize the pitch presentation. Although, not all team members were able to participate in the brief session, the rest of the group wes able to complete the final presentation.

18. Final pitching day

The seventh session of the VA training program was held on 26th of February 2020. The session objective was to present the pitch to the development project customer, stakeholders and several of the organization's representatives that were invited to the final event. The event was also shared as a live stream using the Teams application, to the people who could not participate in the event personally. The team's assigned member presented the pitch, first in rehearsals and then to the whole audience. The presenter and the presentation received encouraging feedback from various people in the audience, as well from the facilitator.

6.2 The action research interviews

These interviews are focused on the development stakeholders. These stakeholders are the facilitator, the client company's manager responsible for startup collaboration, the TID team manager and eventually the project team. There was total of six interviews conducted during this PAR study. For each interview a semi-structured interview structure was prepared that consisted of open-ended questions. The project team members had the same questions, but the rest of the stakeholders had more personalized questions.

The Teams application was chosen as the medium to conduct the interviews. Teams was a good choice as it can enable video calls, share documents, share screen view, and there is also the possibility to easily record the conversation. Using the application also proved to be the a well working method as interview situations were challenging due tight schedule at the end of study. The difficulty was to find a suitable available time in each participant's work schedule regarding the short period of time that was reserved for the interviews. And it was further complicated because people were located in different cities. The researcher was also required to come up with other ways to conduct the interviews than face-to-face meetings, due to the ongoing worldwide epidemic.

The project team member interviews, that were conducted after the VA training program, were also seen as a retrospective reflection step like Suojanen (2004) describes the interviews and discussion with the research participants that are executed after each cycle of the AR. From the team's point of view, the aim of the interviews was focused to successfully gather team members reflections, opinions, challenges, and experiences about the VA training program, and the development process and tools it was offering (APPENDIX 2).

The TID team manager's interview was expected to present a different view to the team, but also to confirm the validity of the team's interviews and fill in some missing details that the team members were not able to provide (APPENDIX 5). The startup coordinator's interview was expected to present details about the main reasons that the collaboration of the company and the facilitator was taking place. In particular, the startup coordinator was expected to describe the goal, challenges and efforts related to the VA training program from the client company's perspective (APPENDIX 4). The Maria 01 facilitator's interview was expected to describe the Maria 01 point of view related to the teams, their work and results. It was important also to learn more about the program itself and the motives behind it (APPENDIX 3).

6.3   The document analysis phase

A great number of documents was created throughout the VA program, the development project, and in several related meetings. There were also various materials created by the team, mostly incorporated into the paperless production concept. To enable the triangulation of the research results between different methods, the document analysis was implemented as a last effort. This analysis could provide support for available insights based on other methods.

The document analysis was expected to validate all the development project and program related documents, against the ones that the team was able to create. The document analysis was expected to show if the team has been able to create all the required content that the program presented. The document analysis also showed if the content was valid from the program's point of view. Furthermore, the document analysis demonstrated if the content was showing any indications that the content had the ability to improve the development project's concept.

The initial analysis was executed by exploring the available documents created during the program. The analysis focused on all the documents as a whole, to present an accurate overall result. The documents were simplified and grouped (Ojasalo et al. 2018, 139). This was done by gathering the differences between optimal canvases and created ones, and by reviewing the usual process documents against the created ones.

7 THE RESULTS OF THE EMPIRICAL RESEARCH

7.1 The analysis phase

This phase will present the outcome of the empirical research work and the insights gained through the observation, the interviews, and the document analysis methods. Analyzing the discovered information systematically allows the researcher to form a conclusion based on evaluating the results. There were all together 18 different sessions where the observation was conducted. These sessions included the workshops, project team meetings and user research or interviews sessions. There were also five additional occasions that were included in the development study's research phase. This was because of their value to the development project. In each session, the research methods generated information for the study. In the observation step, the key content was the project team's activities, efforts, outcomes and experiences. The six interviews key content was the project team's thoughts, opinions, feedback and expectations, but also the development project stakeholders' thoughts within the study's context. In the document analysis phase, the findings were gathered from the documents related to the VA training program and the development project. In the results presentation for each method, the available information is divided in two main categories, quantitative and qualitative. The implemented observation and document analysis methods contain both types of data, as their contents includes measurable and unmeasurable information. The interviews are based on qualitative data, to allow in-depth knowledge about the experiences of the participants and the context of the study.

7.2 The results of the observation

The observation was carried out by making notes from each session where the project team was participating. The actual observation included the project team's participants in each session, their activities and output, mood, comments and expressed emotions or feelings. All these different factors were written down on an observation form. There was a research diary in addition to the observation form. In this diary the researcher described the agenda, situation and other specific matters regarding to each session. This provided additional information about the situation and planned actions, which allowed evaluation against the outcome of the session. Keeping this kind of session-based observation documentation was the only possibility to ensure that the required source material was available for the analyses. This observation documentation was also an option to recall each session's incidents along with the e-mail conversations, on-line group messages and the material produced during the sessions. As the sessions were structured and predefined by

a schedule, there was always some material produced that could help to keep track of each participant's efforts and activities.

The results of the project team and its members actions during the program and the development project are presented. The results are related to quantitative observation data like attendance and activity. The purpose of analyzing this kind of quantitative data is not to evaluate individual team members against each other, but to support the other research methods to provide an overall picture based on the research results.

The project team's participation to the development project events

One perspective to look at, for both the project team and its members motivation and determination to participate and internalize new tools and techniques, is the attendance factor. This quantitative data is not truly valid data in the sense of presenting the motivation or determination to learn, since the team members might have had some other urgent tasks at the same time. The attendance possibility demonstrates one view to discuss about the results. The attendance factor details do not include the reason for an individual's' absence, but it gives an overall view of how the team advanced the development project within the VA training program and other relevant sessions. The attendance percentages were divided into session (FIGURE 31), workshop (FIGURE 32), and member (FIGURE 33) levels. This separation enables the evaluation of how the participation was forming between different occasions and different members.
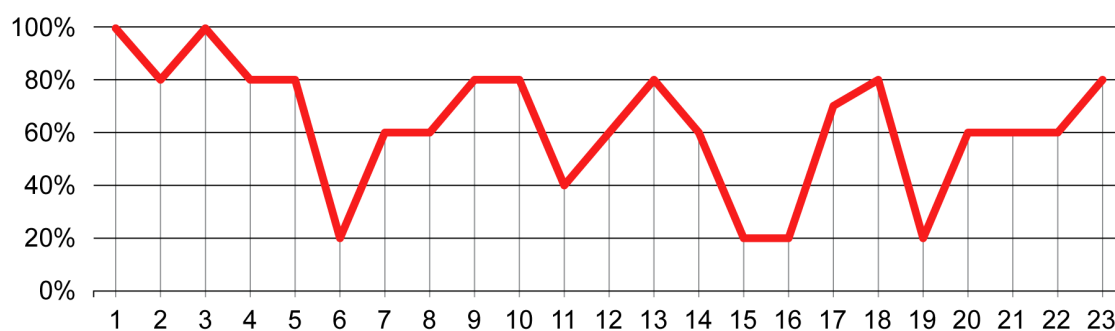

FIGURE 31. Team members attendance per session (Korpi 2020).

This team's participation percentage for all events is related to the development project and not only to the VA training program events. The overall attendance was 73% in total.

This was at a such level that the team was able to make progress with the project and take decisions without having to postpone any event.
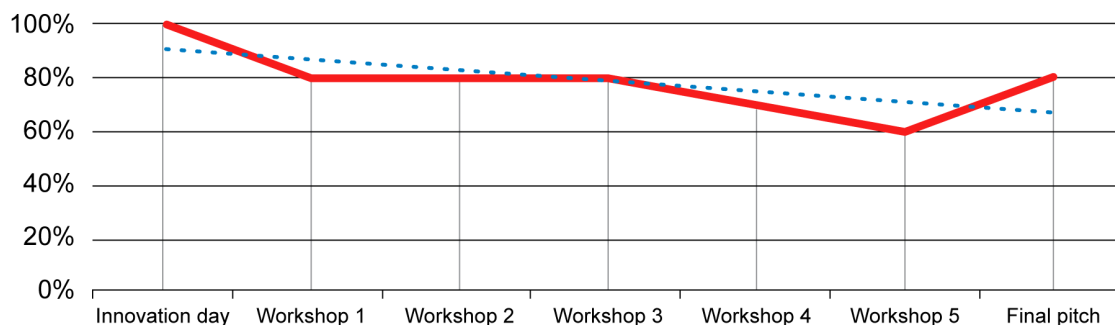
FIGURE 32. Team members attendance per workshop (Korpi 2020).

Figure 32 describes the team's attendance percentage for each workshop. The attendance was at an appropriate level as over three persons were available in every workshop. This is a good level despite decreasing towards the end of the program.
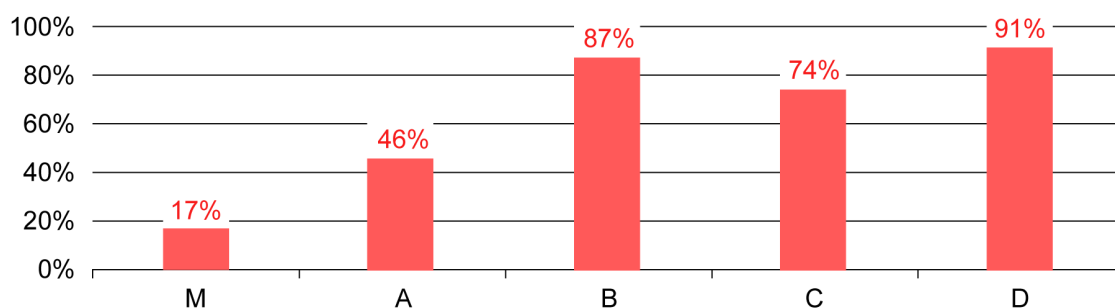
FIGURE 33. Team's each member's attendance (Korpi 2020).

The different team roles: M, A, B, C, and D, presented in the figure 33, are representing the participation of each project team member. The researcher and project lead were expected to be present in every occasion, whereas it was not mandatory that the other to attend. The team manager's attendance was not required or planned for the program, but

as the graphs indicate, her participation was mainly towards the beginning of the VA training program and the development project as she guided the team to start the initial progress and to negotiate with the internal customer.

The attendance graphics as a whole show that the workshops were more popular than other occasions, the team meetings and similar events. This long project had a good percentage of participants, despite the fact that certain events suffered from a lack of participants. It is expected that not every expert in a small team is able to attend each session during long projects.

The team's activity in the development project events

Each team member's attitude towards the VA training program and the development project was evaluated against their contribution, attendance and interview presence. This kind of information does not present very accurate results, but in this circumstance, this information provides good additional content for analysis.

A motivational aspect was linked to the activity of individual members and was determined based on observation results. This was done by giving positive and negative points (+/-) regarding the team member's participation to the actual work and contribution towards the project. The activity indicators have nothing to do with the quality of the conducted work assignment. They are just an indicator of certain members activity and expression of inter-activity within the group.

To present the activity, positive (+) points were given for a member's attendance to the current task or assignment, and if the member had contributed something to the team effort. If a member did not participate or contribute anything, negative points (-) were given. The activity indicator is based on a simplified summary in this case. It was not possible to measure every action precisely, as the observation was not videoed. Like with the attendance values, the activity percentages were split into session (FIGURE 34), workshop (FIGURE 35), and member (FIGURE 36) levels:
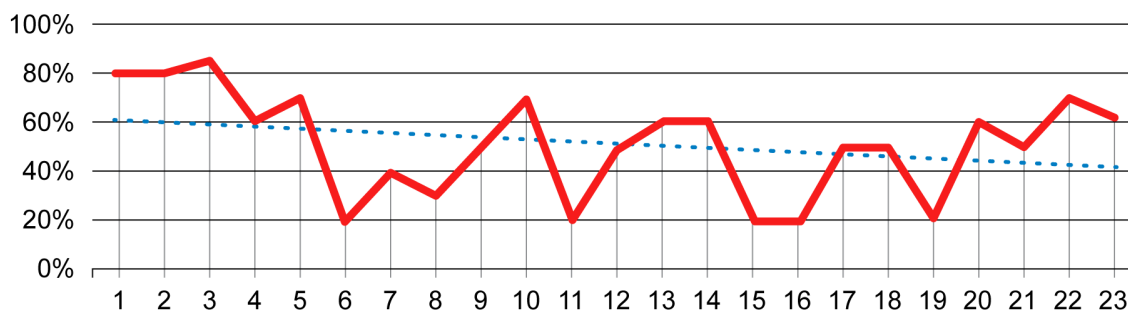
FIGURE 34. Team's activity per session (Korpi 2020).

Figure 34 presents the team's total activity during each session. The results show that at the start and at the end of the project, the team was most active. The workshops show more positive results than the other sessions connected to the development project.
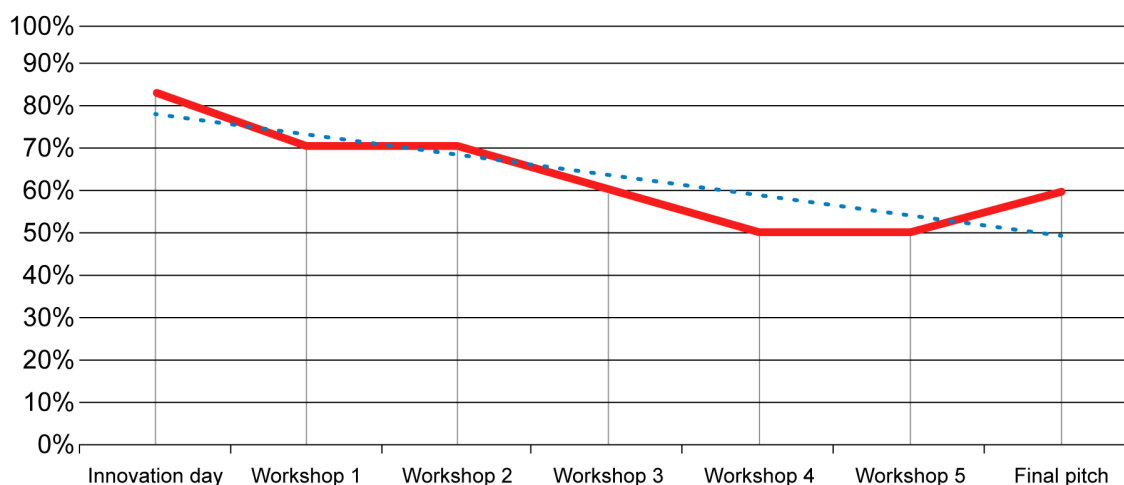

FIGURE 35. Team's activity in workshops (Korpi 2020).

Figure 35 presents the team's total activity in each VA training program's workshop. The overall activity was above 50%, but the activity decreased towards the end of the program.
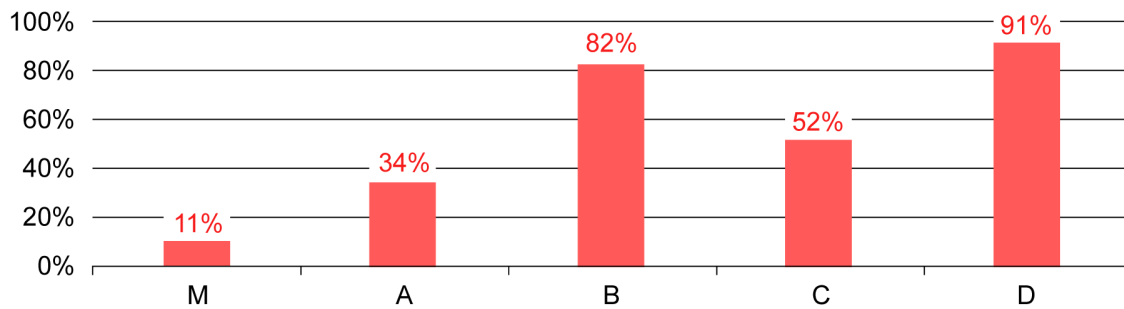
FIGURE 36. Team member activity (Korpi 2020).

Figure 36 presents each team members individual, total activity. The activity was also clearly divided between team members. Two persons out of four were more active within the VA training program. The activities can be seen correlating to the roles of project lead and researcher, but also the motivation and the possibility to attend to the sessions. The team manager did not attend except for other than the first and last sessions, so her activity is low compared to other team members.

As a conclusion, half of the team showed good activity throughout the project and there were nearly always two out of four people to make progress on the project. The activity data correlates strongly with the attendance, which also supports this finding. Based on the attendance details, most of the team seemed to value the workshops more than the project meetings, as the overall attendance was 73%. This percentage was exceeded in most workshop sessions.

The team's activities, outcomes and experiences during the sessions

The qualitative data was implemented through the empathy map, which was used to gather the qualitative information about the team through observation. As the quantitative data presented the concrete actions of the team, this qualitative approach was expected to provide more latent data. The map was created by combining each person's activities, outcomes and experiences into the four categories of the map. A total of three empathy maps were created, one for each team member.

The observation was targeted to follow the project team's actions and efforts related to the program and the project. All the empathy maps were created based on information gathered during the observation. The observations were simplified and grouped under the four groups: Process, UCD, VA training program, and Tools (FIGURE 37).
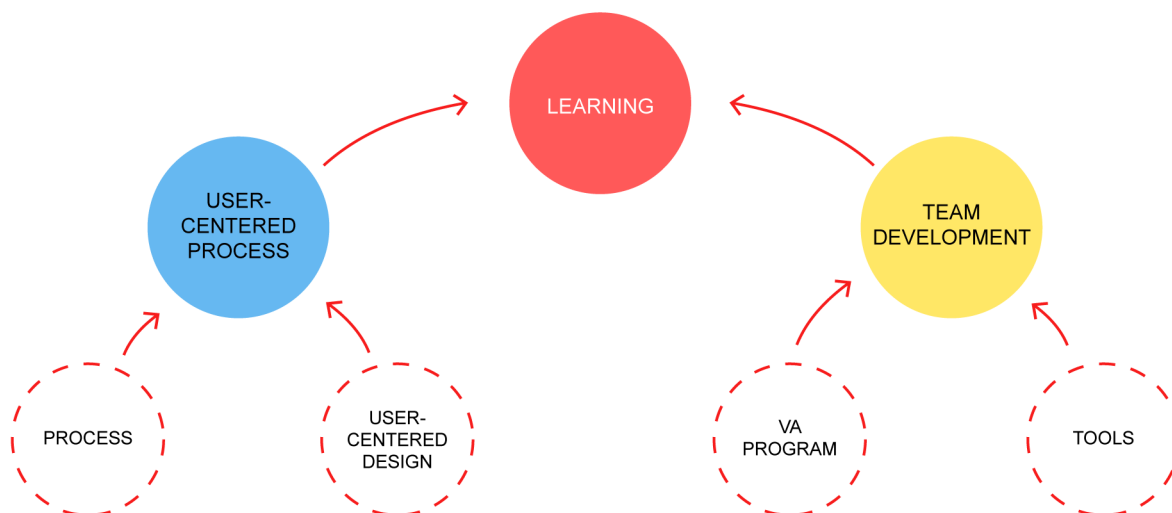
FIGURE 37. Observation affinity diagram (Korpi 2020).

The sub-themes for these content groups were User-centered process and Team development. The main theme that connected these sub-themes together was the learning theme. This main theme encompassed also the purpose of the VA training program. The actual results were divided into positive and negative findings to present the supportive and preventative findings related to the user-centric process and team development. The positive findings were seen to support the project team's efforts towards the goal, and the negative ones were expected to prevent these efforts from being achieved.

The positive findings were mostly related to the VA training program content, the tools, process, and the UCD. This was also seen in the observation through the member's actions, comments, motivation and emotional expressions. The process theme findings were that the project team really saw that the process was essential for the development project to be completed successfully. The process was seen to help conduct the work and structure the delivery of the concept in a more concrete way than the team would have usually done. Together with the process, the tools involved were valuable. In the beginning there were challenges to implement the tools. Since the user information and a clearer project scope were available, the team was able to better utilize the tools and the impact of those tools was clearer to the team. The tools provided the framework to collect and define important topics related to the project. The team saw that the tools enabled them to build a more holistic concept for the customer. In addition, the team, saw that it was valuable to execute the user research. The user research was an especially critical stage. Without the

research, the project would have been based on certain assumptions. The team was also motivated to conduct the research in practice, as this was a good way to learn about the target and users.

The negative findings were mostly related to the development project, but in the beginning, there were certain issues related to other topics as well. The first finding was that the team seemed to be lacking direction or a concrete plan. This was evident both in relation to the VA training project participation and the development project. The project team had little expectations of the program, instead there was more uncertainty towards the outcome of the project. This was because the project was expected to develop new, modern digital solutions to enhance the manufacturing process. These solutions and system integrations were known to have several challenging issues in real life contexts. So, the team expected that the concept creation would require more than was possible to provide during the VA training program and with the available resources. Also, the team pondered how the project would fit in with the busy schedule of each member. This was presented as a lack of motivation at the beginning of the program. Motivation directly affected also to the activity and attendance of the team's individuals. The participation was also affected by other higher priority work. This work was something that the team was required to do, allocating the VA training program to their schedule. UCD theme had some negative aspects as well. Some of the member's expressed that they were familiar with user-centered design, but they were not demonstrating these skills in the development project.

Most of these negative observations changed at the end part of the program. In particular, team members motivation was improved. The team was able to implement validated user information into the work. This made it possible to create more accurate content in the VA training program canvases and the team members could discuss the concept more indepth. The real pains and gains of users were known and that the members could relate to them in the solution creation. This information enabled the team to form a solution that would resolve the requirements of the VA training program and the customer.

7.3 The results of the action research interviews

The interviews were to elaborate the experiences and opinions of the team's own situation, process and needs. The interviews were also meant to show the other stakeholders' points of view related to the context of the development project, the VA program and the client organization's work culture transformation. Most of the stakeholder interview results were implemented for the study's background, and certain sections of it were not analyzed deeply. The project team and their manager's interviews were processed in more detail as they were to produce the research information and results for the study. The process to

analyze the project team and their manager interviews followed the observation research method.

The content analysis was conducted by processing the recorded interviews. The main difference between observation and interview data was the amount of information. The interview data was also more homogenous text content. This amount of data also affected the processing, as it took more time than the structuring of observation data. The recorded interview discussions were simplified after transcribing them. These information pieces were then grouped under certain themes in the affinity diagram. After these groups were reanalyzed, certain sub-themes were formed (FIGURE 38). Like the observation method, the interviews were pre-targeted to gain certain information from the participants, so forming these sub-themes and groups was a straight-forward action.
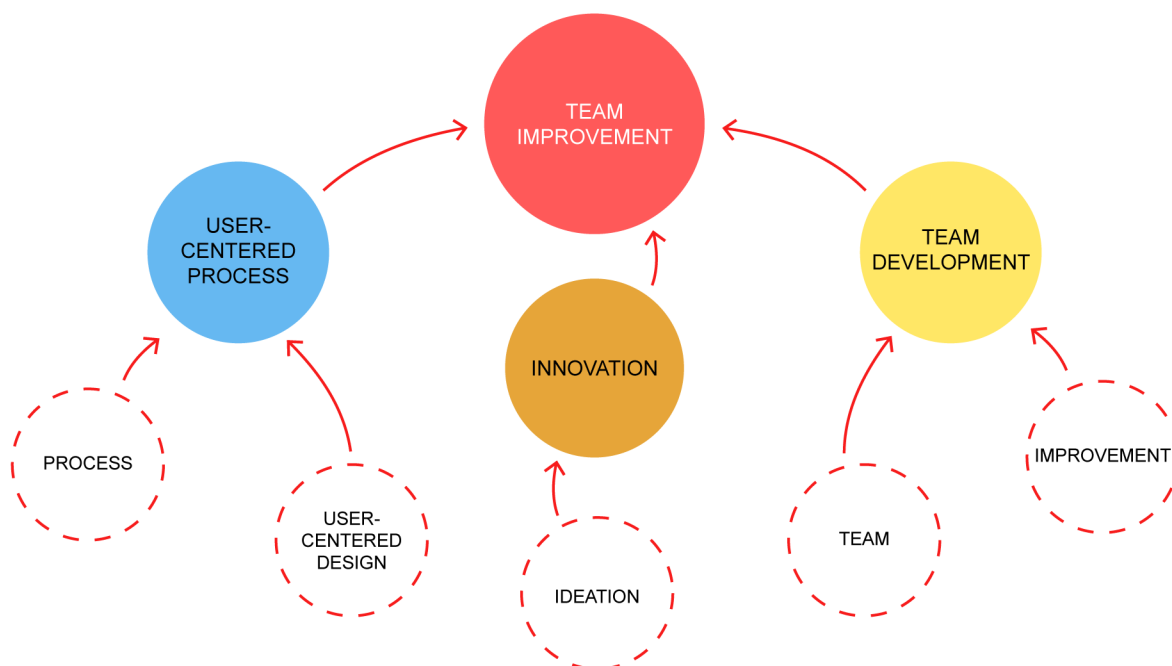
FIGURE 38. Interview affinity diagram (Korpi 2020).

The user-centered design theme related findings were divided by the process and user-centered design groups. The development process related working environment was described as complex. The TID team stated that they work with a huge number of stakeholders and systems and this makes the team's work very challenging. The TID team's collaboration with multiple business units with limited resources was pointed as a negative issue. The UCD approach seemed to lack the proper function to be able to support the

team in the way the team members expected. The collaboration with stakeholders was bi-
ased towards working with customers using the Scrum method. The team also indicated
that they did not implement user research in typical development projects, nor include
user information in the process at any stage unless the customer requirements provided
this information. The UX methods were not implemented and there was no UX role as an
available resource.

The process theme indicated that the TID team also had functions that were focused on
the users and involved them in collaboration with the team. The process topic indicated
that the team has also functions that are focused to the users and involve them to collabo-
rate with the TID team. The process topic indicated that the team has also functions that
are focused to the users and involve them into collaboration with the team. These func-
tions are for example the documentation content development and harmonization and the
internal instructions development. The UCD function has not been incorporated into the
team's development process nor the Scrum method the TID team implements. The TID
team saw that the feedback process is well established in the Scrum method, but other
functions lack the proper way to gather information and respond to it. These other func-
tions were also lacking reflective communication between the team and the stakeholders.
One finding was also that proper user research, usability and accessibility were com-
pletely missing functions within the team's deliverables. Implementing several VA training
program-related tools for improving the process were a good way to practically upscale
the team members' personal capabilities. This improved the capabilities to deliver more
concrete concepts.

The Innovation theme findings were mainly related to the fact that the team was lacking
time and resources to practice developing and innovating new services or similar develop-
ment focused solutions. The team also agreed that they could benefit from incorporating
ideation activity more broadly and thoroughly into their process and work. A typical idea-
tion activity is conducted within the team's own project meeting or in collaboration with the
customer. There are usually no other tools used in the ideation phase than general dis-
cussion or brainstorming.

The team development theme related findings were that the team has lots of different type
of projects that require diverse roles. Project management is one resource that is required
constantly, and the TID team does not have enough available resources for this. Another
topic is that the Scrum method is system and software development focused. Other types
of development projects should be taken into consideration in the same way as the Scrum
method related ones. This is a relevant issue as there exists variance within the process

of the different types of development project deliveries. The team states that there is not imminent lack of resources and they are able to deliver the request fairly well and on time. But they agree that the team's resources are limited and not aligned to the tasks given and the organization size. This usually appears as work overload and vast individual responsibility areas. All the project team members expressed that the VA training program was a great experience and presented new views and opportunities to improve working methods by implementing the tools and process phases into the team's current process. The project team also saw that the mentors and facilitation included in the program really helped to progress the project forward. The TID team's competence is managed through learning required knowledge and skills. Team is very keen to develop both the team's and the members way of working and skills, to be able to operate in the corporation's challenging work environment. Learning is mostly done through personal development plans and learning takes place either by personal effort or through specific courses.

7.4   The results of the document analysis

The available documents were reviewed and coded with several indicators. These results present the quantitative information. This information was gathered in a table as a conclusion of the analysis:

TABLE 1. Document analysis results (Korpi 2020).

CONTEXT	EXISTING DOCUMENTS	FINISHED DOCUMENTS	PARTIALLY FINISHED DOCUMENTS	VALID CONTENT FOR THE PROJECT	PARTIALLY VALID CONTENT FOR THE PROJECT
Development project, 1st round	4	1	3	1	3
Development project, 2nd round	5	4	1	1	3
VA training program, 1st round	8	3	5	2	6
VA training program, 2nd round	8	13	0	13	0

Table 1's header displays the five main topics related to the document analysis. The existing documents column displays the total number of documents available. The finished documents column displays the documents that the team was able to create. The partial documents column displays the number of created documents, which were not completed during the project. The two content columns are divided simply to valid and partially valid content. This split separates the documents that supported the project and its outcome. Other documents were either based on assumed information or were just incomplete. The analysis separated the documents created within the first and second round. The first round presents the documents created before the user research phase in the development project. The second round displays the status of the documents at the end of the VA training program.

In the first round, the materials contained a total of four development project-focused documents. According to the typical development process, the development project would have expected to contain several documents that were not created or were not available for the research. From these, there was only one that would be considered finished and three partially finished at the end of the VA training program. After the second round, there were total of five documents created. Of these five documents, three was considered truly valid for the project and rest of them were partly valid.

As the table indicates, all the VA training program related materials were finished in the end. The VA training program documents also display more documents than expected. This was because the team was able to create four MVPs and two user personas that are included in the total amount of documents. Nearly every VA training program related document or canvas was required to be revisited at the end of the program. This caused a great deal of work but also enabled the final concept document to be based on valid information, instead of incomplete assumptions. The documents that were created during the first round of VA training program contained total of eight documents. Of these eight documents, only three were valid documents. After the second round, the total amount was 13 valid and finished documents.

7.5   The outcome of the development project

The development project followed the VA training programs schedule from start to finish. This specific schedule enabled the finalization of the development project on time. The reason was that the team was working on one thing at a time according to the process. The project's original scope was to improve the manufacturing process from a user-centered perspective. The original scope was adjusted along the way. The team and the customer were able to steer the scope towards a more viable target. The steering was mostly

a result of the user research that the team conducted. The team was able to gain valuable information about the pains and needs of the research. This realigned target was also more appropriate from the team's and the program's perspective. The team focused on describing the first pilot instead of a holistic solution for the customer. This decision proved to be a good as the team would not have time and resources to deliver anything more detailed outcome.

The outcome of the development was expected to be a concept for paperless production. This outcome was composed from the documents created at the end of the program (AP-PENDIX 6.). This concept was presented to the customer and factory representatives. The outcome of the concept was positive in the sense that the planning for prototyping the concept has been started in the factory. This indication alone validates the outcome of the concept as a success.

The outcome of the concept included following topics:

1. Project description
2. Problem discovery
3. Customer development actions
4. Assumptions and hypothesis
5. Initial solution concept
6. Research plan, results and synthesis of the findings
7. User personas, the electrician and the technician
8. User journey maps, the electrician and the technician
9. Solution, the business model
10. Customer value proposition
11. MVPs, four separate experiment plans
12. Pitch presentation

As the concept was the development project's final stage, the pitch presentation was the VA training program's end result. This presentation was required to contain certain aspects from the development project. The project's concept was simplified and adjusted for the pitch presentation. In this way, the team was able to create the final presentation on time for the program's final day's session. The final pitch presentation included the project concept.

7.6   The summary of the analysis

The triangulation of observation, interviewing and document analysis worked very well in this study from the results perspective. The findings can be seen to provide a great deal of

information. The results that could have been interpreted in many ways, could be directed to the real issues. If only certain method was used, the results could have been interpreted incorrectly, and the team's situation and efforts would have been wrongly presented.

Observation results summary

The quantitative results demonstrate that the project team showed an interest in the VA training program and eventually in the project, once the scope and the target were more clear and proper information was available. The team was struggling to work with the development project and deliver it to the customer, when there were higher priority tasks to be done. The outcome was that only a part of the team was able to advance the project with the required dedication. The qualitative results show that the VA training program's process and tools were valuable, and concretely supported the project team's progress with the development project. The team members worked more actively with the tools than without them. The team was also more active during the workshops to discuss the experiences of the VA training program and the possibilities to implement the process and its tools within the TID team's development process. The online meetings were more direct and focused on certain planned operations. The Teams meetings could not generate such deep interaction between the project team, although it would have been beneficial from the project and the trainings perspective. Some members of the project team made no efforts to plan UCD activities, even though they seemed to possess this knowledge and the requirements for certain procedures that the approach contained. The outcome of this was that the planning stage of user research execution did not proceeded as well as it could have.

Interview results summary

The TID team has limited resources and a complex ecosystem that presents great challenges to the team. The team actively maintains their competence as much as possible, despite internal and external requirements. The TID team would like to include more ideation techniques into their development process ideation phase. They do not currently have any particular methods other than general group discussions and brainstorming. Occasionally, these discussions also involve the customer. The project team was not expecting anything specific from the project, but they were positively surprised with the outcome of the project. The TID team does not implement the UCD approach as its own function or process step, although they practice it with certain types of projects. The specific UCD practices, usability and accessibility, are not available functions in the team's processes.

The team manager hopes that the project team will gain positive experience from the training and that the team members will implement this mindset in forthcoming projects.

Document analysis results summary

The team's actions towards the learning to implement the canvases was solidified as the team's ability to improve their work and utilize the tool canvases got better after the user research was conducted and they had validated data to work with. This is also seen in the form of more complete canvases within the concept document. This is supported by the observation results as the attendance and activity leaned towards the VA training program.

Validating the research data

The validity of the gathered data may raise some questions as the observation data gathering method was based on written notes and diary descriptions. The methods were typical in the field of PAR and the method triangulation supported findings from each perspective. The validity of the observation results might still be questioned. These notes and descriptions were usually based on recalled incidents of each workshop and on the researcher's meeting notes on other sessions. The workshop observation was written down directly after each workshop, which also included the material produced within the session. Still the data reliability can be an issue each time the research data is gathered by other means than recording the research subjects and their activities in an audio or visual way.

The conducted note taking procedure proved to be suitable as the actual sessions lasted, typically, around three hours. Over half of this time went to the visiting founder's presentation, briefing of the current session's assignment, the definition of the session's goals and to the review moment of the visiting mentor. So, the observation was focused on the time when the project team actually worked on the current assignment. This part usually lasted from half an hour to one and a half hours. Recalling the approximately one hour's occurrences and the activities of the team was not that cumbersome, and some comments could even be written down each time, directly after each session.

As a benefit of written notes, this method saved some time as there was no need to transcribe the recorded data separately. As a result of this, the notes were already in such a simplified form that it reduced the workload. Of course, managing the data collection by hand, does not ever enable capturing all the available behavior, emotions and interactions of the participants. The observation requires clear objectivity towards the research subjects. This inevitably affects the PAR method, as either the collaboration between the

researcher and the project team, or the observation will suffer from the lack of focus. One person cannot do both tasks and be fully concentrating at the same time, and this will affect the outcome of each task.

From the AR approach point of view, the missing systematic reflection is seen as critical. The original plan was to gather the thoughts of each project team member after the session, which was not successfully executed at every occasion. The typical situation was that the project team had such a tight schedule that each member had to move straight to their next meeting and the feedback discussion could not be held as planned. This was the case usually, despite a couple times, when the researcher was able to arrange some open feedback discussion with the project team. The lack of systematic conversations was replaced with the discussions executed during the work, and in the meetings related to the importance of certain tools and process steps. These internal discussions during the observation, are the successfully executed reflections as the results will be included in the final proposal for the TID team.

Reliability of the research

According to Kananen (2014, 126-127) in an AR approach, the only metric for measuring the study reliability would be the resulting concrete change or improvement. Within this study's frame, the results related to the changes will not be available in concrete form where the researcher would be able to demonstrate the TID team's way of working within this study. This thesis focuses only on presenting the possible ways to improve the TID team's way of working. But the project team's progress is more valid against the requirement of present concrete change. At first, team was struggling to deliver the expected concept, but after the VA training program the project team was able to deliver, and the team's members felt more confident about repeating similar projects in the future. The possible change in the context of this study and the TID team will continue afterwards according to the TID team's own actions and possible implementation of the presented proposal.

Another angle to measure the change regarding the project team and the VA training program more deeply, would be an evaluation of the outcome of the second cycle of AR. If another round of observation and collaboration with the team would present clear improvements within the project team against the first round, the study would be considered successful and the research reliable. This would then be considered as a more reliable way to validate the development research application towards the transformation.

TID team's improvement proposal

The final step of this thesis is to create the improvement proposal for the TID team (AP-PENDIX 7). The proposal is based on the study's findings and the framework. The development study has presented certain positive findings regarding the work culture change. This will support the validity of the proposal as well. These findings will be presented as design drivers that point out the optional actions for the team to perform. The team can then refine and implement this proposal as they see fit.

8   CONCLUSIONS

The client organization's internal transformation efforts, the startup collaboration and the TID team development formed an interesting combination. This context and the participants a created new and interesting mix for the foundation of the development study. The successful improvement proposal for the TID team required a broad investigation of different methods that were involved in the context of this study and the VA training program. This investigation was required as there were many unfamiliar and underlying methods that affected the context. The practical change that the AR approach is expected to provide also supported the inclusion of the human-focused, technology-focused and business-focused themes, and the processes that were connected to them. As the researcher was not part of the TID team and their daily practices were not clear to the researcher, it was important to understand the team's current way of working and process model for the sake of the proposal. For these reasons, the learning, and especially the agile learning, that was involved in this study and the VA program, were an important part of the team's own development. The VA program demonstrated this clearly and the study supports the outcome. The improvement proposal offered next goals for the TID team to continue this way of learning by doing and experimenting.

While the topic and the scope of the thesis were rather clear to the researcher, the issues related to practical methods were quite the opposite. In the beginning, the situation required to define and structure the study along the development project, as there was no time to concretely outline the study and ponder all related aspects beforehand. The main objective of this development study planned find out if the VA training program would have a beneficial impact on increasing the project team members acceleration ability and on improving their innovation and user-centered way of working. The content of this study was focused on understanding these themes and enabling the delivery of the development proposal based on validated findings.

The empirical research phase focused on the observation, interviewing and analysis of different activities and feedback related to VA training program. In this phase, the PAR approach presented an efficient method to explore the status and maturity of the project team's UCD approach and its way of working, by participating in the activities of the team. The research phase was efficient, as the observations directly indicated the project team's current situation which the interviews confirmed. The implemented document analysis helped to validate the raised assumptions within the observation sessions. The outcome was created by reflecting on these experiences and findings, by evaluating and analyzing them from the project team's point of view. The PAR approaches main benefit was to gain

the team's perspective through participation. The PAR approach helped to lay the path to the improvement of the TID team through the study, but foremost with the help of the team's experiences and responses that surfaced within the collaboration. If the study was conducted as external consultation, the analysis would have focused more on certain outputs, and the overall result would not have been as valuable. To evaluate how well the study was executed, the outcome should be reflected on against the research question.

The research question was as follows: "How might the TID team improve their way of working in development projects, towards a more customer, and user-centered and innovative working culture?" It is both easy and difficult to answer this question. The practical answer to the question would be that the acceleration did improve the project team's work, which indirectly improved the TID team's way of working as well. The implementation of the VA process and tools, together with the findings of user research, supported the creation of a successful outcome. The challenge to measure the TID team's ability to improve their way of working is related to the VA training program's impact. As this study's scope is only the first AR cycle, the concrete results will be seen after the possible next VA training program process-based project. The second round would show if the learning has enhanced the project team's abilities and whether the project team could produce another successful outcome. This study also suggests that the second cycle could be done after the improvement proposal has been incorporated into the TID team's daily work. The results would then enable reviewing the gained benefits against the first cycle of the PAR. In both cases, the validation would be visible in the form of more efficient utilization of the tools, less time spend on understanding the problem and creating the solution. In addition, forming a suitable solution for a certain market might be faster as the team should now embrace the customers and the users more deeply from the beginning.

According to Mansoori (2016, 19) experiential processes of the single-loop and double-loop learning theory enables the entrepreneurs to become aware of the consequences of their actions, and they could adjust their action strategies based on the outcome of the experiments. This study found that the TID team's knowledge and attitude to a user-centered approach varies. Based on these notes, and according to the single and double-loop learning model, the TID team requires both the support to embrace new methods and more practical guidelines to be able to integrate the user-centered approach into their process. The incorporation of only certain tools into the team's process, is not really a solution in this context.

The TID team has been implementing a user-centered approach in certain functions and cases. However, the holistic implementation still requires more action from them. In this

sense the study's findings are significant to the TID team. A practical proposal will help the TID team to take the next steps to begin incorporating the additional UCD functions. The more detailed answer to the research questions is presented in the form of the improvement proposal. The next step is up to the TID team itself, to decide whether the improvement will be targeted to the single-loop or to the double-loop learning actions. This requires deciding if the adjustments are directed towards improving the governing values, process and roles as the root cause to facilitate greater transformation, or to focus on implementing simpler actions. Learning actions would be framed by the tools, the individual skillsets and the findings during the case project to persevere with the requirements and expectations.

From the researcher's point of view the study presented acknowledgeable challenges related to the AR methodology and UCD approach. To implement these approaches in an VA training program-like environment and at the same time participate in an ongoing project proved to be an effort that required a lot of concentration and time. Eventually, as each phase of the study was concluded as planned, all the set expectations and goals were met. When the various phases, methods applied, and the obtained results are combined, it can be stated that this study was an extremely valuable learning experience. The gained knowledge will be beneficial in forthcoming projects, where a UCD approach is required.

The venture acceleration program

The client organization's role in collaborating with Maria 01 to pilot the VA training program, along with the company's strategy, was a main enabler for this thesis to exist in the first place. The program was established to overcome the fact that the organization has identified a requirement that challenges it to transform its development work culture. The development work has been relying too much on what is technically possible, rather than on how to innovate a commercially suitable solution to an identified customer's problem.

The research question regarding the VA training program was: "How might the Venture Accelerator program help the project team to embrace the presented methods?" Despite a certain process model and agenda, the actual scope of the VA training program was not clear to the project team, in the sense that they could not have accurately anticipated the necessary and expected stages. This led to a situation where the project team was unprepared to participate in the program. Due to this uncertainty, the project team seemed, at the start, to have lack of commitment to learning the process and techniques involved in the project. This was evident, as the development project was not highly prioritized on their agenda, and the project was seen as an experiment related to the VA training

program. While there were challenges in the beginning, the project team really felt that the tools and process were useful and helped them to advance the work accordingly to the finishing line.

As the study presents, the whole VA program agenda is important to the participants, but the schedule is not directly applicable to handle all projects and situations. This is especially true if teams manage the project together, as their main priorities can affect the motivation and participation, like in this study. To improve this, the program participants should have a more strictly framed scope and product plan. The schedule should be revised to enable the whole agenda. The program should consider that it is mandatory to conduct the customer and user research, or that completing this research could be a requirement before the participants join the accelerator training. The whole VA program process could be done with facilitation and coaching within the scope of the initial agenda. This would require the proper customer or user research, and its results being available right at the beginning of the program. The actual canvas-based workflow enables fast, end-to-end progress. If the team members are familiar with the canvases and experienced with the program, there is no unnecessary breaks while participating the project acceleration.

Based on the study's results, it seems that multi-disciplinary teams benefit from facilitation or coaching. This is the case, especially when the direction of the project is not clear, or teams lack the knowledge to progress a certain type of research or experiments. According to Mansoori (2016, 21) entrepreneurs could benefit from the acceleration program and instructions and they changed their theories-in-use based on this. This supports the VA training program's existence as a facilitator and hub, where mentors and project teams collaborate and overcome the change barriers. The collaboration environment might have an impact on the progress of the development work as well, if one compares activity in the facilitator's premises to the team's own office space through the results of this study. According to this, the atmosphere and environment might have affected the project team members, as they performed more actively in the workshops that were located outside their own office than in other situations.

Just as the strategy is important as an enabler of the startup's founder's vision, it is equally important for a development project and for an organization as well. Those working on development projects should outline the ultimate vision for the project and then create a strategy that implements that vision. By testing this strategy, a development project can be steered towards a vision by learning from experiments. Björkman (2018) says that organizations, teams or an individual's interpretation of an experience will change their behavior accordingly and determine their future actions. The positive experiences encourage

a return experience the event or service again and a negative experience will most likely do the opposite. Based on this argument, the focus of the learning should be where organizations, teams and individuals can achieve positive experiences that strengthen their knowledge the most.

This thesis-related development project's successful outcome supports the important knowledge and experience that was gained from piloting the VA training program. To also support the organization's strategy and the transformation, it would be beneficial that the different managers from different levels within the organization participate in the VA training program. Then they would gain a better understanding of the needs, requirements and opportunities of the acceleration process regarding the whole organization.

The TID team's improvement

The TID team is very self-guided and open to improving their way of working. The participation to the personnel training-focused VA program supports this well. The team is implementing an agile Scrum method and they collaborate with customers. This collaboration usually takes place within the development definition phase. The research question regarding the project team was as follows: "Can the project team's learning of implementing UCD approach be validated by AR methodology?" After the process described in this thesis, the TID team identifies certain user-centric features in the functions and shortcomings of its own operations. However, for the most part, the holistic user-centric mindset is still missing. An important part of a user-centric approach is to both consider and incorporate customer and user roles, needs, and requirements. In doing so, the user or customer-centric way of doing things can truly be discussed.

Based on the observations and interviews, it can be stated that the challenges of the TID team are not so much in a lack of customer focus but on not being able to fully execute this in practice. This manifests itself by disregarding the needs of the end user and the absence of user research function. This is also reflected in the system-driven process where assignments are very technology-focused, and decisions are not based on valid user data. AR presented a good view for the researcher to see and experience the team's way of working. This also helped to see the team's efforts towards the UCD approach. The UCD approach-related disciplines, like UX, states that it is important to separate the difference between what the subjects say and what they do. In this sense the validation of the AR method's usefulness is true, as the participants were themselves acting against their own expectations of UCD. However, they were also convinced of its significance through the results of the development project. The researcher is now more informed about the situation and can propose certain improvements based on the findings.

Mansoori (2016, 20) describes Lean Startup's main pillar as the understanding and learn-ing of the customer. This proved to be a very important strategy to improve internal and external communication, by frequently interacting with customers and evaluating findings with team members. Also, the continuous interaction with the customers and reacting to the established findings, enabled the team to tailor their solution to the customer needs.

The TID team could benefit from more thorough utilization of user-centered methodology by gaining practically from the user research insight and empathy. The process rarely in-volves the end user directly or contains any visible forms of user experience design func-tions. This can be seen through the current process description, even though it is a simpli-fied model. In this light, the project team's experiences from the VA training program and the end results of the development project, present a clear opportunity to upscale their work and project outcomes. This upscaling can be achieved by learning more about the presented practices and by implementing those practices to their project work activities. Incorporating these elements into the TID team's work is seen as the study's solution sug-gestion from the team's perspective.

The use-driven focus was more significantly present in the end results than was respond-ing only to the customer needs. This can be seen also in the case of the development pro-ject, the concept. The shift from customer focus to user focus is not just a matter for the TID team, but for the entire organization, who should consider the benefits achieved against the costs involved. The involving costs must also be seen as something other than an expense item, or just staring at the ROI meter, as they do not produce a real picture of the situation. This can be seen with the innovation accounting function of the Lean Startup method, which seeks to demonstrate the experiments are not successfully measured with typical economic indicators.

One solution, for implementing the user-centered and innovation-oriented approach into the TID team's process, would be exploring the available methods that contain these fea-tures. For example, the Lean design thinking, Lean UX, and Google's design sprint meth-ods enable agile teams to incorporate the UX into their daily work.

Mueller and Thoring (2012) describe the Lean design thinking as a synthesis of Lean Startup method and the design thinking approach. The combination of these two methods combine the important part of each method into one hybrid method. This method is meant to provide a process that implements the best practices of both methods to deliver a more user-centered and innovation-oriented solution.

Gothelf and Seiden (2016, 7) describe the Lean UX as design thinking, agile methodol-ogy, and Lean Startup-based framework focused on governing the design process, team

culture and team organization. The application of Lean UX to the TID team's Scrum method and its model for user research, feedback and user involvement alongside the customer, can alone be seen as a great opportunity for a more user-oriented outcome of such solutions. This would be expected to have an important impact on TID team operations and on their operations across the organization.

Knapp et al. (2016, 9) describes the Google's design sprint as a five-day process that focus on ideation, prototyping and testing assumptions with customers. The outcome of the sprint is knowledge that benefits the participants and enables them to build the optimal solution based on the findings. Implementing this way of ideation and testing of prototype would be a concrete addition to the TID team's process.

The adoption of the UCD mindset is supported by the presented and implemented methods of this study and within the development project case. These methods present practical solutions to scale up the TID team's capability to understand and deliver customer-centric solutions to problems. The methods support the TID team's operations and provide procedures to manage their challenges with ways to apply them into their way of working. The methods also support establishing opportunities to innovate and to create new solutions for the customers, and for the organization. Process improvement is one specific way to solve certain challenges together with personal skill and competence improvement.

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APPENDICES

APPENDIX 1: The interviews

APPENDIX 2: The team member's interview structure

APPENDIX 3: The facilitator's interview structure

APPENDIX 4: The startup coordinator's interview structure

APPENDIX 5: The team manager's interview structure

APPENDIX 6: The paperless production concept (Confidential)

APPENDIX 7: The technical information development team improvement proposal (Confidential)

APPENDIX 1: THE INTERVIEWS

The interview of the concept owner on 9.3.2020.

The interview of the chief information architect / product owner on 9.3.2020.

The interview of the global information architect / process owner on 13.3.2020.

The interview of the TID team manager on 9.4.2020.

The interview of the client organization's startup coordinator on 16.4.2020.

The interview of the CEO / facilitator of Maria 01 on 29.4.2020.

APPENDIX 2: THE TEAM MEMBER'S INTERVIEW STRUCTURE

The interview questions for the project team members:

1. Briefly describe your role, mission and your unit in the company?
2. Describe your team at a general level.
3. How often are you involved in development projects implemented by the team?
4. What experiences do you have of your role in development projects?
5. Describe your team's typical process in development projects, at general level.
6. Describe what methods or tools your team uses in project work, at general level.
7. Is there something in your current way or in the way the team works on development projects that you would like to highlight?
8. How does the team discuss the topic, solutions and methods of a development project?
9. How does the team give feedback on development projects?
10. What kind of competence development do you feel your tasks, organization or customers require?
11. How do you feel you can develop your own skills and work process by yourself?
12. How do you learn new things in a team?
13. How do you feel the team's expertise and resources match the requirements?
14. How should competence development be enabled in the organization, in the team?
15. How do you feel your team will be able to perform the tasks assigned to it?
16. How do you feel the role of a supervisor best supports the work of your team?
17. How does the team ensure that everyone has the opportunity to influence choices or work outcomes, other than through their own role?
18. How does a person's appreciation manifest itself in a team?
19. Does your team do surveys or concepts for other units or organizations?
20. Are your team's customers always familiar or the same to you, or are there new ones?
21. What kind of ideation methods does your team apply in development projects?
22. Are there any situations or a clear need for ideation?
23. How does your team become familiar with understanding the roles and operating environment of the user or customer?
24. Does your team implement user personas in development projects?
25. How are customers or users involved in the development process?
26. How are usability and accessibility measured in development projects?
27. How do you see the briefing of the development project was conducted?

28. What were your expectations for the development project?
29. Describe your role in this development project.
30. What were your expectations for the Venture Accelerator program?
31. Describe how you experienced the development project within the framework of the program.
32. Describe your own experiences of working under facilitated method.
33. What would you change in the way the team was working with the development project?
34. What would you not change?
35. Several tool canvases were applied in the program. Which of them did you find useful for the project?
36. What other content or activities in the program did you find important to the project?
37. How did you feel the presence or participation of other teams affected the project, and your own work?
38. How did you feel that Maria 01 facilitation influenced working on the project? How about the outcome of the project?
39. Would you like to participate again in the implementation of such a guided project?
40. Do you want to give feedback on the interview and topics?

APPENDIX 3: THE FACILITATOR'S INTERVIEW STRUCTURE

The interview questions for the Maria 01 facilitator, CEO:

1. How do you describe your role in Maria 01 and Venture Accelerator?
2. What is the Venture Accelerator program?
3. Why should a big company participate in this kind of acceleration program?
4. Are there any restrictions on the program in terms of target groups or projects?
5. The world has similar startup accelerator activities, so is Maria 01's activity typical in this sense or do you have any special features?
6. What are the goals and motives of Maria 01 for accelerating business development projects?
7. How were the tools / methods selected for this program?
8. What role did the visiting tutors play in the program?
9. Is a similar program, guidance or facilitation implemented for the actual startup companies?

APPENDIX 4: THE STARTUP COORDINATOR'S INTERVIEW STRUCTURE

The interview questions for the startup coordinator responsible for new business development and startup collaboration:

1. What is your role at the company?
2. How would you describe the work culture within the company, especially in relation to development projects?
3. How would you change the work culture in relation to development projects?
4. Why does the company need to be agile, innovative and customer-focused?
5. Does customer-centricity need more attention within the company?
6. What is the role of innovation in the company?
7. How was the venture accelerator program born and why you decided to collaborate with Maria 01?
8. Were there any specific requirements set for the teams or projects participating the program?
9. What do you wish the development teams will embrace from the startup culture or Venture Accelerator program?
10. Is there anything that you would like to mention, in addition to what was asked?

APPENDIX 5: THE TEAM MANAGER'S INTERVIEW STRUCTURE

The interview questions for the manager of the TID team:

1. What is your role at the company?
2. What is the role and mission of your team?
3. Briefly describe typical development projects for your team.
4. How do development projects usually originate?
5. How are they briefed to the team?
6. How are people chosen for specific roles in the project?
7. Does your team have a particular way of working on development projects?
8. Is the team's way of working with development projects suitable for requirements or are there some typical challenges?
9. Does your team have the required resources to operate the way you want it to?
10. What role does innovation play in your team?
11. Do you think that your team implements enough ideation methods to perceive and solve problems?
12. How do you think user-centricity is implemented in your projects?
13. How does the team gives and receives feedback?
14. How can team members influence team operations and applied methods?
15. How are the team's skills developed?
16. How do you measure the team's or project related success?
17. What expectations did you have for piloting the Venture Accelerator program?
18. What is your experience of team performance in this project?
19. Do you wish your team to adopt some habits or patterns from the program?