THE ROLE OF SERVICE DESIGN AND COLLABORATIVE LEARNING SUPPORTING THE CUSTOMIZATION OF DESIGN WORKSHOPS FOR CHILDREN

In an AI design sprint use case
Master thesis in Service System Design
May 2020

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Process Report

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SERVICE SYSTEM DESIGN

Aalborg University Copenhagen
Master thesis

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ABSTRACT

This thesis examines how service design and collaborative learning theories can be used to support the customization of the AI Design sprint workshop to be targeted for children. The current AI design sprint is developed by the design agency 33A and will be used as a case to explore the concept of AI design sprint workshops for children. The thesis has been conducted in collaboration with 33A taking place from February to May 2020.

The main purpose of the current workshop is to support companies that collaboratively would like to use new methods to transform towards AI. The aim of 33A in developing this workshop is to make AI accessible for people and businesses and under this aim, they saw the opportunity to expand their service to new markets where they see education being a huge potential.

The focus of this case is the service offering The AI design sprint as we categorize as the AI design sprint workshop. The service offering is organized by a facilitator across a sequence of touchpoints, where the facilitator being the service provider 33A, interacts with the customers (users). By conducting a service design process, we have explored the user journey of an AI design sprint workshop primarily using qualitative methods, collaborative learning theory, and service design tools. A user journey map is used, as the primary tool, to provide insights into the users' experience, collaboration needs, and motivation through the journey.

The case is concluded with a service concept building on the existing AI design sprint workshop. We are proposing additional steps and touchpoints to the current user journey as well as elements from collaborative learning theory with a focus on customization and collaboration. The customization concept is based on relevant findings and development conducted through our design process. Here we identified that the participants being children are challenged in collaboration leading to challenges in group work where the aim is to solve problems using AI. The focus is, therefore, on the outcome by guiding and instructing the children in the AI design sprint process the work and in general, improving the collaborative learning and overall experience working solving problems and developing solutions using AI technologies.

The user journey from the customization concept was tested with 33A in May 2020 during a remote online AI design sprint workshop for children. The service proposal was then delivered as a product report presenting how the touchpoints can be integrated into the existing service journey and what value it could provide both for the users and the service provider. Furthermore, based on the use case, this thesis will reflect and discuss the service design process and how our findings can be relevant.

Keywords: Service Design, User journey, Collaborative learning, children, education and design workshops

ACKNOWLEDGEMENTS

Firstly, we want to give our appreciation and special thanks to our collaborators through this process Mike Brandt and Jonas Wenke from the use case company 33A for making it possible to work closely and the opportunity to engage with them and their clients. Through this process, they have provided us with support, guidance and expert knowledge in the real world of AI Design sprint workshops and business development.

Furthermore, a huge acknowledgement and thanks to Luca Simeone, goes to our official supervisor at Aalborg University, who provided consistent and valuable advice throughout the thesis process.

Thanks to all the children (students), experts and other knowledgeable people who engaged in the process, interviews and participation in the AI Sprint, contributing with their trust, and providing us with insights, reflections, and ideas. The people mentioned above have made it possible for us to shape this thesis throughout and finally give our contribution to the field of Service Design. We are grateful for all of them being involved throughout and it would not have been possible without them.

Finally, a huge thank you to our fellow service design students, for being helpful and critical, our families for being major support and friends, for moral support whom we look forward to seeing you again soon after the Corona lock downtimes we are in now.

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TERMINOLOGY

Definitions

AI design sprint: Collaborative design workshop where participants work together and go through a design process to find solutions to wicked problems.

33A: Jonas Wenke and Mike Brand co-founder of the company and the service provider, an expert on the AI design sprint. They have the role facilitator during the workshop and they are part of testing the final service proposal.

Participants: Term used in the thesis that describes the role of the children that will participate in the AI design sprint workshop

Artificial intelligence concept solution: Ideas created from children based on Artificial intelligence cards that 33A offers to create solutions. These cards show the capabilities of Artificial intelligence, robot capabilities and emerging technology capabilities.

Early adaptor: Early adopters are the first customers to adopt a new product or technology before the majority of the population does. They're often called "lighthouse customers" because they serve as a beacon of light for the rest of the population to follow, which will take the technology or product mainstream.

Late majority: Late majority refers to the second to last segment of a population to adopt innovative technology. The adoption of innovative products can be broken into five primary segments: innovators (the first to adopt), early adopters, early majority, late majority and laggards.

Udskolingen: Secondary schools (Students from; 7, 8th & 9th grade) just about to start high school.

Acronyms

AI: Artificial Intelligence

Edtech: Education and technology

LEARNING OBJECTIVES

Official Learning objectives

During the master's program of Service Systems Design at Aalborg University Copenhagen, we as students have acquired subject-relevant learning competencies, skills, and knowledge through lectures, group projects, and lastly our internship. The following section presents the official learning objectives outlined by Aalborg University (AAU) as well as our learning objectives in the thesis group.

According to the curriculum of the master program of Service Systems Design (2017) (Aalborg University, 2017), students who complete the module will obtain the following qualifications:

Knowledge
Students who complete the module will obtain the following qualifications:

- Must have knowledge about the possibilities to apply appropriate methodological approaches to specific study areas.
- Must have knowledge about design theories and methods that focus on the design of advanced and complex product-service systems.

Skills
Students who complete the module will obtain the following qualifications:

- Must be able to work independently, to identify major problem areas (analysis) and adequately address problems and opportunities (synthesis).
- Must demonstrate the capability of analysing, designing and representing innovative solutions.
- Must demonstrate the ability to evaluate and address (synthesis) major organizational and business issues emerging in the design of a product-service system.

Competences
Students who complete the module will obtain the following qualifications:

- Must be able to master design and development work in situations that are complex, unpredictable and require new solutions (synthesis).
- Must be able to independently initiate and implement discipline-specific and interdisciplinary cooperation and assume professional responsibility (synthesis).
- Must have the capability to independently take responsibility for their own professional development and specialization (synthesis).

Personal Learning objectives
According to our shares motivation our learning objectives are defined as:

- Gain an understanding and experience in how service design can be utilized within collaboration with a company.
- Learn from the process of collaborating with stakeholders from different professional backgrounds and via this synthesize insights to create value in the service context.
- Utilizing different analysis tools for the user journey .
- Customization of the entire user journey for the specific users (target group).
- Learn more about Collaborative Design sprints and how they can be applied in practice.
- Learn how to design a service that contributes positively to the needs of the users and the service provider.

Throughout the process of writing our thesis, we will aim to explore and implement the above-outlined learning objectives, which throughout the design process will be evaluated and reflected upon between us. We will use the thesis project

to extend our skills and confidence within the field of Service design and hopefully with the outcome of the service proposed also strengthen our confidence and position as future service designers.

Other personal goals with the thesis (e.g. concerning how to face complex challenges):

- Be punctual with the deadlines.
- Group work and deal with dynamics within the group.
- Learn about workshop facilitation and collaborative learning in children.

The success of the kernel of the thesis is not only measured in terms of the right outcomes or level of success the designed service can provide for the company but is mainly based upon the experience of both the "good" and the "bad" we stumble upon in the process. This is also in regards to the interpersonal relationships between group members which means that we see the challenges in the project and the problem based learning as part of the thesis journey. In business in the future we as designers can expect to be challenged and are facing challenges through the experience of writing our thesis will only prepare us for future jobs.

STRUCTURE OF THE THESIS

The structure of the chapter within the thesis will be as follows.

Chapter 1
INTRODUCTION
In this chapter, we will briefly explain the overview of the project, the motivation to use service design and collaborative learning as a theoretical approach as well as the limitations presented in our process.

Chapter 2
PROJECT CONTEXT
This chapter presents the background of the thesis for the use case we are working with, introducing 33A and their offerings. Furthermore, we will talk about what is the intention of the company for the future to conclude with our problem statement of the project.

Chapter 3
LITERATURE REVIEW
This chapter includes the theoretical foundation of the thesis. The three main concepts presented are service design, the workshop that represents the AI design sprint and collaborative learning. This will be the core concepts described in the chapter and it will conclude the chapter with our research question that we will explore in the thesis project.

Chapter 4
METHODOLOGY
In this chapter, we will describe our methodological approach and the framework that we will use during the thesis. The chapters that follow this will be related to the methodology used to conduct the project process.

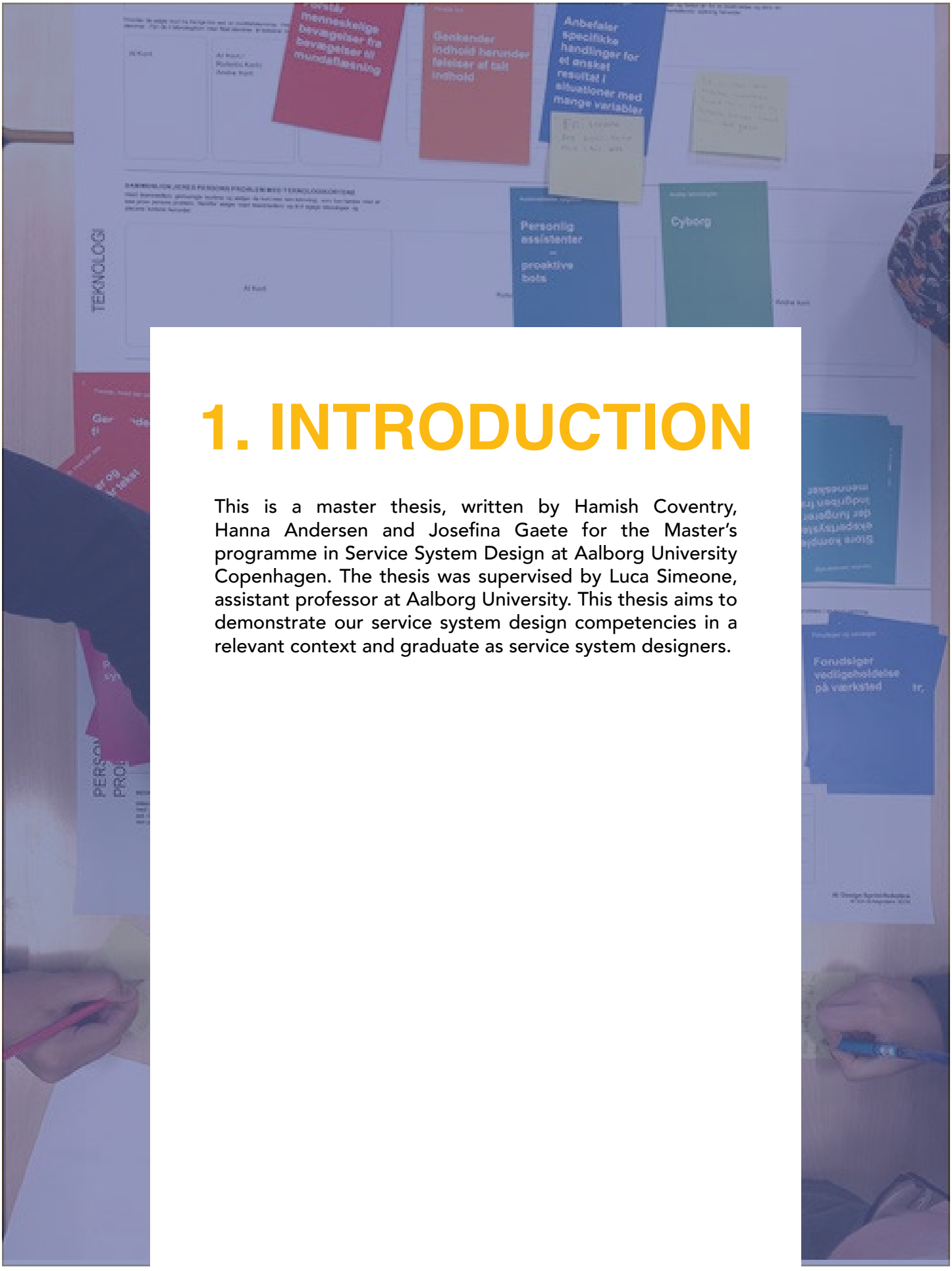
Chapter 5
DISCOVER
We will present and explain our exploration of the field around our project and the information we gather for identifying pain points and initial insight into the project.

Chapter 6
DISCOVER
We present the visualization of the information gathered and at the end present the direction we will take during the ideation phase.

Chapter 7
DEVELOP
This chapter describes how after processing the data collected, we created the first idea.

Chapter 8
DELIVER
This chapter describes how after an iterative process of testing we used the data collected to create a service concept.

Chapter 9 and 10
REFLECTION AND DISCUSSION.
This chapter presents the reflection and discussion of our design process, research question, and the learning objectives during the process. Also, we will finish with the conclusions of the thesis and future suggestions.



1. INTRODUCTION

This is a master thesis, written by Hamish Coventry, Hanna Andersen and Josefina Gaete for the Master's programme in Service System Design at Aalborg University Copenhagen. The thesis was supervised by Luca Simeone, assistant professor at Aalborg University. This thesis aims to demonstrate our service system design competencies in a relevant context and graduate as service system designers.

1.1 INTRODUCTION

It is known that the use of technology in society is growing rapidly and the need for social interaction skills within groups has increased during the wave of digitalization (Talvio et al., 2016). Advances in technology and changes in organizational infrastructures put an increased focus on developing learning skills required for the 21st Century.

This new reality of the digital age and emerging job markets as well as these new approaches, has therefore also affected the scope of future learning among children and in society. Traditionally education prepared children to work in the Industrial Age, but nowadays economies are moving towards the knowledge age (Fadel & Trilling, 2009) which requires new ways to learn the skills of the 21st Century. These changes are in demand of "creative problem solvers" who can be imaginative, collaborative and confident professionals able to solve so-called wicked problems of the 21st century. A wicked problem is a term used to describe problems that are difficult to solve because they have layers of complexity because the problems are constantly changing, and there are various interests related to them. This means that businesses and education (teachers) need to adapt to solve these future wicked problems by implementing new teaching methods and subjects preparing for the 21st Century.

This thesis project is based on the use case of the AI design sprint workshop, provided by 33A, aiming first and foremost to support companies in their transformation towards using Artificial Intelligence (AI) as part of their services (33A, 2020). The AI design sprint is inspired from the well-known Google design sprint developed by Jake Knapp which is a five-day process where business teams answer critical business questions and engage in wicked problem solving using Design thinking elements through; design, prototyping, and testing ideas with customers. (Knapp, Zeratsky, & Kowtz, 2016). Design thinking encourages open-mindedness, curiosity and collaboration and the elements can be used as a way to collaborate (Stickdorn & Schneider, 2014). This approach is valuable since participants without any prior knowledge with AI can engage with design thinking to work towards a common goal and in business, the approach has become popular as a way to stay competitive and develop innovative solutions in this new digital age. The AI Design sprint was created based on the hypothesis that their service with the use of design methods and their trademarked AI cards would make AI more accessible, and an approach to explore new business models, collaborations, and innovative products and services (33A, 2020).

The main lacking skills that 21st-century skills look to fulfil are related to oral and written communication, critical thinking and problem solving, professionalism and work ethic, teamwork and collaboration, working in diverse teams, applying technology and leadership and project management (Ananiadou & Claro, 2009). Due to the outlined, the Ministry of education in Denmark implemented a trial subject- Technology comprehension class as well as looking for new teaching platforms, and methods of teaching aiming to bring pedagogies and design-based learning in to play to teach children to solve future problems in collaboration.

``...It is the appropriate time to bring design methods and pedagogies into mainstream education to help lay a sound base for the development of innovative, problem solvers who will have the needed skills for the 21st century and beyond .... ´´ (Noel & Liu, 2017, p. 2)

Under this context, we see value in exploring the AI design sprint, as a possibility to contribute to implementing new methods contributing to the 21st-century skills (Ananiadou & Claro, 2009). The new skills that are required in students due to social changes in the unknown future. The focus in our use case is, how we with the use of service design and Collaborative learning can provide customization of the current AI design sprint for children, by using and improving collaborative learning so children can learn how to implement AI in problem-solving.

The thesis begins with an introduction to the project context and by defining different design methods implemented in an educational context and then defining collaborative learning within the new era of technology in the 21st-century skills which are the future of the learning environment. Furthermore, hopefully, enhance the opportunity to make AI design sprints accessible to children outside of a traditional classroom setting

1.2 MOTIVATION TO USE SERVICE DESIGN AS AN APPROACH

Businesses can use service design both to improve existing services and to develop new value propositions (Stickdorn et al., 2018). Service design can be particularly relevant in our use case since service design takes a holistic human-centred approach and offers methods for first identifying the problem space, by including relevant stakeholder needs, followed by identifying a solution space, in an iterative process. This thesis is a continuation of the prior experience of two members of the thesis project team; Service design students Josefina Gaete and Hanna Andersen who have worked as interns at 33A in the fall of 2019. During the internship, they worked with the co-founders, Mike Brandt and Jonas Wenke. The main task during the internship was to kick start their process of developing their current AI design sprint to be potentially used for educational intent. Based on co-creation sessions with children, the AI Card deck was redesigned to make them more engaging and easier to comprehend for children. At the end of the internship process, we reflected on the experience and together with the business owners discussed the potential for customizing the entire user journey, tools and methods used throughout to ease the process for children and facilitators. This was the key that inspired us to use the AI design sprint as a use case for our thesis project.

The use case "The AI design sprint", opens up a window of opportunities. By using service design to customize the service, we believe that we as service designers can improve the touchpoints along the service user journey, so that children can have a smooth experience when collaborating, solving problems and reflecting on their process and actions related to AI throughout. Service design will make designing of the customer journey possible by visualizing the customers (users) movement **before** engaging with the service, the customer's beginning relationship with the service, what happens **during** the service and how the customer experience is **after** using a service (Reason et al., 2015).

As mentioned previously the focus of this thesis is the AI Design Sprint organized by 33A. From the business owners'' own description as well as from our preliminary work conducted in the internship, we found that the AI design sprint could be categorized as a Design workshop done in collaboration. We will therefore forwardly refer

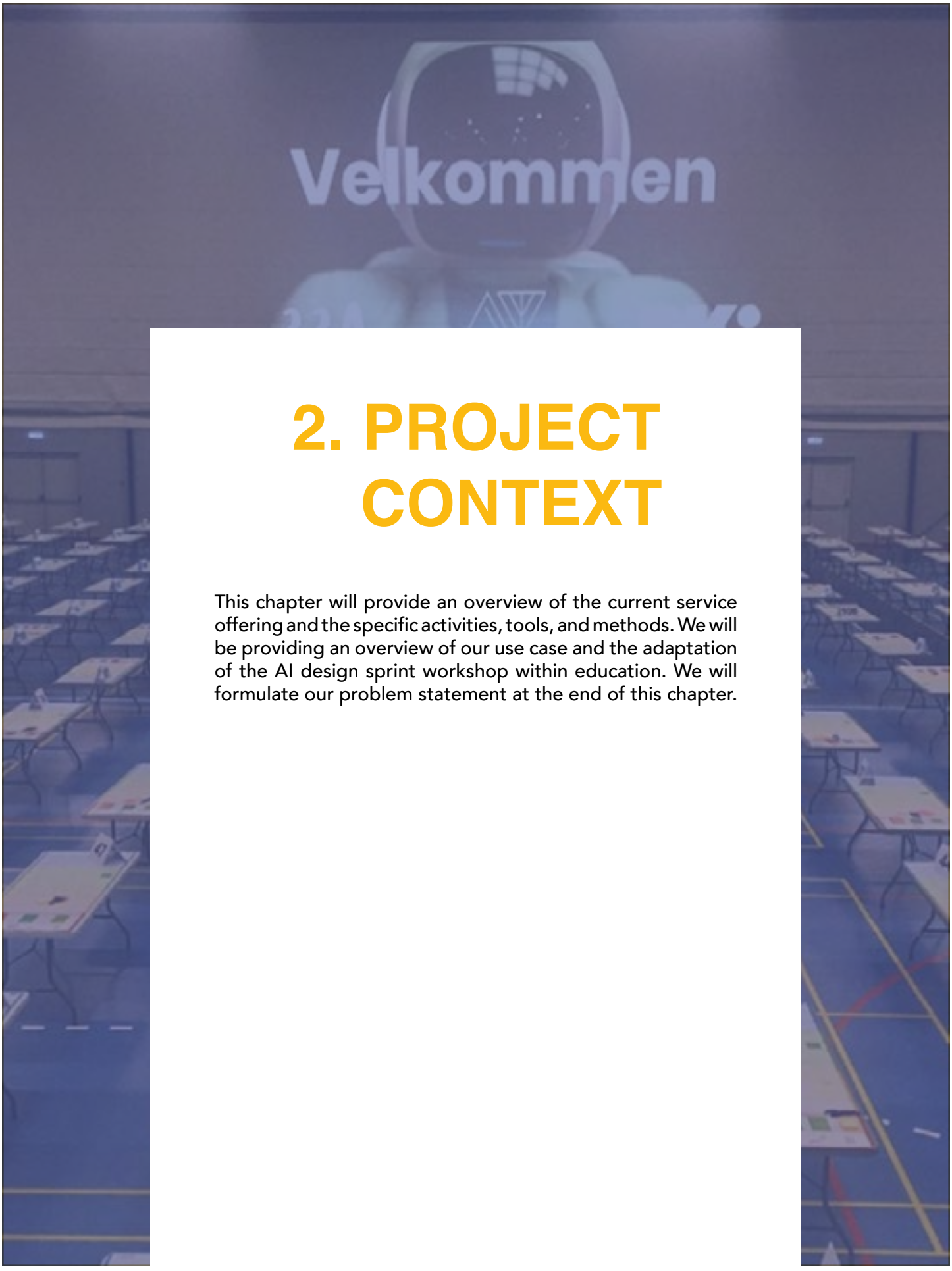
to the service as the "AI design sprint workshop" or "the Workshop". We define the AI design sprint workshop as the overall constellation of workshop activities providing the context (tools and methods) to collaboratively, design, and solve problems using technology (AI). These definitions will be explored and elaborated in the literature review.

1.3 LIMITATIONS

There has been an interest from educational institutions, to explore new methods like design workshops such as the AI design sprint workshop. For the scope of this thesis, we want to explore the potential and see how this could look in an education or learning environment setting since the business version & elements can not be transferred 100%. We are well aware that we are not experts in didactics so adjusting tools according to a specific curriculum, learning goals are out of scope for a master thesis. Our service is mainly a proposal to be used for children to learn about AI as part of participation in a design workshop.

Due to the COVID19 situation parts of our research were affected and we needed to adapt to these circumstances. For instance, we were not able to meet with users and stakeholders in real life after the point of lockdown. This delayed the process and some of our initial initiatives had to be reconsidered.

The company 33A have approved the service proposal and will be in charge of the legal aspects and approval related to working or providing AI design sprints for children under 18 years of age in the future. We will therefore not include these considerations in our final service proposal although we have included consent forms related to the data collected from children throughout this thesis. To add to this we are mainly interested in what the user experience and collaborative learning looks like for participants in the AI design sprint and will therefore not focus on the on-boarding but briefly mention future business scenarios.



2. PROJECT CONTEXT

This chapter will provide an overview of the current service offering and the specific activities, tools, and methods. We will be providing an overview of our use case and the adaptation of the AI design sprint workshop within education. We will formulate our problem statement at the end of this chapter.

2.1 SERVICE PROVIDER

33A is an AI design firm that supports companies in their transformation towards implimenting AI. In order to accomplish this, 33A works with an AI Design Sprint that is based on Google's design sprint developed by Jake Knapp (Knapp, Zeratsky, & Kowitt Z, 2016). In the AI design sprint workshop, companies work in teams in order to develop an AI application concept in collaboration with AI experts for their companies. This is so that companies can have more knowledge about AI and board members can see new strategic and tactical impacts that AI can create. This tool enables participants to develop concepts without previous technical knowledge (33A, 2020).

At the present moment, 33A is the only company in Denmark that helps assist teams in organizations to enable them to understand AI and allow them to create AI applications concepts. This is done collaboratively together as a team with their colleagues (shown in figure 1). The AI design sprint is a Design workshop that supports companies that would like to know how AI can be utilized in their business. During this workshop, they work with design methods to develop concept solutions. 33A created a card deck, (shown in figure 2) that with the ones that participants can play with during the workshop, these cards provide an insight of what AI can do, then participants select the cards to create a concept solution.

After the workshop session, companies receive feedback from an AI expert on the concept solution and how feasible it is for the company. The workshop is attractive to companies because it is user friendly, by this, we mean that the tools that the participants work within the workshop are paper-based equipment and pens. They work with a paper canvas, paper card deck, pens and pieces of equipment to convey thoughts and ideas. This makes it easy for the participants to work with an accessible product and service. Participants need no previous knowledge and the workshop is designed to apply to a certain category or a group of people. Anyone can use it and people don't have to be experts in AI to be able to participate. The aim of 33A is to make knowledge about AI accessible for people, and they state their mission as:

...``AI has the potential to skyrocket people's work and life, therefore we are dedicated to making AI accessible to everyone. Yes, any person, any team, can be at the forefront of AI´´.... (33A, 2020).

Figure 1: AI design sprint workshop for businesses. Original source: www.33a.ai

Figure 2: AI cards for businesses

2.2 AI DESIGN SPRINT OVERVIEW

The workshop is structured with a pre-(before), during and after the session. In the pre-session where companies define the topic of the workshop. During the session, the companies work in teams and develop a concept solution following 5 steps.

The AI design sprint consists of 5 main steps: Framing, Concept development, Tech Check, Presentation, and Prototype (33A, 2020) as you can see in figure 3.

1. Framing: 33A defines with the client what aspect they are going to focus on.
2. Concept solution: The client and their team develop their first concept with the AI expert, then they present it and to get some feedback.
3. Tech Check: The AI expert together with the client and the IT department, sees the viability of their concept.
4. Presentation: One week later, participants meet to have a final presentation of the concept. This is done to discuss the implementation and feasibility of the project.
5. Prototype: 33A provides an experienced prototype to make the solution tangible and enable buy-in.

Figure 3: 5 main steps of the AI design sprint

After experiencing this workshop, the expected outcomes are as shown in figure 4:

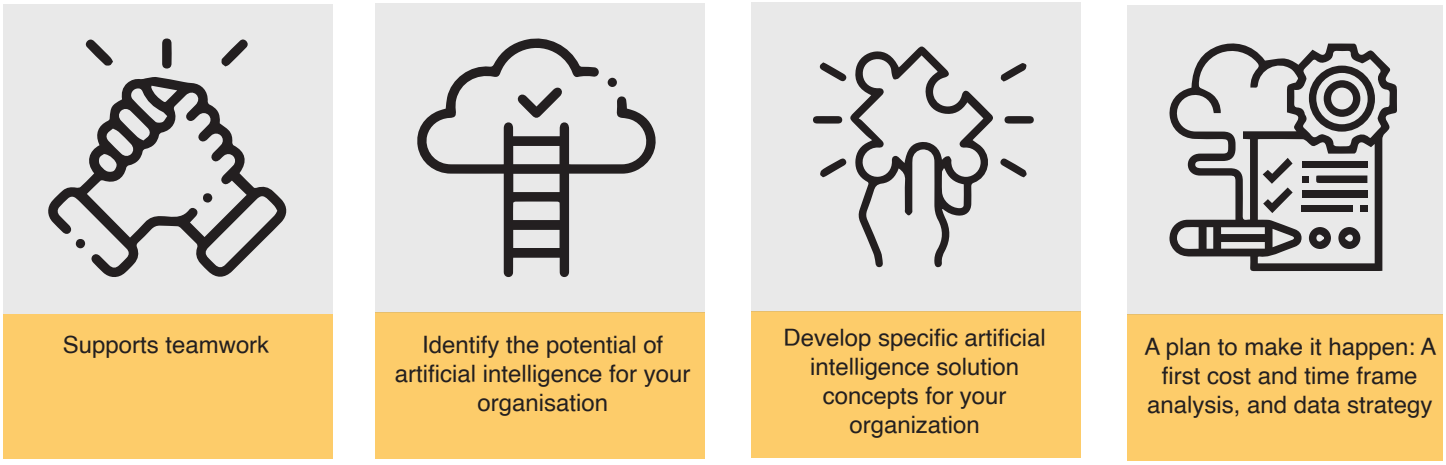


Figure 4: Expected outcomes for clients

2.3.1 Activities, tools and methods

To have a better overview of the AI design sprint workshop service experience we have presented the current user journey map in (figure 5)

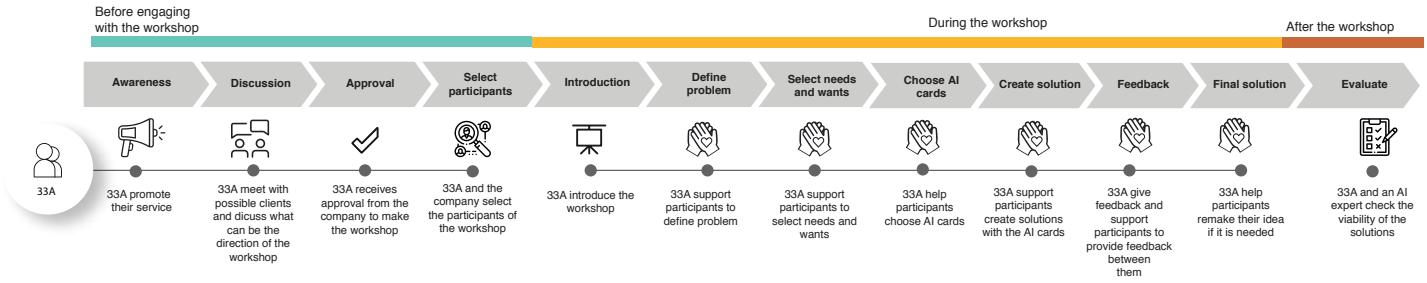


Figure 5: User journey of the original service

The workshop consists of a series of steps that are needed to run the AI design sprint workshop with their clients. We overviewed the customer journey steps and we separated the steps into a 'Before', 'During' and 'after '(Reason et al., 2015). Figure 5 illustrates the steps of the workshop and how to place them into the three sections. Table 1 indicates the tools that are implemented in the workshop, the functionality of tools, and what particular method will be used.

Besides the AI cards being used to create concepts, 33A developed a series of AI ethics cards (see figure 6) together with the Service design students, as part of their internship. The idea is to offer a free trial of the ethics card deck that is provided in the webpage of 33A but is not at the current time part of the AI design sprint workshop process. These cards can be used to reflect upon obstacles and opportunities related to AI technology as well as considering the ethical aspects (33A, 2020)

Figure 6: Ethical cards. Original source: www.33a.ai

During the workshop	Tools	Activities	Methods
INTRODUCTION	 Digital presentation	·Powerpoint presentation to introduce the workshop and support the facilitation along the way. · Provides the different categories they have developed in the card-deck. ·They use different examples of real life situations to explain what AI can do.	
DEFINE PROBLEM	 Canvas	·Participants interacts with the canvas that contains all the steps of the workshop. ·For defining the problem, the participant selects a problem statement and places it in the canvas. ·The problem is provided in a form of a 3 step storyboard with the problem statement and they also have to select a persona that represent the user.	Problem statement in form of storyboard Person
SELECT NEEDS AND WANTS	 Canvas  Needs and wants cards	·After choosing the person and the problem statement the participants need to define the needs and wants. ·This is done by selecting from the cards that 33A provide but they also can include more if they feel is necessary.	Card sorting Brainstorm
CHOOSE AI CARDS	 Canvas  AI card-deck	· The AI card-deck helps the participants ideate and understand the potential of what AI can do. ·The participants select the cards they want to implement in their solution and they place them in the canvas. ·After the cards are selected, they share their point of view and then select the top 3 cards to ideate together.	Card sorting
CREATE SOLUTION	 Canvas  AI card-deck	·Participants start their ideation phase. ·They create their solution by mixing the top 3 AI cards in one concept idea. ·They represent their final idea with three post-its and place them on the canvas in a form of storyboard.	Storyboard
FEEDBACK	 Canvas	·After creating the ideas, the participants present their solution to the other groups. ·The different groups give feedback between them and also 33A provide some feedback.	
FINAL SOLUTION	 Canvas	·The groups have to modify their solutions if they think is needed after recieving feedback.	Storyboard
During the workshop			
EVALUATION	 Canvas	·33A has a different canvas where the participants and the AI expert help to evaluate how feasible and helpful for the user is the solution.	

Table 1: Indicates the tools that are implemented in the workshop

2.3 MOTIVATION FOR AI DESIGN SPRINT WORKSHOPS FOR CHILDREN

From 33A's previous experience in education working with a municipality project, they were able to identify that their workshop was unable to facilitate children and their ability to learn about artificial intelligence. Before exploring the challenges in the existing workshop, the level of engagement that children have and how to improve it in the process. We want to explore the relevance of AI in education and what could be the benefits of teaching AI to children.

The relevance of implementing the AI design sprint in education is to use new methods to enhance and educate children in terms of achieving technology comprehension. Technology comprehension, in this case, means to enhance children's knowledge surrounding the use of technology not only the technicalities but reflect and discuss the opportunities, challenges and the technology potentially could have on people or society. The purpose of the AI design sprint workshop is to learn about AI via a collaborative Design workshop environment. A key motive for 33A to implement the AI design sprint in this context for children was that they wanted to make them aware and identify how children can learn and use AI capabilities to solve problems to create solutions in collaboration.

The AI Design sprint workshop offers children the opportunity to identify a problematic issue and how features of AI can be used to help and assist the problem. The purpose was to provide children with the knowledge that surrounded the capabilities of technology.

As mentioned previously, 33A's previous experience in education identified that there were several pain points in the participants' experience. These were related to collaboration as well as challenges related to the facilitation of the AI design sprint workshop. To improve their existing service, we have noticed that we would have to focus on the user journey of the workshop and customize it for children. We will be using service design to customize the user journey, meanwhile having the hypothesis that enhancement of collaborative learning will improve collaboration between participants. This leads to our problem statement, knowing how to utilize collaborative learning to customize the user journey of an AI design sprint for children.

2.5 PROBLEM STATEMENT

33A was contacted by Faurskov Municipality, who wanted them to run a huge AI design sprint workshop where 800 teachers and children participated (figure 7). This event led 33A to realize the need to improve and customize their AI design sprint workshop.

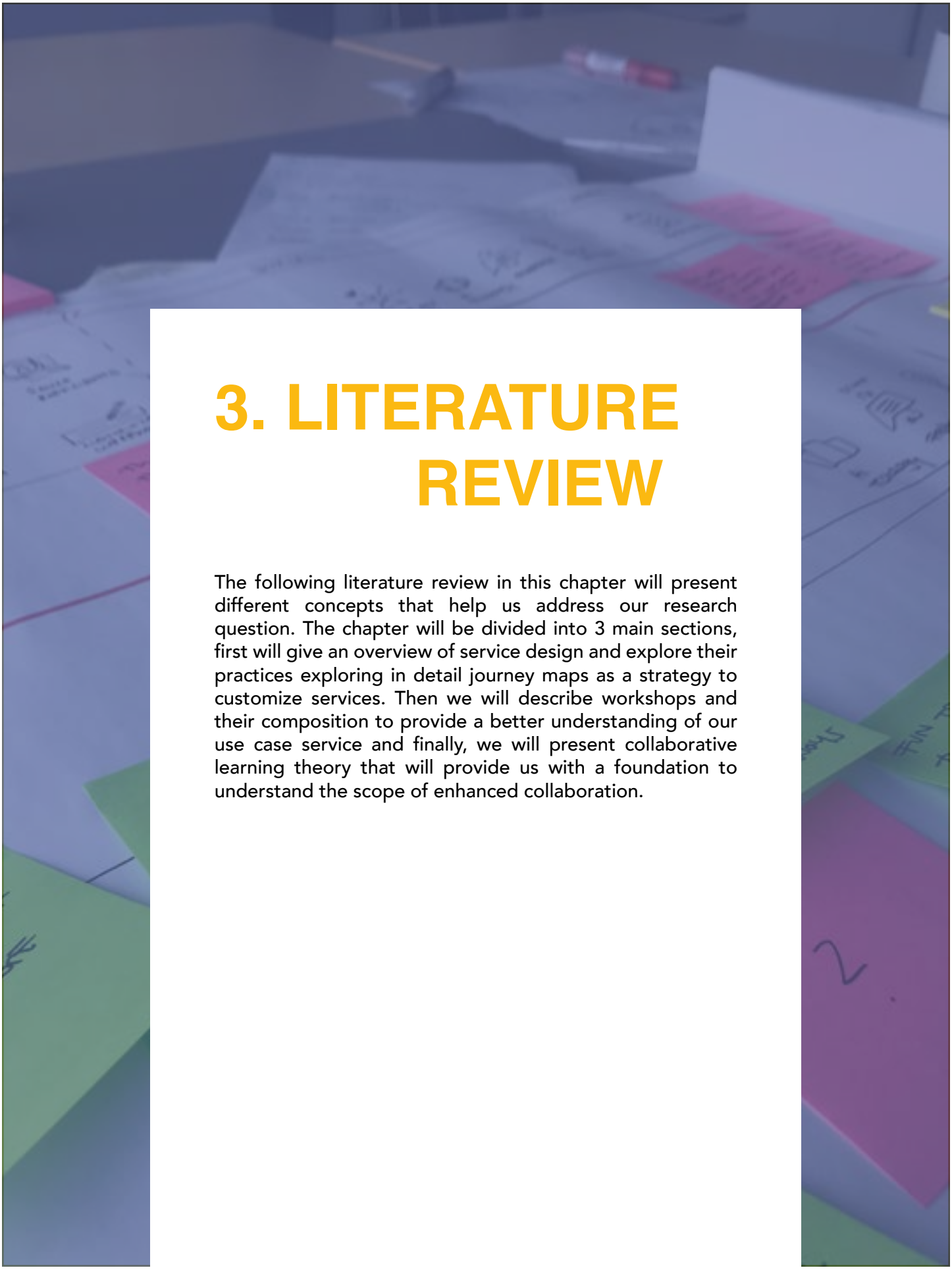
The pain point and challenge detected during this experience were related to facilitation and that children did not at all times understand how to collaborate working with the canvas that was provided as well as a complex technology. These issues were due to their lack of experience working in collaboration and working with the tools and methods in the AI design sprint workshop. Based on this we discussed that the canvas needs to be simplified for children.

We want to focus on how collaboration between children during the AI design sprint user journey is now and how this collaboration can be enhanced. Based on our preliminary findings as well as from the knowledge from 33A we have developed the hypothesis that collaborative learning and Service design could support the customization of the user journey. We expect this could make the AI design sprint workshop far more smooth and engaging for children particularly when it comes to collaboration and reflection related to AI technology. During this experience, children will be learning and working together. We want to use Service design and collaborative learning theory to improve the way children collaborate in problem-solving using AI technology.

Figure 7 : Faurskov Municipality and 33A collaboration workshop. Original source: www.33a.ai

This hypothesis led us to us to the following problem statement:

“How can we use Service design and collaborative learning theory to support the customization of the user journey of the AI design sprint workshop for children?”



3. LITERATURE REVIEW

The following literature review in this chapter will present different concepts that help us address our research question. The chapter will be divided into 3 main sections, first will give an overview of service design and explore their practices exploring in detail journey maps as a strategy to customize services. Then we will describe workshops and their composition to provide a better understanding of our use case service and finally, we will present collaborative learning theory that will provide us with a foundation to understand the scope of enhanced collaboration.

3.1 SERVICE DESIGN

Service design is a discipline that emerged in the twenty-first century as a response to different changes in society, it is a discipline that is constantly evolving making it harder to define and it could be described in many ways (Reason et al., 2015). Stickdorn (Stickdorn et al., 2018) presents service design as a discipline that offers businesses or service providers an approach to understand and capture customers' perspectives. It balances the needs of the customers with the needs of the business, aiming to create seamless and quality services experience.

As it was mentioned the emergence of service design was driven by different changes in society, the response in this changes are defined by Reason, Løvlie and Brand Flu (2015) in three main trends (economic, social, technical) from the economic perspective business went from manufacturing to services presenting a higher potential, from the social perspective the customer start valuing more their own needs than before rising their expectation in the services and from a technical perspective society is being driven by a growth of digital that been shaping the services (Reason et al., 2015).

This transformation has opened the values that product or services can provide nowadays to the customers, generate a rise in expectations, this transition has increased the awareness of the business to focus on the experience that they provide and improve them to match with the needs of the customers and expand the offering of customized services (Reason et al., 2015). However, many organizations find it hard to move from understanding the importance of excellent customer experience to delivering one. (Reason et al., 2015). Service design provides a holistic human-centred approach with different tools and methods to identify challenges and the problem space in the customer experience taking into account the need and point of view of the customer and the different stakeholders, followed by providing an improvement of the customer experience through a process of iteration during the conceptual stage.

Keeping a holistic and systemic approach to analyse services is a critical aspect, even more, when we analyse existing services to improve them. Some companies may only concentrate their efforts on analysing specific aspects or activities of their services and do not consider the overall system (Grenha Teixeira, 2010). This can cause customers to interact with areas or activities that were not taken into account and end up with a service made of pieces that do not come together affecting the new customer experience. On the other hand, when it comes that service design approach is used to create new services in existing companies is important to keep in mind the large context and not only the customer perspective, this kind of mistake can lead to a series of problems on the existing organizations (Grenha Teixeira, 2010).

One of the tools to focus on analysing the user experience is user journeys that are highlighted to facilitate the analysis of the stakeholders and the customers and how they move through the services experience. This tool will be introduced in the section below.

3.1.1 User journey customization

Journey maps as is mentioned in '' this is service design doing'': ***``... help us to find gaps in customer experiences and explore potential solutions. They can be used to visualize existing experiences as well as potential future experiences...´´ (Stickdorn et al., 2018, p. 70).***

In this sense, a customer journey map provides a vivid but structured visualization before and after the core experience of customer experience and can be utilized to visualize new services or understand existing service and improve them (Reason et al., 2015). Also, journey maps can be used as a boundary object to assist the communication of a process and create a common language (Stickdorn et al., 2018).

A journey map enables us to focus on users or customer experience by mapping from the customer perspective the movements of them through a service, represented in stages and steps that show the journey during the service and through the different touchpoint during the experience that show the different interaction of the customer and the service (Stickdorn et al., 2018). This interaction can take many forms, from personal face to face contact between individuals, to virtual interactions with a website or physical interactions (Stickdorn et al., 2018).

Often the journey map can be extended and integrate layers that represent the pain points and positive emotion that stands out for the customer experiences, this can also be explored through an extension of journey maps as the emotional journey tool, were the emotions of the customer during the service are mapped and represented by a curve floating from moments of frustration to delight or by emotions represented by icons and pictograms place in a specific step of the journey (Oblo, 2020).

As it was mentioned before, journey maps are a tool used mainly to understand the customer perspective and to understand how the customer feels during the service experience, but are also relevant to keep in mind the interaction with the business overall and not only with the service we are designing for. Normally a customer does not differentiate between experiences, they blend the experience with the service and the business that provide the service (Berry et al., 2002) make it relevant to keep and holistic perspective, considering the services as a process that extend over time, involving phases before and after the actual interaction with the service, keeping a consistent experience not only with the service but also with the business (Berry et al., 2002) otherwise business can fail in achieving a competitive and planned customer experience.

3.2 WORKSHOPS

To approach the AI design sprint offered by 33A we will review the theoretical reasoning behind it, which will be approached from the perspective that the AI design sprint is a workshop where participants collaborate to solve a problem applied in the context of a design process.

A workshop can be defined as a working group led by a facilitator that can be internal or external and need to guide the process and not only run a group meeting, these skills can be leadership, discussion managements, structure and management of tools and techniques (Burtonshaw-Gunn, 2010). The key success to the workshop is up to the preparation in knowing of the participants attending the workshop, what is the main purpose of the workshop and what it would be the final successful outcome consisting of (Burtonshaw-Gunn, 2010).

Doing activities collaboratively during a design process is considered one of the core principles in service design where stakeholders from different areas are brought together in collaboration. In this framework, this is often referred to as a workshop.

The life cycle of a workshop can be divided into four phases: (1) Define clear purpose, (2) Plan workshop, (3) Run workshop, and (4) Follow-up on the workshop (Burtonshaw-Gunn, 2010).

The workshop can be also structured as semi-structured where we can have a discussion, problem resolution, idea generation. Overall a workshop has a start (after) phase were some preparation is needed before attending the workshop as reading or questionnaires, this phase can affect the expectation on the output, participation and rules of attending the workshop, middle (during) a phase where participants go through a serial of steps to discuss and resolve a problem and an end (after) phase were normally an outcome of the process is presented (Burtonshaw-Gunn, 2010). Besides the preparation and structure of the workshop, the success of it must keep a collaboration among the participants and keep them engaged through the process.

3.2.1 Collaboration in the workshop

As it was presented in the section above the outcome of the workshop and the success of it is mostly based on the collaboration between the participants. Collaboration workshops are most effective when attendees understand the project goals, the design problem to be solved, the roles and responsibilities of individual team members, and the context. Huxham & Vangen (2004) claims that effective workshop sessions need to include several co-workers to define common goals and guidelines for the organization and to further make these goals the most satisfactory for the majority of the organization (Huxham & Vangen, 2004). Working collaboratively and interacting with others can lead to innovative approaches, more feedback, more ideas, and distribution of work and responsibilities (Lindeke & Siechert, 2005).

In the context of this thesis and since our service is inspired by Google design sprint we understand a typical Google design sprint as a design process with a duration of five days and combines individual problem-solving preferences with space for groups to learn skills such as problem-solving, critical thinking via collaboration. All of these ingredients to the "recipe" will empower the participants in the various teams to collaboratively design holistic solutions to complex problems in a fast-pace (Knapp, Zeratsky, & Kowitt Z, 2016). Therefore, we can see the AI sprint as a design process where participants engage in a fast-paced collaborative workshop, where they work with problem-solving in this use case related to AI. The discipline is as mentioned increasingly being approached with the use of design, which will be elaborated in the following section.

3.2.2 Design and collaboration in workshops

Considering our use case and the new target group being children it is relevant to understand the context of collaborating in groups taking into account that is the main task of the participant during the AI design sprint, this being also a design process. Is not new but the practice of collaboration in creative design has been around for nearly 40 years, which has been going under the name of participatory design (Sanders & Stappers, 2008). The participatory design process and the practice of collaborative design sprints workshops can be put concerning co-creation which by Sanders & Stappers is described as; ***"[...] any act of collective creativity, i.e., the creativity that is shared by two or more people." (Sanders & Stappers, 2008, p. 6)*** where designers, as well as non-designers, are engaged throughout the

entire design development process (Sanders & Stappers, 2008). Design as a discipline has a long history with different theories, methodologies and design process. Among different design processes, it is relevant to mention some as a design thinking methodology that combines various elements in a non-linear, iterative process with the purpose being to try to understand users and re-define problems to create innovative solutions to prototype and test. The elements can be used as a way to collaborate towards a common goal (Stickdorn & Schneider, 2014). Design thinking is not new and has been already described in the 1950s and 1960s in the book "Creative Engineering" by John E. Arnold (Arnold, 2017) and "Systematic Method for Designers" by L. Bruce Archer (Archer, 1965) and later on, it has been popularised by David M. Kelly the founder of IDEO.

"Design thinking is a human-centred approach to innovation that draws from the designer's toolkit to integrate the needs of people, the possibilities of technology, and the requirements for business success."— Tim Brown, CEO of IDEO (Bridges, 2016, p. 172).

Design thinking has been known as a meaningful approach to tackle wicked problems. These problems are difficult to solve and often the solution to these problems can be different depending on the perspective that you approach them, there are no true or false answers to this type of problems. Designers do not aim to solve a problem with a final answer instead look for creating a positive contribution to the state of the case (Leinonen & Durall-Gazulla, 2014).

Similarly, design-based learning (DBL) used in learning environments, integrates elements from design thinking and design processes, where collaboration is used as a coordinated, synchronous activity which aims to construct and maintain a shared understanding of a problem (Zhang et al., 2020). The core of this discipline is the articulation between participants were the roles that each of them has become relevant. In this case, each individual expresses themselves in the process which makes the 'invisible thinking' "visible" by explicitly sharing with others. This could mean expressing their thoughts and emotions through design tools such as eg.: audible or visual artefacts, that potentially triggers other group members' reflection-in-action (Zhang et al., 2020).

3.2.3 Collaboration in children

Due to the development in emerging technology and changes in the infrastructure of organizations today there is an increased emphasis on teamwork. Group members have to think creatively, assess problems, and make decisions as a team. (Laal et al., 2012). This new shift means that there is no longer as much focus on the performance in individual efforts but focus on group work performance- from independence to the community. There is a need in society for new generations to think and work together on issues of critical concern and problem-solving matters have increased (Laal et al., 2012; Leonard & Leonard, 2001).

Since the 1980s collaboration in learning started to be widely accepted after criticizing the cultural resistance to switch from an individualistic way of learning where students learn by themselves without interacting with classmates to collaborative learning. Today collaboration in education is utilized in school and universities through almost all subjects areas and from pre-schoolers to graduate school and adults (David W. Johnson & Johnson, 2009). Even though collaboration in students is

highly recommended by different resources we can distinguish differences according to groupage. It has been observed that 3-year-olds often engage in playing near to other children but not playing between them, children between 4 and 5 years or more have increasingly become interested in interacting with other children and also we can see benefits in older children (Park & Lee, 2015).

The benefits of students from elementary school have been documented and supported but we can also find some challenges in unskilled groups where personalities can be too different affecting the collaboration in teamwork, therefore students must be taught interpersonal and group skills to achieve high quality in collaboration. A way to accomplish this is is to build strong trust ties between the group, communicate clearly, support each other and resolve conflicts constructively (David W. Johnson & Johnson, 2009).

Collaboration style of learning indicates a shift from a traditional teacher- or lecture-centred teaching to learner-centred learning. This is also supported by Samuel Totten (1991) who mentions that learning in collaboration allows children to engage in discussion, take responsibility for their learning, and hereby become skilled in critical thinking, which is a very crucial skill for future learners (Gokhale, 1995; Totten & Pedersen, 2010). Frequently, teaching time is dedicated to regulating the interaction between students and teaching materials and not considering the interaction between teacher and student and the way students interact between them is almost ignored (Yalçin & Hasan, 2018). A switch in teacher way of seeing in education has been needed, going from how teachers should teach to how students should learn (Yalçin & Hasan, 2018)

Even if most of the literature supports collaboration in children there are some considerations to take into account when we use collaboration to teach children in an educational context. Some educators can be more interested in achieving individual students' scores but group assessment, this separation can blind individual contribution and both ways of working can not be compared making it challenging in terms of grading the knowledge achieved. Scores between the participants can not be considered independent of one another. Another aspect that can be challenging in terms of collaboration is the student's characteristics, the composition of the groups and the characteristics of the tasks (Lai, 2011).

Besides the challenges presented above, we can see in collaboration in children, the scope of future learning among children and in society, makes collaboration skills a 21st-century trend. The reason is that collaborative skills such as being able to think and work together to try and solve problems and critical issues becomes necessary in the future, also due to change in future jobs (Austin, 2000; Welch, 2016).

3.3 COLLABORATIVE LEARNING

The challenges of the AI design sprint workshop with the new target group was collaboration group work. This was an obstacle to the success of the workshop. We wanted to better understand how to improve the experience in the workshop and the objective of the workshop of learning how to solve problems by using artificial intelligence. We first need to understand how to incorporate an approach or method to foster collaborative learning. Collaborative learning (CL) as a term has been used in a wide variety of ways across

different disciplines and fields, but there is a lack of consensus upon definition of the term (Jenni & Mauriel, 2004), Marjan Laal and Mozhgan Laal defines Collaborative learning as:

``…Collaborative Learning is an educational approach to teach and learn, that involves groups of learners working together to solve a problem, complete a task or create a product… This term refers also to an instruction method in which learners at various performance levels work together in small groups towards a common goal´´… (Laal & Laal, 2012)

In a collaborative learning context teachers tend to think for themselves less of experts that transmit knowledge and more of as expert designers of intellectual experience for students, they see themselves more as coaches (Laal & Laal, 2012). Concerning students, this new shift means that there is no longer as much focus on the performance in individual efforts but focus on group work performance from independence to the community (Laal & Laal, 2012).

But what are the benefits of working with Collaborative Learning methods? There is proof evidence that by working collaborative teams achieve higher levels of thoughts and retain information longer that students that work individually (Laal & Laal, 2012). This is also supported by Samuel Totten (Totten & Pedersen, 2010) who mentions that learning in collaboration allows children to engage in discussion, take responsibility for their learning, and hereby become skilled in critical thinking, which is a very crucial skill for future learners (Gokhale, 1995).

Although collaborative learning can provide benefits in learning there are also challenging factors that can limit the behaviour of the participants to support the learning during the collaboration (Andrews & Rapp, 2015). Collaboration can lead to reduced motivation and low productivity if the participants unequally contribute to the group work and mistakes produced during the collaboration. Engagement can be a fundamental element to have a successful collaborative learning process, the lack of engagement can be produced for the not clear understanding of the task or the different personalities of the participants where some can be left out of the process meanwhile others can take more responsibilities (Andrews & Rapp, 2015).

Collaborative learning positively influences their motivation in terms of increased self-efficacy, learning goal orientation, and intrinsic valuing of the learning task (Leinonen & Durall-Gazulla, 2014). For avoiding a wrong path in collaborative learning some pre considerations can be taken into account to reduce the challenges and then provide a better collaborative learning context.

3.3.1 Elements that support collaborative learning in children

Many reasons make it hard to measure a collaborative process because there are particular forms of interaction that need to happen to have the desired learning mechanism and there is no guarantee that those interactions may happen (Collazos et al., 2002). Although it is mentioned that learning and knowledge emerge through the network of interactions and is distributed among humans and tools that interact (Leinonen & Durall-Gazulla, 2014). Some literature proposes different elements that we can consider in advance to structure how collaboration interaction can happen and be triggered.

Some of the key elements that should be presented in a collaborative learning process are that there should be a clear definition and understanding of the project goal, the design problem to be solved and that each participant needs to have a role to play as much as individual as group task and responsibilities (Collazos et al., 2002). When children recognize that success in learning depends upon the success of their peers, they are more likely to provide emotional and tutorial support for learning (Leinonen & Durall-Gazulla, 2014).

Some literature proposes different elements that we can consider in advance to structure how collaboration interaction can happen and be triggered. For instead Johnson (D. W. Johnson & Johnson, 1990) point out that there are basic characteristics that collaborate learning process should have, these are:

1. Trust: Team members are obliged to rely on another to achieve a common goal. Members need to believe that they are connected with others to ensure that they all are going to succeed together.
2. Discussion and feedback: Participants must be interactively giving feedback to each other, challenging one another's conclusions and reasoning. This will encourage participants to learn.
3. Individual and group tasks: Individual accountability and personal responsibility, all participants must be responsible for doing their share of the work and for mastery of all the material to be learned.
4. Evaluation: Group self-evaluating, team members must set group goals, periodically assess what they are doing well as a team and identify changes they need to do to function more effectively in the future.

To trigger this characteristic some previous structure can be made. This structure can be composed of the following elements that we need to keep in consideration when we are creating this collaborative process are (Collazos et al., 2007):

- Activities: Collaborative learning processes need to define their activities that represent the tasks that the group member must perform during the collaboration process. This includes the workflow of individual and collaborative activities that will compose the process. It also includes goals and rules for each task, each activity must be specified and the activities should be designed so every member of the group has a similar work.
- Participants: In the collaborative learning process need to have defined roles that should be present in the collaboration process and this role must rotate among the participants.
- Tools: All collaborative learning processes should have tools that the team members will use to perform the activities, these tools must facilitate the communication, coordinate, and participate in the process.
- Objects: the participants will have objects, meaning physical or digital evidence that will represent the knowledge that is shared by the group members during the activity.

Even though we can structure our process to trigger collaboration is important to keep in mind, that it does not guarantee that collaboration will happen because it is hard to control or anticipate the interaction that participants will have due to the different personalities that participants can have. In our use case, we want to obverse how the interaction between the participants occurs and analyse it to identify the pain point in terms of collaboration (Andrews & Rapp, 2015).

3.3.2 Evaluating collaborative learning

Some literature presents different approaches to measure and analyse the interaction between the participants. Some measure the success of a collaborative learning process by observing the process and others take more into account the outcome (Collazos et al., 2002).

When it comes to evaluating the process of collaborative learning there are a lot of variables to take in account as the size and the composition of the groups, the nature, and objective of the task, the media and communication channels, the interaction between peers, the reward system among others (Collazos et al., 2002). Different research approaches for analysing group collaborative learning interaction are based on online platforms, where they can analyse the quality of the discussion or feedback by taking data from an online conversation among participants that later is computer cluster and analyse. Others have developed a framework system that can detect conflicts in focus setting and also make shifts in adding and revision phases during the collaboration sessions on problem-solving (Collazos et al., 2002).

On the other hand, to measure a workshop that occurs with physical interaction we can present César A. Collazos approach where he highlights the analysis of the cooperation process itself and not the quality of the outcome tries to understand how we can effectively manage the interaction to evaluate the quality of the collaboration process (Collazos et al., 2002).

A way to analyses the collaborative process it can be divided in into pre-process related to coordination and strategy activities, in process related to the performance of the group members and it is here where the interaction of cooperative work process occurs and post-process related to evaluation activities this too phases are matter related to the facilitator (Collazos et al., 2007).

To analyse the in-process phase, it is proposed that we observe the interaction between the participants with the following aspects (Collazos et al., 2007):

1. Apply strategies, this captures the ability of the group members to generate, communicate, and build and apply a strategy to solve the problem in the group.
2. Intra-group Cooperation, If group members apply collaborative strategies previously defined during the process of the group work. If each member of the group understands her task is related to the global team goals, then everyone can contribute and reduce coordination efforts.
3. Success criteria review, check the level of involvement of the group members during the activity. It can include summarizing the outcome of the task, assigning action items to members or taking the time assigned for each assignment.
4. Monitoring, observe regularly to check if the group maintains the chosen strategy to solve the problem.
5. Performance, consider first the quality of the result of the collaborative work, second the time it took to get to the solution and third the amount of work made to get to the solution

In the paper where these indicators were presented, they used it to evaluate the data collected through software that analysed the interaction made by

children's teamwork done through an online game, as the data that we will analyse is going to be of physical interaction we will use this information to base our analyses of the current situation of the AI design sprint. In the flowing chapter, we will introduce the tool that will help us to analyse the AI design sprint and further we will cross it with the information gathered in the literature review.

3.4 RESEARCH FOCUS

Following the literature review presented we would like to summarise the insights gained to answer our research question of this thesis.
Introducing service design enables us to take a view of the service experience holistically. Service design will provide us with the ability to analyse the user experience from their perspective. We will use the journey maps tool as the main resource for discovering the challenge in the user experience and through an iterative process of customizing the user journey map and testing we will improve the user experience.

After analysing the AI design print as a workshop were participant collaborate to solve problems we can define that an optimal collaboration between must occurs to have a successful experience, this beside the relevance of collaboration in the educational context and 21st-century skills we define our main focus in improving the collaboration during the AI design sprint a key element for customizing the experience.

Our goal after identifying elements that can support collaboration presented in the literature review as structure the collaborative learning process like defining a clear understanding of the participant tasks and activities, having group and individual tasks, roles among the participants, etc. will help as finding the ingredients that may be lacking in our current AI design sprint process. Once we identify the lack of these elements we can bring them to the experience and trigger a better collaboration among participants.

Based on our research we found several pieces of information that highlight general insights on how children reflect and collaborate in design-based learning but are not specific to AI . Similar cases remain limited in academic research, therefore, we want to gain more knowledge on the topic exploring how children reflect and collaborate under this context. Even though some cases that work with artificial intelligence and in general with technology will be presented in the desk research.

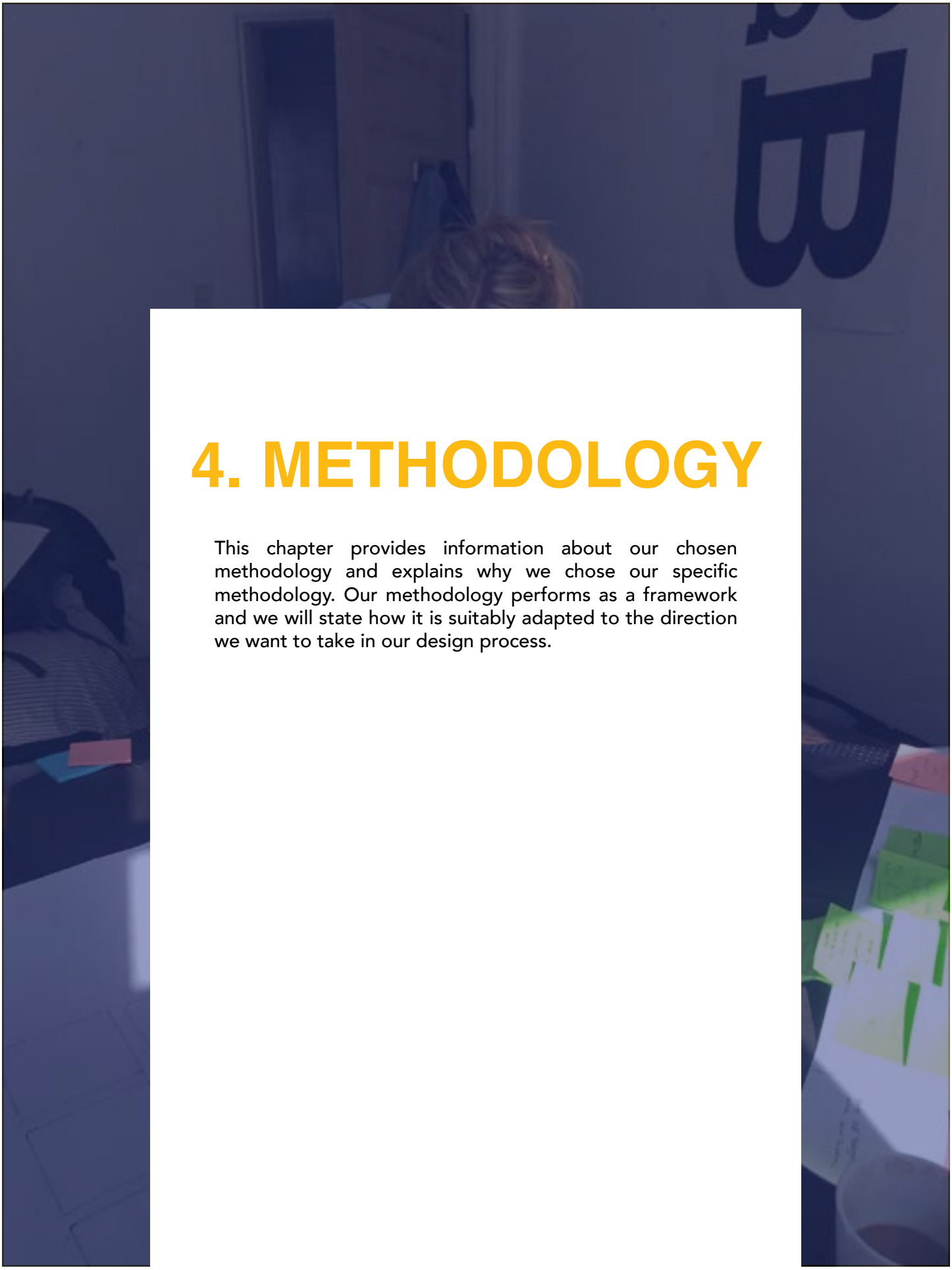
Based on the use case AI design sprint workshop, and an exploratory research approach we want to investigate the following research question to contribute to academic research:

3.5 RESEARCH QUESTION

How can service design and a collaborative learning theoretical perspective support the customization of Design workshops for children? (in an AI design sprint use case)

We want to address this question using the following sub-questions:

- What are the needs of children in a design workshop situation?
- What are the challenges (fits and misfits) with the existing AI design sprint format in a children's context?
- How can we redesign the AI design sprint workshop to fit the needs of children using service design and collaborative learning theory?



4. METHODOLOGY

This chapter provides information about our chosen methodology and explains why we chose our specific methodology. Our methodology performs as a framework and we will state how it is suitably adapted to the direction we want to take in our design process.

4.1 FRAMEWORK FOR THE DESIGN PROCESS

To structure our thesis, we were largely influenced by the Double Diamond methodology as a framework to structure our design process. This methodology proposes the following phases: Discover, Define, Develop and Deliver. The graphical description in the Double Diamond is a valuable tool to visually present how designers work and explore the challenges they meet in the process of transforming the not yet defined and intangible into more tangible definitions and solutions (Stickdorn et al., 2018).

From previous experience the different phases of the double diamond work as a guideline. Thoughts and possibilities that can be broad and then they can be narrowed to situations and focus on specific objectives.

This methodology proposes tools and methods to use during the different phases according to the objective of each phase. Since the double diamond was first formed 16 years ago, design is being asked to solve more complex, multi-faceted challenges and those challenges themselves have become trickier. So some other models and frameworks can be used alongside the Double Diamond. We felt that by just sticking to one methodology, would restrict the amount of flexibility in the design process and would not provide guidance when we deliver a series of iteration phases as in the delivery phase. In Figure 8 is a representation of

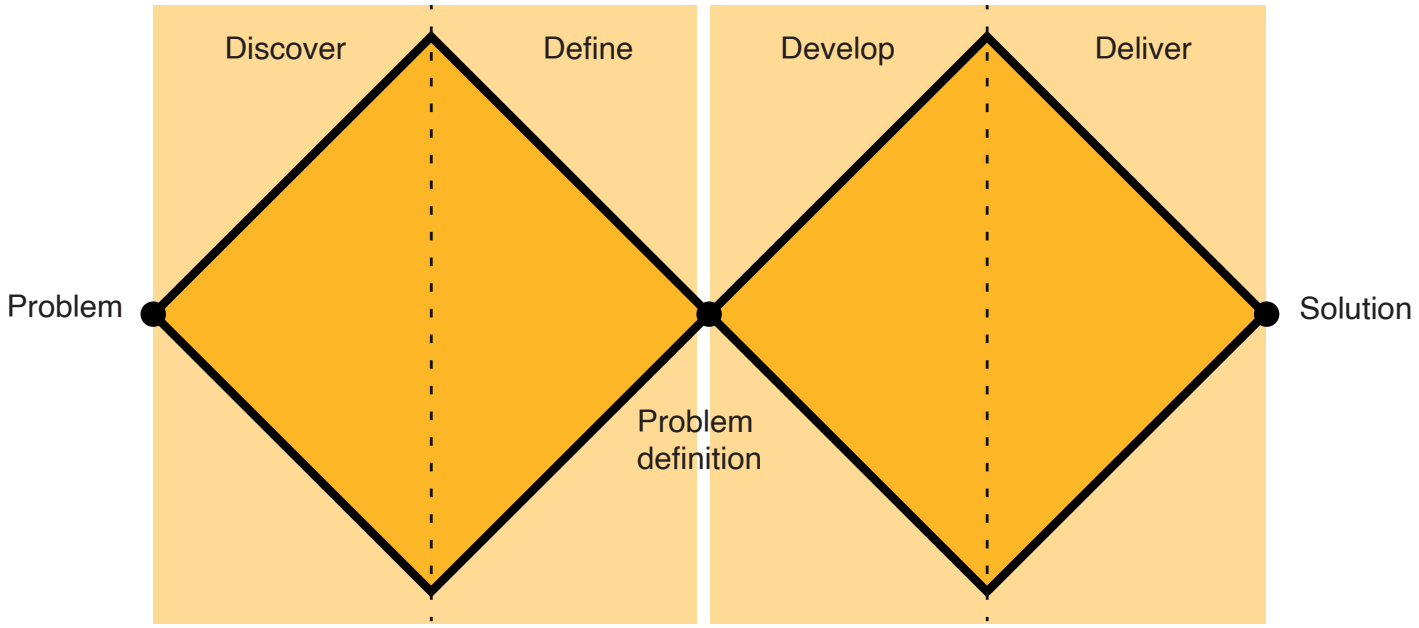


Figure 8: Representation of the double diamond

the 'Double Diamond' (Design council et al., 2015).

We wanted to have a design methodology that provided a series of phases that worked as a guide for shaping our process. We wanted to include aspects of other design processes that would provide a guide specifically within the iteration process. This is where the implementation of the IDEO design process would work. The two approaches provided similar traits, the key steps of the IDEO design process were, diverging, converging, diverging, and converging (IDEO, 2020). The approach to IDEO's philosophy is that IDEO strategically puts users at the core of everything they do, a process they refer to as human-centred design (IDEO, 2020). Figure 9 is a representation of IDEO's human-centred design process.

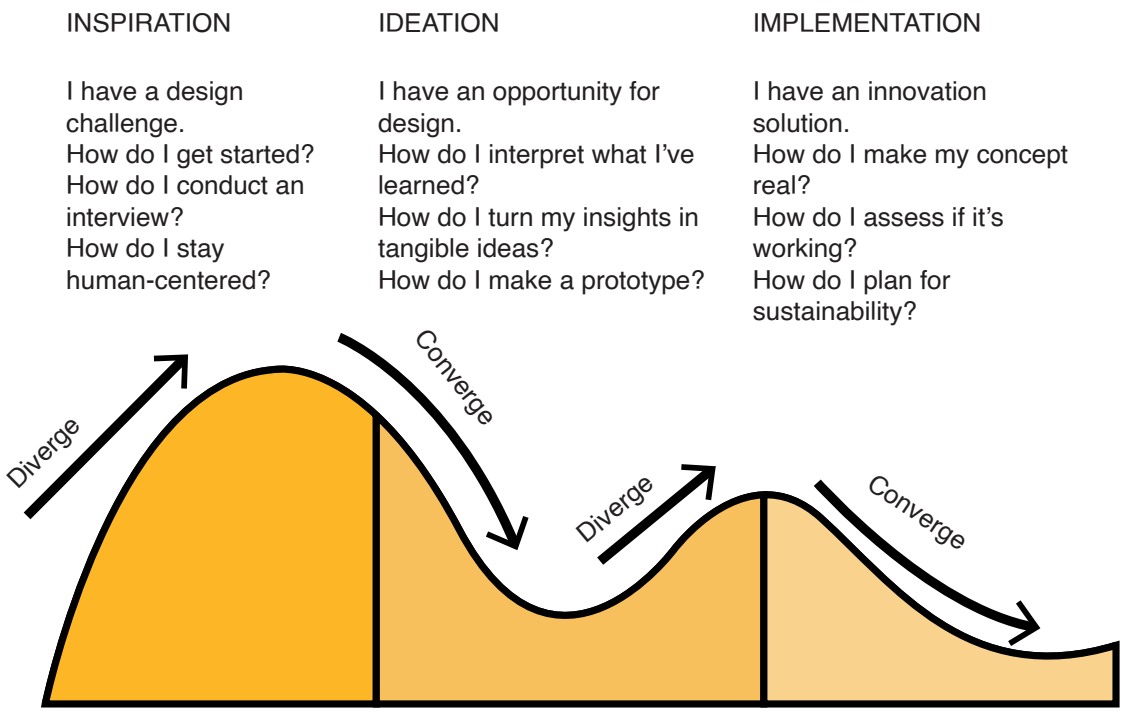


figure 9: IDEO'S human-centred design process

We found a tool that we could use as an approach that will help us frame, organize, structure, run or manage design challenges (Dan Nessler, 2018). Nessler labels figure 10 as "The Double Diamond revamped" which means giving it a new and, structure, or appearance. (Nessler, 2018). The methodology approach includes the four distinct areas, discover, define, develop and deliver from the British Design Council's Double Diamond and IDEO's human-centred design ideology. We knew that in our process there was going to be a series of iterations in our deliver phase because it was to customize and facilitate the needs of our users. This is why this approach is very applicable to provide direction and guidance in our process. This diagram of the "The Double Diamond revamped" is represented in figure 10.

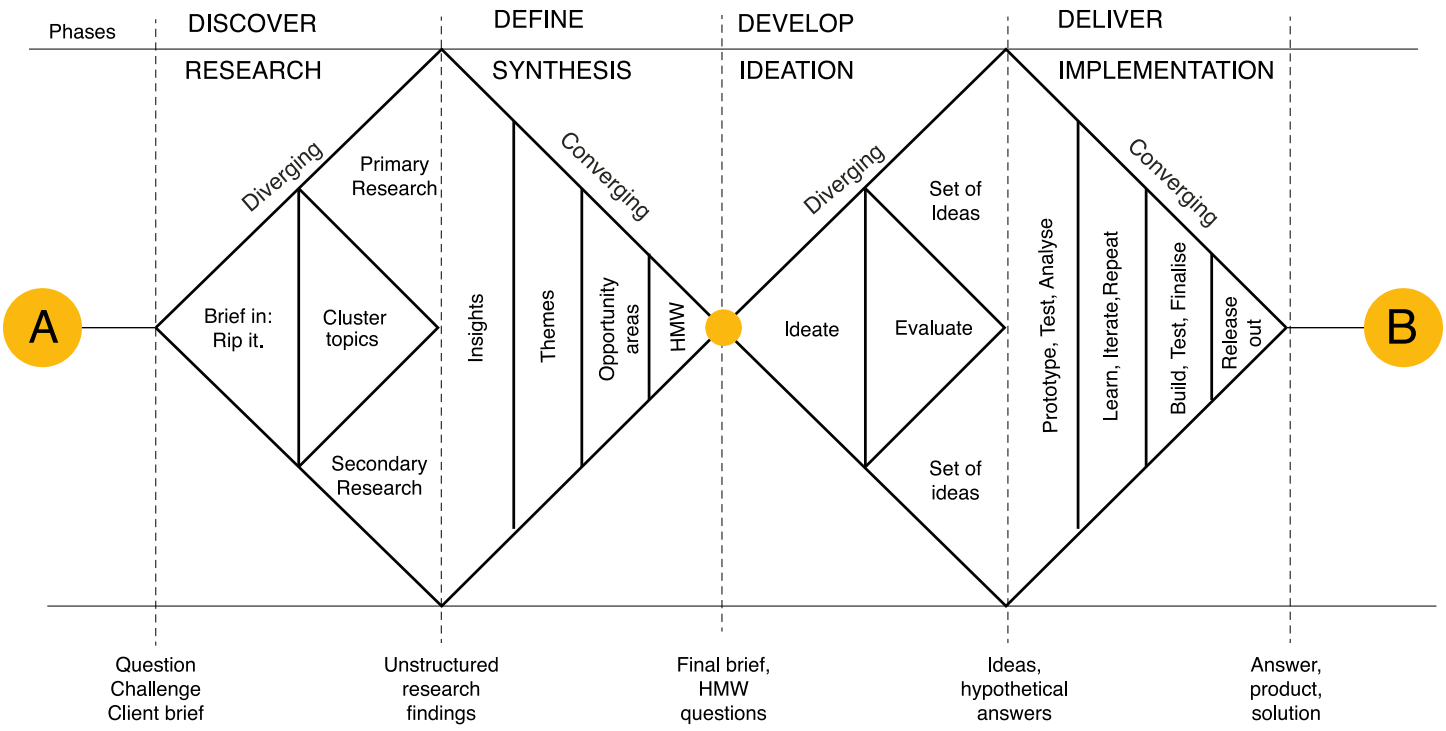


Figure 10 Nessler "Double Diamond revamped

4.2 RESEARCH APPROACH

Having developed the research question it is time to consider the research approach that will best help us to answer the research question. We have done explorative research and to compare research results and thus get a nuanced "picture", we combined different methods to compare the research results. This approach is described as mixed methods and has been the approach we have used for this thesis.

2.1 Quantitative research

Quantitative research focuses on objective measurements and statistics, while qualitative research is more subjective. Our thesis includes quantitative data in the form of surveys and statistics, although the main focus for service designers usually is the qualitative research approach which is aligned with (Segelström & Holmlid, 2015), who mentions that service designers tend to focus on qualitative research in contrast to quantitative methods in research since quantitative data is usually provided by the client organization, in our case mainly provided by external organizations (stakeholders).

4.2.2 Qualitative research

Qualitative research is more focused on how researchers interpret different topic matters, where quantitative research is measurable by numbers, statistics, and facts. Throughout the thesis, the interview method that has been applied most frequently has been the in-depth face to face interview. This interview technique helped us receive detailed information and provided rich data and clarified the topic. This form provides the possibility to interpret both words and body language providing the research team to gain a better understanding of the topic and the target users. The in-depth interview usually provides more detailed information providing the researcher with valuable data and new insights. The direct contact builds trust so the respondent becomes more open which is very suitable to have a conversation about a private, sensitive, taboised, or controversial topic (Bjørner, 2015).

When doing qualitative research, in particular, that involves collecting data from people, ethical considerations are important (Punch, 2005) (Bjørner, 2015). With certain target groups such as children, it is important to ensure they feel safe and motivated as well as making sure they are allowed to participate in eg. interviews (Bjørner, 2015, p. 14). When reaching out to key informants we took into consideration how to inform them about the objective of the interviews at all times, to make sure we had their consent in terms of using the information they provided. This was a good way of creating peace of mind and clarity for the interviewees as regards the purpose of the interview.

To get deeper insights into the field of education, the research team decided early on to schedule interviews with some of the most relevant stakeholders within EdTech. Some of the interviews were performed as remote interviews through Skype. The general advantages of this approach in conversation included the elimination of distance constraints and made it possible to get access to qualitative data and reach the stakeholders which would otherwise be difficult (Bjørner, 2015).

When facilitating workshops, the research team made observations to be close to users and stakeholder's interactions, behaviours and processes. There are several observation

techniques to choose from depending on the purpose (Bjørner, 2015).

Through our research process, we at all times kept in mind the GDPR guidelines provided by AAU, making sure we had consent when recording audio and taking photos (Aalborg University, 2020). This was done to protect the people we were collecting data from. Before all interviews, we presented the thesis project which the data subject interviewees were part of, in a declaration of oral and written consent. We chose to send out online consent forms (Appendix 1) to parents and children that participated in workshops and interviews since they were under the legal age. This was done to be open and to make sure the interview situation could leave both us as interviewers data controllers and the interviewees feeling vulnerable and insecure.

As data controllers, we were aware that the personal data we were responsible for was not disclosed to unauthorized persons. For the interviews with adults we should have made a written consent in all of our interview situations, but due to the corona situation, this was not possible.

5. DISCOVER

This phase is made to get an overview of the macro environment and what is relevant to our project. We explored through desk research the context of design in education and technology which later led us forward in the process by giving us an overview of potential stakeholders. Further in the process, we did secondary research to understand the challenges of the current AI design sprint.

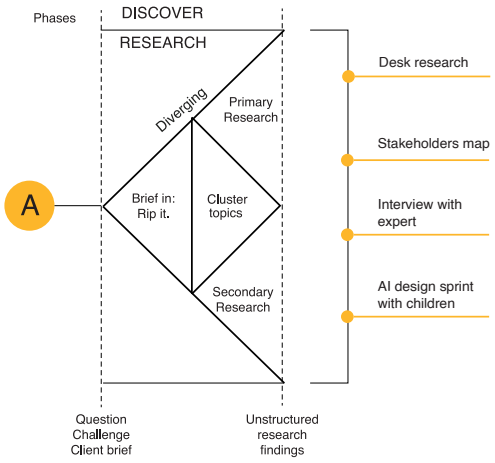


Figure 11 : Nessler "Double Diamond revamped, discover phase

5.1 DESK RESEARCH

As part of our desk research, we looked for existing projects or areas that could potentially have an impact on the development and execution of the AI design sprint workshop. Based on previous knowledge related to 33A clients and business connections in education we began separating the desk research into three focus areas. The three areas of focus which we thought would allow us to generate some relevant insights: Education, education and technology (EdTech) and Design in education.

5.1.1.1 Education.

According to Denmark's digital growth strategy of the analysis of national initiatives (Larosse, 2017), the digital strategy between 2016-2024, aims at further enhancing close public sector collaboration to deliver good and efficient services to the public and businesses. The investment towards new technologies that have been introduced into the educational field has made the process of learning and knowledge sharing more interactive. A major impact of technology on education is the shift of our outlook towards the world (Ghosh, 2020). These transitions in education have primarily influenced the need of 21st-century skills and the emergence of different movements to provide children with new skills and new ways of solving problems for the future (Ananiadou & Claro, 2009). These problems are often referred to as "Wicked problems". A wicked problem can be described as a social or cultural problem that is difficult or even impossible to solve for as many as four reasons: incomplete or contradictory knowledge, the number of people and opinions involved, the large economic burden, and the interconnected nature of these problems with other problems (Kolko, 2014).

To solve these so-called "Wicked problems", new approaches have emerged, promoting the implementation of teaching in a cross-curricular way. One example is STEM that promotes the merge between; Science, Technology, Engineering, and Math. From this, STEAM originated in 2012, adding arts (design). Opponents believe that adding in the arts (design) takes away from STEM education, however, STEAM aims to strengthen the foundation of STEM by helping students enhance their critical thinking skills and recognize the intersection of art, science, technology, engineering, and math. This cross-curricular way of teaching promotes the mix between disciplines that helps children to be more prepared for real-life "Wicked" problems thus be more prepared for future jobs. We particularly found this cross-curricular approach relevant and inspiring for our use case, as it combines different subjects including art (design) and technology.

Under this new context in education, the Danish Ministry of education has made innovation and entrepreneurship a compulsory interdisciplinary subject as well as implementing a new trial subject "Technology comprehension" (Undervisningsministeriet, 2018). This subject consists of three main learning objectives: Firstly students understand the core concepts in computing as algorithms, pattern recognition and abstraction. Secondly, students specify and articulate a wicked problem and utilize an iterative design process to develop a digital solution. Lastly, students should reflect and evaluate the problem solution, its applicability, impact and ethical concerns from the social perspective. The requirements of this new subject area are so that students can collaboratively formulate, design, construct, and modify digital artefacts for the solution of problems that contain layers of complexity (2018).

5.1.1.2 Technology in education

As support for these changes in education, Denmark has increased its level of digitalization, so we set out to focus on what are the benefits and barriers of digital learning technology as well as digital learning platforms. To start we can define digital learning as a web-based instruction that offers learners unparalleled access to instructional resources. This is far surpassing the reach of the traditional classrooms. Web-based instructions make it possible to learn experiences that are open, flexible, and distributed, providing opportunities for engaging, interactive, and efficient instructions (Khan, 2010).

Digital learning platforms are increasingly used in the academic field and it's been part of the latest school reforms in Denmark since 2013. Digital strategy program from the period 2016-2020 leads and promotes the digitalization for primary and lower secondary schools. To transform Danish schools into digital learning, several agents are working towards supporting this and among several portals. We can highlight Clio, an educational portal that since 2006 has created several services and tools for classrooms, plus 45 interactive learning portals. Clio is used for more than 750,000 students and 80,000 teachers in Denmark and Sweden and recently they launched an English version to expand the portal (Clio, 2019). A survey was conducted between the time of 30.01.2019 - 13.03.2019 through Clio's database. This survey was distributed via email directly to Danish schools and as a result, the report stated that there was a collection of 5970 respondents, 4465 were teachers, 315 were principals or vice-principals and 1190 were 'others'.

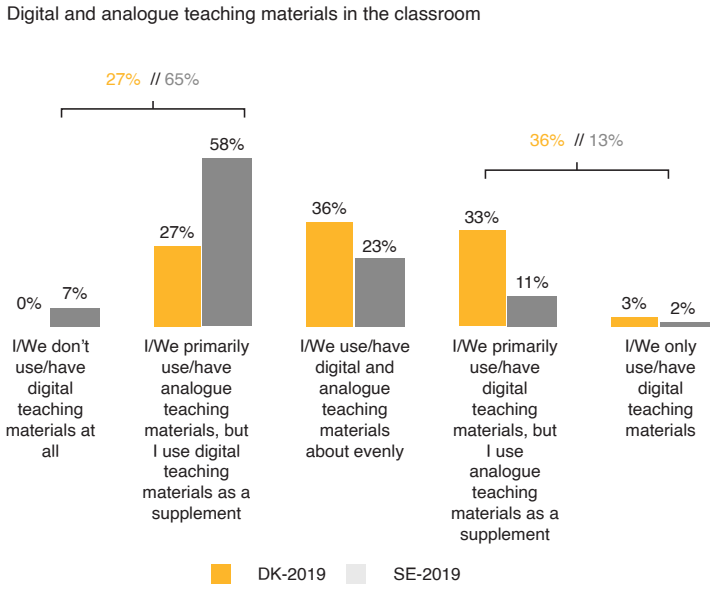


Figure 12: Comparison of digital tendency between teachers in Sweden and Denmark

As represented in the graph (figure 12), Danish teachers tend to be very digital, here 36% of the teachers are primarily using digital material, in Sweden, the teachers only use 13%. On the other hand, 49% of the teachers believe that digital teaching materials prepare the students for the skill requirements of the future in a better way than analogue materials (Clio, 2019).

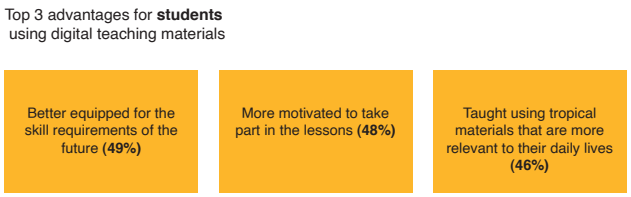


Figure 13: Top 3 advantage for students using digital teaching materials

In the Clio report, it also appeared that teaching through digital material can be defined as more relevant to the situation and is far more motivating. They defined three key advantages to digital teaching methods. This consisted of, 'better equipped for the skill requirements of the future´ (50%). Secondly, 'more motivated´ to take part in the lessons (48%). Then lastly 'taught´ using topic-related material that is more relevant to their daily lives (46%). Numerous advantages were discovered (figure 13). Out of the teachers that were asked 63% of the teachers found digital teaching material to be more updated than analogue materials. It was also for that 'they also support them to get easier inspired (Clio, 2019).

We were also interested in looking at the digital strategy within schools and how respondent municipalities are to install this strategy in schools. More than half do not have a public digital strategy and 42% of the teachers were not aware that their school had a digital strategy (Clio, 2019). The key reason that stated why there was little or no digital strategy, was that there was a lack of resources because of the absence of digital strategies' (Clio,

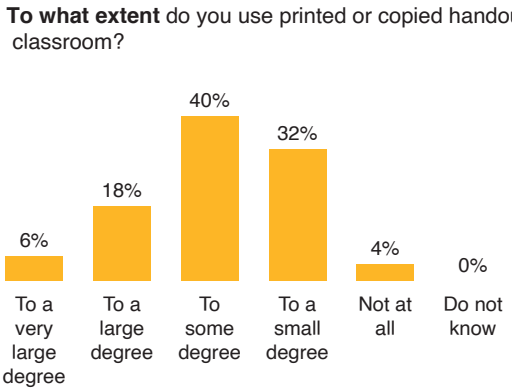


Figure 14: Extent do you use printed or copied handouts in the classroom

2019). 26% stated that they would have no one who could manage the digital strategy whilst 18% said that they don't have the resource to support the digital strategy.

Although the new strategy aims to implement more digital learning platforms and devices we found there is also an increased focus on learning how to use new technology and less focus on having more digital platforms. Some of these new ways are called the 'makers culture', supporting technology-based learning. The 'maker's movements' implicate the use of new digital gadgets, fabrication tools and places for creative learning and teaching and it seems like a creative way to deal with our world, it is aware of ecological challenges and enables to create technological interest and competences (Schön et al., 2014).

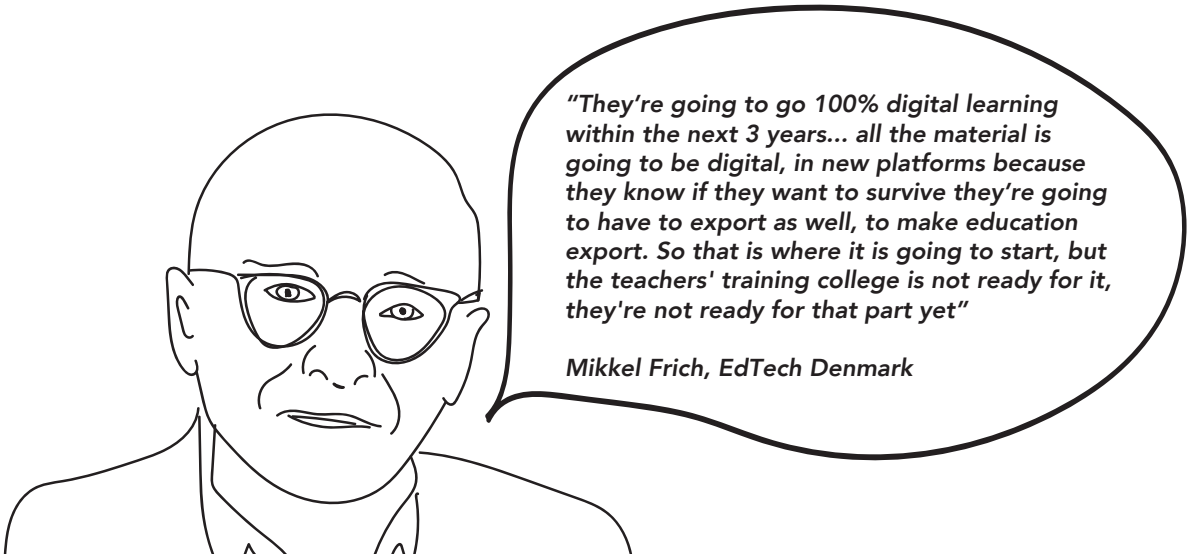


Figure 15: Mikkel Frich

This goes hand in hand with the technology comprehension trial subject (Undervisningsministeriet, 2018), where the aim is to provide students with a level of understanding, in regards to technology and students can understand the implications of digital artefacts. This is to generate greater strength for students to create, understand, and act meaningfully in society. This is done in a way where digital technologies and digital artefacts are catalysed for change.

5.1.1.3 Design in education

As we have presented before, technology, design, innovation & collaboration have been the main focus in education in recent years. There have also been projects that have been developed to provide support for innovation in schools. One of these projects wanted to highlight how design workshops can be used to improve life,

'Project Develop' by INDEX Project worked with the Helsingør Municipality and other partners, intending to strengthen teachers and students competencies in design and innovation so they could be better prepared for the future jobs, emerging technology and global challenges of the future (Innovativ skole, 2020).

Index Project (Design workshops in schools)

The project consisted of a design process facilitation course for teachers in the Helsingør municipality. The project lasted for 3 years and the same project was tested in 7 countries. 1,000 teachers have been educated through this course and 10,000 students have participated in the innovative course (Innovativ skole, 2020). The course also provided a guideline for teachers acting as help for Helsingør teachers, school educators and educator assistants in charge of teaching, providing them knowledge,

tools, and methods to help them create innovative processes and working methods in the classes.

Since the aim is to use the AI design sprint workshop in education, we felt this was a project that was very relevant for our thesis to look further into.

Favrskov municipality (AI Design sprint workshop)

Since we learned that 33A made a design sprint event for teachers and students in Faurskov municipality, we wanted to learn more about it. The project was held in 2019, in the municipality of Favrskov together with 33A and the Design School in Kolding. Here 33A provided their AI Design sprint workshop focused on teaching teachers and students about learning about AI & emerging technology in collaboration. In the sprint, there were 800 teachers and 100 school children. The motivation for doing the sprint was to "Shape the future" with design and technology (33A, 2020).

By using design and digital solutions (AI) to solve complex problems, the aim was for students to learn about the possibilities in emerging technology as well as learning, reflecting, and working in collaboration (Favrskov Kommune, 2018).

We find both of these design workshops projects relevant because they use design methods in an educational context. We discovered through these projects that some teachers adopt these methods in their everyday life and see the value in including this type of methodologies even though implementing these methods can be a challenge for the majority of teachers. To conclude our desk research, we will present a table below that shows the relevant inputs we gained for each field and how this desk research helps us to find relevant actors to interview later in the process.

Figure 16: Index project. Original source: http://innovativskole.dk/

Figure 17: Favrskov municipality. Original source: www.33a.ai

5.1.1.4 Summary of desk research

Feilds	Insights	People we want to reach
Education	New ways of teaching are required in the education systems, this new way aspires to create more prepared professionals for the future that can work in teams and in multidisciplinary ways. Denmark has launched a project to support these changes as a technology and comprehension course and is open to make changes in their laws in order to be aligned with the new goals in education.	We will interview people in the education context in Denmark to discover how they perceive these changes and the resources that the Danish government offer and how they are aligned with this new demand.
Education + Emerging technology	During the entire process of the workshop the participants interacts with the canvas that contains all the steps of the workshop. For defining the problem, the participants select a problem statement and places it in the canvas. The problem is provided in a form of a 3 step storyboard with the problem statement and they also have to select a persona that represent the user.	We will interview experts related to EdTech to identify how they see the situation in Denmark towards their digital goals and which challenges they have to overcome.
Education + Design	In order to support the new needs in education, design methods are seen as an opportunity to teach how to solve real problems in society. Different projects have emerged in order to insert these new ways of learning in an educational setting but still is not a demand for education.	We will interview people in the field of design and specifically people that have been working in developing design tools for educational contexts.

Table 2: Summary of desk research

5.2 STAKEHOLDERS MAP

The initial desk research provided insights into the macro environment, so we wanted to get an overview over who could indirectly or directly engage with 33A and the AI design sprint workshop. The stakeholders' map (figure 18) is a visualization of the stakeholders put into a map or system which is developed according to specific priorities (Stickdorn et al., 2018) and how they could potentially influence the development of the service.

To prioritise the stakeholders directly or indirectly influencing 33A we began by splitting the stakeholder map into three key parts, we had layer 'A', 'B', and 'C'. Layer 'A' are internal stakeholders, and these are entities within a business, these could be employees or managers. Layer 'B' are important stakeholders, these external stakeholders are to help keep in mind when making decisions and carrying out operations. They are not directly connected to the user, these could be suppliers,

communities, governments, and society at large. Layer 'C' are other stakeholders, this category represents the stakeholders who do not interfere with 33A. The layer involves stakeholders who can still be affected.

Once we could visualize the relevance of the stakeholder's map we decided to interview the stakeholders closest to the middle layer. They were formed from the field of education, technology and design, those are: Students, Teachers, Design & Education & Technology experts and The objectives and outcomes of these interviews will be presented in the next chapters.

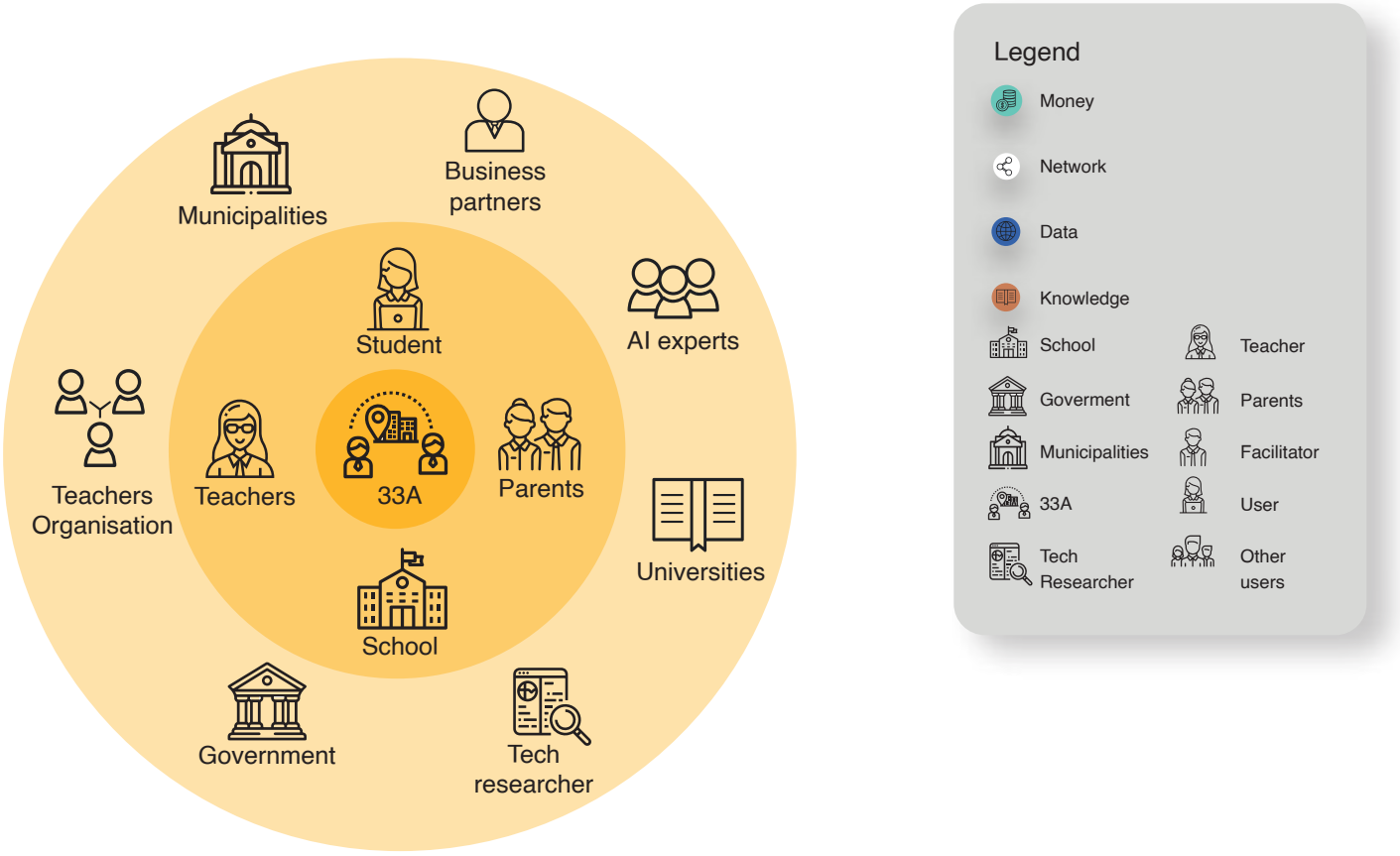


Figure 18: Stakeholder map

5.2 INTERVIEWS

At the beginning of the thesis process, the research team managed to meet face to face with stakeholders. The following section describes the field research done through Business meetings with 33A, and interviews with relevant experts (see figure 19).

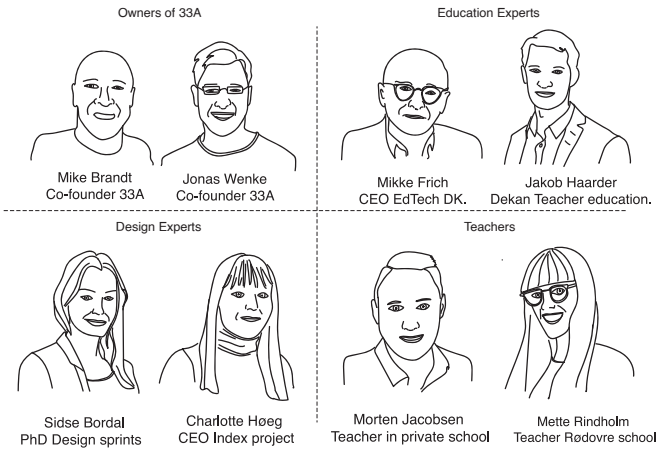


Figure 19 Expert that will be interview

The purpose of the field research was to uncover relevant "themes" pains and gains which could be examined and further used to define the opportunity areas as well as helping us to understand the current status of education, as well as knowing more about the potential users of the AI design sprint workshops. The majority of the interviews were contextual interviews taking place in a familiar environment as it is here the process of interest occurs (Stickdorn & Schneider, 2014) although due to the Corona situations some of the business supervisions later in the process were performed remotely via Zoom or Skype. The interview recording and its transcript can be found in appendix 2.

5.2.1 Business meeting with 33A

The purpose of the meeting was to know more about their previous experience and motivation for doing sprints for schools. We wanted to discover what they believe would be of value for the new target group. The meeting was very informal with some predefined questions and took place at AL02 in Copenhagen. CEO Mike Brandt and Service designer Jonas Wenke told us that they believed there was a market for it due to the request for 21st Century skills in children and to learn how to collaborate so they would like to customize the AI sprint to work for children based on their previous experiences and mentioning the wish to simplify it by reducing the time and complexity and for children. They would like children to reflect & discuss between them the potential consequences concerning their solution and the problem they should solve.

Figure 20: Mike Brandt

Figure 21: Jonas Wenke

5.2.2 Interviews with teachers

To get feedback and present the AI design sprint to two teachers, we decided to interview Morten Jacobsen who is working as a teacher in a private school. Morten was very passionate about transforming education and could be considered an early adopter. We met Morten Jacobsen in AL02 in Copenhagen. Shortly after we interviewed Mette Rindholm who represents the late majority of teachers in Danish Public schools. We conducted the interview in the Campus of AAU Cph. The main purpose of the two interviews was to gain knowledge from two very diverse teachers' experiences with Design sprints and to know more about their perspective on using new teaching methods such as the AI design sprint workshop.

Morten Jacobsen, teacher in private school;
Morten Jacobsen was presented to the canvas and the sprint and we got some feedback based on some predefined questions. We wanted to know if he could see it being used in learning.

After talking to Morten we learned that for children to work with emerging technology they need to have an introduction before due to the complexity of the topic. Furthermore, technological comprehension is not about the technicalities but more about talking about the different kinds of technology and the potential and pros and cons. He also explained that it is important to focus on the process of learning not only AI due to the complexity and the potential of scaring off less technically skilled teachers or facilitators away. Furthermore, how much preparation would be needed if you would use the AI Sprint. When looking at the cards he felt it was more important to emphasize explaining how and where the particular technology could be used, to not focus too much on the technology itself.

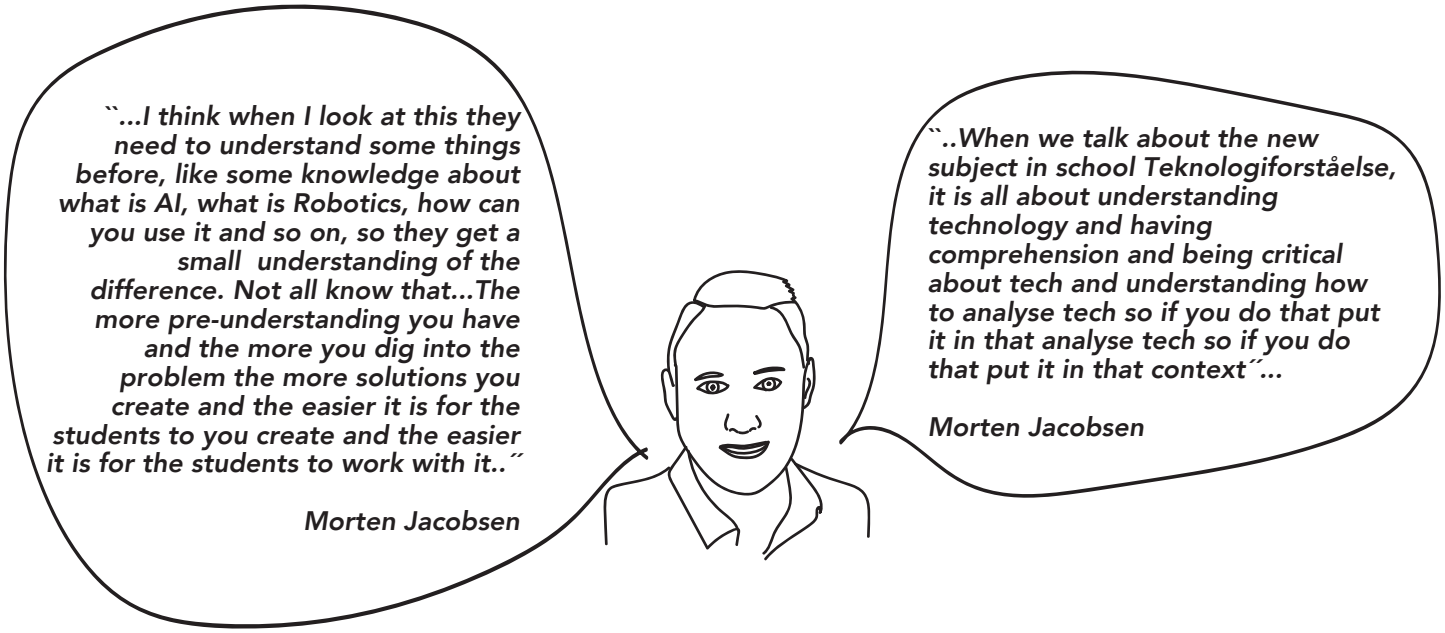


Figure 22: Morten Jacobsen

Mette Rindholm, teacher Rødovre school;
Mette was unaware of what a design sprint was and told us that you have to feel confident if you want to use new platforms or methods to teach. She explained that they use online teaching platforms a lot, mainly CLIO since it is easy to follow a guideline event though you are not experienced in a subject. We learned that if a student has a teacher who is inexperienced or uninterested in AI & emerging technology they will probably not have any teaching on this topic. Mette said that it could be quite hard to find the time to do it and that it would require a whole day. Furthermore, it was difficult to structure teaching if half of the computers were not working. It requires not only pieces of knowledge in terms of the sprint but also about technology. Reflection in regards to obstacles concerning technology is an important part of technological comprehension.

Figure 23: Mette Rindholm

5.2.2.1 Main insights from teachers:

1. Teachers are not ready or capable to facilitate design sprints at the moment due to time and lack of experience (know-how). When it comes to the sprint it should be easy to use and not take too much time to prepare.
2. The role of teachers today is more a guiding role concerning technology since children already know more about technology than most teachers do. Using online teaching platforms such as Clio as a teaching guide is very common for teachers to use.
3. Technological comprehension is not only about technicalities but discussing how different kinds of technology have the potential and pros and cons hereby giving the children the ability to reflect and be critical when using emerging technology.
4. In Danish school's students and teachers need to have a pre-understanding of a topic and define a focus area if you should seriously work with technology so that the focus can be the reflection and not only the technology.
5. For children to collaborate and as part of reflection they should provide each other feedback and discuss how the topic and the solutions affect eg. people and the environment.

5.2.3 Interviews with experts within education and technology (EdTech)

We wanted to interview potential stakeholders within EdTech as well as teachers in a primary and secondary school to get more knowledge about the opportunities to run AI Design sprints in the danish schools, and if it could be a reality to implement. Therefore, we met with Jakob Harder, the Dekan of the teachers' education in Denmark, as well as meeting with Mikkel Frich from EdTech Denmark. EdTech Denmark aims to foster collaboration and engagement among stakeholders within education.

Jakob Harder, Dekan at the teacher's academy;
Jakob explained that the impact of technology would also affect the role of the teachers and in the classroom, which enables students to be experts fast which means that teachers will have more of a guiding role – not just a facilitator role than many people think. Therefore, they needed new methods for teaching eg. design Thinking methods.

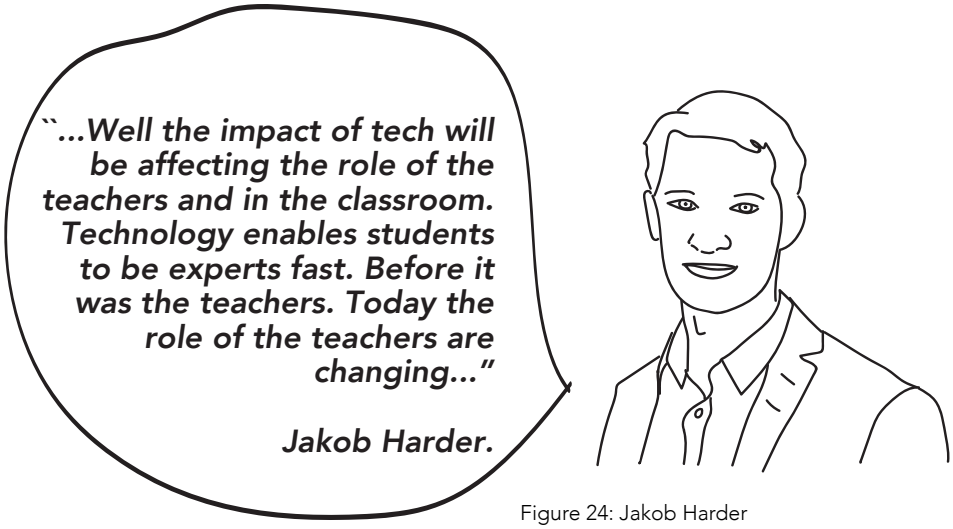


Figure 24: Jakob Harder

Mikkel Frich, EdTech Denmark;
Mikkel explained that schools would have to go 100% towards digital learning within the next 3 years if they wanted to survive and make education export but the problem is that the teachers training college and schools are not ready for it. In terms of age groups in children, there is a difference in terms of complexity.

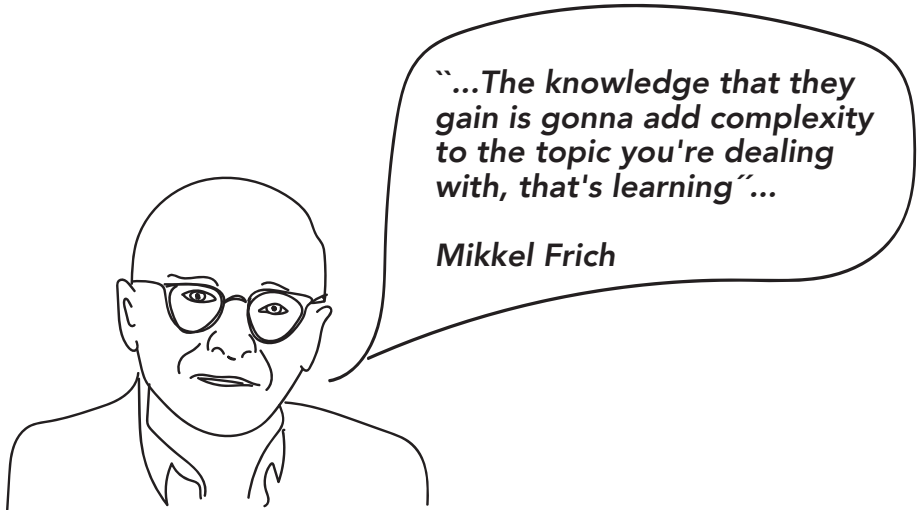


Figure 25: Mikkel Frich

5.2.3.1 Main insight from experts within Education and technology (EdTech)

1. Danish schools are not so flexible since they are regulated by learning goals and it is up to the teacher to structure their classes and their learning goals.
2. In the near future, the goal is to make learning 100% digital within the next 3 years.
3. The role of teachers is changing now so today teachers are more acting as guides asking the students questions and making them reflect.
4. Students are therefore increasingly responsible for their learning because teachers are not experts with all the answers because they don't know the future.
5. Before (pre)- service, could be to define the learning goals/scope in collaboration and in the after service to have a feedback session to make students reflect on the Design Sprint process and the learning goals/scope Eg. how the students see the goals were fulfilled, and how the problem was solved including the discussion of how AI and emerging technology are used.

5.2.4 Interview with experts in Design methodologies

We presented the existing AI Design Sprint Canvas and Cards to two experts in design in education Sidse Bordal, PhD in Design methodology & Certified Google Sprint facilitator & Charlotte

Høeg from the INDEX project. The interviews intended to gain valuable insights from the experts' prior experiences using new teaching methods, as well as getting feedback on the existing AI Design sprint process and format. This was done to know more about how they see it could work for children as a learning tool. We met them at their offices in BLOX Copenhagen.

Sidse Bordal, PhD in Design methodology and Certified Google Sprint facilitator;
Sidse Bordal works together with Design skolen & Sprint digital which is a design-driven project lasting for 3 years. The aim is to run Design sprints based on the Google Design sprint frame at least 100 small and medium-sized companies. Sidse told us that a very structured design process is not the real research way (which is not limited by time) it is more unstructured in research and education. Due to time limits and limited revenue for small companies and even in learning environments it has to be more structured in time and specific time to gain more from it. Also, the value is often more than just the result but is the process throughout important to keep children motivated.

Charlotte Høeg, INDEX project;
We met with Charlotte to get some insights about the INDEX project which was running for 3 years in schools in the Municipality of Helsingør. The intention of the project which was called "Design to improve life", was to strengthen students' competencies in innovation, design and collaboration, so they could be better prepared for the future jobs, technologies and global challenge of the future. Furthermore, teachers were taught to facilitate a design process with a facilitation tool the KOMPAS acting as a teacher guide (Innovativ skole, 2020).

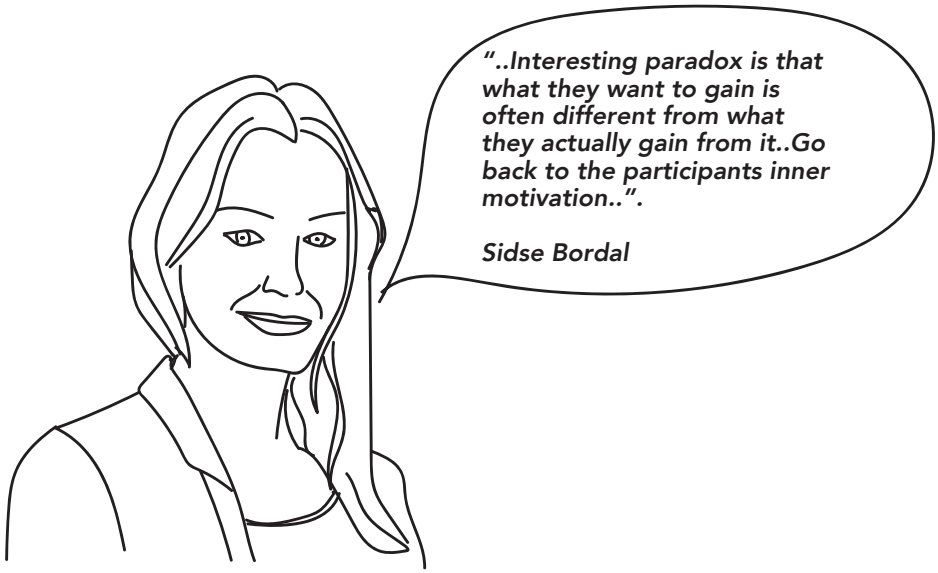


Figure 26: Sidse Bordal

Figure 27: Charlotte Høeg

5.2.4.1 Main insights from design methodology experts

1. Teachers know they need to work with 21. Century skills and technology, but they do not have the time to implement it in their daily work.
2. The majority of teachers did not see the value in using the new tools and methods of design because they did not know what it was and had other ways of teaching.
3. The teachers who are more interested and open to it would be early adopters.
4. When working with children of teachers in a design workshop & process you need to define a purpose or a goal to keep them focused throughout.
5. The value derived from it should be in the process and not the outcome but it can be difficult to measure the value derived from a creative design process.
6. There is a scalability and format issue which can be an obstacle for teachers to implement it as well as keeping in mind not to make it too long.

5.3 FIRST WORKSHOP

Based on the initial findings, we chose to conduct the existing AI design sprint workshop but using children as participants. This was done to observe and analyse their experience and identify the challenges in the user journey. Furthermore, we wanted to identify if they had challenges in relation to collaboration and level of motivation. We know from the literature that collaboration can be affected if the participants unequally contribute to group work thus affecting the motivation and the engagement of the participants (Andrews & Rapp, 2015). Also, we learned that participants can recognize if they are achieving their learning goals

if their team members also succeed.

The purpose of the workshop was also to observe if the participants helped each other by providing emotional and tutorial support between them when they are working in teams since it will help them achieve the common goal (Leinonen & Durall-Gazulla, 2014). In design workshop processes, collaboration is used to coordinate activities where teams synchronously aim to design and maintain the same understanding of the problem. This is done to discuss and articulate their thoughts and emotions between participants. We know this shared understanding can happen by using design tools such as audible or visual artefacts and can support or trigger their reflection-in-action (Zhang et al., 2020). Based on this notion we wanted to observe if the design tools and the activities in the AI design sprint workshop contributed to the collaboration, and shared understanding through the workshop.

Now we will use the relevant theoretical approaches presented in the literature review, as a theoretical lens to analyze our findings. First, we will use what we learned from service design approach tools, choosing user journey mapping to analyze the workshop experience from the children's perspective and to understand their emotions and feelings related to the service. To do so, we will use emotional journey maps (Oblo, 2020) to measure their level of motivation and engagement with the service, this will help us illustrate the steps before (pre-session), during (in-process) and after (post-process) the children's experience and highlight the pain points and positive aspects that we can identify during the process (Reason et al., 2015).

Secondly, we will use the theoretical approach in relation to collaborating learning from (D. W. Johnson & Johnson, 1990) related to group interaction as Trust, discussion & Feedback, Individual & group task, Evaluation and from (Collazos et al., 2007) we will take in account Success criteria in applying strategy and from the settings of the workshop as Activities, Participants, Tools and Objects. We will analyze the interaction between children in terms of collaboration to later identify the missing elements from collaborative learning that can help trigger better collaboration among children. This theoretical approach will be used for the analysis.

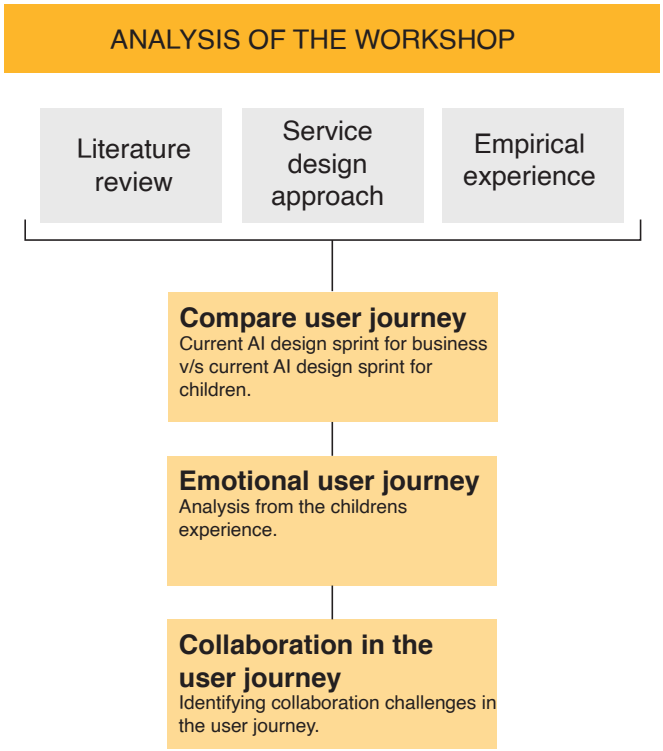


Figure 28 Representation of our analysis of the workshop

5.3.1 Planning the workshop

For conducting a workshop, we need to prepare the number of participants, the structure of the workshop, and how we will collect the information during the workshop. Before the workshop, we started looking for possible participants. (Burtonshaw-Gunn, 2010). We wanted to have two groups that could give each other feedback at the end of the process. To motivate the children to participate we offer a gift card, this helps us to gather 6 children, 3 from 8th grade, and 3 from 9th grade. When we selected the participants we took into account the previous experience we had during the internship where we conducted a similar AI design sprint workshop with younger children from 6th and 7th grade. From this previous experience, we learned that the content of the cards and the instruction of the workshop were too complex for that age of children so this time we choose older children and identify possible similarities or differences between the different group ages. During research when interviewing experts we were able to detect that different age groups can lead to different results supported by the fact that the age can provide a huge difference to the level of discussion and reflection concerning AI and technology comprehension (Park & Lee, 2015).

After gathering the participants, we started structuring the workshop, as a strategy for analysing the pain point of the original workshop that 33A does with companies and try to stick to this structure as much as we could. When involving the students that were part of our group interview and workshops, we had due to the legal age of the children, at all times be in contact with one adult (parent), who in consent with the rest of the children's parents, was responsible for providing us with the opportunity to conduct the group interview at her house. To prepare ourselves and gather the information we need to collect two types of information, one related to the interaction between the participants that will be focused on how they collaborate and the other one about their emotions and how they experience the workshop. For analysing the collaboration between participants we decided to use participant observation and for the second one, we used an emotional journey map (Oblo, 2020).

Group interview

As part of our workshop, we conducted a group interview afterwards to get answers to specific questions related to the workshop process. In the group interview, the interviewer has a more prominent role than in a group interview where a group discusses or develops a topic (Bjørner, 2015). The interview questions in the group interviews were semi-structured having only some predefined questions as an interview guide. This allowed the interviews to be conducted with more freedom as the interview proceeded and made room to add more questions in response to our key informants' answers and reactions (Bjørner, 2015). Whenever possible the interviews with the key informants were recorded enabling the research team to listen to the recordings afterwards to ensure that no important insights and key points would be missing.

Participant Observations

The participant's observation approach is a research tool to observe the participants and immerse them in their "lives" of research participants (Stickdorn et al., 2018).

In this case, participant observation of the workshop was conducted to make it in a realistic and relevant context, to get a picture of the participants ' behaviour' and their opinions (Stickdorn & Schneider, 2014) The observation approach made it possible to gain deeper insight into the concrete and practical knowledge about the respondent and situation (Bjørner, 2015).

We mainly observed the participants that did not participate directly in the behaviour and the act being observed (Bjørner, 2015) although we in some situations engaged to have a dialogue and guide them. By doing observations we could be close to users' and stakeholders' interactions, behaviours, and processes, which made it possible to gain deeper insight into concrete and practical knowledge about the user and situation (Stickdorn & Schneider, 2014). We found this tool useful because it lets us observe the users in their environment where we can observe their interactions and complement the observation with questions, in our case a group interview at the end of the workshop. Final outputs of the participant observation tool can be text, audio recording, photos, videos or artefacts.

``...You can use the participant's observation tool in a situational context and ask participants to explain specific activities, artefacts, behaviour, motivations, needs, pains, or gains...´´.(Stickdorn et al., 2018, p. 146)

Under this context we divided our teamwork and decided that one was going to record the workshop session that can be found in appendix 2, take pictures to document and notes meanwhile others were going to facilitate the workshop. We also talked about keeping in mind how participants act and not only what they say because sometimes what people say and what people do can be revealing so is important to observe their body language and gesture (Stickdorn et al., 2018).

Emotional user journey

An emotional user journey is a visualization tool that maps and illustrates the user's emotional experience when interacting with the service, organization, product or brand (Stickdorn et al., 2018).

For the emotional user journey, we planned some questions for the children to answer every time they concluded a phase in the workshop. These questions were related to how they were emotionally feeling during each phase of the workshop. The questions and how they should answer were the following:

1-How clear was the objective of the task? We asked them to rank from 1 to 6 how they were feeling being 1 the less clear or prepare and 6 the clearer and prepare

2-How do you feel during this task? We define different colours for different emotions we had red for boring, yellow for neutral or doesn't understand, green for a fun, blue for excited and white for complicated

3-How prepared do you feel to move for the next task? We asked them to rank from 1 to 6 how they were feeling being 1 the less clear or prepare and 6 the clearer and prepare.

Finally, we also wanted to have the children's opinion of the whole process and maybe this could help us to gain more valuable information for the emotional user journey, for this, we conducted a

small group interview at the end of the workshop. The questions were about the whole experience and how they feel during the whole process, what they liked more and less, and if they had some suggestions about the workshop. Once we planned everything we gathered to facilitate the workshop at one of our group member houses, we invited the children and the workshop lasted around 2 hours with a break in the middle with snacks for the participants.

Figure 29: Answers from children after the workshop


Figure 30: First workshop


Figure 31: First workshop


Figure 32: First workshop

5.3.2 Challenges identified in the user journey

The result of the workshop will be presented in three main categories, first one will present challenges in the replication of the AI design sprint workshop for a new target group, then we will present from what we observe could be replicated and what could not. We will also point out relevant aspects to consider, mentioned from the expert's point of view, related to the current user steps in the AI design sprint. Then we will present the children's perspective on their experience through the workshop, using an emotional user journey and finally, we will show the challenges we could observe in relation to collaboration.

5.3.2.1 Challenges in the replication of the workshop and experts point of view.

As it was mentioned before we aimed to follow the steps that 33A uses with companies, but after facilitating the workshop with children we realized that some steps could not be 100% replicated. From this point, we decide to contrast the two journeys and see which of the steps were missing, and how this could affect the service from 33A perspective figure 33.

The main aspects discovered will be presented in the form of **Before, During and After**

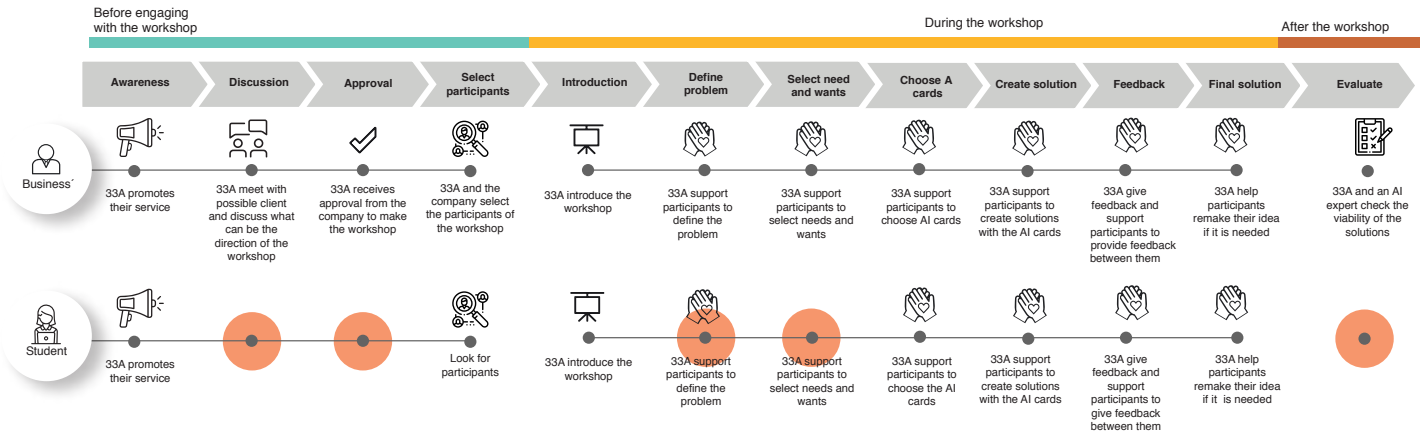


Figure 33: Compation of the replication of the workshop

Before the workshop

There was not a space to discuss either with a facilitator or between the children what they would like the workshop to be focused on; this reduced the customization and also the awareness from both parts of what the workshop is about and how they should perform during the workshop.

During the workshop

Most of the steps were replicated in this phase, but we could not make the children reflect on the needs or wants of the person because we did not have a specific case as when 33A works with companies. When 33A defines with the company the topic of the workshop, 33A can customize the workshop and create personas and problems concerning the topic.

After the workshop

In this phase, 33A has an expert that goes through the concept solution to identify the viability of the ideas but as we do not have an AI expert we did not go through this step. Also, we did not find this phase crucial taking into consideration that with children the process is the main focus and not entirely the final solutions in terms of visibility of the ideas so we focus more on evaluating if the learning process was achieved.

From the interview point of view with expert and children we could highlight the following relevant aspect to keep in mind (see figure 34).

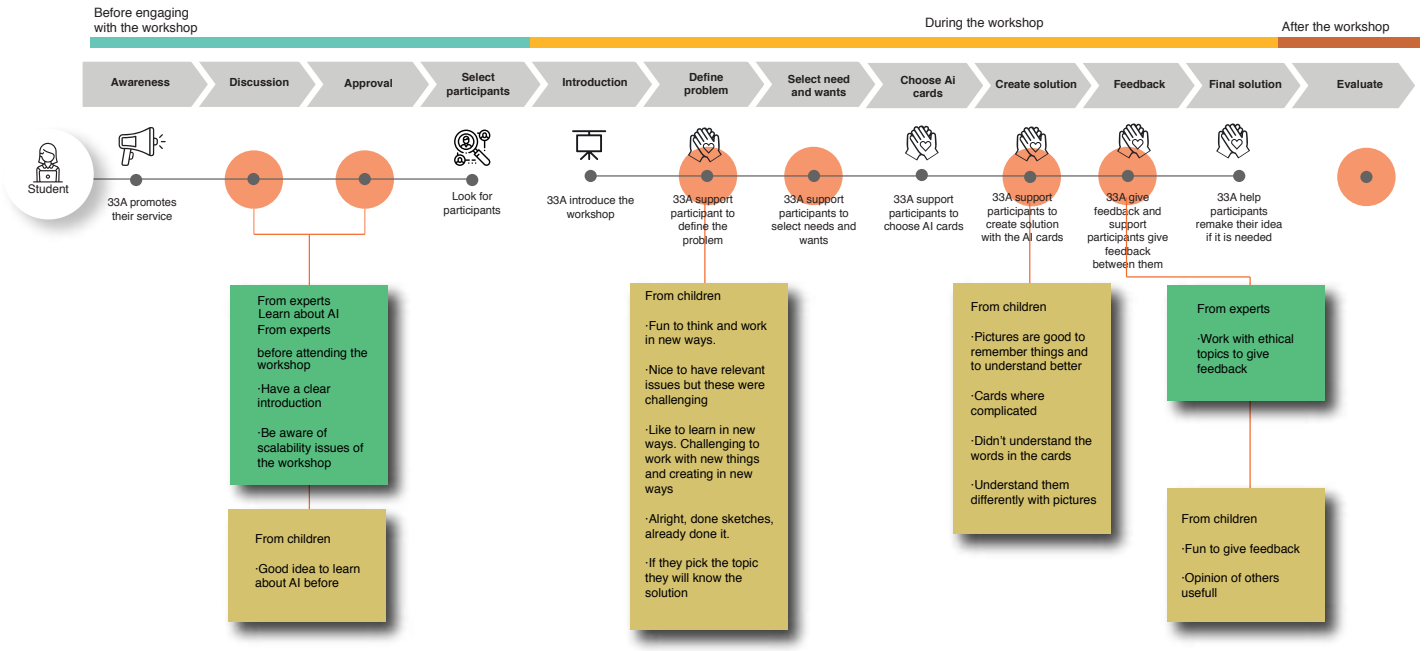


Figure 34: User journey with feeback from experts and children

The relevant aspects discovered were:

Before the workshop

From experts and from children interviews It was mentioned several times from different sources that it would be relevant to learn more about AI and have an introduction to the workshop before attending the workshop. Information gathered from interviews found in appendix 2.

During the workshop

From the children's interview, the comments were in relation to the first step of the workshop, the problem definition was children mention that working with premade problems is something new that makes them think outside the box and even though they found it hard and challenging they also like to learn in new ways. Also was commented that they found challenging the ideation phase because the cards were too many and sometimes too complex for understanding. Information gathered from interviews found in appendix 2.

After the workshop

From experts and children interviews we can highlight that at the end of the workshop it would be relevant to foment the feedback between the groups. Information gathered from interviews found in appendix 2.

5.3.2.2 Emotional user journey

Emotions play an integral part in any customer journey where customers (users) of service go through a range of positive and negative emotional reactions. Since we learned the importance of positive emotions such as motivation and engagement related to collaboration we needed to get an overview to ensure the positive emotions and experiences outweighed the negative. The children placed coloured dot stickers on sheets, each colour represented different emotions for each step of the design process. The purpose was to use words that would be understood by children that could give us an indication of their level of engagement and motivation. Furthermore we added a range of numbers from 1-5 related to the level of difficulty. The answer is represented in the following emotional journey map (see figure

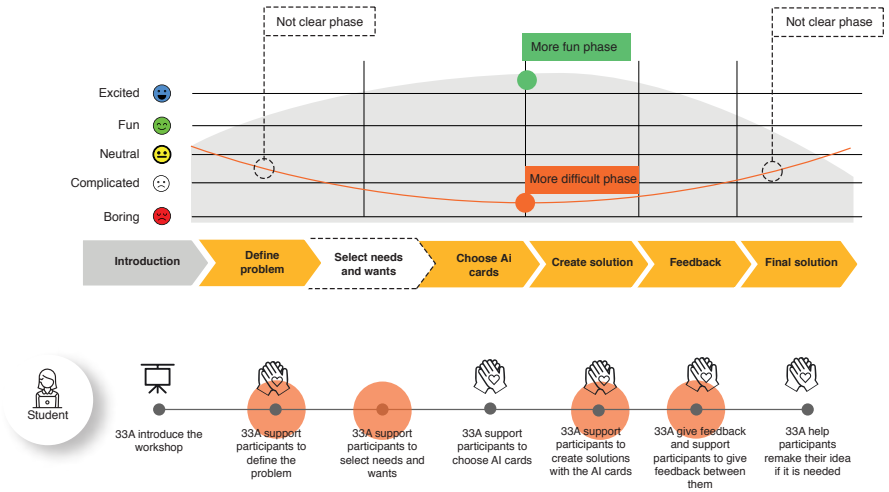


Figure 35: Emotional user journey

35).

From here we examined the mapped emotions from the children during the process reflecting on the insights from the final group interview we had with them. As the question and the analysis of the user perspective was only when children were interacting during the workshop we only describe what we discover in the during phase.

During the workshop

Overall from what the children mentioned they felt that they have a clear understanding of the task during the process, but from what we could observe during the workshop some steps needed more assistance.

An example of the steps was the "problem definition" and the "ideation" phase because the facilitator took more time in explaining these steps and the facilitator needs it to repeat the tasks more than one time. From what we could observe and from what children answered from the group interview (appendix 2) the most challenging step was the ideation phase. This was because the number of cards and the time assigned for the task was not enough. This added to the complexity of understanding the content of the cards and it made it hard for children to utilize AI for their concepts. On the other hand, the ideation phase was the most fun for them among the other steps and the most boring one was the problem definition. During the process, there were some steps that were harder to understand for children therefore they lacked motivation and reflection during the process. And since they did not at all times understand the objective of the task they were not clear on how to go through the process or how to collaborate on the exercises at all times. It was only once they had finished the workshop and were asked the question for the group interview, that they realized all the work they did, why they did it, and what new things they learned.

5.3.2.3 Challenges in collaboration

Our final analysis was in relation to collaboration during the workshop. We know from the literature that uneven tasks can demotivate participants in their learning process (Andrews & Rapp, 2015). We observed that the children at times had uneven tasks and roles due to their different personalities, for instance, some participants were quieter and others more extroverted making a difference in the dynamic in the group which affected their lack of motivation and engagement. The lack of motivation and engagement increased due to the tools and activities of the workshop that do not help in the communication and collaboration between the participants.

As we learned from theory collaborative learning is an educational approach and instruction method where learning involves groups of learners working together on tasks, towards a common goal which can encourage and motivate them to collaborate. Now that we know what are the pain points in the user journey related these factors we now want to illustrate the missing elements of collaborative learning that we could detect During the workshop presentations in the figure 36.

During the workshop, we could observe from the interaction between the children that as the

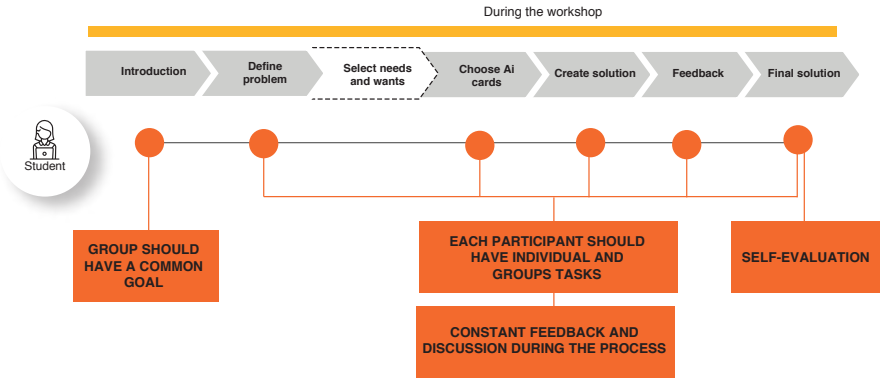


Figure 36: User journey and the pain point in relation to collaboration

instructions during the workshop were not clear enough there was a lack of understanding of what they needed to do so the trust between the children was affected because they could not rely on another and they were not clear in their common goals, also this makes harder to understand which were the individual and group task, we could see this when some children were left out with no task during some activities. These challenges affect the "apply strategies" and the "success criteria" because children could not build a strong communication either create a common strategy to solve the problems and the level of involvement during the process was decreasing.

The feedback and discussion of the process only occur in the feedback step and is not something that constantly happens along the process. When it came to getting feedback about the AI solution children could not perform feedback because during the workshop they did not fully understand the content of the AI cards, making it harder to give feedback.

As facilitators, we realized that children need a lot of assistance when working in groups making us interested in the idea of providing a guideline acting as instruction and support. Further on there was no space for evaluating the process because that step was for the AI expert in the original AI design sprint.

In relation to missing Collaborative learning elements in the workshop, we can detect that the activities are not well defined preventing the workflow of individual and collaborative activities that will compose the process. Children do not have a clear understanding of their participant roles keeping some children outside of the dynamic and affecting their engagement. The tools that the workshop currently provides are not facilitating the communication, participation, and coordination between the children. Finally, the object or evidence of the knowledge that is shared in the workshop is only an object created in "group" so there is no differentiation of what each child can contribute to the collaboration. For example, when children have to define the problem they need to draw a storyboard that in this case will be the object that

represents the knowledge but because the roles are not clear only one child draws the storyboard so there is no shared knowledge.

5.3.2.4 Sum-up of the challenges discovered

BEFORE

During the workshop there is not enough time to understand all the categories also the time assigned for selecting the AI card is too short for the amount of cards.

Before children attend the workshop a pre-knowledge of what the workshop is about is needed.

We want to state
·What they can learn
·What are they going to do
·How are they going to use AI

In reference to collaborative learning we see value in developing an introduction.

This is so children have a better understanding of what their roles are during the workshop and what is the content of the workshop. We believed that if children get a better overview of the process they will have a better understanding of what is expected and what they should do facilitating the workflow of the process and the interaction between the participants.

Figure 37: Challenge obvserve before the workshop

DURING

Define the problem	Ideation	Feedback
Children had a hard time **understanding** the **personas problem** and then **illustrating** the **problem** in a form of a storyboard. There is **no clear role assigned** in this step and this makes some **children feel lef tout**. For example there was **only one kid** that **writes** the **problem and another one that draws** but there is not a collaborative way of doing it or even discussing it between children.	The main problem is the **complexity** of the **content** of the **cards** and the **number** of **cards** that the children's use to **create** the **solution.** This contributed to the **complexity** to **merge** the **chosen cards** into a **one concept solution** and create this solution between a group of people make this step difficult for them.	At this point the children are **tired and we lose their concentration.** They are also **afraid of giving feedback** and the **mix of these elements** make the step inconsistent.

The problems in each step were mainly from a lack of clarity from the children in what they should do and what was expected from them. In this confusion some children are left out of the process. The loss of their engagement during the process affected collaborative learning. From a collaborative learning perspective, we need to reinforce, during the whole process the reflection in the children of what they are doing and why they are doing it. We need to have clearer instructions and provide activities for each children.

Figure 38: Challenge obvserve during the workshop

AFTER

There is a lack of the evaluation in the end this is because that in the business AI design sprint this step is oriented to validate if their solution is viable or not with an artificial intelligence expert.

We could not replicate the evaluation phase because we did not have an artificial expert. We reflect that in the childrens case we are more focused in the process than in the outcome. This makes us think that we need to have a section where students can evaluate if they can learn what they expected. We want to also keep in mind if their idea can be inserted in society and how this idea can impact them the society.

Figure 39: Challenge obvserve after the workshop

6. DEFINE

In this chapter in our design process, we analyze the research results gathered. We use a series of tools, labelled in figure 40 to help us cluster the information, detract and categorize our insights, and to understand our target users. In this phase, we define our user's behaviours by providing archetypes in the form of empathy maps. Furthermore, we will make user stories that will lead us to "How might we" questions that will turn our challenge into an opportunity for a design solution.

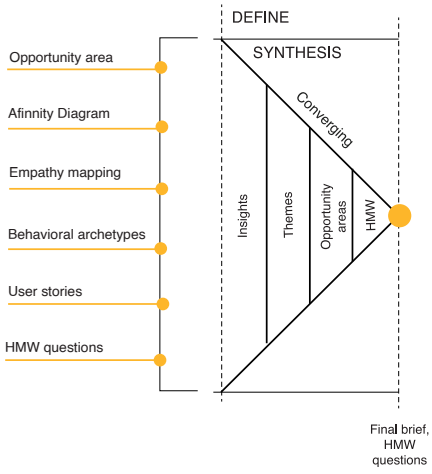


Figure 40: Nessler "Double Diamond revamped, define phase

6.1 OPPORTUNITY AREA

The discover phase in our process enabled us to collect a great amount of information about our thesis topic and our target group, children (students) and teachers. The information that was extracted, was derived from a diverse range of sources. Before clustering our data and developing insights from our research, we have detected patterns in our research, these patterns provide scope into potential opportunity areas. We had noticed that learning on a digital platform was a recurring topic in our research and we have notified it as a potential opportunity for children to learn and work together online. We have noticed that schools are not exactly prepared to adapt to this new way of learning.

6.2 AFFINITY DIAGRAM

To start our define phase, we wanted to put down all the insights in categories by going through a process of clustering all the information collected. This process started by summarizing desk research insights, interview insights, and workshop insights (Dam& Teo, 2020). The diagram provided us with a tool to help us gather large amounts of data and organize them into groups or themes (Dam & Teo, 2020).

To narrow down the insights we needed to synthesize the main insights to be able to take them to the ideation phase. We were given a minimal amount of time to select and we gave ourselves 5 minutes to decide on our decisions.

Figure 41: Affnity diagram

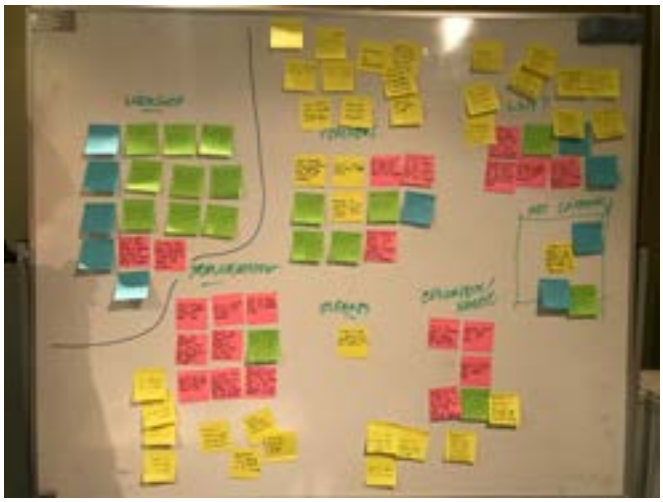


Figure 42: Affnity diagram

Next, we were able to prioritize the insights based on the most voted. Similar insights enabled us to deselect insights. The top key insights we gathered from the interviews are in figure 43:

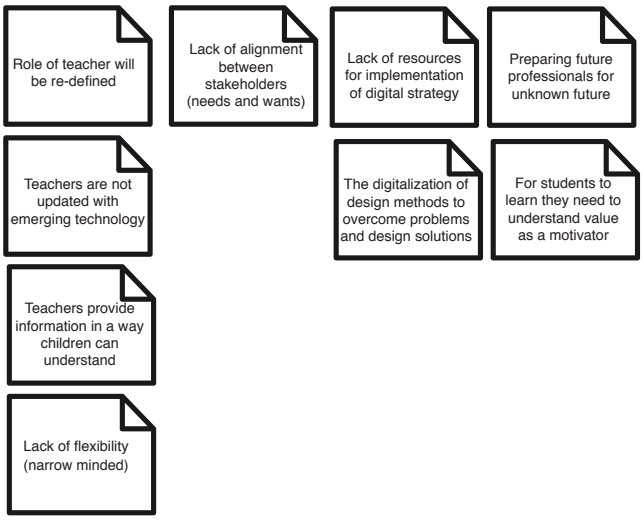


Figure 43: Top hey insights

Concluding this chapter, we could say that the scope of our concept solution should consider the following constraints based on the knowledge provided by experts and teachers. We should also consider a scope where the AI design sprint workshop can provide within a realistic timeframe and therefore 33A will be responsible for the facilitation as it is:

1. The context of the service needs to be outside the school & classroom setting because the educational system is not prepared to implement the Ai design sprint workshop.
2. The primary target users will be children from Udskolingen (secondary school).
3. When launching the service, the facilitation will be by 33A although the potential client (facilitator) will be any person interested in engaging in AI design sprint workshops; this could be teachers, parents, or other design companies.
4. The service must consider in terms of scalability and the demand for online/remote learning environments to be in some way more digital.
5. The service itself needs to be clearer and more self-explanatory and also support children to have critical thinking by reflection, discussion, and evaluation between the participants related to AI. It also needs to help enhance collaboration where students work together solving problems with AI.
6. Participants engaging in the AI design sprint workshop service need to understand the context and value to stay motivated.

The following chapter explains the context and actors involved in future service to understand and match the problem statement with the correct solution. Based on our research in the discover phase and the experience gathered from previous workshops we experienced that the new AI design sprint workshop due to the complexity of the topic of AI, would be primarily focused on children in the later classes of secondary school (Udskolingen) as the main user. Therefore we adjusted the problem statement to be:

"How can we use Service design and collaborative learning theory to support the customization of the user journey of the AI design sprint workshop for children in secondary school (Udskolingen)?"

6.3 EMPATHY MAPPING

An empathy map originally created by Dave Gray is a collaborative tool that teams can use to gain a deeper insight into their customers as you can see in figure 44. Much like user personas, empathy maps can represent a group of users, such as a

customer segment (Bland, 2016) although personas help make groups with similar service needs more understandable (Stickdorn et al., 2018). Usually, the way to represent a user in the design process is by using rich, realistic, and specific representations or abstractions such as personas. However, child-specific methods for creating such representations, which are both systematic and responsive to the design context, have yet to be developed.

User representation techniques that have been specifically adapted to model the age-specific characteristics of children are required. Furthermore, since we are designers, we are not trained in child development and therefore we are not capable of interpreting children's behaviours and articulations which could turn out to be based on our own experience which can be biased. Lastly, the method rarely incorporates theoretical information which is arguably more important with child audiences since children's needs, abilities, and skills are not the same as adults and change as children age (Antle, 2008).

The key motive to conduct behavioural archetypes was to educate us as a group and 33A about their potential users and how 33A can tailor their business goals towards customizing them for new target groups. This information was provided through the main users of this service, the students (children) and the possible client, teacher, parents, or 33A.

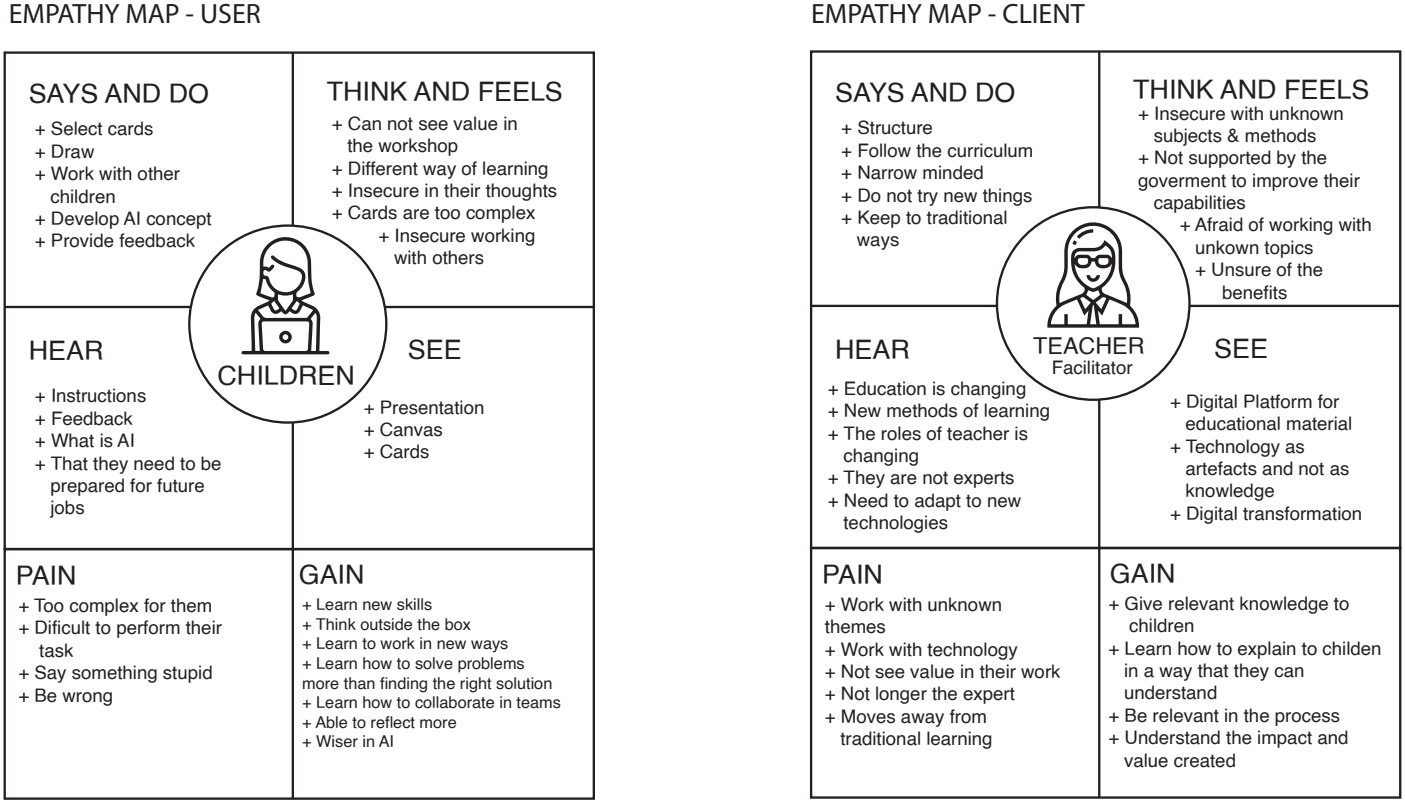


Figure 44: Empathy map

Therefore, we decided to use empathy mapping to generate a rich description of the user and the client. The archetype would exemplify a group of people, for our case it would be users and potential clients. The archetypes focus on types of customer motivations and behaviours. This is done to achieve empathy within a specific group of people with the purpose to address real solutions and create solutions. Figure 44 represent the empathy map of the student and facilitators and were a confirmation of data and insights about the users. The purpose of creating an empathy map for our case was because we wanted to immerse ourselves in a user's environment and build out the user in our user story.

We created two empathy maps representing potential users of the AI design sprint workshops. One for the user (children) and the other for a facilitator. This was done because we wanted to analyse and depict insights and generate behaviours and characteristics from the user(s) The maps are split in 'see', 'say & do', 'hear' and 'think & feel'. From analysing the insights from the interviews and research generated we were able to fill these sections and fill in the pains and gain of the service. Once they were placed, we were able to group them, if they needed to be grouped. This was done to help us analyse the behavioural trends of our users. Figure 44 display each empathy map and the key points and quotes that were derived from the process. After the empathy mapping was conducted, a vast amount of information was formulated about children and the facilitator in regard to our case study. Behavioural archetypes provided us with a different type of user representation.

Once we concluded the empathy maps, we had a better overview of the target group and what would be the most relevant direction to insert our service. We learned from our research that many teachers are not prepared or even open to change their regular habits of teaching and also the school context they are working under is not that flexible in terms of time or resources to implement or add new teaching methods. These insights gave us the chance to present this service as a future opportunity to provide AI design sprints outside of the traditional school setting (classroom), leaving the idea of teachers being solely responsible for the facilitation. 33A will first hand provide and facilitate the AI design sprint for children as the main users, with the opportunity to include other target groups that are open to engaging in the service as facilitators.

6.4 BEHAVIOURAL ARCHETYPES

For representing our users and potential clients we clustered the information gathered in the empathy map in behavioural archetypes (Parkhurst et al., 2020). As it was mentioned previously this tool helped us represent and gain empathy with the user and clients of the service. The archetypes represent the children (users) that are going to participate in the service. The figure 45 and 46 represents the main goals, thoughts, needs, feelings, pain points, and actions of participating in the service from our user perspective. On the other hand, we represent the client being 33A the main facilitator and the ones in charge to instruct others that are interested in learning how to facilitate the workshop (parents and teacher).

Based on the wish from 33A and our archetypes we realized we need to design the AI design sprint as a simplified version meaning it can be used by anyone interested in this new method. Making it simply means that not only early adopters can understand it and see the value but many teachers

and parents who are unskilled would be able to facilitate the workshop and some sort of AI design sprint guideline would be needed. In terms of children participating as the main users, we knew that we need to customize the user journey to include elements, tools, and activities that can be easier for them to understand and see value in what they are doing, therefore, more engaging for them in order to make the experience smoother and learn how to solve problems using AI.

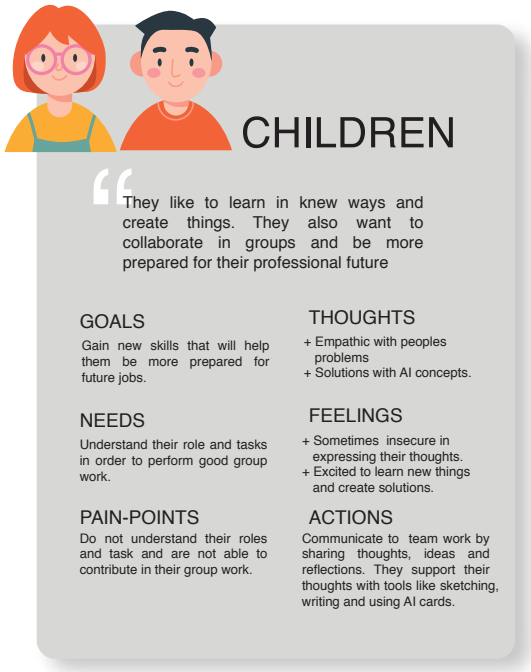


Figure 45: Children behavioural archetypes

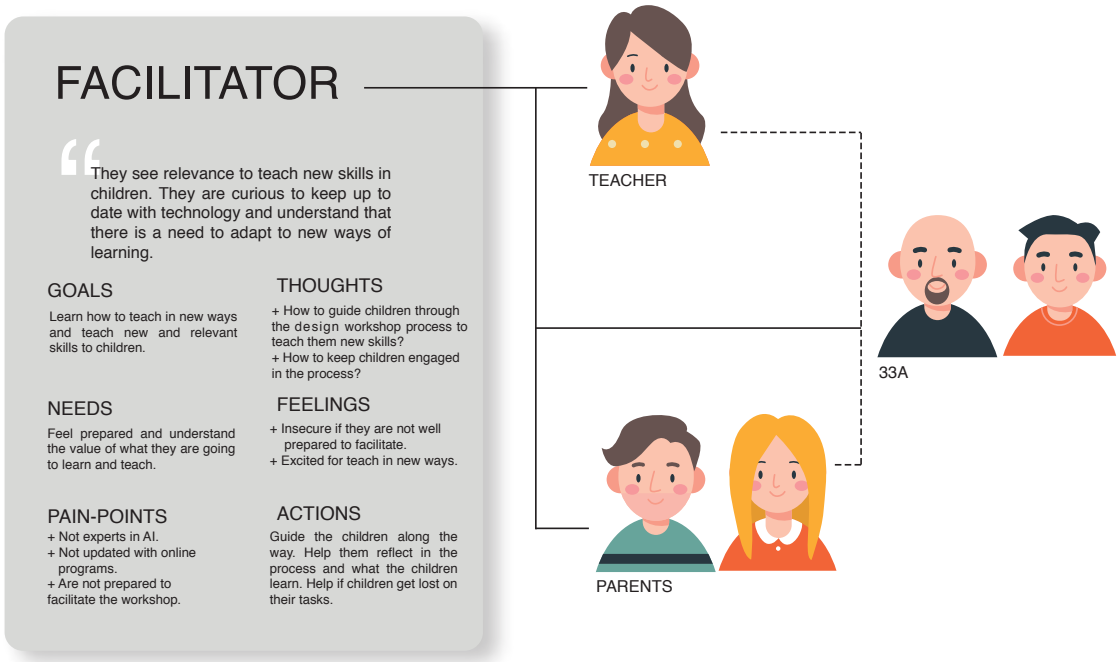


Figure 46: Facilitator behavioural archetypes

6.5 USER STORIES

The broad knowledge that we gained through our process related to the requirements of the new AI design sprint workshop related to the user needs as well as taking into account the wishes of 33A to simplify their AI design sprint workshop, we wanted to empathize with the children and the teachers who are potentially using the service.

User stories helped us empathize with the target group and see their specific motivation and challenges. The tool helped us to achieve this and turn it into an opportunity area (Interaction design foundation, 2020). There are different ways to structure the user stories but they all use a similar structure to capture the information (Interaction design foundation, 2020).

We set up our research wall with all the insight gathered from the discover phase and by keeping in mind our archetypes to base our user stories on their perspective. We set up a 6-minute timer and we made as many user stories as we could from the facilitator archetypes and the children archetypes at the end of this process we vote in the main user stories.

The phrases we used to structure our user stories were:

"**When**…" (situation), "**I want to**…" (motivation), "**So I can**…" (goal or spectated outcome)

From the childrens perspective our top user stories were the following:

When I learn new things **I want to** understand the purpose **so I can** be more engage and contribute better to the group work
When before the workshop **I want to** know what he workshop is about and its structure **so I can** be prepared and have a smooth process

When during the workshop **I want to** be given the problem **so I can** be a challenge in thinking in new ways

When feedback stage **I want to** see how ethics play a role **so I can** as a group reflect on the solution and find the ethical to take into account.

From the facilitators perspective:

When I work with unknown teaching methods **I want to** understand the value **so I can** master new methods of learning and feel confident

When I teach in new ways **I want to** master the new way **so I can** feel more prepared to teach it

6.5 HOW MIGHT WE QUESTIONS

''How might we' questions trigger questions that are generated from insights and user stories. This is done to convert the research we have gathered into a broad range of ideas. We conducted this exercise because we felt like we had generated enough good research or experience to work with. We shaped slippery data into human forms and visual stories which we can understand from any viewpoint. Instead of designing complex systems directly, we try to answer simply "How might we ...?" questions (IDEO, 2020).

To start making, 'how might we' questions, we kept in mind our user stories and our archetypes. We gave ourselves 15 minutes to create as many 'how might we' questions as we could and finally we voted in the top 3 more relevant ones that fell within the brief, our user stories, and our

archetypes, these were:

1. HMW provides children with existing and challenging scenarios so that children can learn collaboratively to provide interesting solutions with AI to these problems?
2. HMW provides a self-explanatory workshop for the participants so they could feel more confident collaborating?
3. HMW create an engaging experience so participants can collaborate and learn about artificial intelligence?

We had formulated and selected our three 'HMW questions' although we did not select where on the user journey of the workshop we wanted to ideate on. We knew from our research that we had several spots along the user journey that needed to be changed so we wanted to allow the ideation phase to be flexible and we wanted to still think holistically and allow us to focus on multiple areas of the user journey. Finally after having our main 3 HMW questions we were ready to go to the developing phase.

7. DEVELOP

This chapter will mainly present our ideation process, it is worth mentioning that in this part of the process COVID-19 a worldwide pandemic was occurring. Due to the lockdown situation, we were affected during this stage of our thesis project since we were limited to work remotely. We chose to take advantage of this unfortunate context, so nstead of focusing on the limitations of being unable to facilitate physical AI design sprint workshops we looked at the opportunity to integrate digital platforms to the new service proposal. This decision supported by our findings in the discover phase highlighted the fact that digital platforms are increasingly being used in learning environments for children. Furthermore inspired by the reality that remote design sprints have increasingly started to emerge due to the above (Sprint, 2020).

For our ideation phase, we wanted to keep in mind that the core of the project is to use tools and methods that can support the collaboration in the workshop. This is so that the children can learn to solve problems using AI while leaving room for discussion and reflection. We see the opportunity of the new service to contribute to making AI accessible for children by making them collaborate in problem-solving meanwhile reflecting on the opportunities and challenges related to making AI solutions.

The structure of this thesis will follow the develop phase of the double diamond presented in figure 47.

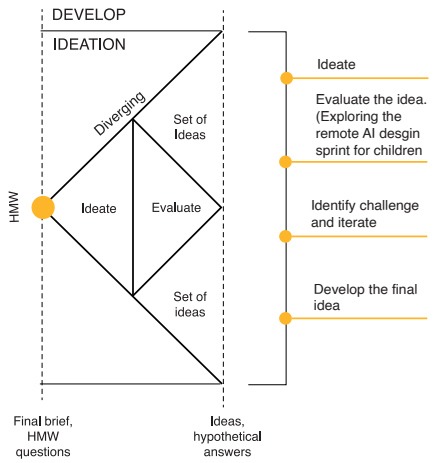


Figure 47: Nessler "Double Diamond revamped, develop phase,

7.1 IDEATION

For our develop phase, we wanted to use sketching as a way to visualize our main ideas. Our tool to make ideas was the four-step sketch presented by Jake Knaap in the design sprint. This exercise consists of 4 main steps).

7.1.1 First concepts

Once we had these 3 'how might we' questions from the previous exercise we were ready to start generating ideas. To start our ideation process and because of the pandemic situation, we had remote ideation between us. The ideas generated were presented in the form of a storyboard and we shared them online so we could pitch the ideas to each other and later on vote in the ideas we want to take further.

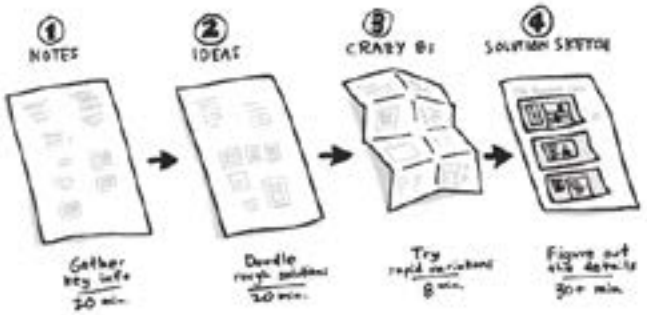


Figure 48: Four-step sketching. Original source: www.sessionlab.com

The four-step sketching exercise consists of 1. Note-taking, 2. Ideas, 3. Crazy 8 and 4. Solutions sketching. This exercise helps us visualise the ideas and make concrete solutions that support communication between the group members. At the end of this exercise, we finish with 3 concept solutions for each HMW question, we present the ideas via online to be prepared in voting and deciding in which direction we will take.

7.1.2 Co-creating the final concept idea.

As a group, we wanted to get co-founder of 33A, Jonas Wenke to provide his assistance in providing the supervote. Firstly, he has high authority in the company and would easily allow rapid changes in their service and he was fully dedicated and passionate about finding a solution to the problem. Jonas was also our supervisor and because of his position, he had full knowledge and awareness of our thesis project and the current stage of the process. We used co-creation to develop our design ideas which by Sanders & Stappers is described as; ***"[...] any act of collective creativity, i.e., the creativity that is shared by two or more people." (Sanders & Stappers, 2008, p. 6).***

At this moment of the process, we had generated 9 times, '3 step solutions' We had three solutions that answered one HMW question and now we need it to select the final idea that we would take further. To select this final idea we first, pitch the solution so everyone could understand the ideas and then we gave each of us 20 dots that we could place in a specific section of ideas if we could find a future that we like or we could place them for a whole idea.

Once we had placed our voting, we invited Jonas Wenke to have a "super vote" decision. At this point in the process, we implemented Jonas to select and specify which solution we should use. We asked Jonas Wenke, to help provide his expertise and knowledge to help select on which solutions we should use. We asked for his opinion and he selected three solutions which we merged. At this stage, we co-created to provide a solution to a shared vision. With his three votes, he placed them on all three different solutions that answered one HMW question of ''HMW

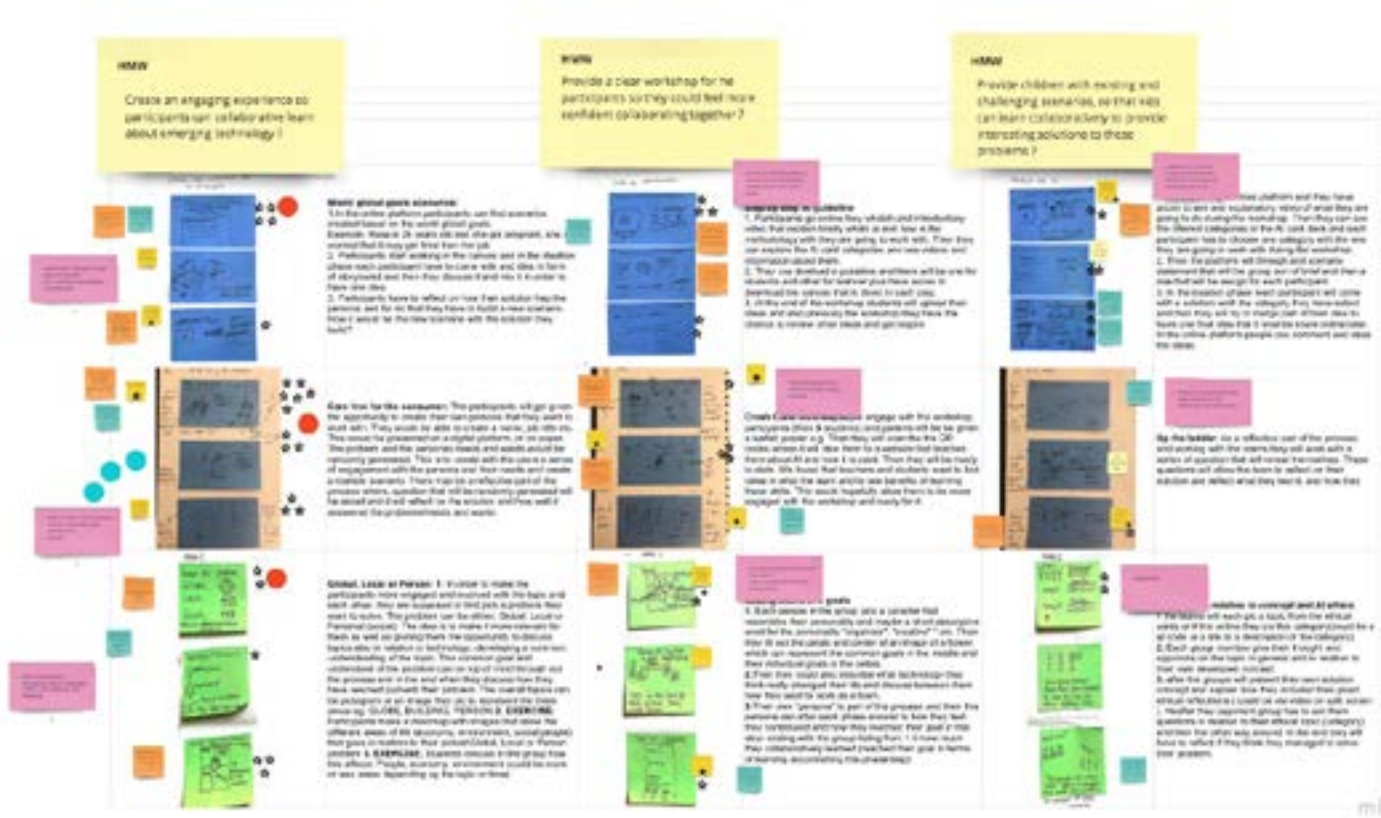


Figure 49: Four-step sketching of our HMW questions.

create an engaging experience so participants can collaborate and learn about artificial intelligence?''. The three solutions that he picked were, 'World global goals scenarios', 'Care for the consumer' and 'Global, local or person' (see figure 49).

7.1.3 Chosen Idea - Online Concept

Our decider, Jonas Wenke voted on the solutions that he felt would answer the HMW question. So to have a final concept we decided to analyse the final three ideas. We kept in mind the criterias from archetypes, user stories, and the final HMW question and select the most relevant idea and try to rescue elements from the other ideas that could be relevant to integrate into the final concept.

Nevertheless, because of the spread of COVID-19, we also needed to keep in mind how the solutions would be tested on a digital interactive platform that allowed remote working. This change meant that we wanted to focus individually on how the merge of our three solutions can be primarily used on a digital platform.

Finally, after analysing the ideas and the amount of votes that each idea had, we decided to keep one of the ideas called "Interactive guide", this idea

consists of a digital platform where the children can interact. The digital platform will assign to children a problem with needs and wants for a persona, there also has a reflection part of the process where questions that will randomly generate will be asked to reflect on the solution and how well the solution answers the problems/need and wants of the persona. This idea won among others because it proposed 3 main characteristics that were aligned with the insights gathered. The idea promotes empathy from the children's perspective with the persona by giving the children the task to define the problem, providing a digital platform that will align with the new government strategy in education (Larosse, 2017) and guide the children along with the experience and finally promote reflection along the journey.

7.1.3.1 Storyboards.

As an exercise to include the relevant elements from the other two ideas that were left to the main idea, we decided that each of us will make a storyboard. Storyboards are an engaging way to visualize an idea or a service. They can be used to explain our first prototype idea (Stickdorn et al., 2018).

We created an individual storyboard to help generate a better idea of how our vision of merging the three solutions would happen. The main element we integrate from the other ideas is represented in figure 50.

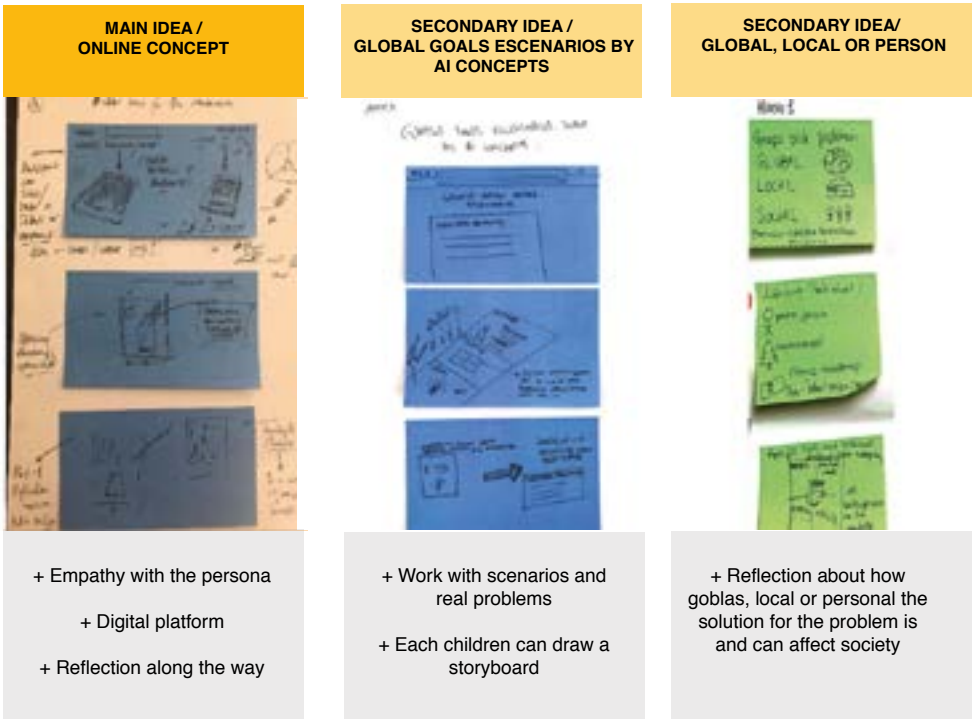


Figure 50: Top 3 ideas that we merge

Taking these characteristics from the ideas (figure 50) we created three individual storyboards. We would then present the ideas and finally, select the idea that had a more clear and specific description of the whole journey. The chosen idea consists of the following steps (before, during, and after) presented in the images (51,52,53):

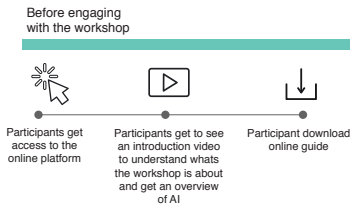


Figure 51: Before the workshop

Before:

During:

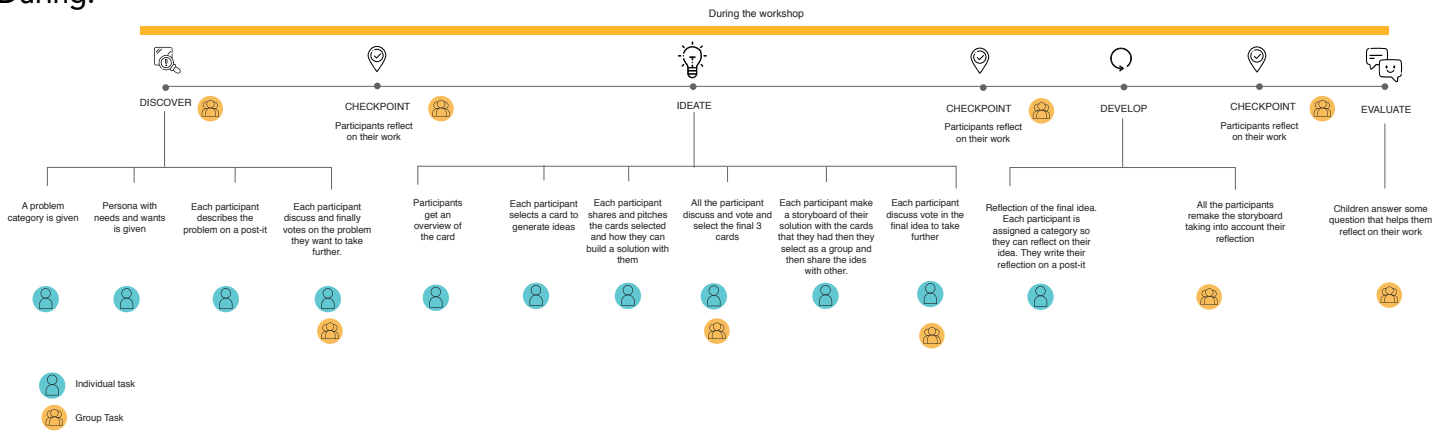


Figure 52: During the workshop

After:

Figure 53: After the workshop

7.2 EXPLORING A REMOTE AI / ROBOTICS DESIGN SPRINT WORKSHOP

As the original AI design sprint workshop was physical, we had to understand how we could transfer the elements of the physical AI design sprint workshop to an online version and if a digital service would even be viable for 33A. Our first approach to answering this question was to gain knowledge of the topic through desk research and secondly we decide to go back with our final idea and present to Mike Brandt and Jonas Wenke the co-founder of 33A to discuss with them how we could transfer some elements from the AI design sprint into a digital platform and if they had thought of something like these for their business. Luckily by that time most of the work was being done remotely for the COVID-19 context so they had already started recruiting children to be part of an online workshop. This was a great opportunity for us to observe the children and the facilitators as well and observe the benefits and challenges of a remote online workshop.

7.2.1 Online remote workshop benefits and challenges

Going through desk research we can distinguish some benefits and challenges when it comes to working online. A summary of the characteristics will be presented below.

The benefits of working remotely can be list as:

- Group members can receive faster feedbacks (Koh & Hill, 2009)
- Online activities promote flexibility and convenience because participants can be anywhere and still participate. (Benefits and Challenges of Online Instruction, 2016)
- Some people feel more confident by working remote, allowing to get a richer discussion among participant that can be shyer (Benefits and Challenges of Online Instruction, 2016)
- An online workshop can also be more efficient by saving instruction time (Koh & Hill, 2009)

The challenge found can be list as:

- Online workshop required previous knowledge and comfort in the use of technology (Benefits and Challenges of Online Instruction, 2016)
- Technical aspects can slow down the communication and the flow of the workshop (Tippin et al., 2018)
- Keep focus and engage participant can be hard (Benefits and Challenges of Online Instruction, 2016)
- Participants and facilitator may need to get more prepared than physical workshops (Tippin et al., 2018)

To anticipate a successful online workshop some structure and recommendations are made. Remote workshop relies on applications to make the interaction possible there are key capabilities needed to keep in mind for creating a remote workshop, this is presented in the table 3 below:

Structure recommended for online workshops is

FIVE KEY CAPABILITIES NEEDED FOR REMOTE WORKSHOPS

COMMUNICATE IN REAL-TIME	See everyone's smile and hear everyone's voice when you meet.	**Recommended:** Zoom **Alternative:** Skype, Bluejeans
COMMUNICATE ASYNCHRONOUSLY	Create a community before you meet and stay connected between sessions.	**Recommended:** Slack **Alternative:** SMS, HipChat
SHARE CONTENT	Establish the location where videos, PDFs, and other necessary files are stored.	**Recommended:** Google Drive **Alternative:** Dropbox, Box
STAY ORGANIZED	Track resources, events, and assignments to keep the team aligned.	**Recommended:** Trello **Alternative:** Asana, BaseCamp
THINK VISUALLY	Collaborate, brainstorm, share artifacts and interact like you're in the same room.	**Recommended:** MURAL **Complementary:** UxPin, Invision

Table 3: Key capabilities for remote work (Tippin et al., 2018)

presented in the table 4 below:

STEP	METHOD	OBJECTIVE
Pre-Work	• All Aboard	• Engage & Inform
Warm Up	• Me, In Images	• Introductions
Diverge	• Interviewing • What's On Your Radar? • Creative Matrix	• Research • Aligning • Generating
Converge	• Affinity Clustering • Visualize The Vote • Importance/Difficulty Matrix	• Pattern Finding • Taking Temperature • Prioritization
Conclude	• Design Studio	• Create & Iterate
Test	• Think Aloud Testing	• Testing

Table 4: Proposal structure for an online workshop (Tippin et al., 2018)

7.2.2 Online AI design sprint workshop

Once we had this information, we were ready to present the idea to Jonas Wenke and Mike Brandt. As it was mentioned in this discussion, we realized that they were already planning to make an online workshop and we were invited to observe and be part of the workshop.

As we were not in charge of gathering participants neither preparing the workshop we aligned ourselves to what Mike Brandt and Jonas Wenke were already planning. We learned from them that there was going to be 5 children that would remotely participate. They managed to gather these children from parents on LinkedIn who were interested in having their children participate (see figure 54).

To support the work and remote communication, different online programs were required. So before the workshop, 33A sent the participants an email with instructions as well as information related to the time of the workshop and the programs needed.

Wetransfer: Gives access to the presentation that Mike Brandt and Jonas Wenke use to support the facilitation. Zoom: The channel where all the participants can talk by live video stream. Mural board: Access to the online canvas where participants can work at the same time remotely.

We used the same research approach as mentioned in the discover chapter. One of us participated in the workshop and used the participant observation approach and was responsible for observation of the interaction between the children and note-taking. Besides this, we also had the chance to record the session for a better analysis later (found in appendix 3).

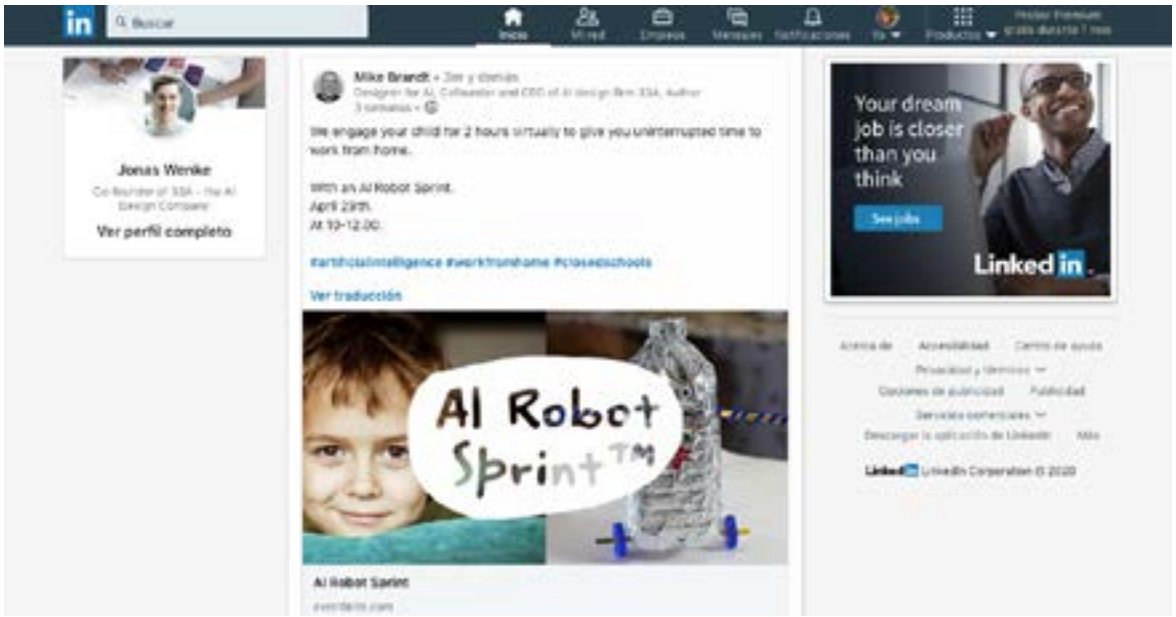


Figure 54: Linkedin invitation- Original source from www.linkedin.com

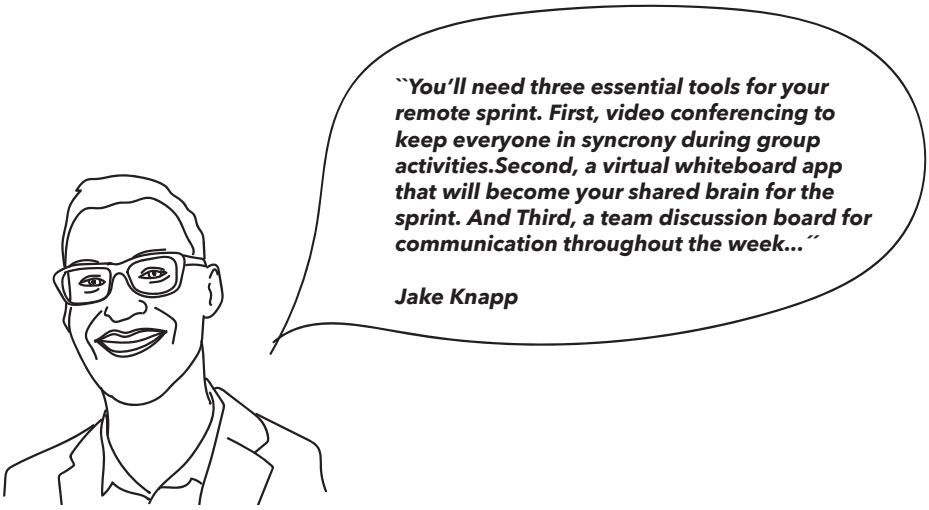


Figure 55: Jake Knapp

7.2.3 Challenges identified in the workshop

The challenges presented in the online workshop are going to be presented first, in relation to the replication of the physical workshop to the online version taking in account the information collected in chapter 7.2.2, and secondly, to observe the interaction of the children in terms of collaboration. To measure the level of engagement and emotion along the process, we wanted to use the emotional user journey like in the physical workshop, but there was no time to ask the children how they were feeling along the process.

7.2.3.1 Challenge in the replication of the workshop.

As we could observe 33A changed the structure of the workshop and the name of the workshop to be more relatable for children.

The changes in the structured are presented in the figure 56:

Comparing the information gathered to remote workshops and after observing the online AI design we can observe that 33A uses the programs (capabilities) recommended to support remote workshops. For communicating in real-time they use zoom as it was recommended in the literature. To share content they use WeTransfer instead of the one recommended in the literature mainly because we only give a certain time to download files and in this way, participants only have one time to access the information making it safer for 33A, finally for thinking visually Mural was used as it was also recommended.

For the structure of the workshop, we compare what is presented in the literature (Tippin et al., 2018) and what happened in the workshop. This is represented in the table 5:

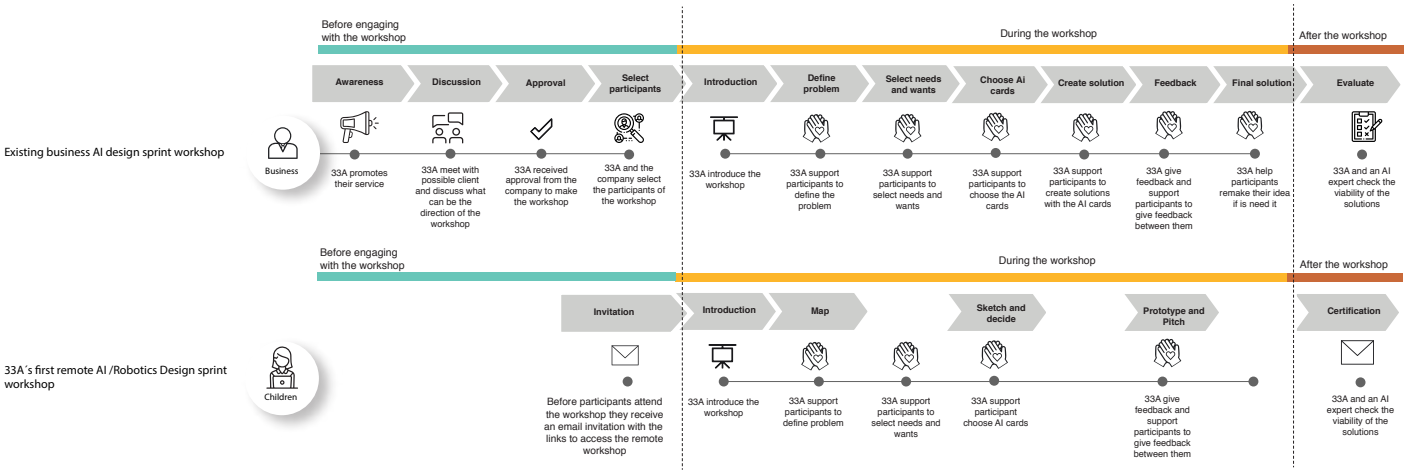


Figure 56: Challenge in the replication of the workshop

Step recommended in the literature	Steps of the workshop
Pre-work: Engage and inform	33A send an invitation with the link to allow participants to have access to the materials and programs used for the workshop.
Warm Up: Introductions	33A use a presentation to introduce the workshop. They also use this presentation as visual support along the workshop.
Diverge: Research, Aligning, Generating	Map: Participants select a case with a persona and a storyboard to work with.
Converge Pattern Finding, prioritization	Map: Participants define the problem for the person.
Diverge: Research, Aligning, Generating	Sketch and design: Participants ideate with the AI cards.
Conclude: Create and Iterate	Prototype and pitch: They don't test but participants present their ideas to other participants.
Test: Testing	The groups have to modify their solution if they think it is needed after hearing the feedback.

tabla 5: campare of the workshop and literature.

Differences we observed related to online vs. offline in the AI design sprint workshop:

Physical:
- Time, and place (negative)
- Scalability difficult to carry canvas around and making space (negative)
- Another kind of energy being there face to face (positive)
- A team strengthening/ team building (positive
- Tactile that you can use tools (positive)

Online:
- Easier, scalability and documentation (positive)
- Different ways of making sure it is not biased, no influence from other groups (positive)
- Remote work is real, and there are plenty of remote teams.
- Playing online with other people (positive)
- Making new friends - e.g. you are from this country (positive)

7.2.3.2 Observing the remote collaboration.

We observed that the online workshop and the physical one had similar challenges, so the result of this analysis was mostly the same because 33A mainly shortened the process instead of providing a clear instruction of the activities. Although there were some technical issues in the online workshop, they increased the collaboration between the participants. This was since two teams were formed in the online workshop, so the intention was that through the zoom program the team would be able to talk and discuss and reflect on ideas in their separate group chat where they can communicate in private. Nevertheless, this did not work, which led to both teams discussing with one another on the same video call. With minimum preparation for this online workshop, separate team channels were not tested, which led to this problematic situation.

Finally, we will evaluate the collaboration during the workshop. As it was presented before we will use the theoretical approach about collaborating learning from (D. W. Johnson & Johnson, 1990) related to group interaction as trust, discussion & Feedback, Individual& group task, Evaluation and from (Collazos et al., 2007). We will take in account success criteria in applying strategy and from the settings of the workshop as activities, participants, Tools, and Objects.

In detail, the workshop still does not provide a clear instruction of the activities and some of them are too complex for the children, making it difficult to trust and rely on another. For instead some children that had a harder time to understand the instruction and took longer time to perform their task making them a little left out of the group dynamic. The lack of clarity and communication problems that the technical issues caused, made it hard for children to come with a common goal and identify their individual and group tasks, most of the time children just perform the tasks as instructed. We identified that mainly the more extroverted child worked individually during group tasks. All this challenged the process making the group work harder and mostly did not happen along the way, so there were no apply strategy criteria because they did not discuss on how to perform the task and there was also no success criteria as we could observe that children got bored along the process. This meant that they lost the concentration as we could observe in the ideation phase when children start watching the video showing different examples of what AI can do (see figure 57).

Figure 58: Remote AI design sprint

Figure 59: Remote AI design sprint

Figure 60: Remote AI design sprint

Figure 61: Remote AI design sprint

For evaluating the process, children present their ideas to each other intending to trigger some comments for the other participant, but this won't happen. Finally, the feedback and discussion were performed as a "check out" where children say what they like most of the workshop but there is no retrospective thought of the process and no discussion at all.

Regarding the elements of the workshop as activities, participants' role tools, and objects have the same challenges presented in the physical workshop because they are still the same. The elements do not support the collaboration and communication between the participants. From our perspective, we could still detect a lack of engagement from the children's experience through the workshop due to the confusing instruction. The children did not have enough time to reflect on their AI solutions and rash decisions were made during the process due to the bounded time they had for each step.

On the positive side, the children had fun and we learned from 33A that the online workshop format got positive feedback from parents which leads us to believe that going online would be the right direction to take (33A, 2020)

Figure 62: Remote AI design sprint, parents feedback

7.3 DEVELOPING THE AI DESIGN SPRINT WORKSHOP FOR CHILDREN.

For improving our service we need it to consider:

1. Motivate and engage children with an introduction of the workshop where they will get a better understanding of what the workshop is about.
2. Provide a clear instruction of the activities and task so children know how to procedure.
3. Define how this activity will be performed in terms of the group or individual tasks. The individual tasks will help us keep the children engaged and make them aware of the process and the group task will help us trigger the discussion of what has been made.
4. Make space between steps of the workshop so children are led to reflect on what they have done.
5. Provide an ending of the workshop where children can evaluate their work and discover what they have learned of the process.

Our main considerations for developing the new AI design sprint workshop, in the user journey there is going to be an introduction (before) where children will have a better understanding of the workshop, then in the (during), we want to provide a better understanding of the activities and the roles assigned for each task in the design process (Canvas), we also want to improve the ideation phase and make it easier for children to select the cards and generate their ideas. We also want to reinforce the reflection during the process giving space after each session to reflect and discuss the work done and finally, in the (after) we want children to share their ideas with other possible future participants.

Our user journey proposal is represented in the user journey below (image 63). Once we have this concept we want to validate it through an iterative process of testing that will be presented in the Deliver chapter.

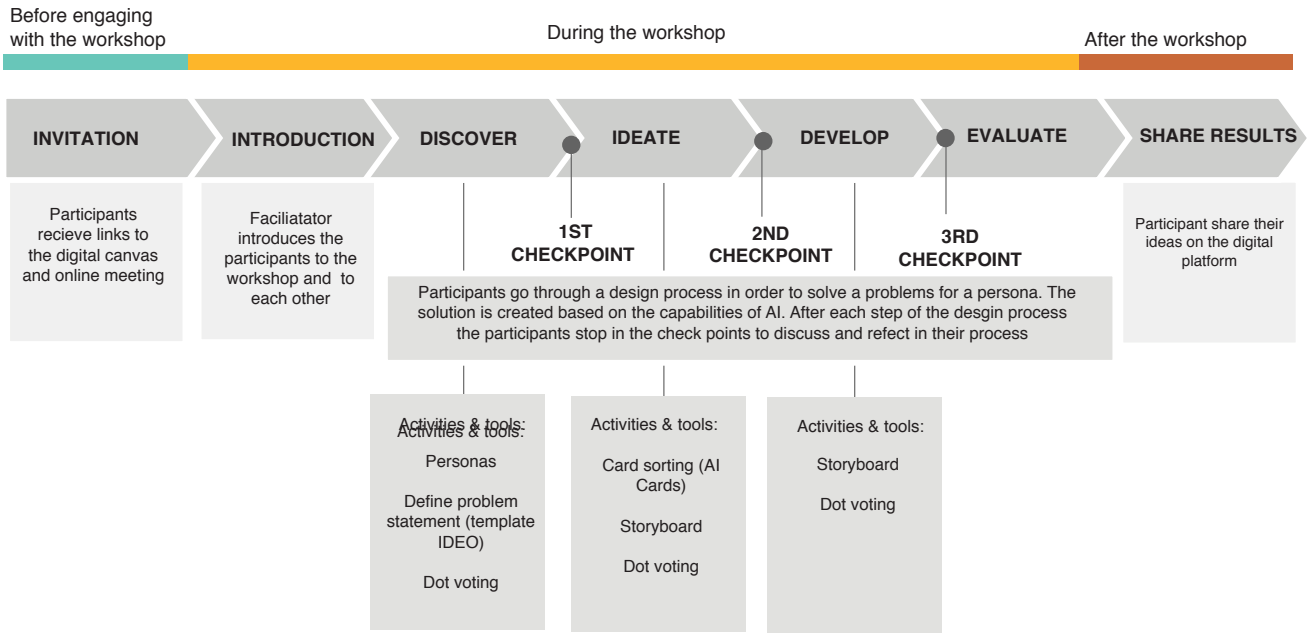


Figure 63: Final idea proposal

8. DELIVER

This chapter will show the iterative process we went through to get to the final service solution (figure 64). First, we will present the 3 prototypes that lead to the final solution and from then the final service solution will be delivered as a product report found in Appendix 8, where we will show the main findings from our process report, the identified user and client profiles and finally the proposed service solution.The purpose of the Product Report is to present an overview of the importantfindings and conclusions for the project and to describe more in detail the final concept solution the AI design sprint workshop for children.

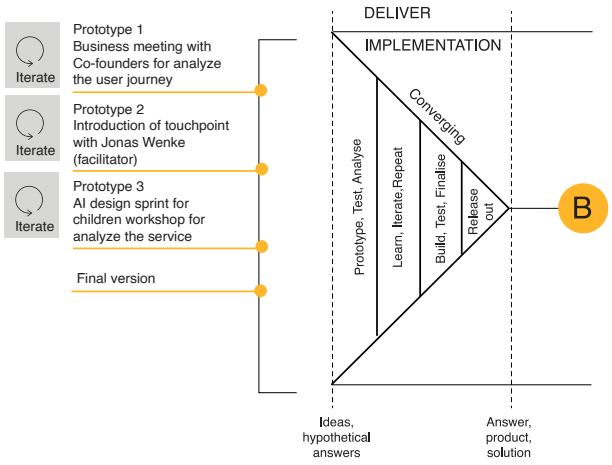


Figure 64: Nessler "Double Diamond revamped, deliver phase

8.1. PROTOTYPE 1.
FEEDBACK ON THE SERVICE

8.1.1 Build the prototype.

As a way of validating our service concept idea we had another business supervision meeting with Mike Brandt and Jonas Wenke. This was done to detect what changes were needed before they would see it ready to be facilitated. We wanted to generate insights from Mike and Jonas' perspective and identify their experience of the workshop with positive and negative reflections. As a way of collecting the co-founder's feedback, we provided them with the user journey map in the online programme Miro. This was used as an interactive whiteboard (see figure 65) so they could directly place their feedback in each step of the user journey map.

8.1.2 Test.

As a result of our business supervision meeting, we could explore topics based on areas of the workshop that were used for the online remote workshop related to the level of engagement of the participants. The meeting gave us their view of the experience as well as pinpointing specific details of each step in the user journey, for example, motivations and levels of excitement of the participants. We analyzed our findings and we depicted key insights that we felt felt were valuable to help us make some qualified decisions, to change any parts from our new user journey. Most of the feedback was in favour of the user journey presented, but we incorporated the following key insights that we gathered from the meeting:

The feedback related to the phases in the canvas was:

Discover:
33A gives children a couple of problems to choose from, it would be great to have a better way to do this step so children get more involved and come up with problems themselves.

Ideate:
They have reduced the number of cards and use a new version for children that were previously designed by us in the internship. The figure 66 represent examples of the AI cards. These will be the cards that we will implement in the last version of the service, and can be found in Appendix 4.

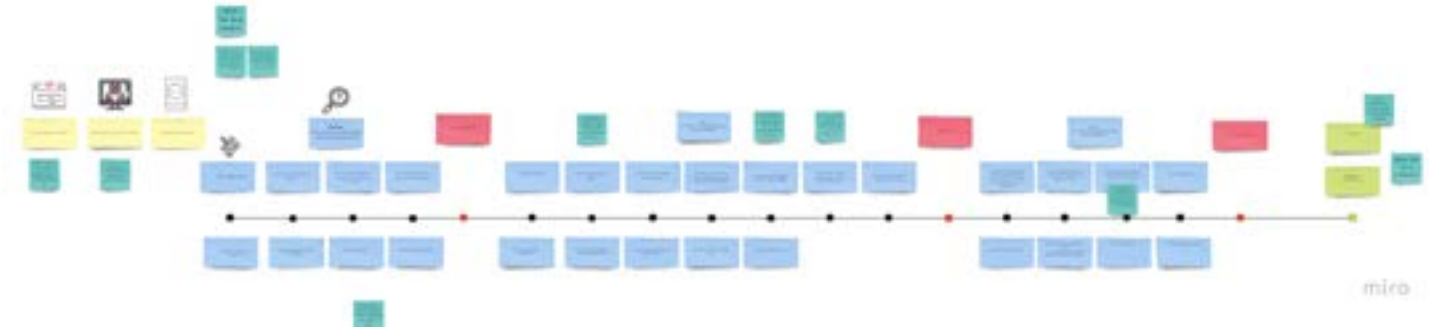


Figure 65: First proposal.

Figure 66: AI cards

Develop:
We agreed that it would give value to the reflection and discussion between children, to implement the ethical cards that 33A and we developed in the internship. This would be because it would enhance their level of reflection related to AI. These cards had at this point not actively been used in the workshop (overview of the ethical cards in appendix 5).

After the workshop 33A sends an AI design sprint workshop certificate to the children who participated in the workshop. We found this step relevant because it could contribute to participants' motivation. We chose to add it to the new service.

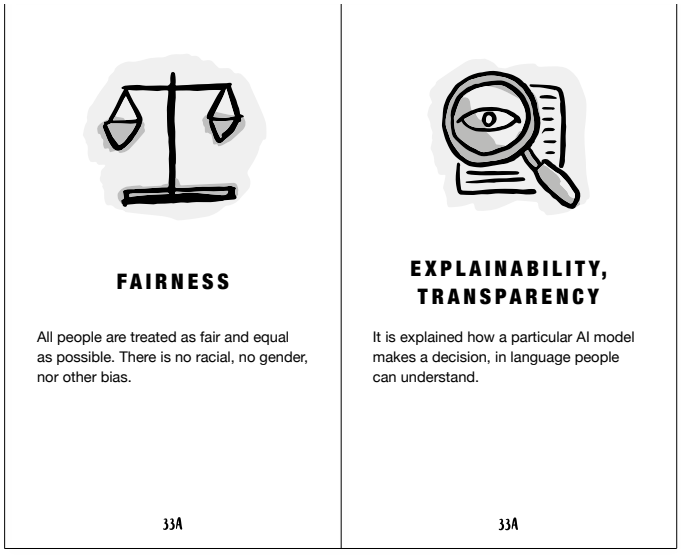


Figure 67: Ethical cards

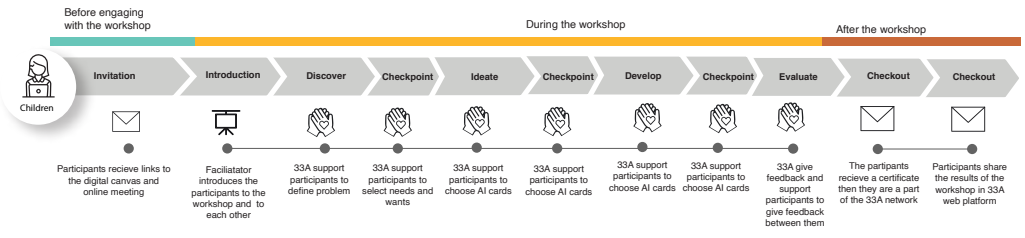


Figure 68: Modification of the proposal

8.1.3 Iterate

As a result of this first prototype, we made small changes in the solution, these changes are going to be presented in the figure 69:

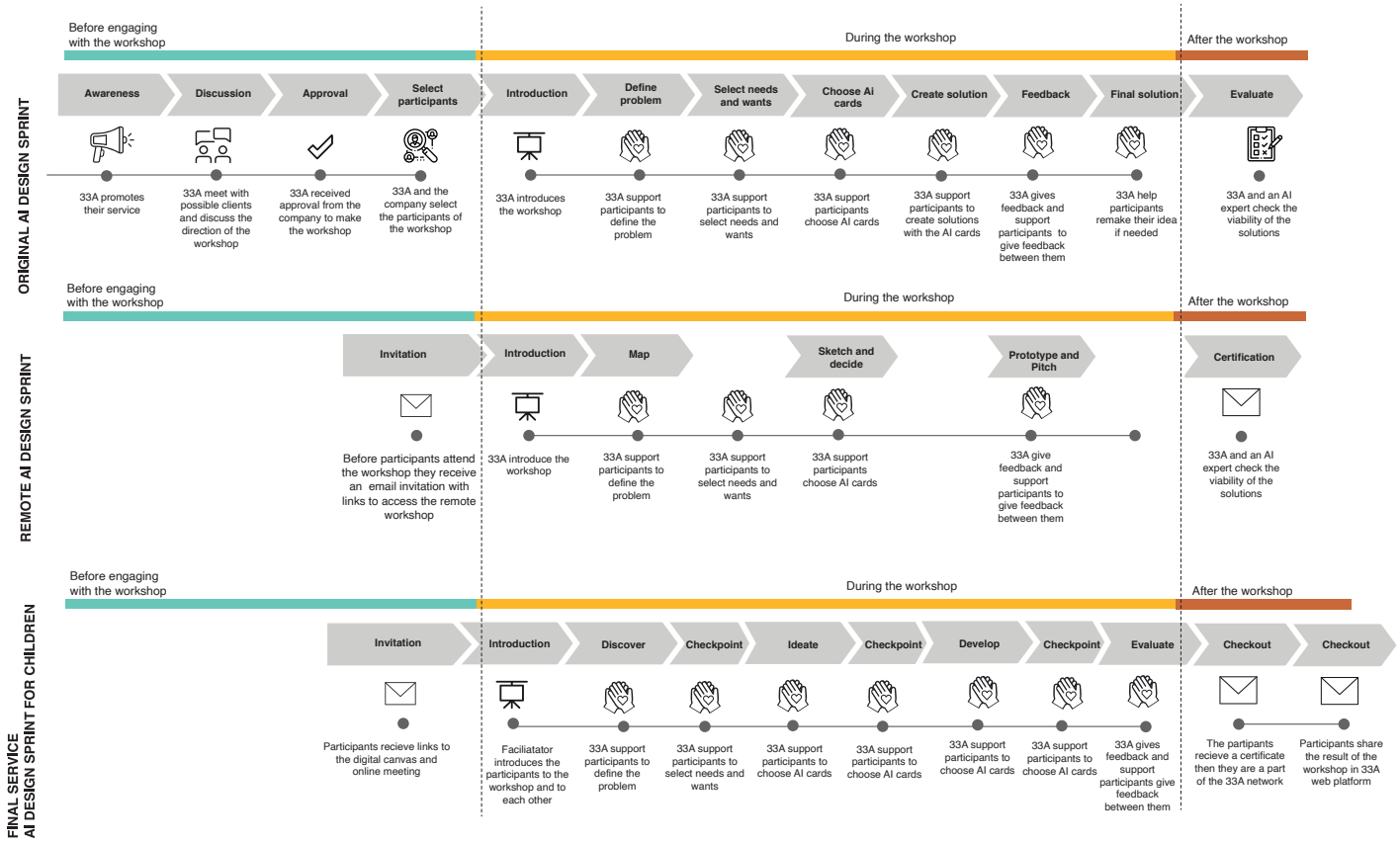


Figure 69: Comparison of the iteration in the user journeys

8.2 PROTOTYPE 2.
DEVELOPING THE TOUCHPOINTS

8.2.1 Build the prototype

Once we had the overall user journey map of our solution, we needed to develop the touchpoints that would help the children interact and engage with the service.

With our remote workshop, we wanted to help support them to communicate and think visually with the tools in the interactive whiteboard. We believe that this will make them more motivated and engaged with the remote online workshop.

The three main touchpoints we added and improved, was an introduction video, a canvas that supports the design process and finally an online guideline. The reason and the goal of this touchpoint will be represented in the table 6.
We presented the final version of the guideline and the canvas, to Jonas Wenke considering that he will be the official facilitator in the last workshop

Touchpoint	Purpose
Video (Script of the video can be found in appendix 8)	We believe that making a intro-video could communicate in an engaging way. It will communicate what the workshop is about and briefly explain what AI is. This is so children could be more prepared and motivated to participate in the workshop. Video sketching is a fast way to represent a concept or an idea avoiding 'death by bullet points' making the introduction of the AI design sprint workshop for children more engaging as well as enabling the content of the workshop to be clear in a shorter amount of time (Vistisen, 2018).
Canvas (design process steps) (found in appendix 9)	The canvas was redesigned by taking into account the design steps from the original canvas. The changes made in the canvas are to support children in their group work and make the instructions of the task more clear.
Online guideline (found in appendix 10)	The online guideline was made to train the facilitator and to support the facilitator in their explanation of the activities and tasks. Furthermore it is used as an instruction guide to help the facilitator to communicate in a better way, what is the purpose of the collaborative 6 design activities and what are the role of the participant in each exercise.

Tabla 6: Touchpoint

prototype. The idea was to fix small details in the explanation of the workshop and give him a clear understanding of the tools and the activities that children will use during the final prototype. To test how the introduction video was perceived by the children we sent out a survey to get their feedback (appendix 7).

8.2.2 Test

The test as it was mentioned consisted of a remote

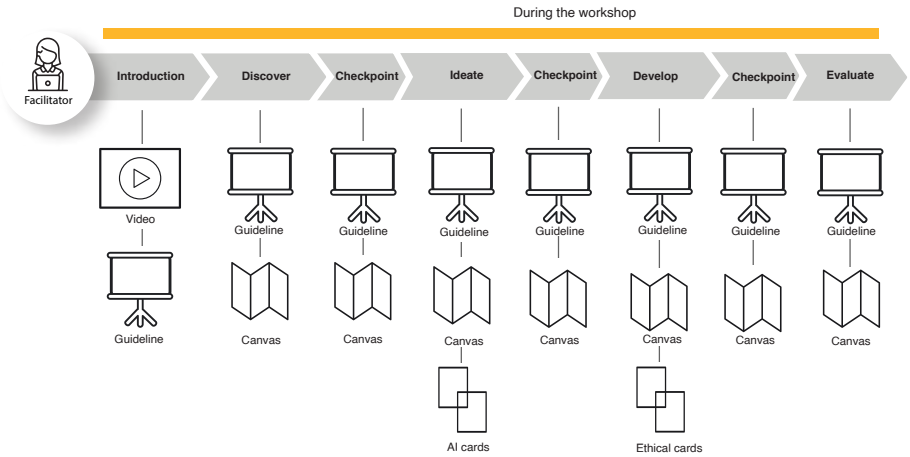


Figure 70: Touchpoint in the new proposal

meeting with Jonas Wenke, where we went through the guideline and the canvas explaining to him the steps of each activity and the roles of the participants. The intention of the test was to hear his point of view as an expert facilitator of the AI design sprint and also, test if the instructions were clear enough so someone that is not an expert could facilitate a workshop with the information given by the touchpoints.

From the meeting with Jonas Wenke, we realized that the guideline worked as an instruction method for the facilitator to understand what they have to take into account in each step and that the canvas was more a guideline for the children. From the survey responses, we learned that the video helped them to get a better understanding of what AI is and that the workshop was about collaboration and problem-solving.

8.2.3 Iterate

After gathering the insights from our observations

and the business supervision meeting with Jonas we prepared the final version of the touchpoints. The changes in the canvas and in the guideline were more related to the wording so children could understand the instruction better. Also, we present some examples in the activities to facilitate the understanding of the task for example explain what a storyboard is and how to make one.

The change of the new canvas versus the canvas used by 33A is described in the figure 71 and table 7.

Figure 71: New canvas

Old Canvas	New Canvas
Map: The main exercise are: 1- Children get 3 possible scenarios with a user represented in the form of a storyboard. Children have to select one. 2- Children define the problem, state it in a post-it note then finally they individully have to select one.	**Problem definition** 1-Children are given a theme and an engaging persona with needs and wants. 2- Then by using a template (problem statement by IDEO) each child has to define the problem for the person. 3- Finally children will individually vote which problem they take further.
	Check point **Reflection: space for children to reflect**
Sketch and pitch: 1- Children go through 3 steps of selecting the AI cards then ideating. After each step, they narrow the amount of card to finish with 3 main cards. 2-Children in post-it notes describe why they select the final card. 3- Children draw a storyboard to represent the solution.	**Create** 1- Each child goes through the cards and selects the 3 main cards to ideate. 2- Children pitch why they choose those cards. 3- Each child votes on the cards they want to take further. 4- Each child draws a storyboard to represent the solution then shares it with others. 5- Each child vote in the storyboard that they want to take further.
	Check point **Reflection: space for children to reflect**
Prototype and test: 1- Children describe their solution to other groups and receive feedback. If needed they can adjust their idea.	**Adjust:** 1-Each children are assigned an ethical card which they use to reflect on how the solution impacts global problems. 2- Each child explains in a post-it note the reflection of the ethical card and then shares it with others. 3- Children re-make their idea.
	Check point **Reflection: space for children to reflect**
	Evaluate: 1- Children give a name to their idea and place the final storyboard with the AI cards to see their solution. Then some questions help them reflect on their process.

Table 7: Contrast of the old canvas with the new canvas

8.3 PROTOTYPE 3. ONLINE AI DESIGN SPRINT WORKSHOP FOR CHILDREN

To test the final user journey, we organized an online remote AI design sprint workshop for children to observe if we improved the workflow and collaboration between the children participating. The workshop is based on the new user journey. We created and tested the new element that was integrated into the user journey. These elements were the introduction video that describes the overall of the service and the improved canvas with the design process as well as the guideline. This was done to also observe if the customization of the tools and the user journey had affected the emotional user journey, compared with the first we made in the physical workshop. The workshop was recordered for further analysis found appendix 3.

8.3.1 Build - Planning the workshop

We started by gathering children from 8th and 9th grade (secondary school) in Danish Udskolingen who would like to participate in the online workshop. In pre-process of the workshop we invited the same children that participated previously with us and sent them an invitation with the daytime and the links to have access to the online communication channels and online whiteboard programs ultimately, we wanted children unfamiliar with the AI design sprint workshop to not have any biased result.Unfortunately, this was not possible due to COVID-19. On the other hand, having the same group of children could allow us to see if the changes we made affected, that could otherwise be difficult to know due to different participants collaborating would not act the same way.

Communication channels:

Zoom: To communication channel where all the children can talk by live video stream

Miro: We decided to use this virtual whiteboard where children can access the online canvas and work at the same time remotely. The change from Mural to Miro was because it was a more familiar tool for us.

As we had already observed in the first online workshop, we knew that dividing into teams so they could orally communicate at the same time was challenging due to the limitations of the online channel. We decided to just work with one team of 4 children and observe the interaction and collaboration between them.

As it was mentioned before we used the guideline which was made in the form of an online step by step presentation (found appendix 6). The guideline was presented to the facilitator Jonas Wenke beforehand, so he was able to facilitate this final prototype of the workshop. One of us was going to observe the interaction between the children and assist Jonas Wenke if needed due to the potential language barrier being the workshop was in English but with Danish children.

8.3.2 Test (Running the Workshop)

Starting the workshop we asked the children if they got permission from their parents to participate in the workshop and if they allowed using the information gathered in the workshop for research purposes, once we got their approval (see appendix 1) we then presented the introduction video (found in appendix 6). In the workshop, we could first understand that there were still some

technical challenges to improve, by technical we mean the interaction with the software programs, where some children could not get access at the beginning to edit the canvas and it took a while to get everyone on board and be ready to start the workshop.

At the end of the workshop, Jonas Wenke provides children with a certification that they attend the workshop.

Figure 72: AI design sprint for children final test


Figure 73: AI design sprint for children final test

8.3.3 Iterate

To see if motivation and engagement had improved, we compared the first emotional user journey of the original workshop with the last one. To present the result of what we have improved about collaboration we will look at the result of the elements of collaborative learning, we added in the user journey.

Figure 74: AI design sprint for children final test

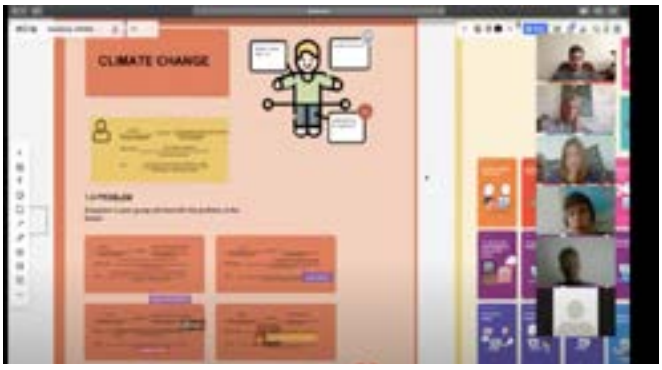


Figure 75: AI design sprint for children final test

8.3.3.1 Comparing the emotional user journeys

In the emotional user journey for our online workshop, we provided the same questions as in the first workshop. The questions were again related to how they felt during and after finishing in regards to motivation and engagement at each step. Hereafter we were able to compare it with the original emotional user journey from our fist physical workshop, which will be shown below in figure 76. This was done to get an overview of the new methods and tools we implemented in the user journey and the touchpoints provided had affected the new user journey experience overall supporting the collaboration and workflow.

As the question and the analysis of the user's emotions were only when children were engaged in the design process (canvas) we only will describe what happened in the during the phase.

During the workshop (in the design process).

We can observe that the new emotional journey map is more stable than the original workshop. We as observers experienced the children staying motivated and engaged in the exercises through the design process in contrast to the first physical workshop where the children at times felt demotivated and did not have a clear understanding of what their role was during the workshop.

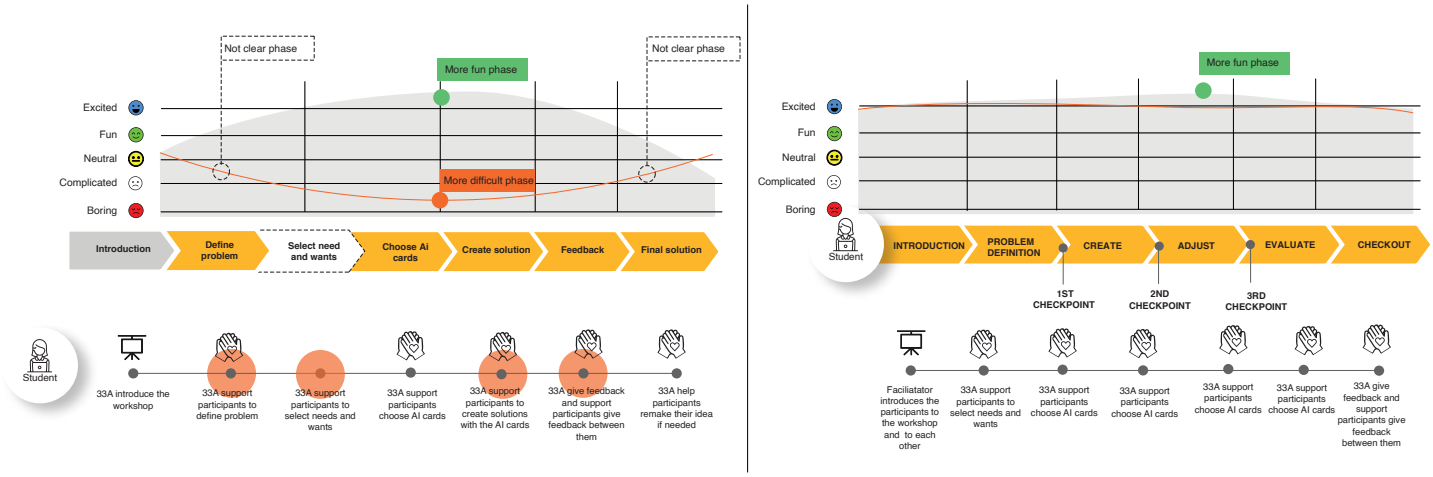


Figure 76: Contrast of emotional user journey

8.3.3.2 Reflecting on the improvements

As a result of our online AI design sprint workshop with children, we want to observe if we improve the challenges presented in the first physical workshop where the children did not manage to collaborate equally throughout and were somewhere left passive in the activities as well as not having a constant workflow towards solving their problem with AI. We observed in this particular workshop that team members provided emotional and tutorial support between them due to that they recognized that the success of the team relay on the group work which is really important to having an equal collaboration between them (Leinonen & Durall-Gazulla, 2014).

We know that in design processes, collaboration is used to coordinate activity where teams synchronously aim to design and maintain the same understanding of the problem. This is important to discuss and articulate their thoughts and emotions between participants. We knew this shared understanding can happen by using design tools such as audible or visual artefacts since this can support or trigger their reflection-in-action (Zhang et al., 2020). Therefore we want to observe the design tools and the activities in the AI workshop to contribute to their collaboration, and shared understanding through the workshop.

In the last workshop, we implemented the Introduction video for them to understand what the AI design sprint workshop was about and the guideline that acted as a clear instructive method for children and facilitators. Both tools made them aware of their common and individual roles in order to achieve a common goal. We also observed that new activities such as the individual storyboards, the new persona and the ethical cards in the canvas provide each child with a task and required that each child had equal work to contribute to group work improving the motivation and the engagement of the participant affecting the group. We could see for instance that when they were giving feedback to one another they were all engaged in discussion and if a person in the group did not speak they asked her opinion.

We illustrated the new element of collaborative learning that we insert along the during phase presented in the figure 77.

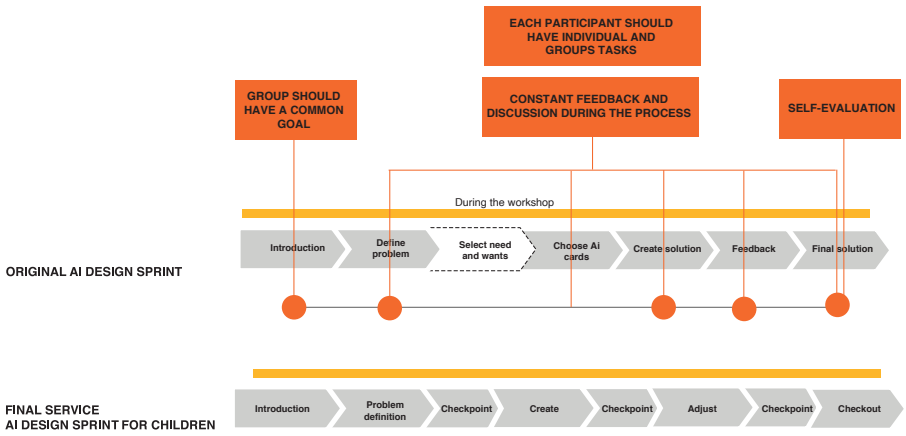


Figure 77: Collaborative learning inserted along the the during phase

Before we could observe that opposite the first workshop, where the instructions before working with the design process (Canvas) were not clear, this time the children were clearer on the common goal and the overall purpose and steps of the AI design sprint. Furthermore, due to the introduction video explaining also the roles and responsibilities in the group the trust between the children were affected positively since they realized that it was okay to talk about what was clear and what was unclear.

During
They showed that they could rely one another although they were not clear in their common goals. Furthermore, due to some shifting individual challenges in terms of the online whiteboard in Miro that affected the group tasks, they built trust by helping each other. In the individual and group tasks, we could also observe that if one in the group did not engage or understand an individual task the rest would encourage them to engage, resulting in maintaining trust meanwhile solving the group tasks. This also resulted in that no one was left out with no task during some activities as well as affecting their communication.

These positive changes affected the ''apply strategies'' they communicated and organized to solve each task and the ``success criteria´´ because children managed to build strong communication and thus creating a common goal and strategy to solve the problem and the level of involvement during the process was increasing. The constant room for feedback and discussion through the design process steps (canvas) was a success. This involvement was especially evident in the step CREATE. Here the children presented their individual AI concept ideas and gave feedback to each other before discussing how their chosen AI solution would solve their "Persons" problem. In the step 'REFLECT, they improved at orally articulating themselves between other participants. This only occured in the feedback step and is not something that constantly happens along the process also there is no space for evaluating the process because that step was from the AI expert.

In relation to improving the collaborative learning elements of the workshop, we can detect that the activities were well defined by the facilitator using and providing an overview and clear instruction with the Guideline. This together with the introduction video and the Canvas supported the workflow of individual and shared activities that composed the design process. Due to the shared understanding of the purpose of the AI design sprint workshop. When collaborating in teams and working towards a common goal, the children had a clear understanding of the overall purpose and the importance of their participant role through the entire process, supporting the group dynamic and affecting their engagement and motivation.

The tools such as Personas, AI cards, and Ethical cards in the AI design sprint workshop currently provides the opportunity for good oral communication and collaboration between the children. The tools and the object or evidence of the knowledge provides an even distribution of the work task making all the children participants of the process and generating the final solution as the individual definition of the problem statement, storyboards,and ethical cards reflections.

In terms of the duration of the workshop, they felt it was a bit long. We see this as mainly due to the challenges in terms of the technical errors with the

whiteboard in Miro not responding at all times, but they managed to help each other on the digital whiteboard to move forward.

After

After the workshop was done the children were asked to provide feedback (workshop video can be found in appendix 3). The feedback was mainly positive, and they felt their teamwork skills had improved. When asked what they felt they learned from participation, they mentioned that they improved their learning related to designing solutions using AI in collaboration and learned what AI can be used for in the future. They liked to discuss between them and listen to the opinion of others. They were excited about how they developed their ability to not only make a concept idea but to consider and discuss the pros and cons to their AI solution, in terms of how it could make an impact on climate change. In the end, it was a positive experience where the children shared their reflections and came to a common result.

Figure 78: Children feedback

8.4 SERVICE BLUEPRINT

To get an overview of our final service a service blueprint was developed. Service blueprints are diagrams that visualize the relationship between different service components as actors, physical evidence, or digital evidence and processes that are directly attached to a touchpoint in a specific journey. Blueprints can be used as a holistic approach to the service, by illustrating the multiple coordination needed for a service to work. Service blueprints can be understood as an extension of journey maps. They are set up to specifically connect customer experiences with both frontstage and backstage processes (Stickdorn et al., 2018). The service blueprint allowed us to visualize the service processes, points of customer contact, and the physical evidence associated with 33A´s service from their users' perspective. The blueprint is an efficient tool to help represent the actions of the participant, facilitator, and 33A and how they interact. The service blueprint is based on the user journey and associates the user experience with stages that are visible for the user, who has direct contact with and those which are being processed in the backstage. The "line of visibility" distinct the two. It also let us see whenthe touchpoints were used in each part of the service. This gave us an overview of the interactions and connections between the different actors. The further details of our final service will be found in the product report (appendix 8).

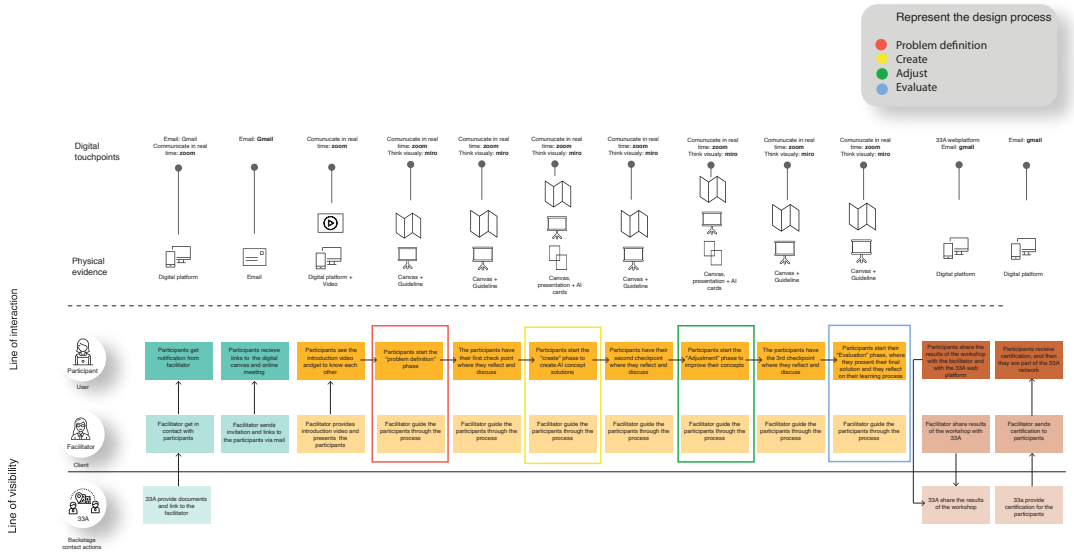


Figure 79: Service Blueprint

8.5 VALUE PROPOSITION MAP

To verify how our service concept customization could assist in improving 33As existing business, a Value Proposition Canvas was utilized. The Value Proposition Canvas consists of a Value Map, describing how the service will create value for the customers and a customer profile that clarifies the understanding of the customer (Osterwalder et al., 2014). In our case, the customer is the users of our service and describes the expected benefits for the users provided from the service (Osterwalder et al., 2014). The Value Proposition map (see Figure 80) helped us in creating an overview of the pains and gains of our user segment, how our final service concept could create value by reducing pain points, and confirm if our service concept is providing value.

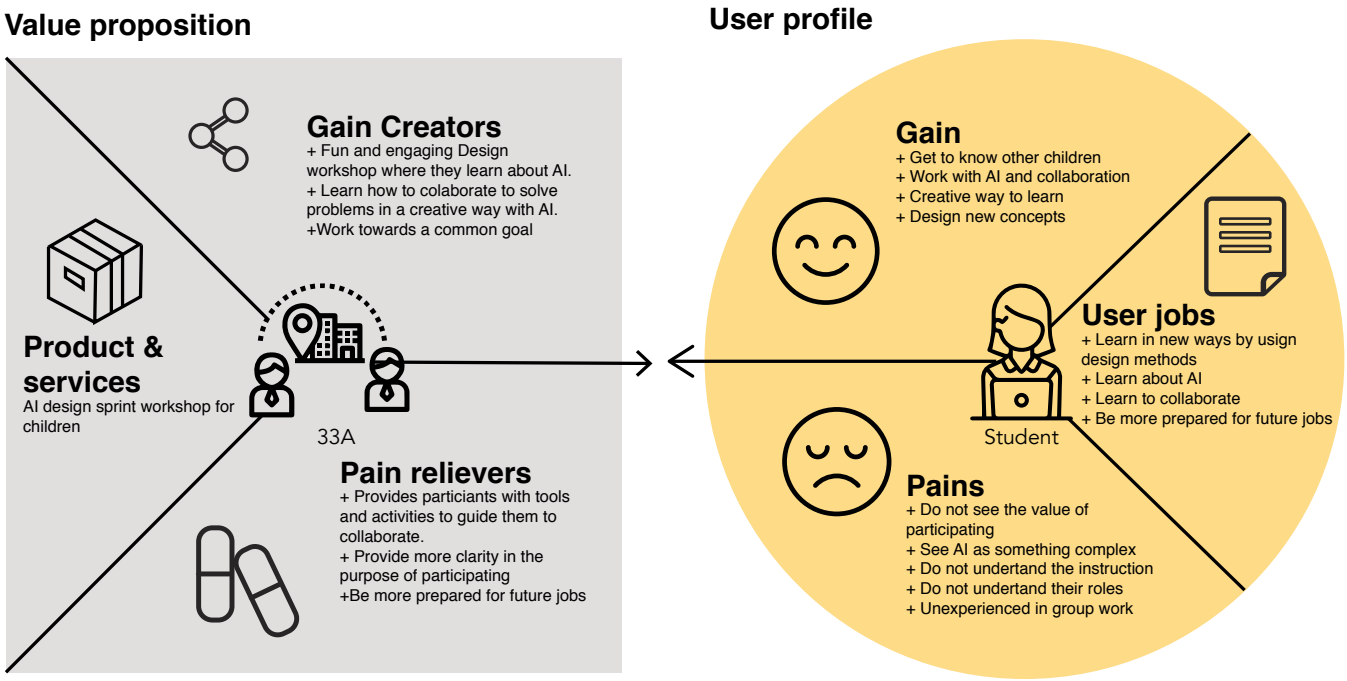
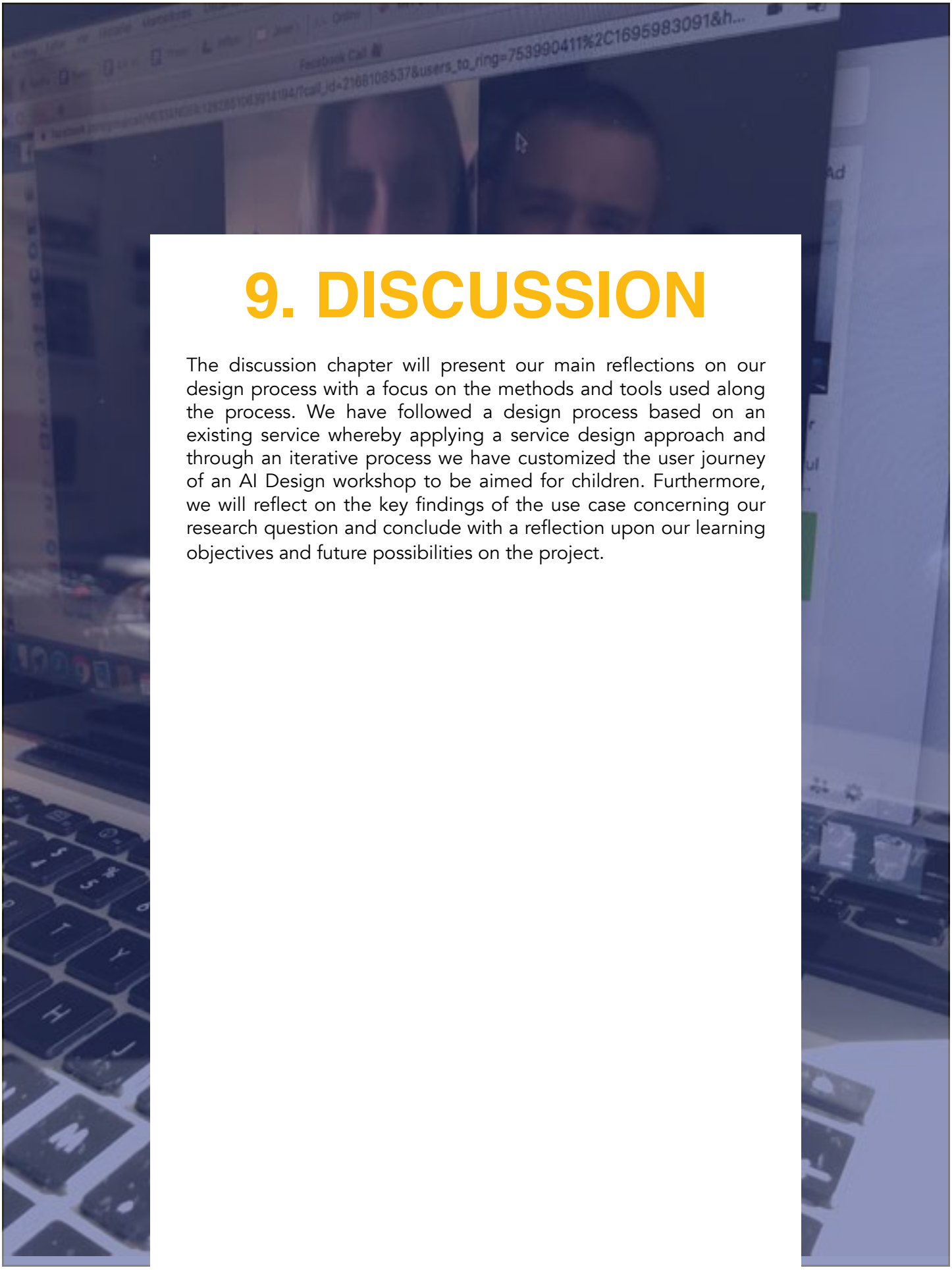


Figure 80: Value proposition map



9. DISCUSSION

The discussion chapter will present our main reflections on our design process with a focus on the methods and tools used along the process. We have followed a design process based on an existing service whereby applying a service design approach and through an iterative process we have customized the user journey of an AI Design workshop to be aimed for children. Furthermore, we will reflect on the key findings of the use case concerning our research question and conclude with a reflection upon our learning objectives and future possibilities on the project.

9.1 DESIGN PROCESS

As it was presented in the beginning we structured our design process to work with a methodology that was influenced by the Design Council's 'Double Diamond' and IDEO's 'Human-centered design process'. This helped us organize our iterative process on the user journeys and also have a better understanding of the steps we were taking. Finally, the chosen methodology made a big impact to help structure and framework towards the writing process of the master thesis.

Through our design process, we had close cooperation with the co-founder of 33A. We had business meetings with our supervisor every two weeks and with 33A when needed. This structure and constant flow helped us stay focused and clear. The assistance from 33A along the process also helped us to have a better understanding of the service provider's perspective. Their experience facilitating workshops provided valuable feedback in the development and deliver phases where they helped us validate our idea. This also helped us keep a feeling of creating something of value for 33A and a new service offering that they can apply as an offering of the company.

Working as a group of three during the master thesis was challenging since we had a different way of working that made it harder to agree on ideas keeping us sometimes stuck on part of the process. Even though we had these difficulties along the process we could overcome these challenges and finally win additional experience in teamwork by discussing and compromising what we can see as an advantage for our future profession as service design will be part of diverse teams.

9.1.1 Service design as an approach

Through our process, we experienced how the service design could help us generate solutions through an iterative cycle of research and development (Stickdorn et al., 2018). This explorative loop (series of repetition) helped us gain knowledge, understand the challenges by getting user and business feedback and quick experiments for the iteration in the process to provide a better solution. The iteration process can slow down towards the end but never goes away making it relevant to know when is the proper moment to stop. We believe we are going to reach this point after the last workshop.

In this process, we as service designers worked with people from different fields of expertise. The use of service design activities involved the stakeholders in the project to understand their point of view without having the same "language" or expertise. As part of co-creation, this communication was facilitated mainly with design tools and provided us with feedback and helped us design the new service by having access to the journey map as a boundary object (Stickdorn et al., 2018).

During our design process, we needed to have a holistic view to address the needs of all the stakeholders. Although we could have included the children more in terms of co-creation of the tools eg. (personas) used in the new service, we aimed via our research, observations and workshops to

have a user-centred approach to understand our users' needs and challenges.

9.1.2 User journey map

Our main goal in this thesis project was to customize an existing AI design sprint workshop to be for children. To assist us in the design process we used the user journey map as a research approach that helps us along the design process. We could then combine it with the qualitative research from the workshop we conducted and interviews to find the challenges in the workshop and understand the user experience and use literature to find elements that could help us with the customization of the journey map. We also were aware that as we worked with a specific group of children, and one facilitator the result of our investigation can not be representative and generalizations can not be based on the participants (Bjørner, 2015). In our process, we included the target users. Although we realise that the number of participants we tested was a single group of children therefore we are aware that we can not generalise the result of the research.

From all service design tools along the process, journey maps gave us the flexibility to constantly iterate on it as a living document (Stickdorn et al., 2018). Our first user journey worked as a starting point to understand how the initial service experience was, and from there we iterated on the user journey based on research, co-creation and user data.

Having the opportunity to work with 33A during the internship helped us get a better understanding of how their service was, the steps the service had and why. This gave us a strong base to illustrate a first journey map that was later on shared with the co-founders to be sure we were capturing the whole experience. Once we had that initial user journey we customized it by changing, adding and taking out different steps to form the new journey. These tools also helped us to interact with 33A and explain how we were visualizing this new service, journey maps helped us to get a base to communicate our thoughts and receive valuable feedback form 33A.

We wanted to visually represent the experience of the users with the user journey map adding an emotional journey. We can reflect that because the number of participants that were considered to map their emotions along the service was not a big amount the user journey map did not give us crucial data to customize the journey but it helped us understand what steps were more interesting for them, than other. This could be translated to the level of engagement and motivation of the participants. In the first workshop, we could find some "boring" stickers in part of the journey but in the new services we also had positive emotions and this could also be reflecting in the way children behave along with the experience.

Journey maps helped us to present an overview of the journey to the children. They were used through out as e.g. to provide the step by step of the activities that they will go through during the workshop. This journey was not presented as a traditional user journey; it was present as a zoom-in for each step in the guidelines used by the facilitator. The use of journey maps in this way helped children understand better what were the overall tasks in the process and what was coming later on.

During the ideation phase, the user journey map helped us to build and communicate between the

group members how we visualized the possible new service. As we also used to map the challenge in the original AI design sprint it was easy to keep in mind which consideration we needed to change to provide better customization of the workshop.

Journey maps were a helpful tool along the process although it provided confusion, this was because we did not have only one type of journey to gather insights. We sometimes used journey maps with quotes to illustrate relevant information in the process. We also used user journey maps to pain point the challenges about collaboration and we added an emotional user journey as a layer to identify the user's emotion along with the service. Even though we had different versions, we did not want to mix the information as they brought us different perspectives.

9.2 RESEARCH QUESTION

In this section we will reflect upon our approach and learnings during the process and explore how we answered our research question and sub-questions:

``How can service design and a collaborative learning theoretical perspective support the customization of design workshops for children? (in an AI design sprint use case)´´

We wanted to address this question using the following sub-questions:

- What are the needs of children in a design workshop situation?
- What are the challenges (fits and misfits) with the existing AI design sprint format in a children's context?
- How can we customize the AI design sprint to fit the needs of children using service design and collaborative learning theory?

Customizing the AI design sprint workshop

33A has a mission to support companies in their transformation towards AI and they aim to make AI more reachable and understandable for everyone. Under this context, they see value to target children as education is changing and new methods of learning are required. 33A´s services give them a position to contribute to providing learning methods that can contribute to collaboration, problem-solving and critical thinking. 33A provides a workshop that is based on a design process where children need to solve wicked problems by working as a group. Furthermore, they provide a workshop that adapts technology literacy meaning, where participants learn how to apply technology by providing an overview of what AI can do and using AI elements to generate the solution to the wicked problems. All these skills are related to 21st-century skills. Even though there is an opportunity to contribute to these skills some customization is needed to achieve the learning aspect mentioned above. To explore how to customize the AI design sprint workshop we will answer the following sub-questions:

What are the needs of children in a design workshop situation?

From research and hands-on experience, we learned that the needs of children in a design workshop situation is to be able to work in collaboration, to have clear instruction and to see the purpose of why they have to participate. They need to have a common goal within their team, feel confident and motivated throughout. It is

important to build strong trust ties between them in the group, to communicate clearly, support each other and resolve conflicts constructively. We also believe it is important that the participants have equal responsibilities.

What are the challenges and opportunities with the existing AI design sprint format in a children's context?

We identified the core challenge in the existing AI design sprint workshop were issues related to the lack of instruction and guidance throughout. After exploring the challenges in the AI Design sprint workshop, we could from the children's perspective distinguish a lack of understanding of the capabilities of AI, the design exercises, and reflections. This made it difficult for them to collaborate and communicate, which created an obstacle for the children to fully engage in the workshop activities and the communication with their team members. Furthermore, it also made it difficult to allow the participants to learn how to use AI towards accomplishing their common goal of the workshop to solve a problem using AI.

We experienced whilst observing the AI design sprint workshops, that the children lost interest and attention, this was more evident as the workshop went on. This meant that the children provided minimum effort towards the end of the workshop and their motivation to engage with the workshop decreased as the workshop continued. They felt the number of cards were overwhelming and they did not at all times understand the content. The feedback related to the challenges and opportunities when using AI in problem-solving, made it evident that it is a challenge for children to give each other feedback if they do not have the right guidance or knowledge before and during the workshop. Despite the challenges the children encounter, they had a positive experience participating in the design activities. As part of the design of their AI concept idea, they used design tools such as ideation and sketching in storyboards, which we discovered was a fun and engaging learning experience for children.

How can we customize the AI design sprint to fit the needs of children using service design and collaborative learning theory?

The use of relevant theory related to collaborative learning and service design helped us identify elements that supported the customization of the AI design sprint workshop. We see the customization of the AI design sprint as a result of the use of service design approach with the contribution and the support of collaborative elements. With this adding specific structure and tools to the journey map which triggered and helped the collaboration in the AI design sprint workshop. Our iterative design process enabled us to add collaborative learning elements to foster better flow and instructions. The use of service design and the elements that we identified from collaborative learning were important in our process as they helped us to answer our research question.

9.3 LEARNING OBJECTIVE

During our Master Thesis, we have gained relevant learning competencies, skills, and knowledge that are aligned with our learning objectives described at the beginning of the thesis. We applied methods and tools from a service design approach, to analyse the whole system around our project from a holistic point of view. We explored, analyzed and developed a new service concept and learned

independently to take professional responsibility to be in charge of developing a service that will be functional for the business 33A spite the challenging circumstances of COVID19.

From our personal learning objectives, we had strong support from 33A along the process that gave us the chance to learn to collaborate with a real business. We also conducted several interviews with experts from different fields, trying to understand their different points of view and consider relevant insights from the different stakeholders. We also gained experience in gathering insights that helped us customize and work with user journey maps. Finally, we had the chance to facilitate the AI design sprint workshop several times, giving us the chance to learn about the service, and about facilitation. This helped us gain knowledge that let us empathize with the users and clients to make better customization of the service.

9.4 FUTURE POSSIBILITIES AND CONSIDERATIONS

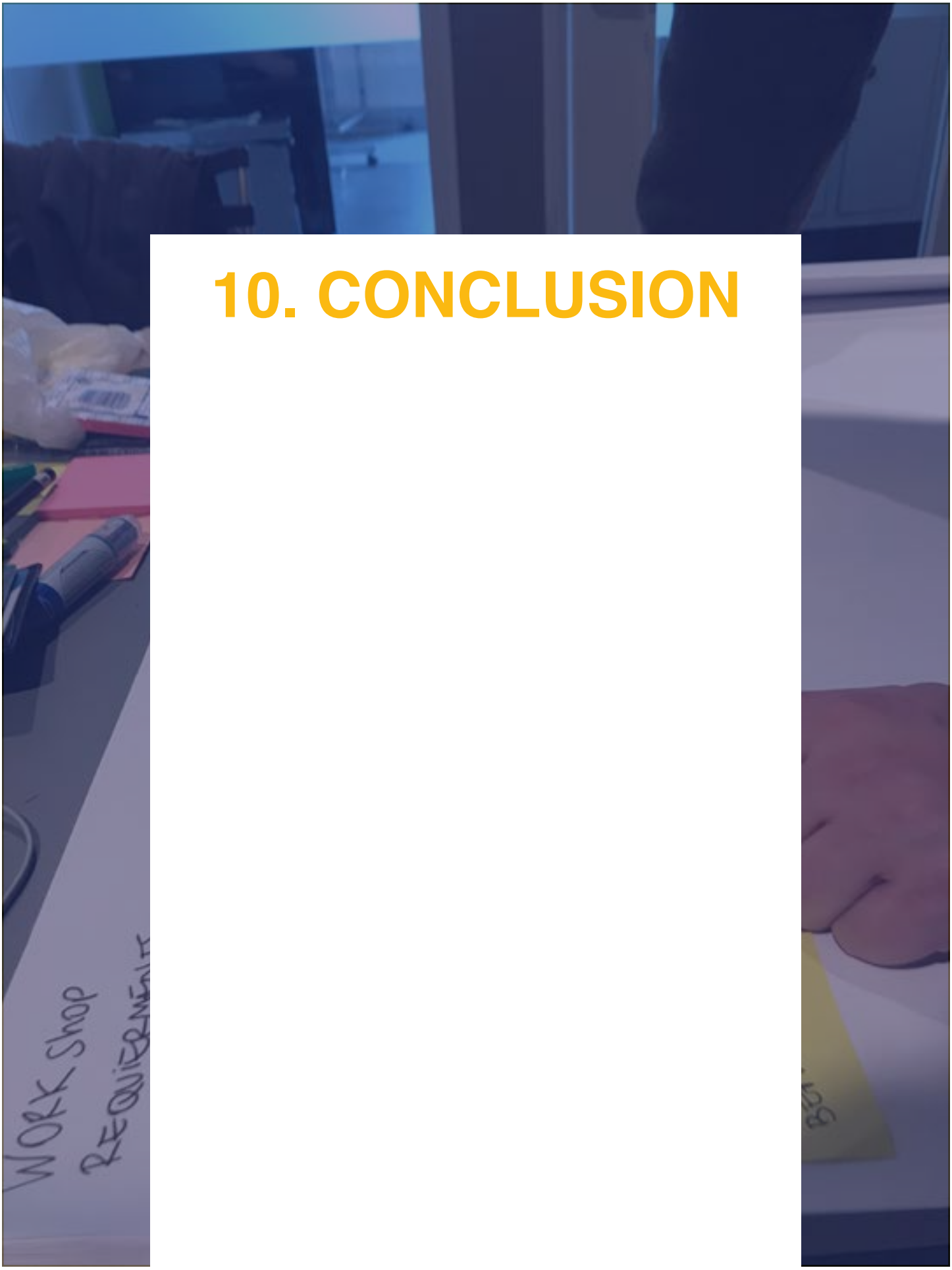
Reflecting on future possibilities and considerations that we should take into account, we have only tested the workshop as an online service. This was done mainly because the final idea was adapted to an digital platform, due to COVID-19 which obliged participants in the workshop to work remotely. We will consider further research that will explore our new service in a physical context. We take into account that our first analysis of the original service was a physical workshop and we would like to test how our solution could have an impact on the group work in a physical context. For now, the service will be provided by 33A. We see that the workshop can be adjusted in three different variations either online or offline.

1. First, we see the version we present as our final service where 33A has the role of the facilitator and the children will be the participants. All together will work remotely on the online platform and they will have access to the online canvas and a guideline.
2. Our second version is that children have the chance to meet physically to work and discuss but they still work on the digital platform.
3. The final version will be that children will work together physically with a physical canvas and with the support of the digital guide. This variation needs to be tested.

We decided to keep the service as a direct offering from 33A to the clients and the main user. We see a big potential for the service to be used for educational purposes, although we learned from our conducted research that teachers and schools are not ready to implement the service as it is. We will not have an external institution to go through as it would be a school or municipality. We have received positive feedback from a leading teacher in a private school, so for future consideration, we would like to test the workshop in this context and see if it's viable to use this version in a classroom setting.

Although we did not manage to include them within the time frame of this project, we have received positive feedback from teacher Morten Jacobsen after presenting the Introduction video and the guideline to him (see appendix 8). From this, we believe that in the future we should test with other possible facilitators as teachers or parents and identify if the service user journey and the overall service should be slightly adjusted.

Reflecting on what we could have done differently as part of the customization of the user journey, we believe that if possible we could have included unskilled facilitators, rather than only 33A in the process of testing. Due to the fact that the facilitators are going to be a big part of making the AI design sprint workshop for children happen in the future.



10. CONCLUSION

This thesis has explored the user journey of the AI design sprint workshop provided by 33A. Our research has been done via desk research, interviews, observation and workshops using service design methods and tools. These were used to assist our design process and develop a final solution where we have involved the users and 33A. Through a service design approach and based on our literature review, we had achieved our main goal of customizing the existing service to a different target group being children in a secondary school as the primary users.

The use case allowed us to explore the following problem statement:

"How can we use Service design and collaborative learning theory to support the customization of the user journey of the AI design sprint workshop for children in secondary school (Udskolingen)?"

To answer this question, we have, with our use case, provided an example of how service design and collaborative learning theory can be used to support the customization of the AI Design sprint workshop. This has been done by exploring the challenges of instruction, comprehension and collaboration when using AI to design concepts to solve problems.

The process needed to adapt service design as a primarily qualitative approach. It helped us explore and customize the user journey while involving the service provider and the users. 33A assisted our process by keeping us on the right track to help customize the workshop and finally make a service that would be valuable for them and the children.

We have worked with children in secondary school, we analyzed the service and tested the customization of the service with the same group of children, who had a better workshop experience that also matched our observations. Comparing the results led us to believe that our customization was the reason for the improvement in the user experience.

From our observations and the childrens experience, we used collaborative learning elements and service design activities such as adding checkpoints in the online canvas to support the customization of the user journey. These touchpoints helped make room for reflections and discussions. We added a guidline acting as an instruction guide to help the participants and facilitators to work towards a common goal. We also added service design tools such as new and re-designed personas and ethical cards, to improve the team experience and learnings related to designing AI solutions.

After customizing the user journey and testing it with the same participants, (children) we learned that the children's experience was improved after the customization. Although we are aware that we improved the collaboration and the overall experience in the workshop, we still need to consider that we only tested with one group of children and the interaction between different teams can shape the outcome. We are aware the customizations is based on the involvement of a small sample of students. This could cause some limitations in the replication and use in other design workshops, that may have other structures or tools and that are not based on designing and problem-solving with the use of AI cards. Furthermore we have proposed a "before" phase, where children can share their ideas and work as

inspiration to future participants, this could not be tested, but we believe that this could build a stronger community for 33A, where participants can share their reflections and challenges and in this sense keep supporting collaboration.

We believe that we have successfully customized the AI design sprint workshop for children and different target groups. The customization of the service relies on the customer needs, although we had to take into account 33A as a company and their demands. In this scenario, the workshop supports children to learn, and therefore a different goal compared to the original service that is more business-oriented. The motivation for businesses to participate in the AI design sprint workshop is to produce innovative outcomes. On the other hand, the motivation for children to participate is to use design and AI to innovate and solve wicked problems. Therefore providing space for reflection and understanding helps support the learning process since AI is complex and can be a challenge for anyone to understand. This difference of the new workshop can make it harder for the 33A to change their mindset and facilitate a workshop for learners and not for business creators.

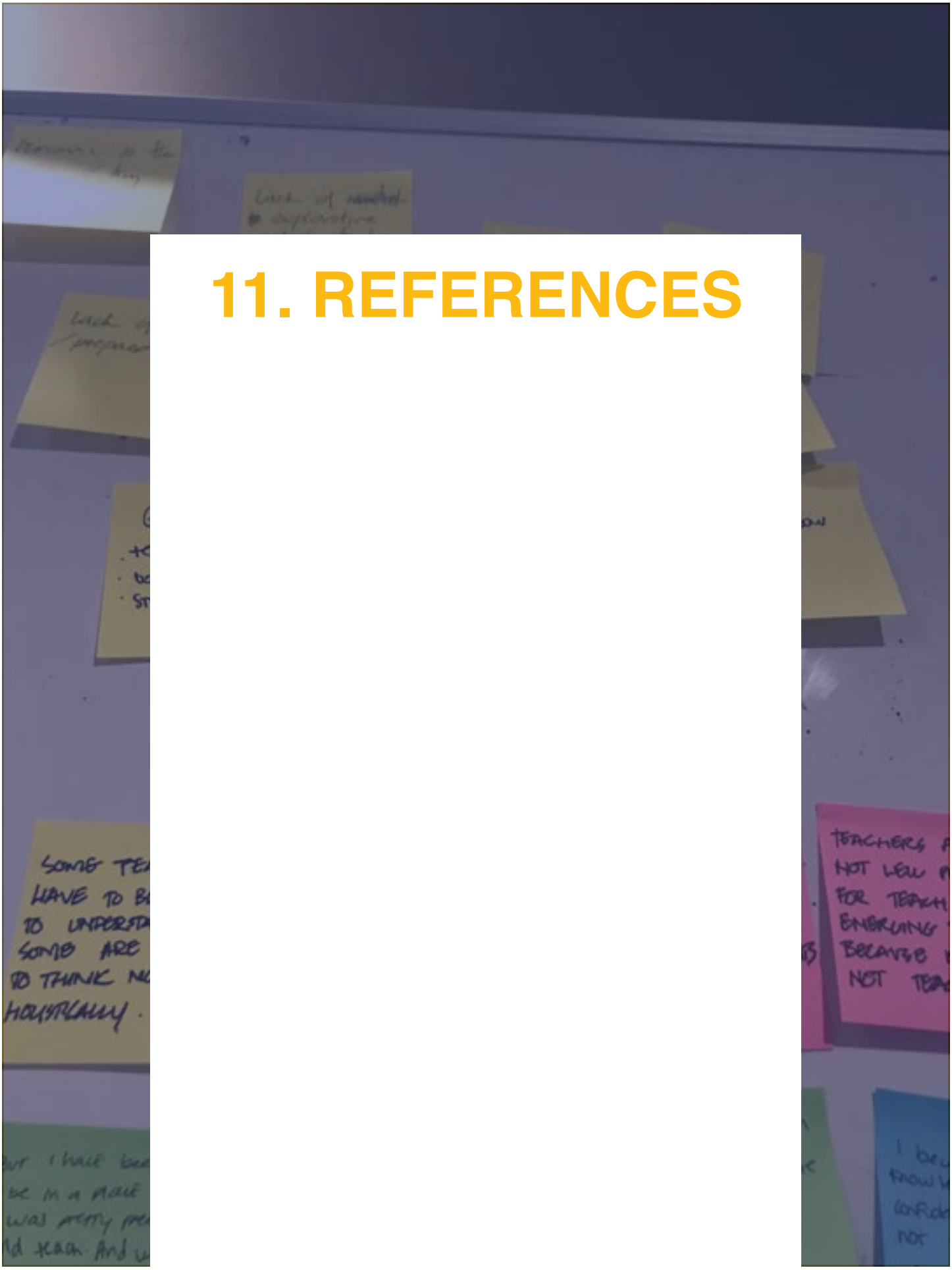
We experienced that by adding key elements from collaborative learning as part of the customization of the user journey, we can trigger collaboration or improve it. Clear instruction, communication on goals, tasks and activities are crucial to support collaboration. Even though we can have these elements included, collaboration is not always certain and the role of the facilitator becomes relevant in terms of supporting collaboration by guiding the reflection, discussion, and assistance in the group dynamics.

From our perspective as service designers we see collaborative learning as a broad and complex field. We can conclude that collaborative learning is hard to measure as it is not something tangible that you can observe. Firstly we divided collaboration from collaborative learning, where collaboration is the interaction that we can observe is happening between participants, and collaborative learning as an instructive method that can help us lead this interaction to happen. This is aligned with design workshops and design based learning where we realized that collaboration between the children was used as a coordinated, synchronous activity which aimed to construct and maintain a shared understanding of a problem. As service designers we used design and collaborative learning as a way to support our customization of the service.

From the children's feedback, we found that they had an enjoyable experience learning with design methods. Children learned about collaboration, problem-solving, as well as technology literacy in the field of AI. They go through a design process that leads them to learn how to develop a specific AI concept, solve a problem, reflect on the impact their solution can cause in society, and pitch their solutions.

We have presented a particular case that is not frequently found in literature where children participate in a design workshop and collaboratively learn about artificial intelligence. As we have presented, education is changing and new methods are starting to emerge. The use case, the AI design sprint workshop, can act as inspiration and encouragement to use new methods to learn about AI technology via Design sprint workshops. Based on our conducted research we believe that the customization of the AI design sprint user journey (design process) will enable children to have a better comprehension

of AI, design methods and problem-solving in collaboration, which we believe will support them in the future of the 21st century.



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12.LIST OF FIGURES

12. LIST OF TABLES

13. APPENDIX

APPENDIX 1. CONSENT FORM AND NONDISCLOSURE AGREEMENT

Example of a consent form from participants of the AI design sprint workshop for children. The rest will be found in link

Consent Form

Service System Design, Aalborg Universitet København,

The purpose of these projects is to examine how service design can customize AI design sprint workshops, service provided by 33A and support collaborative learning in childrens.

The research is being conducted by: Josefina Gaete Villegas, Hanna Andersen and Hamish Coventry master students at Aalborg University.

Participation in these studies is voluntary – you are not under any obligation to consent and – if you do consent – you can withdraw at any stage. You can withdraw via email supplied below.

Any information that is obtained in connection with these studies able to be identified as in connection with you will remain confidential. If you consent to participating in these studies, I plan to publish the results, pictures and audio record during the research. In any publication, information will be provided in such a way that you cannot be identified.

I have read the foregoing information, or it has been read or translated to me. I have had the opportunity to ask questions about it and any questions I have been asked have been answered to my satisfaction. I consent voluntarily to be a participant in these studies.

Participant name: Frederik Mikkelsen

Signature of on behalf of participant: 

Date: 150520

I confirm that the participant was given the opportunity to ask questions about the studies, and all the questions asked by the participant have been answered correctly and to the best of my ability. I confirm that the individual has not been coerced into giving consent, and the consent has been given freely and voluntarily.

Researcher: Hanna

Signature of researcher: 

Date: 150520

Non-disclosure Agreement
for
Student Thesis Project - spring 2020

Between

Hanna Andersen
270781
Stubmøllevej 6, 2tv
2450 KBH SV
Study number: 20162207

Josefina Gaeta Villegas
200691
Korsørgade 35, 2th
2100 KBH Ø
Study number: 20181226

Hamish Coventry
291193
Frederiksvej 36
2000 F
Study number:20186362

(hereinafter referred to as 'the Student(s)')

And

33A
Vesterbrogade 33A
1630 CPH
CVR number 39037297

(hereinafter referred to as 'Company')

APPENDIX 2 AUDIO FILES AND INTERVIEWS

During our design process we interviewed experts and conducted workshops with children. Whenever possible we have audio recorded the conversations. The access to the audio files and interviews can be found in the following link.

Business supervision link:
33A

Experts
Teacher link:
Morten Jacobsenn
Mette Rindholm

Education experts link:
Jakob Harder
Mikkel Frich

Design experts link:
Sidse Bordal
Charlotte Høeg

Children group interview link

APPENDIX 3 WORKSHOP VIDEOS

Access to the online remote AI design sprint workshop for children, conducted by 33A can be found in the following link

APPENDIX 4 AI CARDS

APPENDIX 5 ETHICAL CARDS

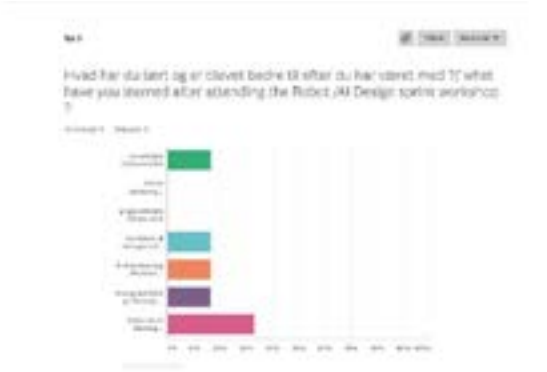
APPENDIX 6 NEW SERVICE

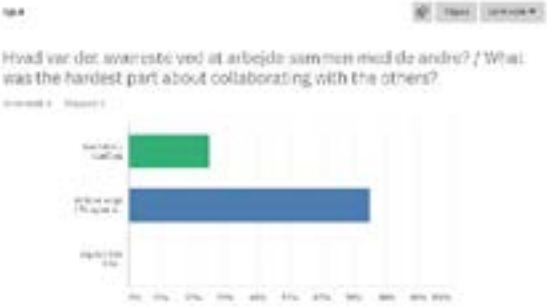
Access to the introduction video and the script can be can be found in the following link

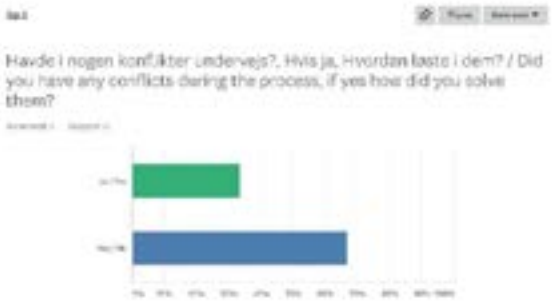
Access to the final canvas (design process) is found in the following link

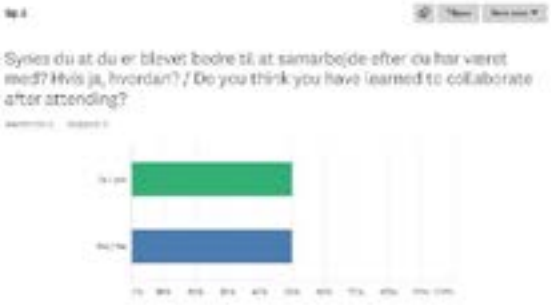
Access to the final guideline is found in the following link

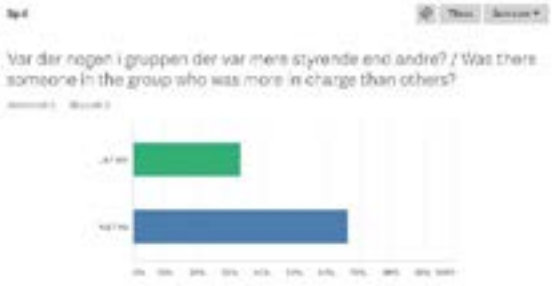
APPENDIX 7 SURVEY CHILDREN'S FEEDBACK

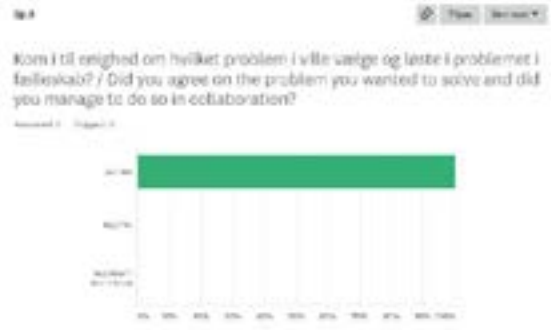


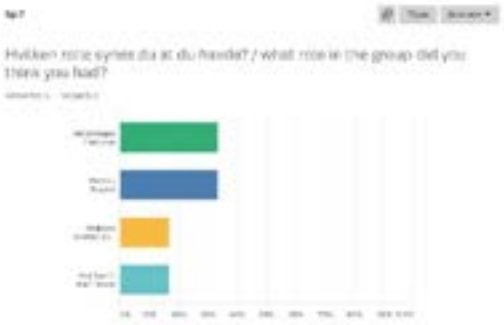


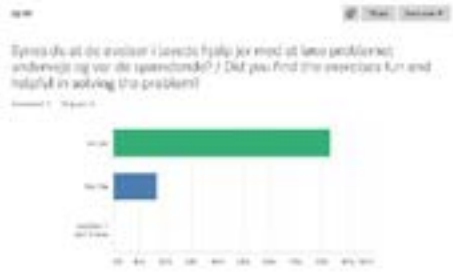

Havde I nogen konflikter undervejs?. Hvis ja, hvordan løste i dem? / Did you have any conflicts during the process, if yes how did you solve them?


Synes du at du er blevet bedre til at samarbejde efter du har været med? Hvis ja, hvordan? / Do you think you have learned to collaborate after attending?


Var der nogen i gruppen der var mere styrende end andre? / Was there someone in the group who was more in charge than others?


Kom i til enighed om hvilket problem i ville vælge og løste i problemet i fællesskab? / Did you agree on the problem you wanted to solve and did you manage to do so in collaboration?


Hvilken rolle synes du at du havde? / what role in the group did you think you had?


Synes du at de øvelser i løbet hjalp jer med at løse problemet undervejs og var de spændende? / Did you find the exercises fun and helpful in solving the problem?

APPENDIX 8 PRODUCT REPORT

The following pages will present the product report.

THE ROLE OF SERVICE DESIGN AND COLLABORATIVE LEARNING SUPPORTING THE CUSTOMIZATION OF DESIGN WORKSHOPS FOR CHILDREN

In an AI design sprint use case

Master thesis in Service System Design

Hamish Coventry/ Hanna Andersen/ Josefina Gaete Villegas

Product Report

SERVICE SYSTEMS DESIGN

Aalborg University Copenhagen
Master Thesis

TITLE The role of Service design and Collaborative learning supporting the customization of Design workshops for children

SEMESTER 10th

PROJECT PERIOD February 2020 - May 2020

COLLABORATOR 33A
Vesterbrogade 33A
1630 Copenhagen, Denmark

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PAGES 21

SUPERVISOR Luca Simeone, lsi@create.aau.dk

HAND-IN-DATE 28.05.2020

PROJECT GROUP Hamish Coventry
Hanna Andersen
Josefina Gaete v.

TABLE OF CONTENT

INTRODUCTION

This product report is created as part of our thesis project as it presents the final concept whilst development of the design process is provided in the process report. The project was conducted from February to May 2020 by Hanna Andersen, Hamish Coventry and Josefina Gaete in collaboration with the company 33A. The product report is a deliverable to 33A.

The thesis project is based on the use case of the AI design sprint, a workshop provided by 33A. The workshop aims to support companies to provide assistance towards the company's service and how artificial intelligence (AI) can be adapted. This is done by providing a workshop where participants from the company, work in teams to help develop AI concept solution in collaboration with 33A and AI experts for their companies.

In 2019, 33A launch their first Ai design sprint in a new context with teachers and children in an educational context. This was done in collaboration with Designskolen Kolding, Regndans and Favrskov Kommune. Some changes were performed in the traditional AI design sprint for their situation they recalled it the 'Robotics Design Sprint'.

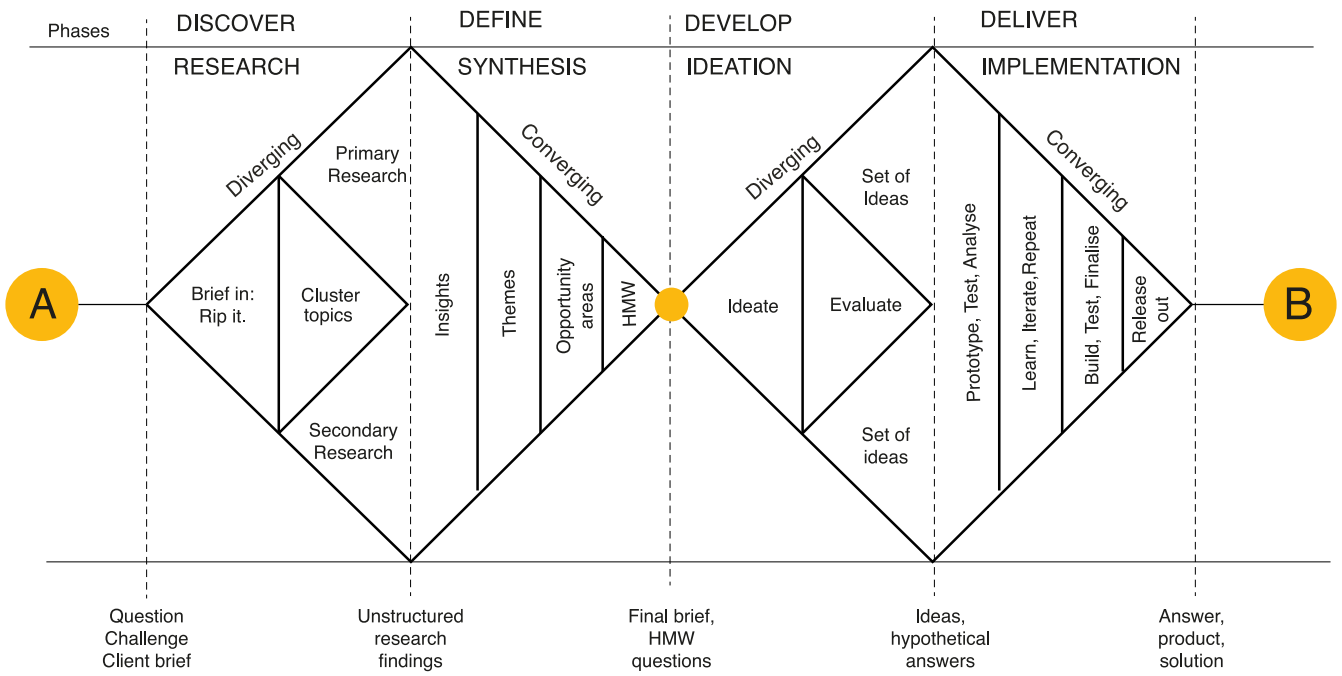
As a result of this experience, 33A realised that there were main challenges that were presented in the experience.

In-depth changes were needed to be made in the service to accommodate the needs of children as they were the new users. We recognised that we wanted to improve collaboration in the experience of the workshop and we took into account that there is a lot of group work involved.

Therefore we wanted to provide a solution towards how can we improve the steps of the AI design sprint by integrating collaborative learning elements and trigger collaboration between children. After conducting our research we can conclude that to customize the service experience we needed to enhance collaborative learning through the workshop to provide a better setting for children to collaborate and therefor a better group work experience for them.

This product report will introduce the project approach and our findings which led us to creating our final service concept. We will present the service concept, which is built upon the current journey of the AI design sprint. Furthermore we will present how it will provide value for both the service provider and the participants. Finally, we will present some future considerations for the new service.

PROJECT APPROACH



Our design approach was largely influenced by the Design Councils Double Diamond and IDEO's human-centred design process. Although the two are very similar we found a methodology that provided a fusion of the two. We felt that each methodology lacked certain aspects to their method which we felt were needed and was crucial for our process.

The methodology that we chose to shape our design process is labelled "The Double Diamond revamped"(Dan Nessler, 2018). A main asset of the methodology was in the deliver phase. The methodology provided a framework for our project approach to perform a series of iterations to develop our service. This is done so we could provide an AI design sprint that is customised to accommodate the needs of children. The outcome was to provide a service that is designed to be human-centred.

Figure 1: Project approach

PROJECT CONTEXT

After our initial desk reseach we discovered the main scope of our project, shown in figure 2.

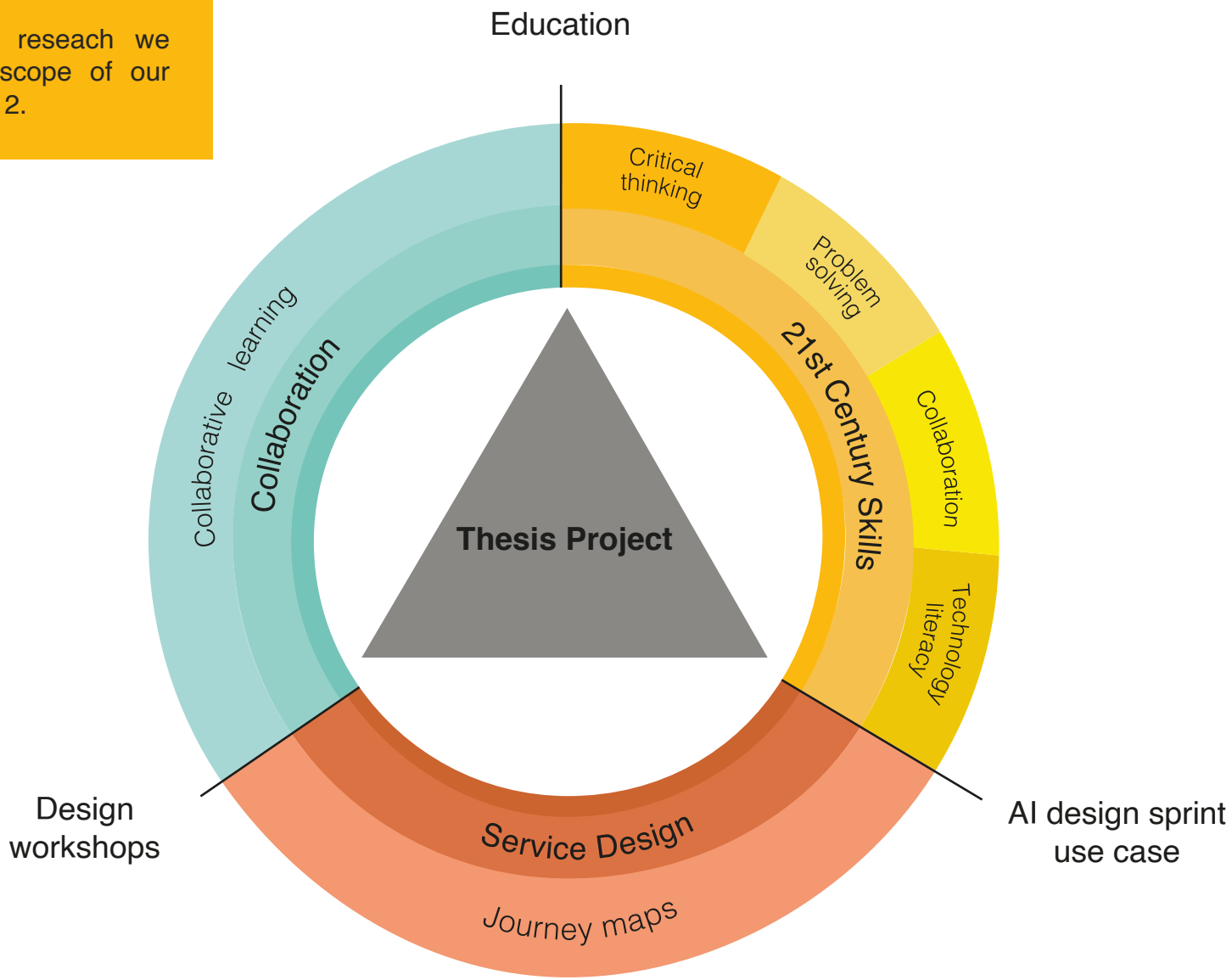


Figure 2: Project context

DESIGN BRIEF

This section presents the Design brief and for whom we are designing for, the goal of a potential outcome, and how we see we can achieve this goal.

PROBLEM

The current AI design sprint workshop does not support children in collaboration using AI and design to solve problems and create solutions.
Children they felt it was challenging to participate and engage with the AI design sprint.
This is due to the lack of clarity in what is expected from them and the complexity of the topic.
This lack of clarity affects children's concentration during the process and prevents them from having a common goal.

WE KNOW

In terms of education, digital platforms are gaining relevance.
Schools and teachers are not 100% prepared to implement new methods in their daily work.

BEHAVIOURS

Groups understand their common goal.

Each of the participants knows their individual and group task.

Promote the discussion and reflection during the workshop.

GOAL

Our main goal is to desing a self-explanatory service that lets children understand AI and design as well as their tasks during the workshop and what is expected from them.

HOW

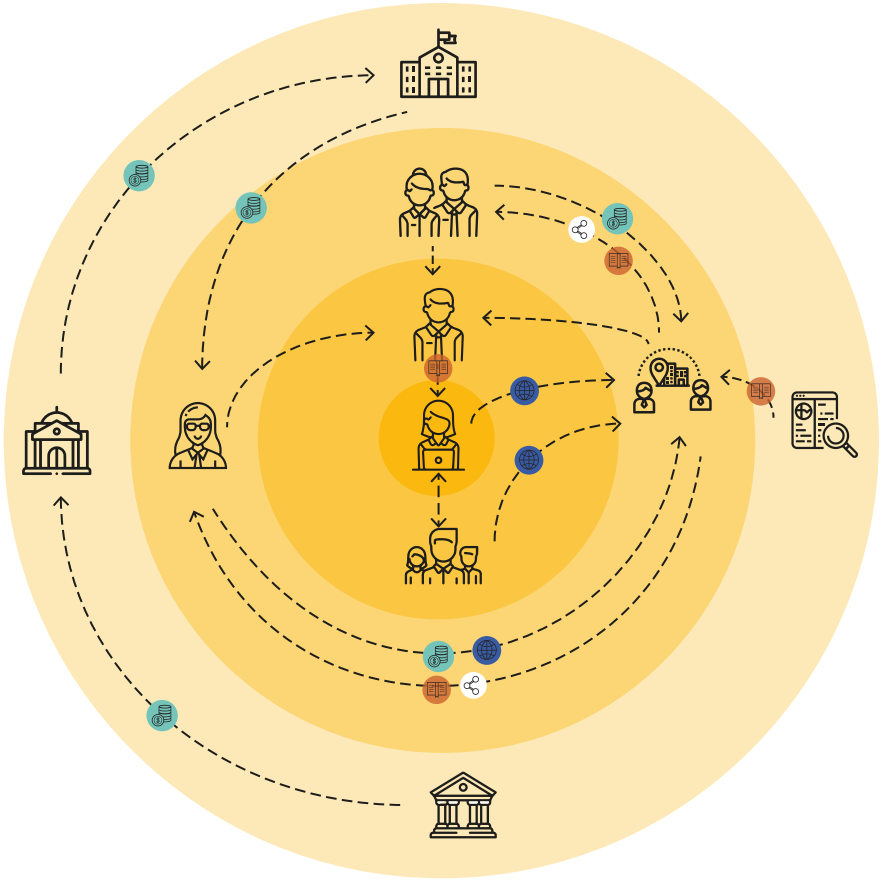
By customizing the user journey of the current AI design sprint and workshop touchpoints.

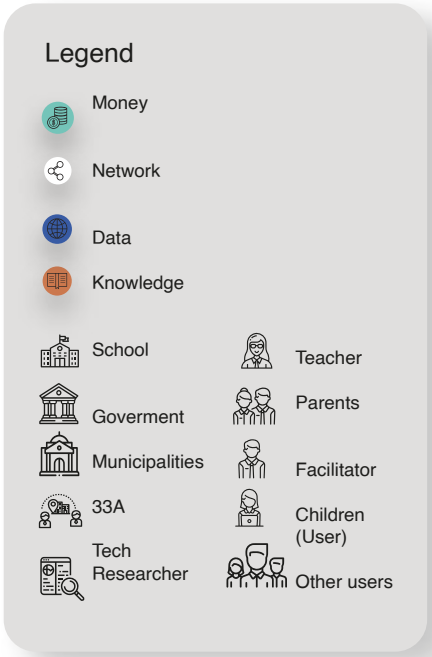
DESIGN FOR

Our primary users will be children from Udskolingen. We found the students in this age group would deliver input from knowledge and experience. We felt that before they go into high school they would benefit by having pre-informed about AI and adapt the skills that they have acquired from the workshop.

Our client (facilitators) will be parents or teachers that see value in presenting new ways of learning for children.

SERVICE ECOLOGY MAP





The service ecology map is presented in figure 3. An ecology map is an extension of a stakeholder map or value network map (Stickdorn et al., 2018).

One of the reasonings for representing the service ecosystem is that we can represent the human–human interactions, but also human–machine.

Figure 3: Ecology map

EMPATHY MAP

Figure 4: Empathy map (user)

EMPATHY MAP - USER

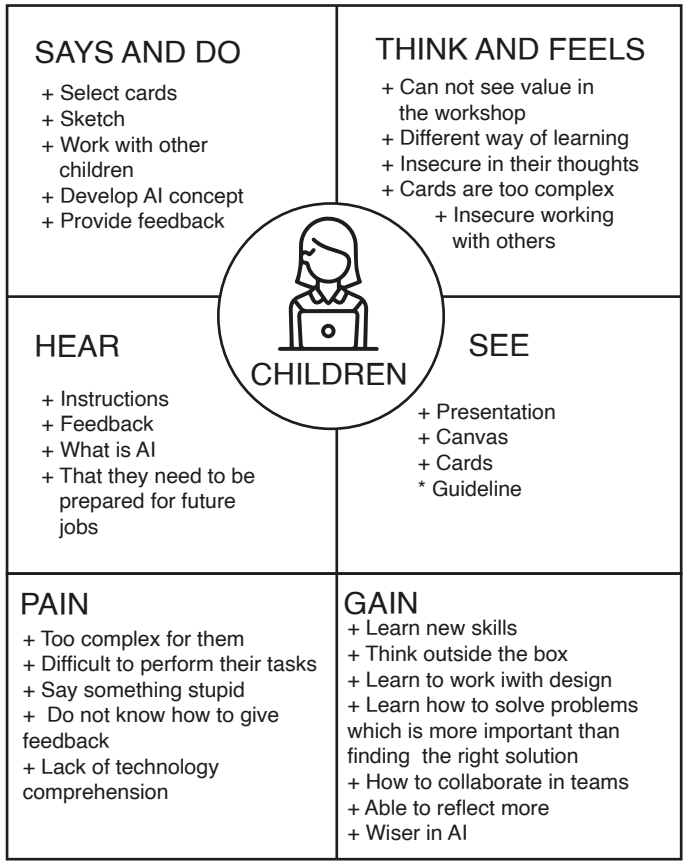
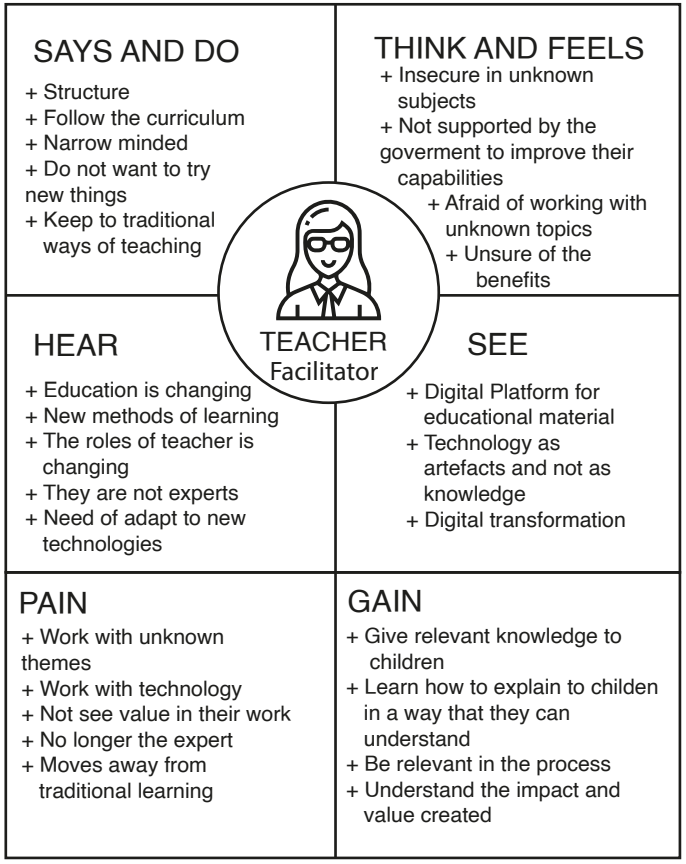


Figure 5: Empathy map (client)

EMPATHY MAP - CLIENT



The empathy maps were implimented to understand the needs of our users and clients. We were able to create these maps based on research regarding the behaviour of children and teachers. We were able to conduct interviews with children, provide surveys and interview teachers and experts in education to create these archytypes. By creating these maps we were able to identify characteristics and behavioural traits, of children and teachers. These helped us produce a service to help accomodate to these needs. We noticed that not all teachers are prepared or used to implimentate new methods and we were able hear parents comments regarding the impact of the workshop. Based on our reseach and experience we decided to make the first facilitators 33A, and then parents and teachers that are prepared and also are ‘open minded’.

BEHAVIOURAL ARCHETYPE

CHILDREN

"They like to learn in new ways and create things. They also want to collaborate in groups and be more prepared for their professional future

GOALS

Gain new skills that will help them be more prepared for future jobs.

NEEDS

Understand their role and tasks in order to perform good group work.

PAIN-POINTS

Do not understand their roles and task and are not able to contribute in the group work.

THOUGHTS

+ Empathic with peoples problems.
+ Solutions with AI concepts.

FEELINGS

+ Sometimes can be insecure in expressing their thoughts.
+ Excited for learning new things and create solutions.

ACTIONS

Communicate with their team by sharing thoughts, ideas and reflections. They support their thoughts with tools like drawing, writing and using AI cards

By performing our empathy maps we can convey the users behaviour and their needs in the form of behavioural architypes. The tool helped present the users motivations, pain-points and we have also used it to capture how they think, feel and act in regards to the workshop.

Figure 6: Behavioural archetypes (children)

BEHAVIOURAL ARCHETYPE

FACILITATOR

"They see relevance to teach new skills in children. They are curious to keep up to date with technology and understand that there is a need in adapting new ways of learning.

GOALS

Learn how to teach in new ways and teach new and relevant skills to children.

THOUGHTS

+ How to guide the children through the workshop process so they can learn new skills.
+ Keep children engaged in the process.

NEEDS

Feel prepared and understand the value of what they are going to learn and teach.

FEELINGS

+ Insecure if they are not well prepared to facilitate.
+ Excited to teach in new ways.

PAIN-POINTS

+ Not expert in AI.
+ Not updated with online programs.
+ Are not prepared to facilitate the workshop.

ACTIONS

Guide the children along the way. Help them reflect on the process and what children had learned. Help if children get lost on their tasks.

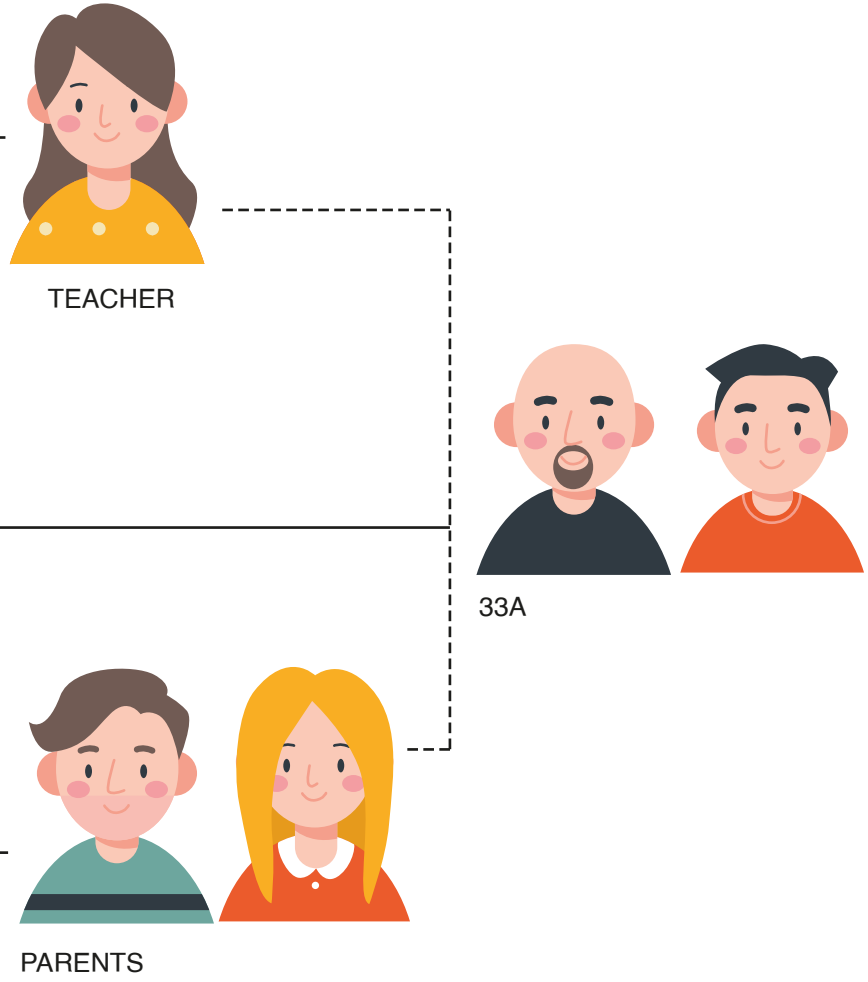
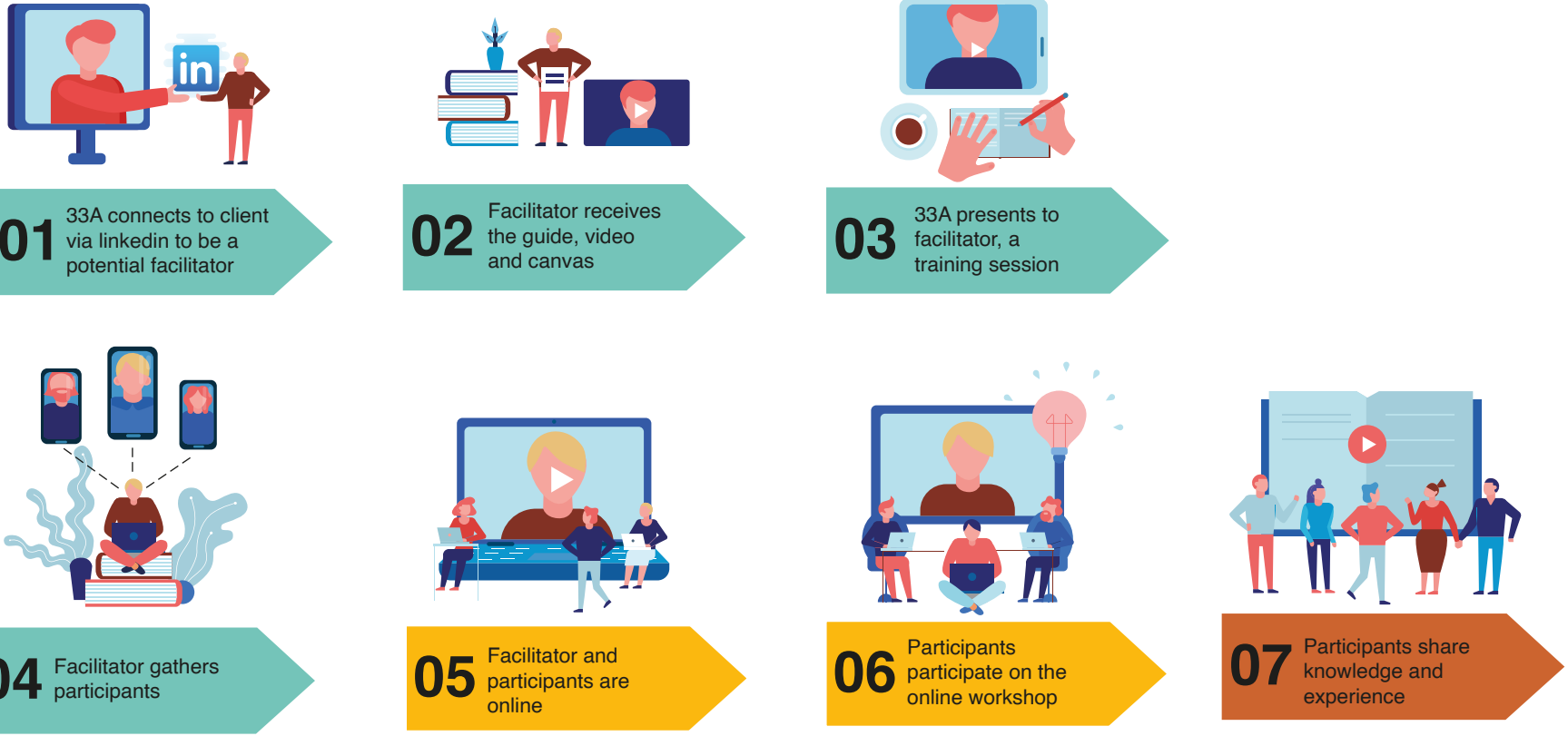


Figure 7: Behavioural archetypes (facilitator)

STORYBOARD



The series of images represented in figure 8 is a simplified storyboard of our service. The steps of the service is indicated with colour codes. These colours represented are stages of the service. The green colours represent all the actions before engaing with the service. The yellow colour of the steps, represent during the workshop. Finally the red steps indicates, after the workshop. We wanted to represent key stages of the process and we included illustrations as a visual aid to help assist the description of each stage.

Figure 8: Storyboard of service

USER JOURNEY

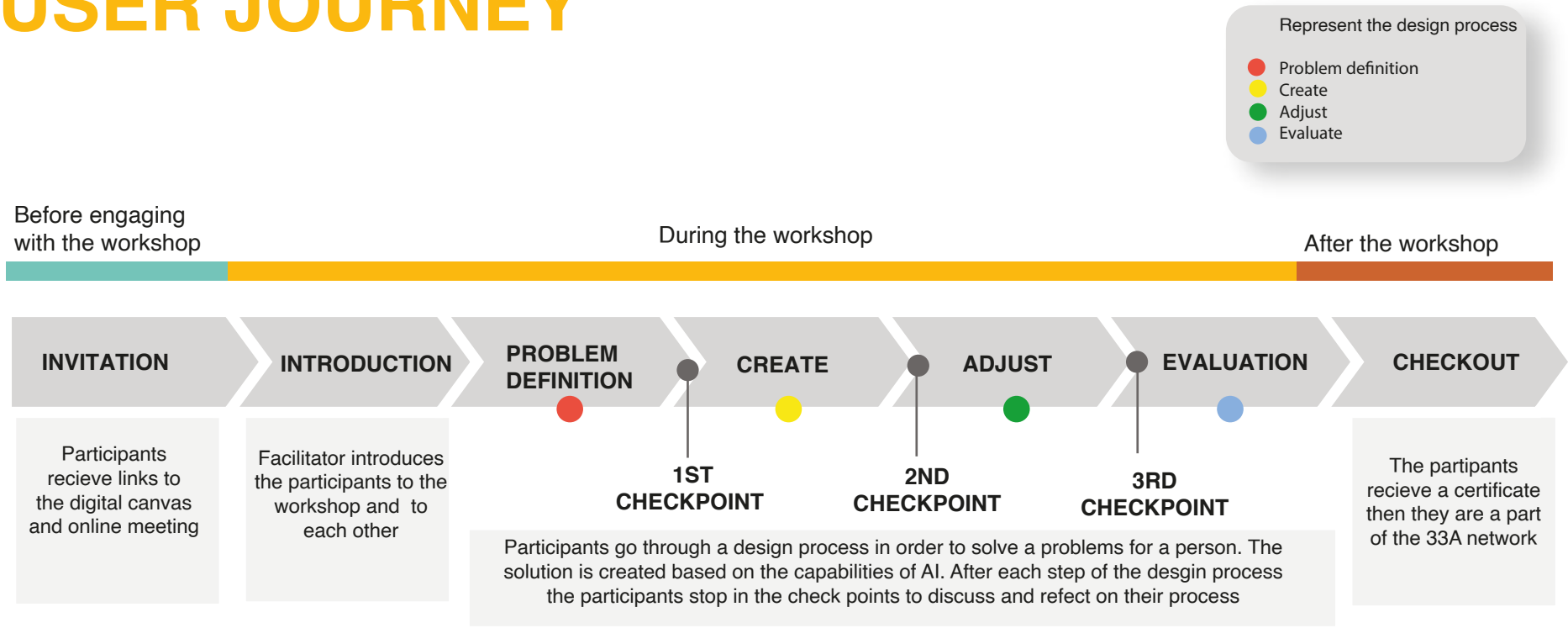


Figure 9 indicates the stages and steps of action from our user in our service. Within the steps, stages are represented in the form of a journey map. The journey map is a great tool to help visualize the experience of a person over time (Stickdorn et al., 2018).

The three major sections of the journey is separeted into a ‘before engaging with the workshop’ , ‘During the workshop’ and ‘After the workshop’. Within each section, stages are represented. These stages provide an overiew of the service for our user. With each stage, steps are provided. These steps provide in detail the actions that are present that affect the user.

Figure 9: User journey

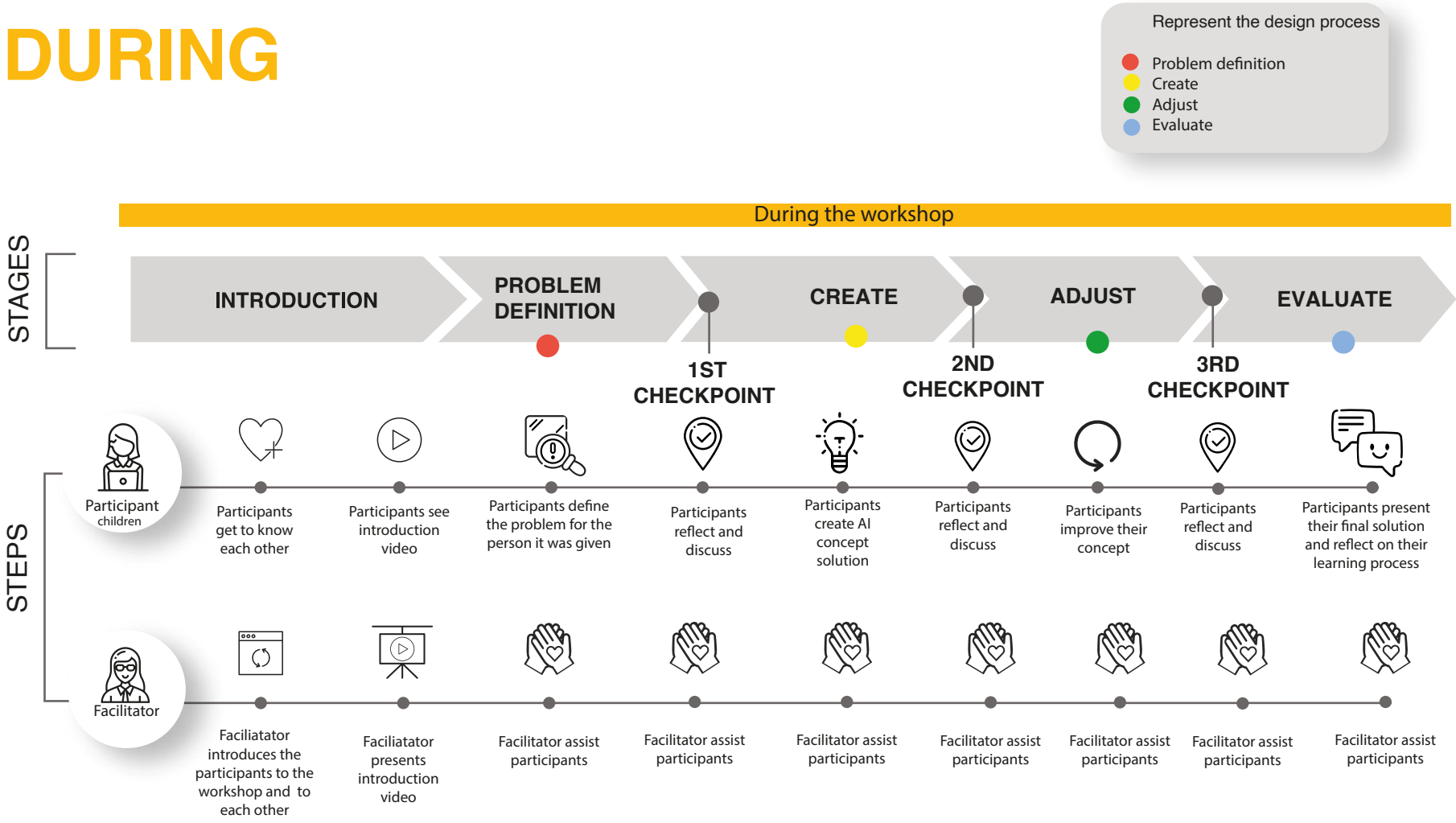
BEFORE

Figure 10: Before engaging with workshop

This stage presented in **Figure 10** are steps that are conducted by participants and the facilitator before the workshop. We wanted to illustrate the step by step actions of the participants and the facilitator in more depth. Furthermore we wanted to indicate how the two actors interact with one another.

The first two steps present how the facilitator is trained by 33A to be a facilitator and they then recieve the online canvas, guideline and the introduction video. Next the facilitator recruits participants to be involved in the workshop. Finally the facilitator will send an invitation to participants via email, where participants recieve links for the digital canvas and online meeting.

DURING

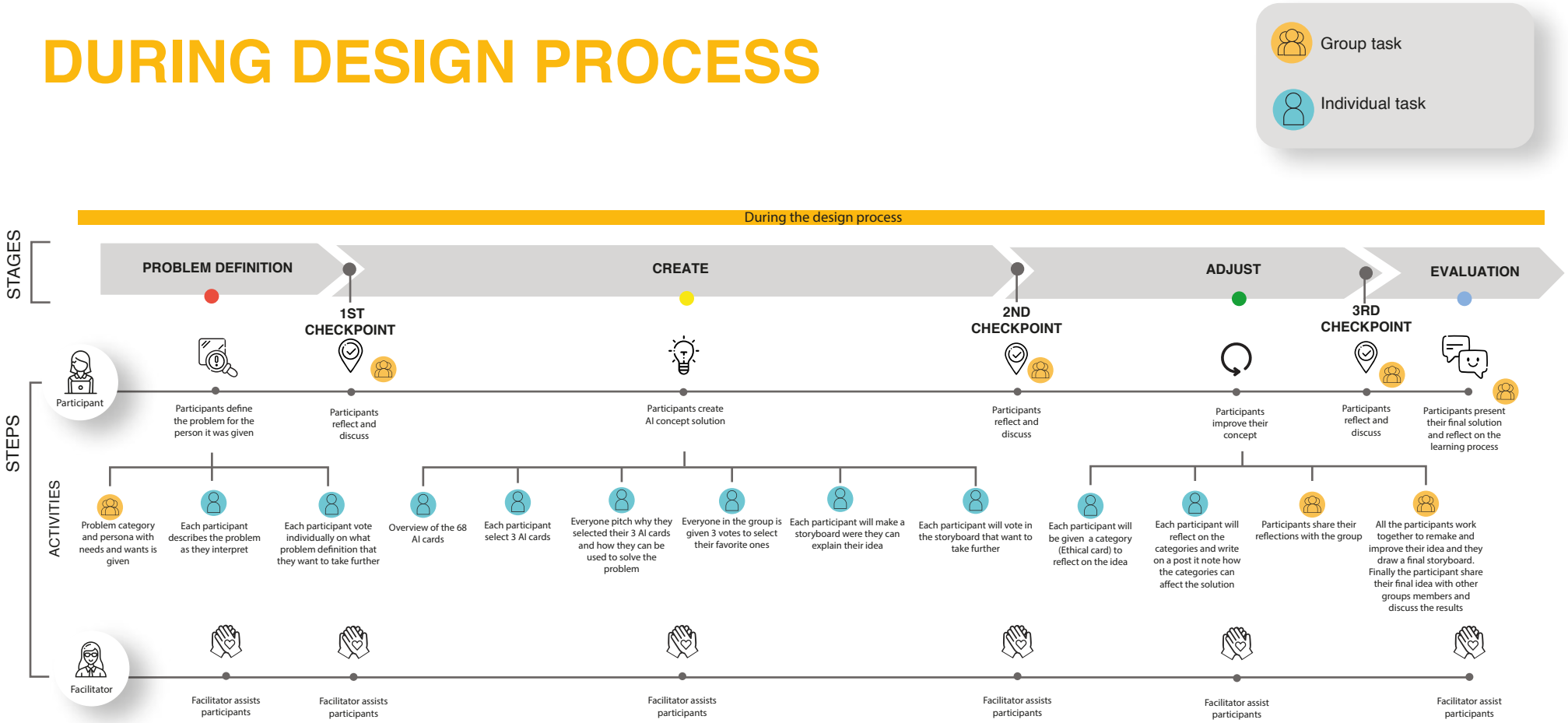


During the workshop represented in the user journey in **figure 11**. The figure provides an overview of actions during the service from participants and facilitators. We have labelled the stages of the workshop of 'introduction, 'Problem definition', 'create', 'Adjust' and 'Evaluation'. The stages are labelled with a colour, red, yellow, green and blue. These four distinct colours are the colours of the canvas of each phase.

Figure 11: During the workshop

During the workshop and in the steps of the design process the facilitator and participants would directly interact. The first steps 'during the workshop' indicate that the facilitator will introduce participans to the workshop and to each other. Next the facilitator will present an introductory video. After that the following facilitator and participant will not directly interact but the facilitator will assist participants. Furthermore participants will follow the steps regarding the four remaining stages of 'during the workshop'.

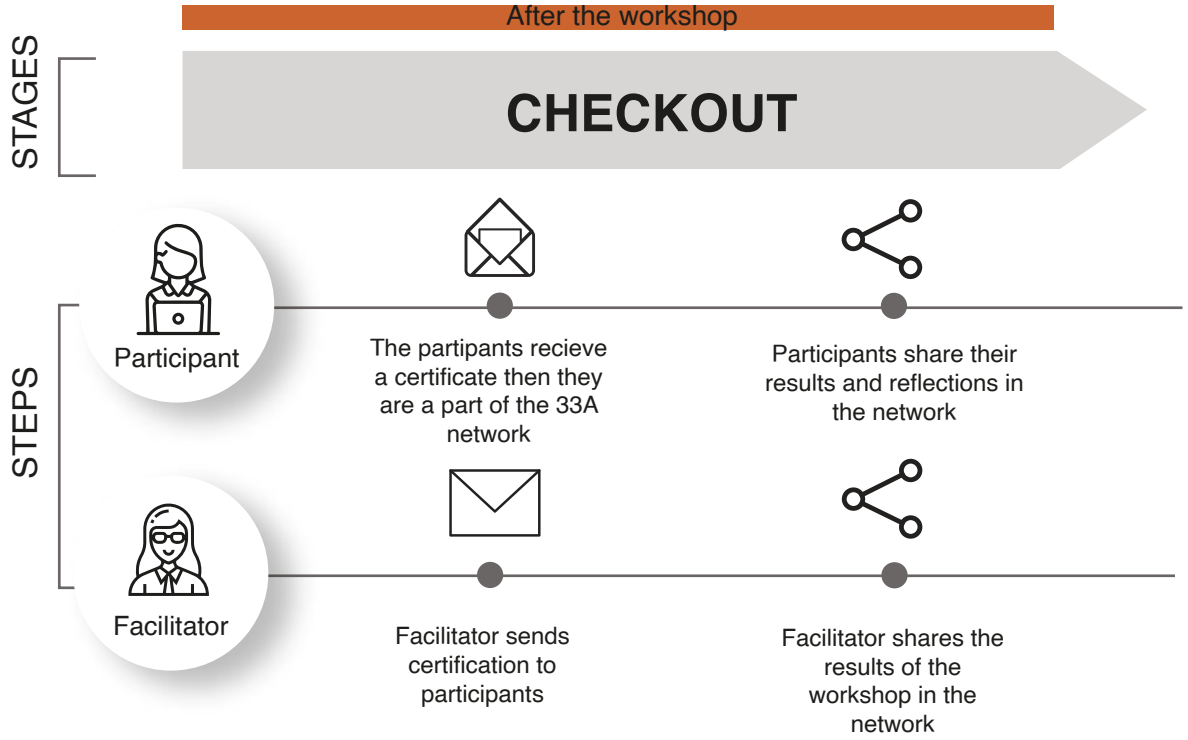
DURING DESIGN PROCESS



The user journey map represented in figure 12 provides an overview of the activities for each step of the workshop. At specific moments of the workshop, activities and steps are labelled with an icon of a specific colour. The parts labelled in yellow are group tasks where they work together and the parts labelled with a green icon are individual tasks.

Figure 12: Engaging in the design process during the workshop

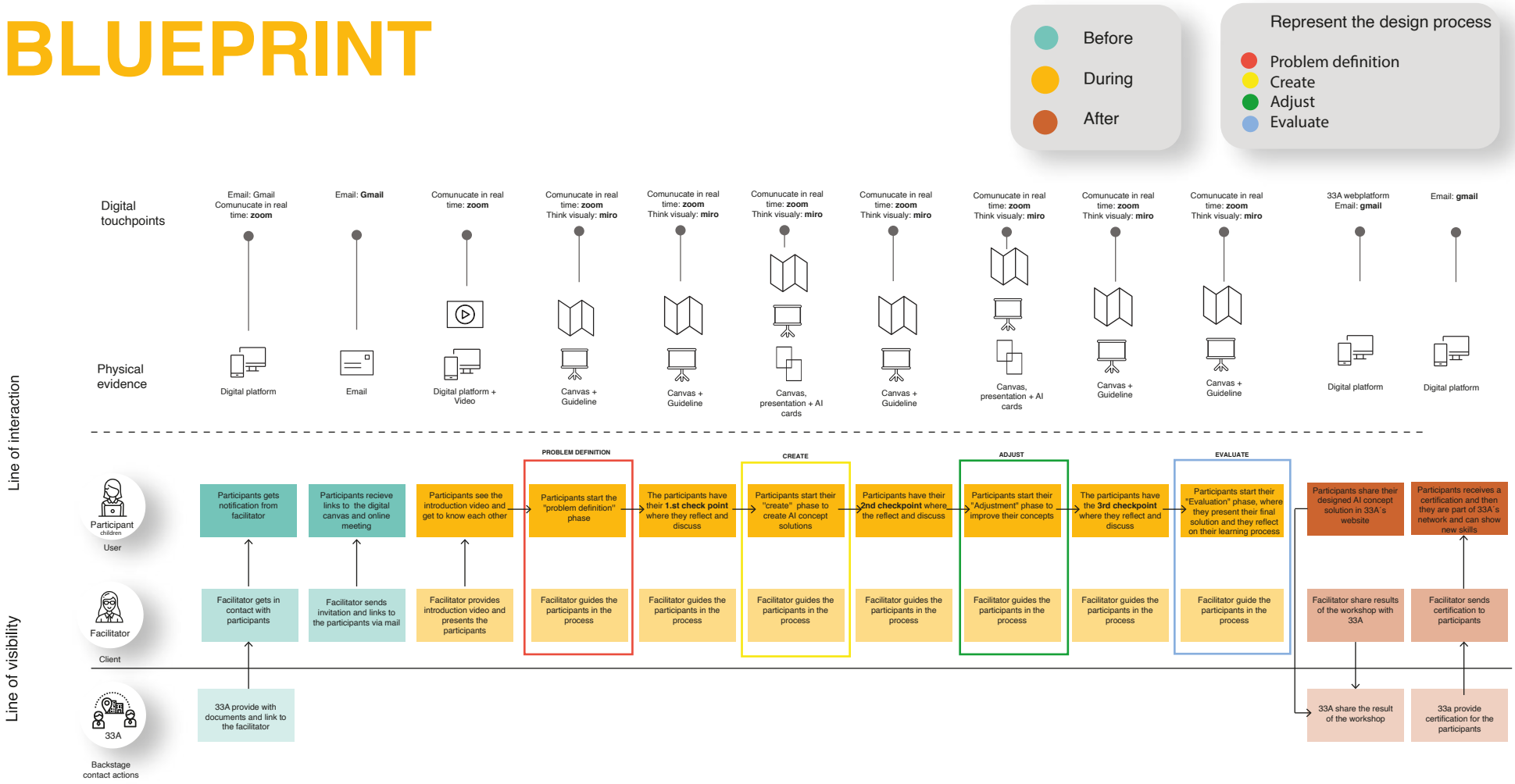
AFTER



The actions of the participants and the facilitator in 'after the workshop' are shown in figure 13. This stage includes two steps. The facilitator sends a certification to the participants, this means the participants recieve the certificate and are a part of the 33A network. Following on from that, the facilitator shares the results of the workshop in the network and participants have their results and reflections in their network.

Figure 13: After the workshop

BLUEPRINT



Providing a service blueprint is an efficient tool and is made to create an understanding of the system of the service. Service blueprints help provide a visualization of the entire service and its underlying support processes (Bitner et al., 2008). The tool helps provide common ground from which critical points of customer contact and physical evidence (Bitner et al., 2008). The blueprint represents the actions of participants, facilitator and 33A and how they interact with one another. These actions are represented within the line of interaction and line of visibility. The line of interaction divides the actions of the participants and facilitator and digital touchpoints. The line of visibility separates frontstage and backstage actions.

Figure 14: Service blueprint

TOUCH POINTS OF SERVICE OFFERINGS

In our service we have indicated in in figure ?? that the video, canvas and guide are major touchpoints for our service.

VIDEO

The video will be an introduction of what AI is and to the steps of the workshop.

The goal of the video is to communicate to the participants and overview of the workshop so they can be more prepared when they work in group.

GUIDELINE

The guideline is an instructive tool for the facilitator. It is supportive material for the facilitator to know what are the steps of the workshop and also is a support material to explain specific collaboration activities with the participants

The goal of the presentation is that the facilitator and the participants know what is needed to do in each step and to make sure they are aligned.

CANVAS

The canvas is where all the participants interact. It represents the 4 stages of the design process the children will go through. We added colour guides, tools and activities.

The goal of the canvas is to be an instructive and supportive tool for the participants. It should help facilitate the comunication between the participants and support for presenting outcomes.

Figure 15: Touchpoints of the service

VIDEO

The introduction video is implimented in the introduction section during the workshop. The principle for providing the video was to help children be more prepared for the workshop. We did this by presenting and outlining a brief step by step process. We secondly wanted children to understand the benefits they would gain from participating in the workshop. We did this by providing a description of artificial intelligence and incorporte the benefits of learning AI and how it can be used in society.

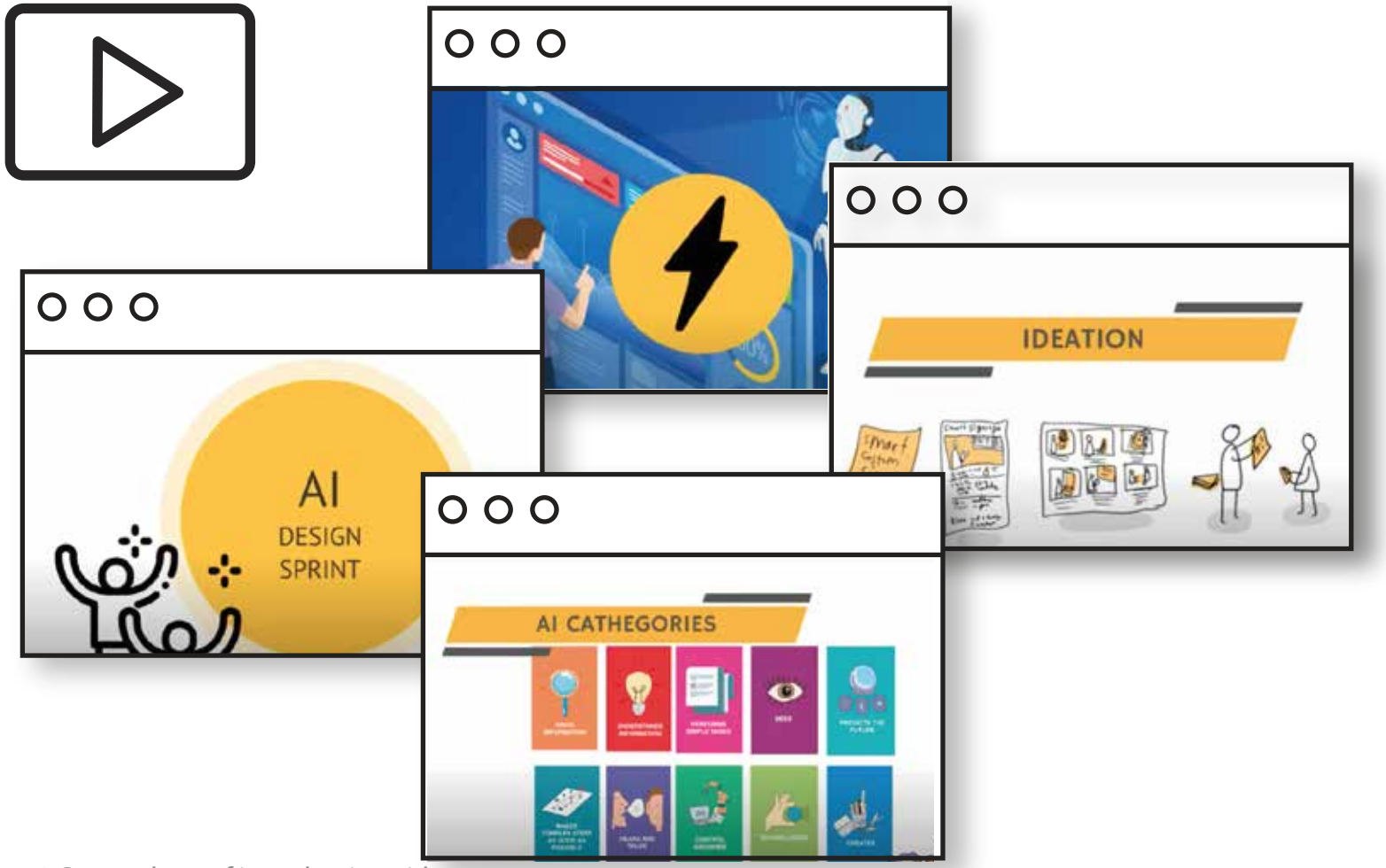


Figure 16: Screenshots of introduction video

GUIDELINE

The guideline will be provided by 33A to future facilitators. The guidline will assist the facilitator in the Ai design sprint workshop as well as help to guide the participants through each step in the design process.
Furthermore the guide can act as visual support to help explain the steps for the participants.

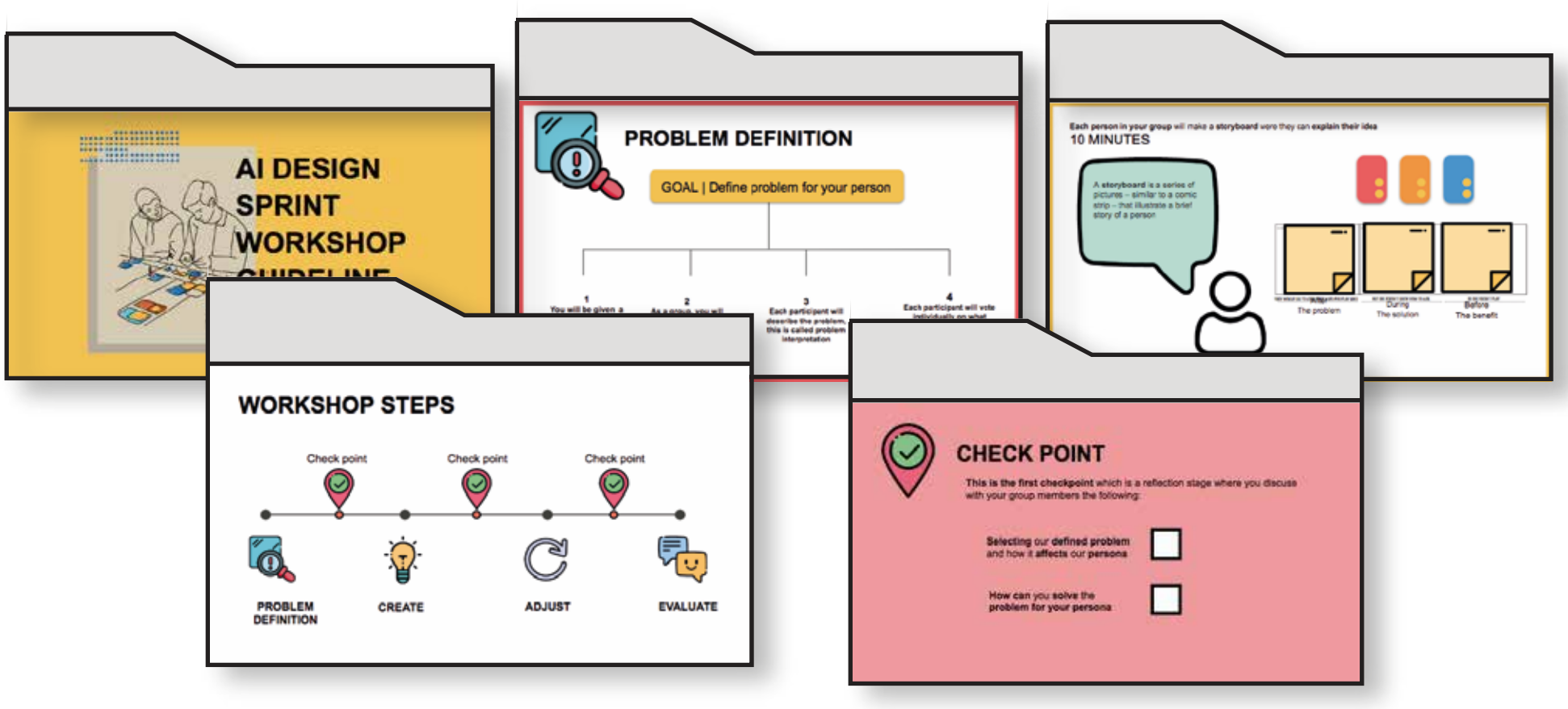
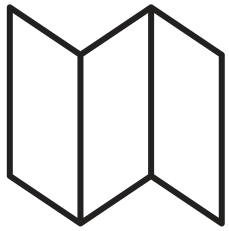


Figure 17: Screenshots of guideline

CANVAS

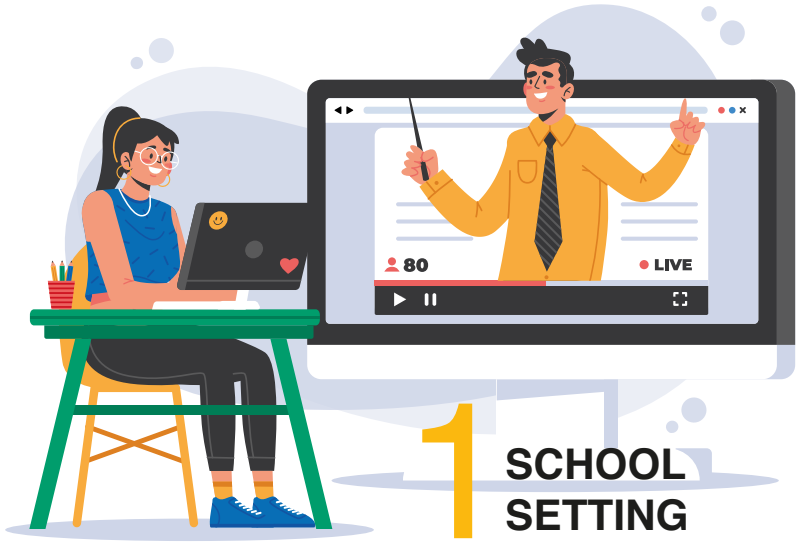


The canvas is used as a tool to help participants to help them create and work with the design process. The canvas and the steps in it, such as the Persona, helps participants think in a visual way and offers space to represent their ideas. The canvas works as an instructive method allows children to understand the activities. The canvas also allows participants to present and show their outcome and their process.

For the workshop we have one colour for each part of the design process; ‘Problem definition’, ‘Adjust’, ‘Ceate’ and ‘Evaluation’. For the participants to interact on the same canvas we placed all the four steps in the canvas next to each other in Miro. The website allows the particpants to work together at the same time and work remotely.

Figure 18: Screenshots of the canvas design process steps

POSSIBLE FUTURE DEVELOPMENT



Possibilities for future development directions for the AI design sprint workshop, without 33A as the facilitators.

1. First, we see the version we present as our final service where a person (teacher or parent) has the role of the facilitator and the children will be the participants. All together will work remotely on the online platform and they will have access to the online canvas and a guideline.

2. Our second variation is that children have the chance to meet physically to work and discuss but they still work on the digital platform.

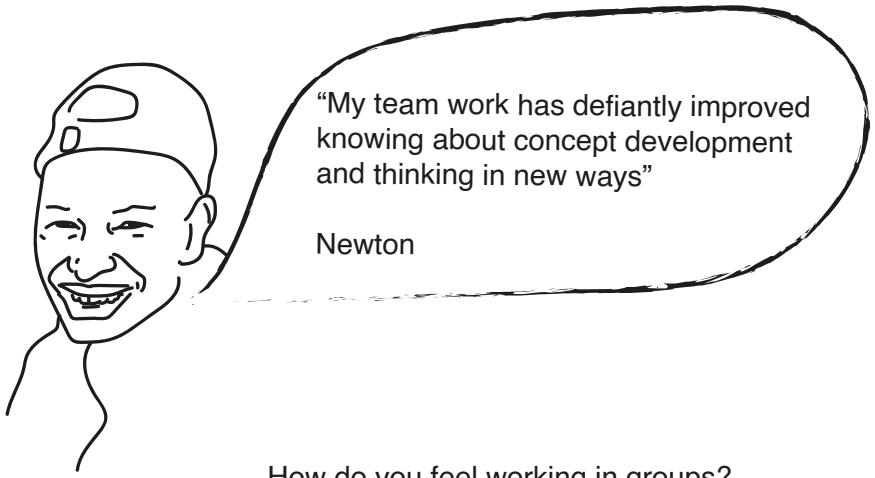
3. The final version could be that children work together physically with a physical canvas with the support of the guide. This variation needs to be tested but we believed that as the most complex interaction is the online one the effect in terms of collaboration would be similar.

Figure 19: Possible future development

FEEDBACK, CHILDREN

The following quotes are from children that we tested our final service on. We wanted to discover, what they learnt, why teamwork improved, how they felt working in groups and what they liked from the experience.

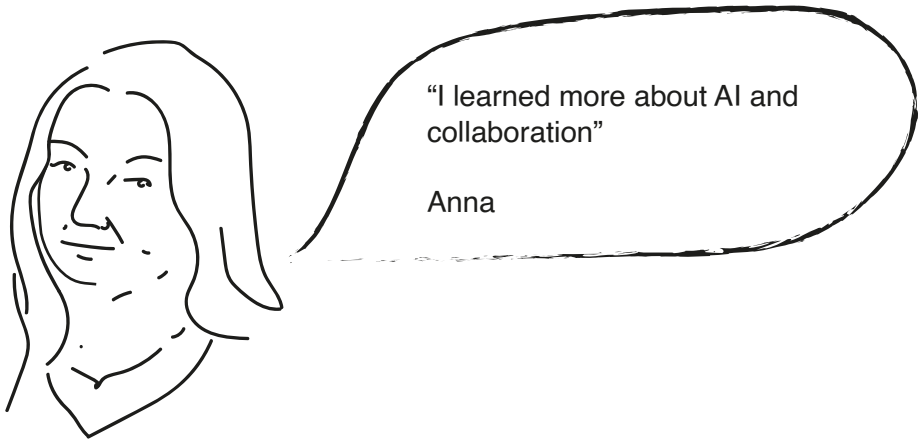
What did you learn?



How do you feel working in groups?

Figure 20: Quote from Newton

Why do you think teamwork improved?



What you like most about the experience?

Figure 21: Quotes from Anna

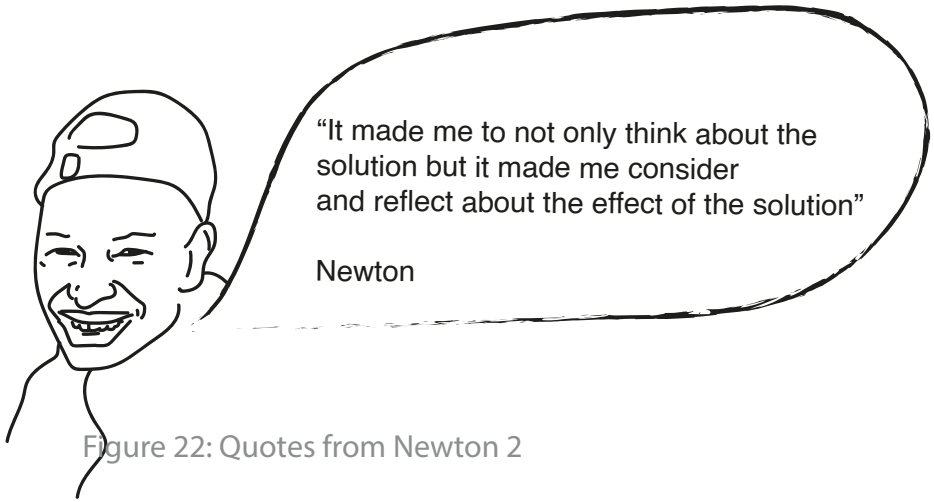


Figure 22: Quotes from Newton 2

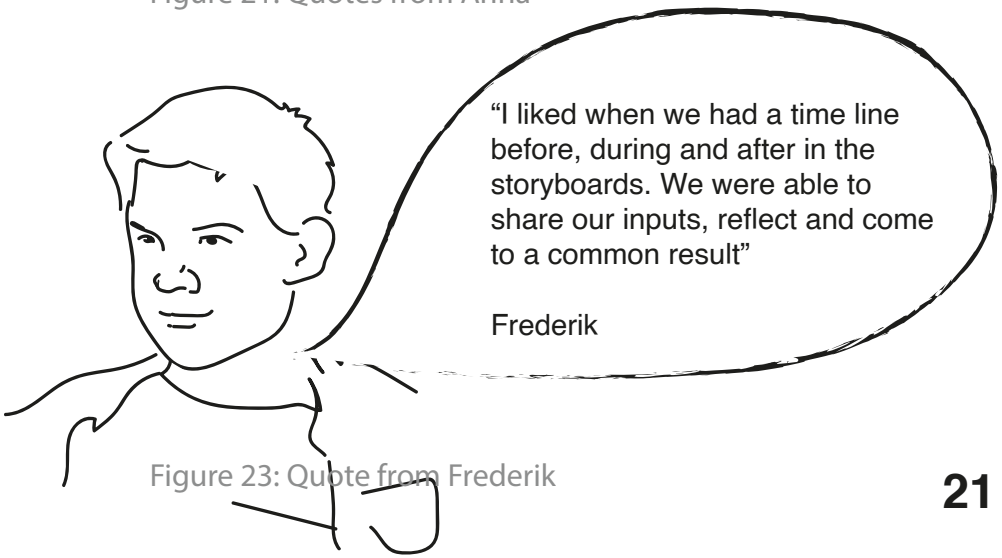


Figure 23: Quote from Frederik

FEEDBACK, MORTEN JACOBSEN

We presented the service to Morten Jacobsen who is a teacher in a private school in Copenhagen. We wanted to know his opinion of the service and how it can be developed for further use.

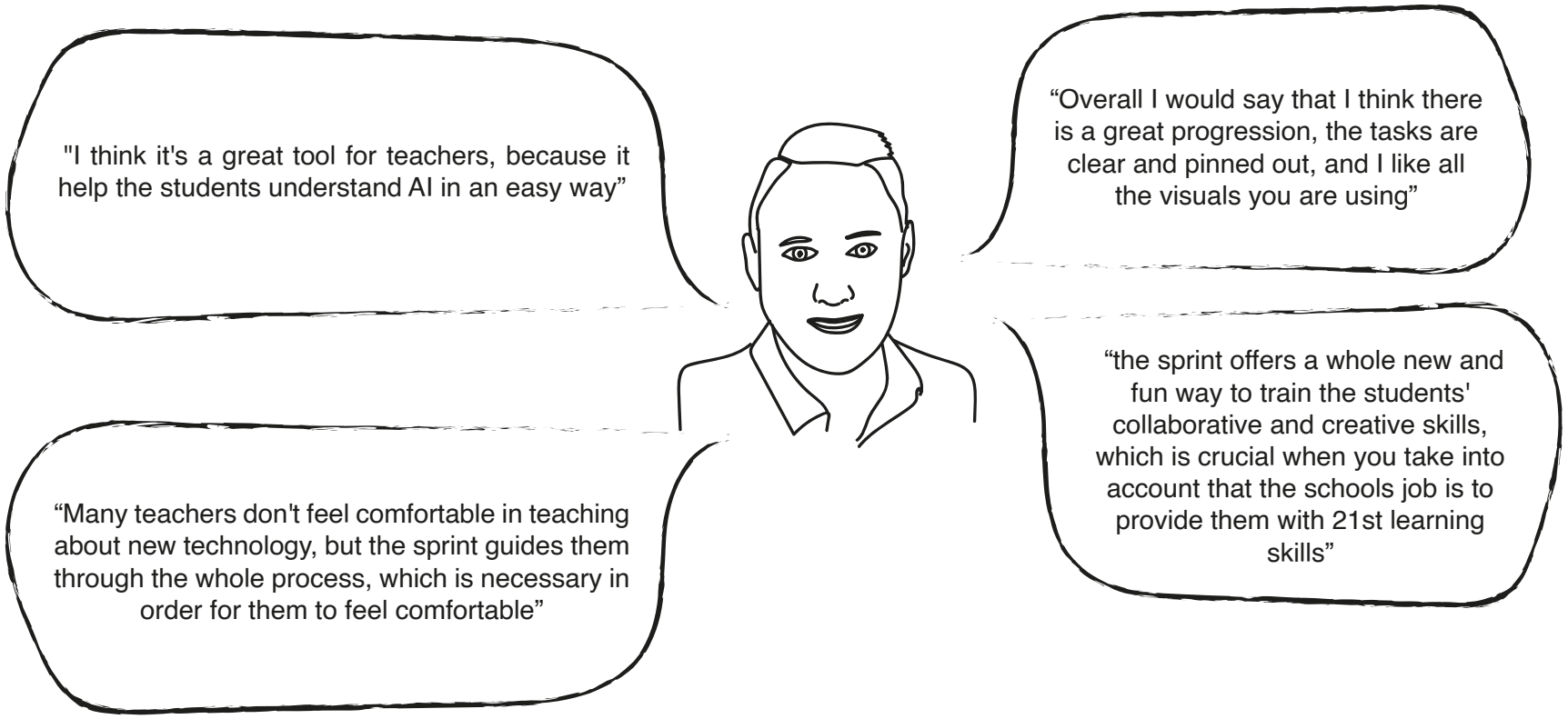


Figure 24: Quotes from Morten Jacobsen

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