Developing online tools for collaborative design thinking

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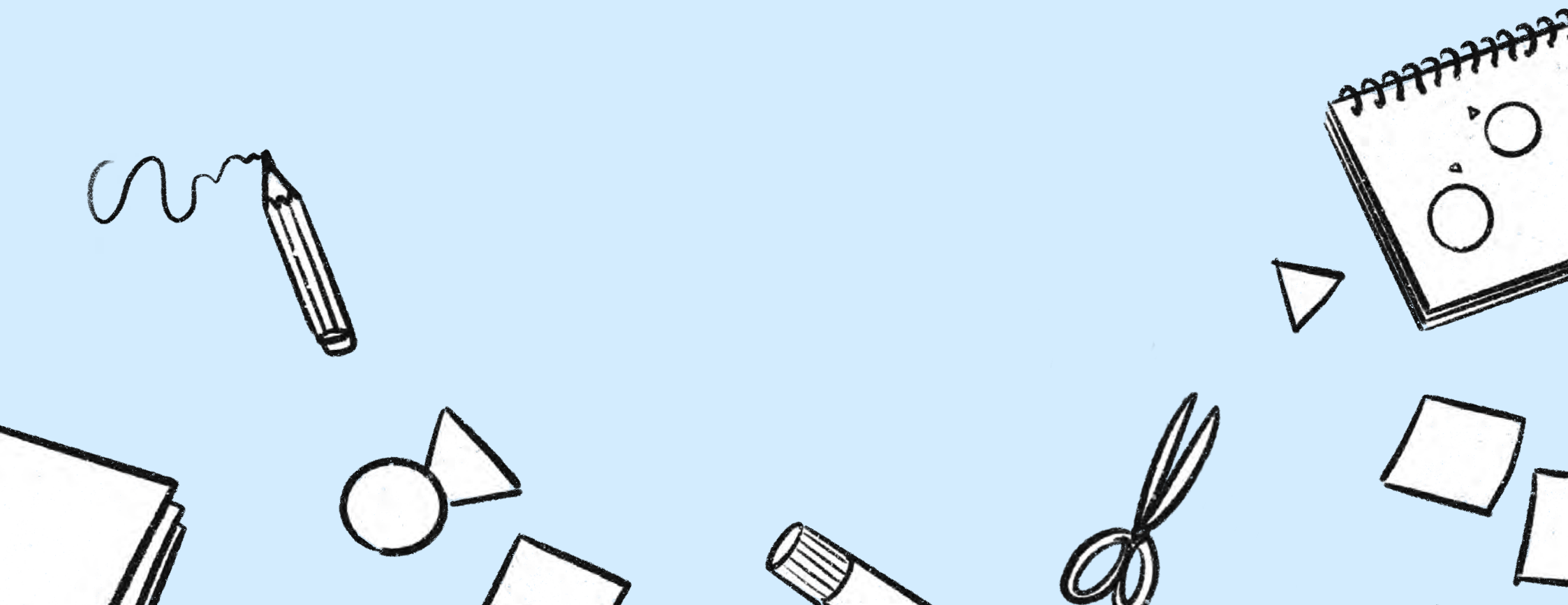

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Preface

"Life is like a box of chocolates.
You never know what you're gonna get." Forrest Gump

I want to thank all of you who made this trip with me. Without the help of many people, this project could not have been successful. While I was working on this project, I felt that the project was completed naturally with many people's help and inspirations rather than lead the project myself. This experience was precious as a designer. The people of Ford, the ID studio Lab people, and even the trivial support of friends from Master Design for Interaction together have inspired this project to flow.

First of all, thank you to Froukje, Ianus, and Nicole. My supervisory team always supported me, and they were there whenever I needed help, which gave me a lot of confidence. This supervisory team was perfect. It was fun and inspiring to work with them.

Thank you to everyone who has been participated in interviews and tests from Ford. Thanks to their inspiring, creative, and critical feedback. Thank their participation, I was able to produce better results than expected. Thank you.

Thank you to StudioLabbers. Thank you, Aadjan, for your technical and practical help as a leader of the lab, and Casieal and Freddy, whom I can talk with and get advice on the lab's graduation project. I want to thank Xueliang for helping me a lot, almost like a mentor. Lastly, thank you to the people who I often met during lunch together. It was a great blessing to be able to work on the project at ID Studio Lab.

Lastly, thank you to my Korean friends who helped me with this project in many ways. It was a psychological comfort to be there whenever I needed help or advice. I think this project was not accomplished by myself but with the help of everyone.

Yeun Kim
Delft, March 2021

Executive summary

"The desire to create is one of the deepest yearnings of the human soul." Dieter F. Uchtdorf

It is our human nature to create, and we must continue to create what we need in a constantly changing world. This project was also started by a world that turned because of Covid-19. Due to the Coronavirus, the online environment's importance is increasing, and a digital transformation is happening worldwide. Under these circumstances, when we involve users in the design process as a designer, we need an online tool to facilitate fluent communication.

I explored various technologies that can be used in an online environment while proceeding with this design project with the experience prototyping approach and research. This expedition gave me a glimpse of the broad potentials of the online environment in the future. From among various possibilities, I developed an idea through design iteration cycles. I discovered that the online collaboration environment currently lacks a sense of togetherness and emotionally dried through the insights obtained from the user tests. This eventually hinders full engagement in a session online. Interaction and emotional exchange are crucial in the online environment, just like in a physical environment. Therefore, we must strengthen a sense of togetherness to better use the online environment for collaboration.

The final concept-Sketcho-is an online meeting web application that enhances a sense of togetherness and evokes positive emotions such as fun and joy in online collaborative works. The app is an example of the various potentials of an online environment. Sketcho strengthens a sense of togetherness with the main features of sharing space together, which ultimately boost people who participate in online collaborative sessions full engagement to their activities.

The reason why people feel enhanced a sense of togetherness is that Sketcho provides "we experience". People share virtual spaces and it gives feelings of connection. In addition to this, Sketcho provides "upload your background" so that the facilitator can create an online space suitable for the purpose of meetings and sessions. The function of uploading your background gives people the power and autonomy to make virtual rooms which meets their needs.

We don't just create online spaces alone. We all contribute to creating and evaluate online space. Through this project, I realized that the online space has the possibility of continuous development and that it must be a space where everyone can contribute to the evolution together.

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Chapter 1.
Project Introduction

This chapter contains the project aim, project context, scope and design process. As this project started with the Covid-19 situation, it provides a strong reason why this project started and how I see the position of this project. At the end of this chapter, it gives an overview of the project process to understand this project better for readers.

Chapter Content

Project Introduction

1.1 Introduction

With COVID-19 situation and increasing working from home, challenges became an issue for better online collaborative tools and better collaborative activities that are optimised for online use. Current existing tools have been developed for better communication, but still, there are difficulties to proceed as smoothly as offline collaboration.

1.1-1 Introduction of assigment

With this increasing needs, both ID Studio Lab at Faculty of Industrial Design Engineering, Delft University of Technology and Ford Research and Innovation Center need a proper online collaboration tool for involving users in a design process. Involving users in a design process has many benefits, to improving the quality of the products or services, and it helps to avoid waste of cost in organizations.[1]

The main opportunity is to develop a new online possibility of user engagement in a design process for Ford and ID Studio Lab. The challenge is to create a fluent tool for both users and designers in a user-centric research project. Therefore, this project aims to develop a guideline which allows proceeding fluent participatory design process in online for Ford's Smart Vehicle Concepts team.

This project started with one main challenge was that "To create a fluent tool for users and designers in a user-centric design project in a digital environment."

1.1-2 Project brief

This project aims to develop participatory design thinking tools and a guidance for fluent user involvement in a digital environment.The main focus is gathering data from users rather than analysing data and making a decision. The role of the user in this research will be a ***co-creator***, and the main issue is ***how to engage them fluently in a design process***.

In order to deliver a high fidelity design at the end of the project, design iterations are planed after context research and defining a problem. Figure 1 shows a sum of this project process.

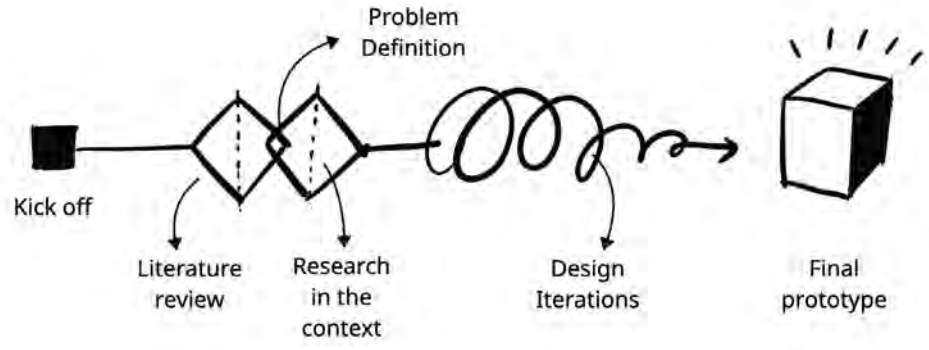


Figure 1. A sum of this project process

1.2 Project Context

The project started in October 2020, during the global crisis of the outbreak of COVID-19. COVID-19 has an impact on all of the world, and this project started with changes in the world. For understanding context, what Corona crisis brought should be recapped.

1.2-1 COVID-19 crisis

The spread of Coronavirus shows that the world is a global village that fully interconnected.[2] The economy has been changed for more than one year, and everyone is trying to be adapted to a new way of life. Medical companies have been trying to find a vaccine, and flights companies have been attempting to overcome the economic crisis. Business domain has been changed, and it has been impacting to everyone who is in job markets.

However, even though our efforts on the current crisis, still individuals, businesses, and societies are in an uncertain time while remaining for how long this crisis will continue. It means that we need to move on a new domain, a new lifestyle in a new world where changed from the past.

What direction we should go further is mentioned by Bapuji [2]. First, learn from the crisis. Understand the current situation clearly, know how much capacity we have for responding it, and try to respond as quickly as possible. Second, evaluate the organizational responses and see what could be better in the future. Third, based on the evaluation, organize the future. Organizations should prepare for the future context, and for surviving, changes are inevitable. One of the most significant results of these changes became Working from Home.

Digital transformation

Digital Transformation Digital transformation indicates a term integrating digital technology into all areas of a business resulting in fundamental changes to how businesses operate and how they deliver value to customers. It also requires cultural change at workspaces. Before the corona, quite many people had a negative perspective on working from home. However, in the wake of the covid-19 crisis, industries had to shift the workspaces from office to home rapidly. As this change, people's mindset and reactions about working from home also shift.

However, a hybrid working situation has been existing. In international companies, some people work from home with employees from different locations, and some people work at the office. The covid-19 crisis just stirred this digital transformation up.

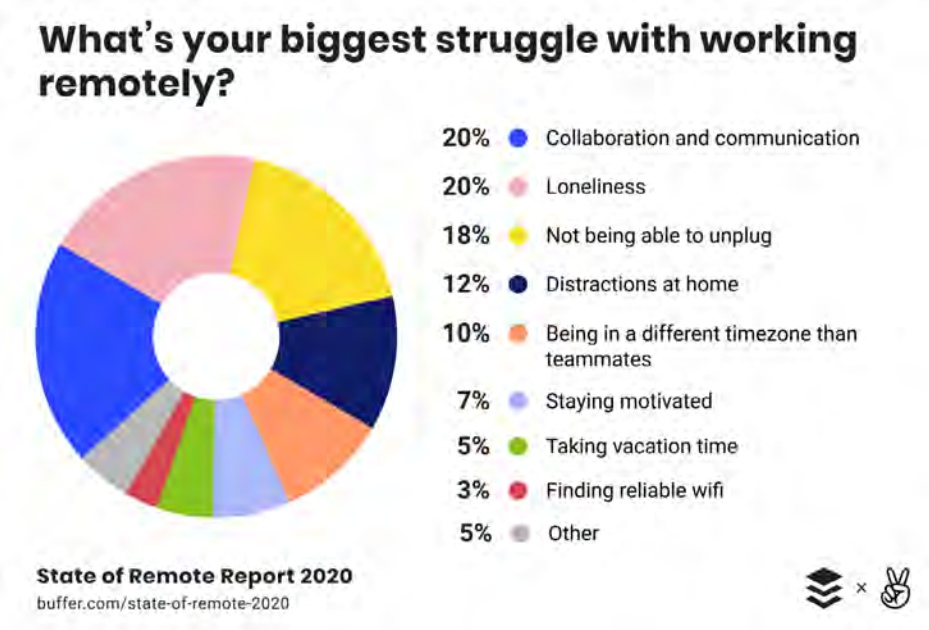


Figure 2. State of remote report 2020 [4]

Organisations had to accept this quick shift, and many people's perceptions changes. Even if this specific situation of Covid-19 is over, it has been a significant impact on workspaces. Even though not everyone works from home, we will work in the hybrid, work in the office, and work from home.

1.2-2 Remote working condition

Turning to the future, organizations are choosing Working from Home(WFH), and a half of organizations most likely work from home at the moment. Significantly, higher earners expect to work from home after coronavirus than they did before.[3] GitLab revealed that 86% of respondents believe remote work is the future of work. There are benefits of working remotely, such as time flexibility and commute time savings.
Lots of companies and employers consistently put efforts on increasing productivity, efficiency, and employee morale. However, remote working does not always work well. Figure 2 shows several difficulties with remote working.[4] The most significant difficulty is "Collaboration and Communication" together with "Loneliness".

Despite lots of online communication tools such as Microsoft team, Zoom, Webex, Miro, Slack, and Mural boards, we are still not overcoming limitations of the digital environment. There are miscommunications, misunderstanding, and sometimes it takes more time when collaboration needs working from home. The system of organizations should support fluent communication between employees and ensure an efficient working environment.

Advanced information technology has been replacing physical presence, and the working environment is changing rapidly.[5] However, we are not as much as mature to follow the speed of changes yet and the digital environment also in the process of customizing people's needs.

1.2-3 Need for change of digital environment

On an individual level, people struggle with feeling isolated, lacking professional supports, and no separation space of work and rest. There are difficulties of management at an organisational level, changing working methods and investing money for transitions.[5] As the demand for remote working increases, meeting employees' expectations of the digital environment is essential for the future.

In the design field, needs are the same or more than other fields, such as marketing, sales, or logistics. Designers always need to build and test, try things out or talk to people. According to the field's characteristics, there should be an appropriate tool for a proper purpose.

There are quite useful online tools for designers, for ideation, building prototypes, design thinkings, or platforms for communications. However, these tools could be complex to be used together with other workers from other fields, such as engineers, sale men, or technicians. Furthermore, people from fields that cannot replace the work to online have much more difficulties using these tools. In that sense, the design field needs the most intuitive and universal tool to involve those people as users in a design process.

Need for togetherness of vitual environment

Apart from the complexity of the existing tools, there is a significant limitation of the online environment. As it is difficult to access people directly, the feeling of being together at workspaces is missing. If people are working at the office together, they are more accessible to others and freedom to talk to each other. Getting close to each other is much more difficult online. It seems that there is an "Invisible Wall" between colleagues. This

project mission is to overcome this invisible wall online and use the online environment better than before.

Pros of working in a digital environment

Nevertheless, online environments have many advantages and potentials. We need to consider about how can we take advantage of online environment, not just trying to overcome disadvantages of online environment. This project not only trying to solve the limitations of the online environment, but also explores the possibilities of an online environment and presents the possible direction for future online workspaces.

There are several advantages of workspaces. One of the key advantages of online collaboration is that, as I mentioned ealier, it makes it easier for people who aren't in the same location to work together. In that case, it is convenience to organise meetings

Figure 3. Example picture of hybrid working

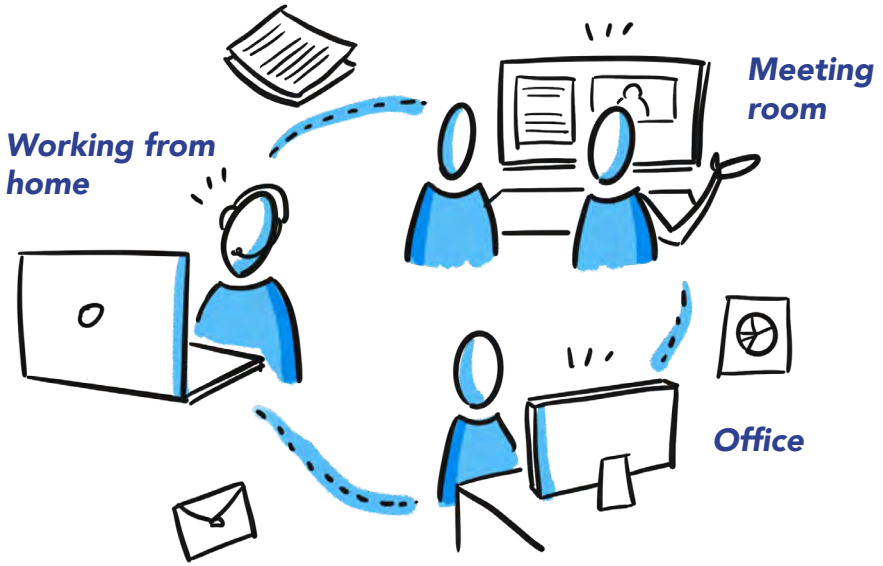


Figure 4. Hybrid workining situation

because people don't need to physically be there. Time could also be saved because there is no traveling. In addition to that, significant cost savings are there too. Sometimes it coule be a challenge to find a physical space that can accommodate everyone. Digital tools allow businesses to host online meetings in real time. In that sense, it is worthy to explore online environment for better use of it in the future.

Covid-19 crisis and advantages led more and more workers to work from home. There is a change of people perspective on working from home. As Miller remarks, "the space of networked digital technologies are no longer liminal since they are now part-and-parcel of the experience of everyday life"[7] It is evitable change, so we should rethink how the workspace should be organised for the better working environment.

1.3 Project Scope

1.3-1 Project aim

This project aims to deliver a solution that improves user involvement in a digital environment in design process. There are two parts of this project scope.

The first focus is on reframing difficulties of user involvement in a user-centric design research project. Second is defining the current challenges of remote collaboration in an organization.

As this project collaborates with ID Studio Lab and Ford, the main organization in this research will be Ford. Combining these two scopes, there are main challenges of involving users in a digital environment. Figure 5 shows where are this project's main challenges.

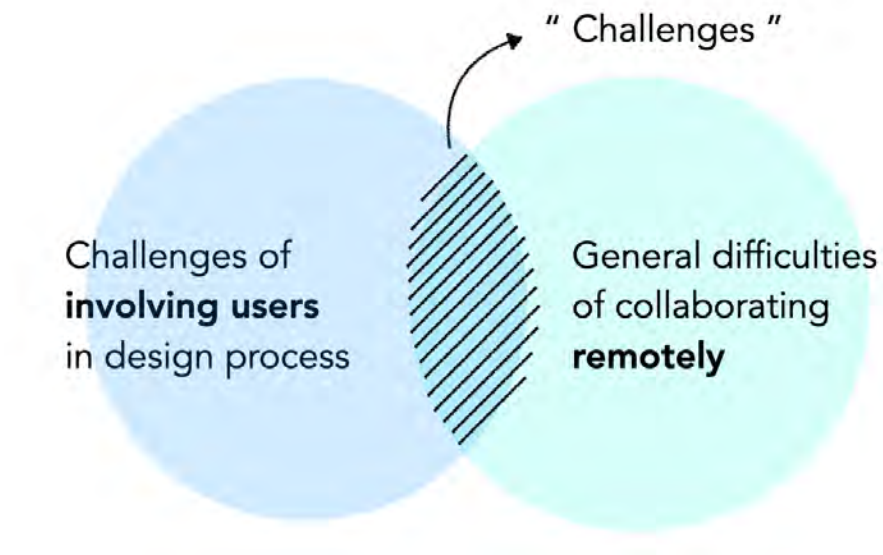


Figure 5. Main challenges

Primary design goal

A primary design goal was formulated for defining the scope of this project.

"How can we create a fluent communication between users and designers in a user-centric design project in a digital environment?"

Definition of Communication :

Communication is the activity or the process of expressing ideas and feelings or of sharing information or instruction with people. (Oxford Advanced Learners Dictionary)

The design goal is to provide a digital environment where information, impressions, and ideas can be exchanged between designers and users. Designers need to gather different types of information from users when they work on user-centric design projects, such as user experience, thoughts, opinions, reactions, and feedback. Designers may also need to provide information to help users understand to participate in design projects easily. In order to do this, we use a variety of communication tools. Still, online environments use unique e-mail, telephone, and a variety of Internet platforms, which have many obstacles and environmental limitations.

Beyond these environmental constraints, designers can fluidly collect information, and for users, it is necessary to use an easy and accessible communication tool. Details are covered in chapter 3, Theoretical Background.

Keywords of the project

Design Thinking, User involvement, Collaboration, Co-design, Communication, Digital enviornment, Participatory Design

1.3-2 Research questions

Together with the main challenges, in a broader sense, the scope of this project is mostly drawn in three ways. As I said earlier, the first one is the User Involvement, the second is Collaboration online, and the last is the context in which the final solution is used. See figure 6.

Figure 6. Scope of the project

The first question to answer is that regarding user involvement: defining ***R 01*** (1) who the user is in the design process, especially the user of Ford, the main target of the project. In addition, there will be research on ***R 01*** (2) how and what activities the user is involved in, and ***R 01*** (3) at what qualities user need when they engaged in the design process.

The second question to answer is about collaboration in a digital environment. The design process involves users and various people, together with designers involved in the project. The research will be conducted on ***R 02*** (1) what difficulties in online collaboration among user and stakeholders currently exist.

R 02 (2) What things are lacking online and (3) how can we take advantage of the online environment to use it better.
The last is the context. The final result of the project could also be used not only for Ford design team but also for students and other design organisations. ***R 03*** (1) Who is the end-user?
R 03 (2) Where will this solution be used, offline, online, or both?
Finally, it should be explicitly considered, ***R 03*** (3) What the final solution can bring and how it can contribute to the current collaborative design thinking in a digital environment.

By combining all these domains mentioned above, research questions were formulated.

R 01. User involvement

C4 (1) Who is engaged in Ford's design process?
C4 (2) How and What activities the user involved in?
C4 (3) What qualities user need to meet designer's expectations?

R 02. Online collaboration

C5 (1) What difficulties are there in online collaboration?
C5 (2) What properties are lacking in the current online tools?
C6 (3) How can we take advantages of online environment and use it better than before?

R 03. Context of Use

C8 (1) Who will be the stakeholders of the project result?
C8 (2) Where the final solution can be used? Online, Offline or hybrid?
C8 (3) What new things the final solution can bring in the current situation?

In this project, first I explored these questions and combined the insights to develop a final concept solution.

1.4 Design Process

A map below shows the approach and design or research activities throughout the project. The process follows a triple diamond approach, including design iterations. The first cycle is the discover and define phase. In the first cycle, I explored the context and conducted research on design methodology and theory. By conducting field research, including interviews in the first cycle, a design direction and problem statement defined. In the second cycle, I did design iterations by repeating prototyping, user testing and evaluation. This design iteration approach is explained well in chapter 2. After two big iteration cycles, the final design concept was created (chapter 07) in the last cycle. The final design concept and the final prototype has evaluated via user test with Ford employee. After that, the entire project's evaluations conclude the final design concept, design goal, and the whole project reflection (chapter 08).

See figure 7. This report chapters are following the design process as well.

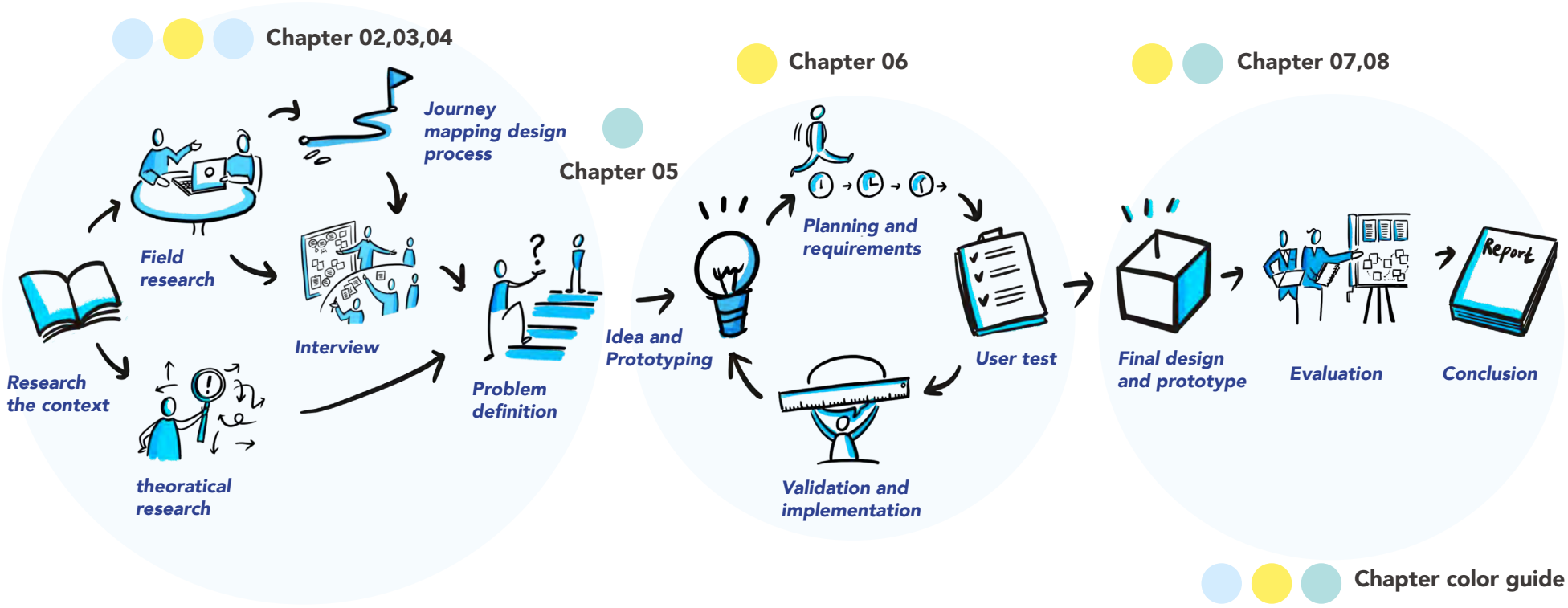


Figure 7. Design Process and chapter guide

Chapter 2.
Design Approach

This chapter explains how I approached this entire project. This project is closer to a design project rather than a research project. I used "experience prototyping" for exploring the context and as a communication tool with potential users. This chapter explains what experience and experience prototyping is. After that, it describes how I approach this project using the experience prototyping method. In summary, you can find a journey map of prototyping in this project.

Chapter Content

Design Approach

2.1 Experience Prototyping

I used "Experience Prototyping" as a project approach. This project aims to design a collaborative design thinking tool. The term collaboration means "the action of working with someone to produce something." The meaning of "action" seems very broad and abstract. In that sense, an action also can be interpreted as experience. In order to design an "experience", this project approach focused on experience prototyping rather than theoretical and analytical research [8].

2.1-1 Definition of experience

The word "experience" is a rich concept that is not able to define as one sentence. An experience is subjective, holistic, situated, dynamic and worthwhile. It depends on the perception of a design's multiple sensory qualities, interpreted through filters relating to contextual factors. An experience does not exist in a vacuum, but it only exists within a dynamic relationship with other people, places and objects [8]. In that sense, "user experience" itself cannot be predicted or designed [10]. People's experiences with products and systems are a complex integration of personal and circumstantial factors [8].

Furthermore, nowadays, designing interactions with products, services and software becoming more complex. Creating these complex systems, complex products, or services requires a broader perspective than thinking about one side of the product. As a designer, even though it is hard to design a direct user experience, we can still design a product (or service) that fits the feelings, atmosphere, and details of circumstances in a specific context [10]. In particular, this graduation project deals with collaboration in the context of design thinking sessions online. I need to deeply understand different aspects of environmental, social, communicational, emotional, and personal in this particular context. Therefore, this project should consider the design of integrated and holistic experiences. To meet this demand, this project's design process is focusing on ***"Exploring by doing"***.

Figure 8. ITD project prototype 2019

2-1.2 Exploring by doing

I first learned "exploring by doing" from the design course approach in the Interactive Technology Design(ITD) course, one of the MSC Design for Interaction compulsory course. For designing an overall experience, rather than just a functional product or system, the design is gradually completed in ITD course by repeating the rough prototyping and testing method every week. Figure 8 shows an example of a weekly prototype in ITD course

This approach was appropriate for personal reasons as well as the appropriateness of the project topic. Among the various design approaches, the ITD course prototype approach was very similar to my characteristic. I am interested in developing designs to generate ideas, prototypes, talked to people, and strengthened ideas, rather than researching them first.

The primary approach of this project is experimenting and prototyping. ***"Exploring by doing"*** is the key of this project approach rather than focusing on lots of literature research and theories. As designers of interactive systems, we find ourselves stretching the limits of prototyping tools to explore and communicate what it will be like to interact with the things we design[8]. In that sense, "Prototyping" is a tool for exploring the current situation's context and discovering potentials for future development. The reasons why this project used this unique approach is that :

1. To understand better existing user experience and context.

As this project is a collaboration with company Ford, the project topic is very closely related to everyday life rather than a profound and significant design research topic. To deliver a ready-to-use product or service at the end of the project, an approach that can look into the current situation is inevitable.

2. To explore radical ideas and stretch people's thinking.

To bring new possible solutions in this extreme COVID-19 situation, thinking outside the box approach is needed. By experimenting with lots of technologies and trying things that people haven't thought about, a new design value can be created.

3. To communicate ideas to audiences.

Sometimes it is challenging to deliver the exact meanings to others. Languages are not always appropriate to understand each other and have limitations. A prototype can be a tool for communication, and it makes people understand the idea better and can encourage them to converse deeply about the concept and further development.

4. To learn existing technologies.

The project topic is about developing 'online tools', so there are many new technologies that can be applied to the online environment. In order to learn what kinds of technologies are at the moment and how they can be used for improving this environment, this project dives into the technologies. For delivering a high fidelity design at the end of the project, design iterations are planned after context research, and a problem is defined.

2-1.3 Experience Prototyping as a sketch

We use tools, such as prototype, which influence the way people think[9]. Everything which forms our daily life limits our thinking and imagination. Designers should bring a new perspective to show a new method of forming our everyday life, and it should be better than before. Experience prototyping is like a sketch of the experience. It allows people to engage in a new way of life [9]. In this project, rather than drawing ideas with a pencil on the paper, building prototyping itself become a sketch and lead to the final design at the end.

As prototyping one of the sketch of experience, this project started with ideating even at the beginning of the project. Problems and challenges were vaguely defined, and the issue was how you reframe this problem. Depending on which perspective you see the problem, the way to solve it can be completely different. Prototyping sketch helps to explore these different and diverse perspectives. Thus, prototyping used as a sketch and sketching used as an aid to thought [8].

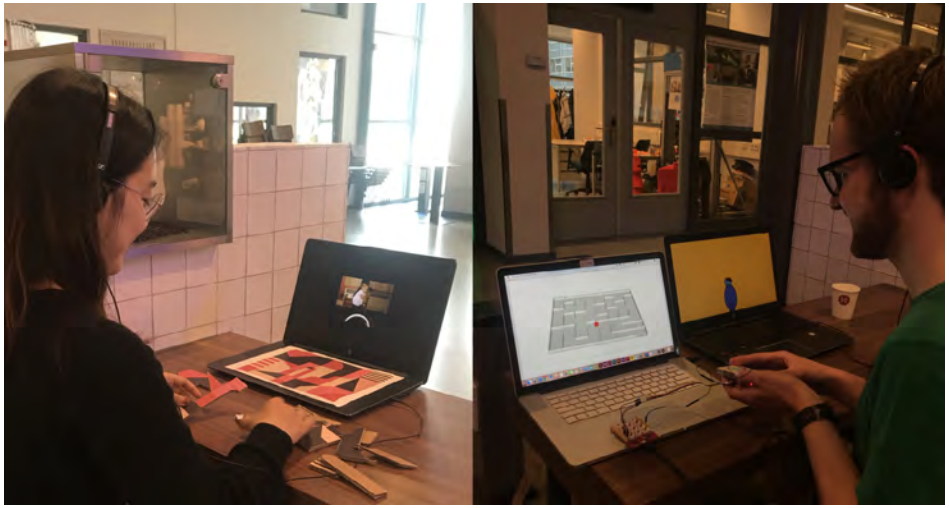


Figure 9. Experience prototyping in ITD course

Wizard of Oz

High fidelity of the prototype is not essential in experience prototyping in a design process. Even in this project, we prototyped ideas faster than creating fancy and solid prototypes and based on that. I developed the concept by actively communicating with users and other designers.

In particular, this project deals with the theme of collaboration in an online environment, so it is inevitable to deal with technologies related to computers and programs. But in Sketching User Experiences, Bill Buxton says:"

Generally the last thing that you should do when begining to design an interactive system is write code." [9]

The objective is not to make a system but to mock up something that users can actually experience, thereby enabling us to explore design concepts in action and as experienced far earlier in the process than would otherwise be possible[9]. The fidelity of the experience is essential (not the fidelity of the prototype itself) to evaluate a concept and better understand the idea to users.

Based on the Wizard of Oz method, experience prototyping at the beginning of this project was done not by programming but by using the easiest and fastest way to sketch experience while exploring the various tools that exist today. As seen in Feature 9, it used a variety of materials and techniques, such as simply showing a video or copying code through an Internet search. Ultimately, this approach has also helped explore the third of the second research questionnaire: how to use the online environment better than before. By exploring and experimenting with various technologies, seeing lots of opportunities in the online environment's possible.

2.2 Prototyping Journey

2.2-1 Room for failure and accidental discovery

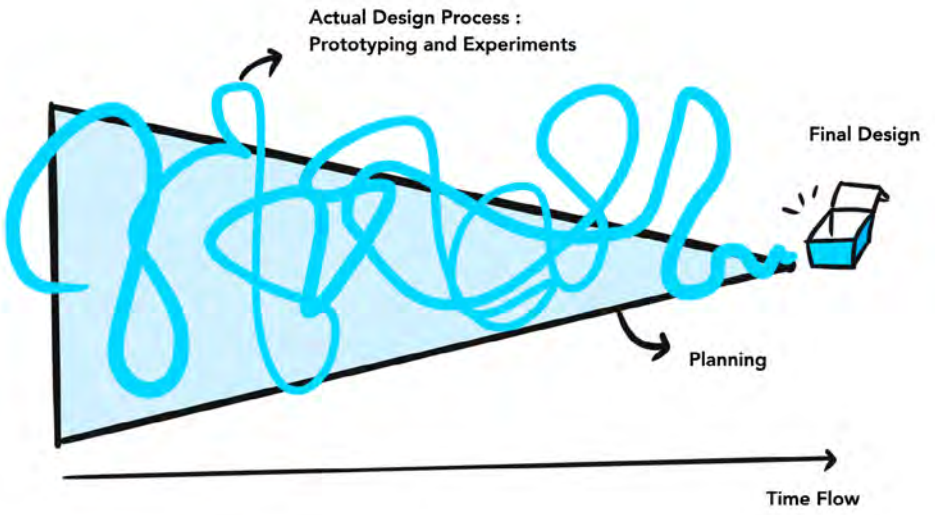


Figure 10. Project planning and actual Design Process.

"Design for the Wild, to do this effectively, we ideally need to be able to experience our designs in the wild during the early stage of the process. Failing that, we have to do the next best thing."
Bill Buxton <Sketching User experience>

Failures are the key to success. Success comes closer when people fail. People learn something from the failures, and it will lead their design to be a success in the end. Things will not always go in the right direction, which people expected. Planning is not always useful, and sometimes people discover something by accident. This project discovers interesting insights into the digital environment and how people react to it intentionally and accidentally. Giving room to fail for learning, and having the right amount of time to lead it to success is key. In that sense, the project planning consists of a half of strict schedule and a half of rooms for an accidental discovery. To achieve it, the details of the project plan is not strictly determined. However, the big picture of the process is kept during the whole period.
Figure 10 shows how this project organised for giving room to fail and discover fresh insights by accident.

2-2-2 Weekly bases of Ideation and prototyping

The sketching ideas started as soon as the project began. For eight weeks, which is almost half the project's time, I drew ideas and prototyping sketches every week. Rather than continually coming up with new ideas, we sometimes developed new ideas and sometimes developed past ideas into details. In this way, the insights gained by conducting weekly identification and prototyping naturally blend into the final design direction.

The critical point of this iteration method is making a decision every time in the prototyping process. More decision-making moments will come if more prototyping is done and more ideas are sketched. At this moment, what is essential in decision-making is to follow your inspiration and gut feeling, but there must always be a reason to support your decision.

This decision-making is also the most challenging part of the project. However, these decisions were made by listening to the opinions of various people and receiving feedback. Between projects, prototypes and idea sketches were sent to experts and colleagues in the relevant fields, and the project was able to progress gradually while listening to their opinions. Details about weekly prototyping can be found in chapter 6. Design Iterations.

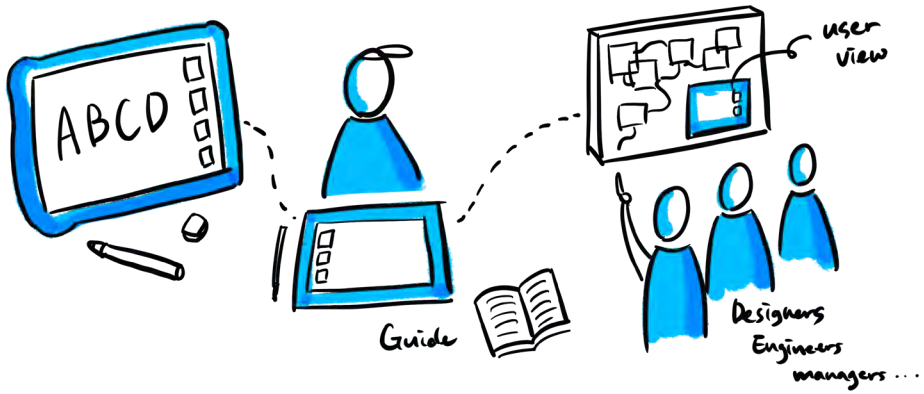


Figure 11. First idea sketch of the project week 02

2.2-3 First ideation as a stepping stone

The above diagram shows the first idea of a sketch. The first idea's focus was to develop an online communication tool that enables smooth communication between users and designers and can be more easily accessed in line with the user's position.

Lots of people have difficulties dealing with online collaborative tools, such as Miro, Mural, Bluescape. Even though these tools help designers, ordinary people (for example, the elderly) easily get stuck when using these online tools. Thus, the first draft idea of simplifying the design thinking tool that fits a specific target group came up.

Most people are frustrated when there is so much stuff on the interface, making it difficult to focus on the session entirely. So, for those people, the 'Memo board' idea came up. The participant can only see a part of the whole board, and designers, engineers, and managers who are already getting used to working with the board can control the participant's view.

The participant can write down their idea on the board like a chatting application. When they send this idea to the board, the design team members can relocate this idea on a sticky note in the appropriate location. Meanwhile, they can talk to each other via voice talk.

Not only about simplifying a communication tool

The challenges of this project is that not only about simplifying a design thinking tool but also think about how this tool can be used in the right context and right timing while improving user's experience of the participatory design thinking sessions. Figure 12 shows a scope of my weekly ideation should include. Finally, this reaserch should address users and designers collaborative environment in a digital co-creation context.

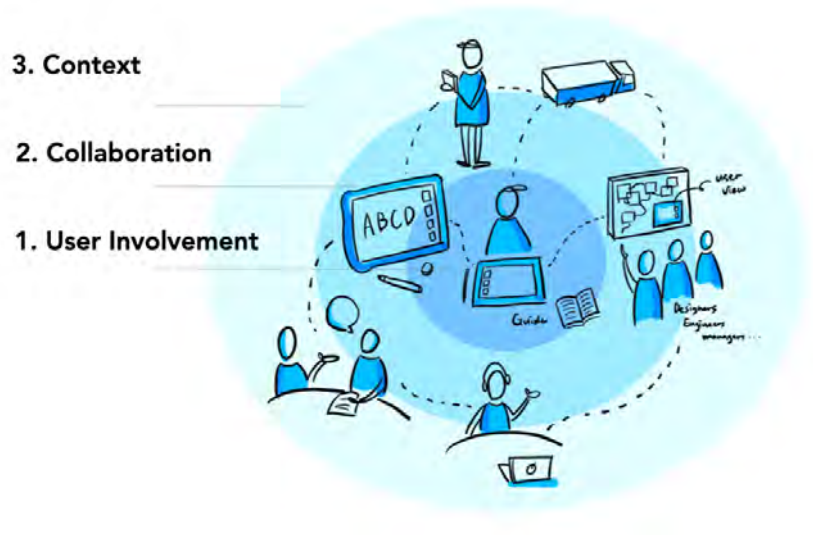


Figure 12. Ideation and Prototyping Scope

2.3 Summary

This graduation project develops the concept through an approach called ***Experience prototyping***. It is to design an 'experience' of collaborative design thinking in an online environment.

Exploring by doing

Experience prototyping used as a tool for exploring a context of the current situation and discovering potentials for future development. Prototyping is a tool to explore extream ideas and stretch people's thinking, and it also helps communication with users. Furthermore, especially in this project, it was also used for discovering potential technologies that can be used in an online environment in the future.

Weekly basis of prototoyping

This project was carried out by repeating the design iteration cycles, which prototypes weekly and aggregates them to evaluate. The figure 13 illustrates prototyping journey of this project. After week 11, final concept was developed. The details of the prototyping journey can be found in chapter 6, Design Iterations.

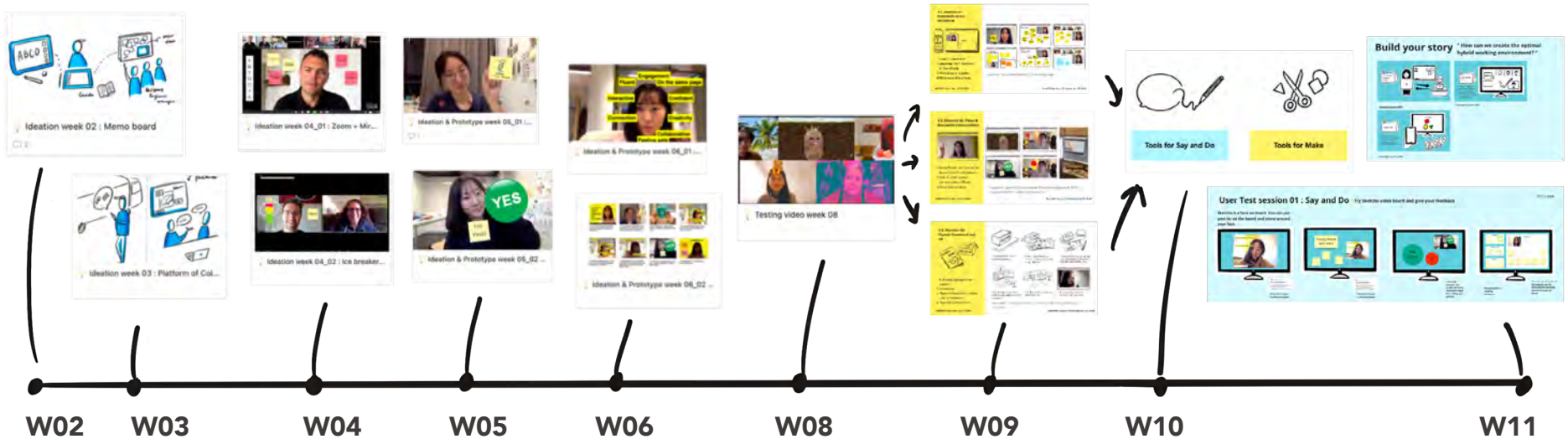


Figure 13. Prototyping Journey

Chapter 3.
Theoretical background

This chapter provides a short introduction to the design thinking approach and user involvement in the design process. Ford wants to help groups across design thinking principals to solve critical challenges. As the starting point of this project is about collaborative design thinking and user involvement in a digital environment, it gives background information for readers who do not know about this field. If you are a designer with background knowledge of design thinking and user involvement in a design process, you may skip this chapter.

Chapter Content

Theoretical background

3.1 Design Thinking Approach

The project started with ***"How can we create flexible communication between users and designers in a user-centric research project in a digital environment?"*** Above is a high-level concept called 'design thinking,' a user-centred research project. Ford is carrying out a design process based on the Design Thinking approach, so it is necessary to define a clear design thinking concept to understand the context of critical challenges.

3.1-1 Definition of Design Thinking

Design thinking is an approach that views design as a way of thinking to solve an evil problem. Designers look at the world differently from others and see it in a creative and exploratory way. This perspective is not just useful for design fields. Design thinking has become useful in other areas besides design. Stanford University saw an opportunity to use design thinking in other areas. They used design ideas for designers and people in other fields such as engineering, medicine, business, humanities, and education to solve big problems in human-centred ways[2]. Design Thinking integrates human, business, and technical elements to frame and solve problems, and finally, design solutions.

Tim Brown, CEO and president of IDEO, defined Design Thinking as a human-centred approach[21].

"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."

The human-centred design process is not linear, but it usually iterated. The process is designed to get people to learn from the process and more open to being creative and boost possibilities on the user's desirability, feasibility, and viability. See figure 14, diverging and converging process[21]. Through this iterative process, and each time you can come closer to the solution.

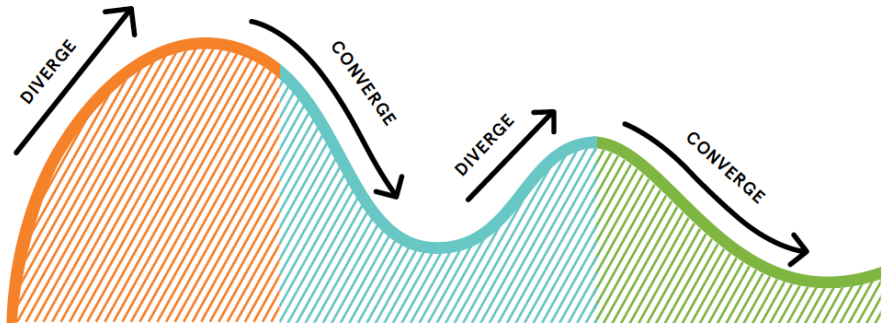


Figure 14. Diverging and Conversing process

Collaboration for Design Thinking

In the design thinking approach, collaboration is a crucial part[23]. To build deep empathy with the people you are trying to serve, it is necessary to conduct interviews, have generative sessions, etc. To maintain creativity and energy, you should work with teams rather than alone. Last, making tangible prototypes of ideas helps to develop the ideas further. Usually, testing prototypes with users are tag along for evaluating the concept. This whole process is done through collaboration with team members and external people such as users, so a certain mindset is needed for a successful design thinking process.

3.1-2 Mindsets for Design Thinking

Even though more and more organisations are using Design Thinking Approach, still many organisations are failing to embed Design Thinking successfully. The biggest reason for this is 'mindsets'. Design Thinking is not a just methodology of Thinking and doing, but it is more a mind-sets, atmosphere and culture. Without mindsets, practising the methods is useless. The company IDEO suggests key elements of the mindsets[21].

Creative Confidence

One of the critical elements is creative confidence. Based on the belief that everyone is creative, it encourages them to make things.

Make It

The second thing is making things. There is a power of tangibility and making things using anything at disposal tools, such as cardboard, scissors, and even digital tools.

Learn from Failure

The making things relate to learning from failure. For successful design thinking approach, people should be able to take failure fast, and willing to learn from it.

Empathy

Understanding the people who we are designing for, gives new opportunities to see the world differently. This is a key property to the human-centred design approach.

Embrace Ambiguity

Leaving rooms for exploring lots of different possibilities can bring unexpected solutions. It will boost creativity.

Optimism

Taking a big challenge and believing that we can solve it is crucial to be motivated. It will encourage us to push to keep going.

Iteration

By continually iterating, refining and improving, the idea will be more valid and quickly arrive at the solutions.

Mindsets are crucial to lead a successful Design Thinking Approach in an organisation. Ford is also using the Design Thinking approach to solve critical challenges for the future(See page 34). Later this report, based on Ford's field research, these key elements will be evaluated and re-created to fit this project context(page 40). These key elements from IDEO were used as a foundation for further research development in this project.

3.2 User Involvement

User involvement is indispensable when discussing a design thinking approach. Users became a central part of the development process[24].Their involvement lead to more effective, efficient and safer products and contributed to the acceptance and success of products. As I mentioned earlier, this project's main challenge is to adequately involve the user in the design process fluently in a digital environment. I briefly explain the user innovation and user-centred design approach to understand the general public, not designers.

3.2-1 Definition of User-centred Design

There are two types of user-centred design.[23] The first is to engage the user in the design process at a particular time to collect data or to test availability. The second type has a broader range of user involvement. This is also in line with the participatory design[16]. At this time, users dig deeper into the design process and act as one designer. At this time, the meaning of the user can be called a co-creator. In this project, the user is not merely involved in a particular timing but is used in a more co-creator sense.

User as a co-creator

In this project, the user is close to the co-creator. This is also in line with the participatory design[16]. The concept of co-creation has evolved as the increasing demand for user engagement in more products and services has grown. The user's experience, or consumer experience, has affected the enterprise's significant value: creation, innovation, strategy, and leadership [24]. Organizations have come to co-creating new values based on human experience, and the boundaries between traditional products and consumption are becoming increasingly blurred.

3.2-2 Co-creation as a method

The word 'co-creation' has been being used widely. Co-creation can be defined as 'act of collective creativity'[24]. Co-design indicate that collative creativity is applied to a design process. It can be a mindset, method or tool for design practice. In this project, co-creation is used as a collection of tools and techniques of involving users in design process. See figure 15. In this project, co-creation is used in design-focus phases, mainly during the design exploration.

Co-creation requirement: Say, Do and Make

In co-creation or generative sessions, combinations of Say and Do techniques are being used. Make technique's importance is getting grow because Make provides more opportunities for

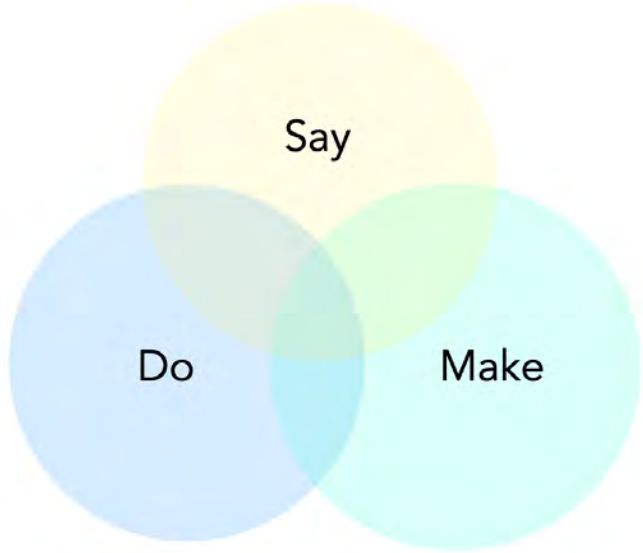


Figure 15. Say, Do and Make techniques complement each other[18].

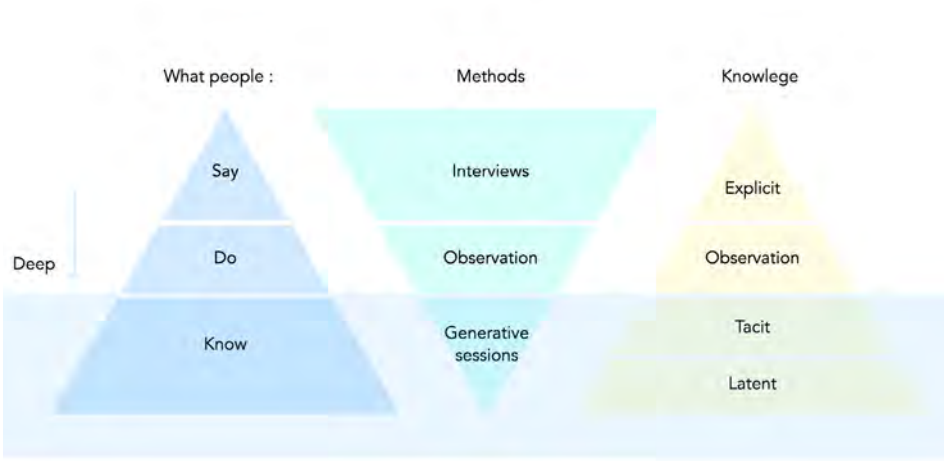


Figure 16. Say,Do and Make help to access different level of knowlege[18].

exploring experience and ideas at a deeper level. Therefore, co-design should have these three elements, Say, Do and Make[18].

What people Say

The form of Say includes interviews and questionnaire, which are the primary method of collecting data in the design process. By saying people can express opinions, speak out their needs, and share their knowledge. Say is the most common way of investigating the context. However, there is a dilemma. Sometimes, what people say is different from what people do.

What people Do

Do techniques include observations of people who are using products or services. By observing people, researchers, or observers will discover what they have not found in interviews. In these projects, Do techniques not only mean observations. It also includes other design activities such as role-playing, not a design activity but elements to help design activities such as ice breakers in a co-creation. Say and Do techniques implements each other so that the researcher can gather more reliable data by then.

What people Make

The crucial part of co-creation is Make. By making, people can express their thoughts and feelings. Idea generation and Make techniques can be used in understanding the context and a problem definition phase. There are limitations to communicate through languages but, Make techniques help to overcome these limitations.

Figure 16 shows that Say, Do and Make approaches help access different levels of knowledge. Combinations of these techniques are useful to find out tacit and latent knowledge. In addition to that, each activity is not perfectly separate, and it is more transitional. It also can be iterated several times in a design process.

Say, Do and Make techniques for this project

This project also takes advantage of Say, Do and Make techniques (especially see Chapter 59) to help participants develop their designs by talking about problems, drawing ideas, and building prototypes and storyboards. This project uses co-creation sessions to create an online tool for design thinking, so there are two ways of using it. The first is to develop an online tool to enable collaborative design thinking sessions, including co-creation. In this case, Say, Do and Make techniques are derived as a result. Secondly, this technique is used as a design methodology to develop this online tool. Involve the user, promote co-creation using Say, Do, and Make Techniques, and develop the final concept.

Chapter 4.
Field Research

This chapter contains findings of field research within Ford company context. The field research was mainly conducted through interviews. I summarized the key insights from the interview and based on this, a journey map of Ford's design process created. From the journey map, qualities of users to have when they involved in a design process were extracted. These qualities are essential elements that users must have to meet the designer's expectations, so these are the keys to solve user involvement challenge.

Chapter Content

Field Research

The theory in the previous chapter helped us understand the overall context of this project. Interviews were conducted to identify difficulties in online collaboration and the challenges of user engagement. The interview's initial purpose was to understand Ford's design process and create a journal map of the Ford design process through who participated in it and how they are involved. Through this, I finally found that users must have specific qualities (or mindsets) when they involved in the design process. For gathering the data that meets the designer's expectations, these qualities required to users. These qualities are essential for a successful design process and a necessary and sufficient requirement to improve user engagement quality.

Figure 17 illustrates the interview purpose and findings, and the results: Qualities of users in the design process.

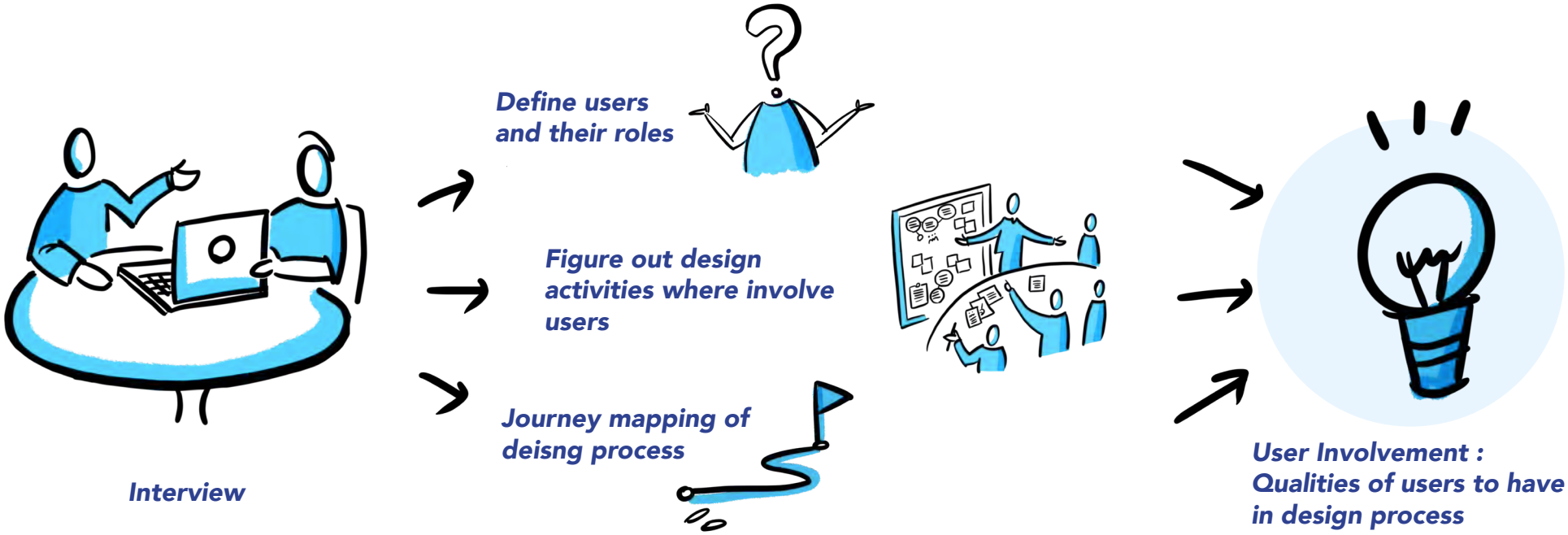


Figure 17. Interview purpose and findings

4.1 Interview Set-up

A total of 10 interviews were conducted in the qualitative study[32]. I divided the interviewee into two types, two designers from ID Studio Lab at TU Delft and eight employees from Ford. To understand Ford's design projects from a more diverse perspective, interviews were conducted with Ford's designers and people with various roles, including project managers, Design Thinking trainers, and Business Officers within Ford. The interview lasted approximately 45 minutes, and the interview recruitment was conducted via e-mail. The main research questions of the interview are as follows.

4.1-1 Research Questions for interview

1. Who
- Who is involved in a collaborative design process?
- Who are the users? Who is the main target group?
- Who is a decision maker in the design process?

2. When
- When do you involve user in the process?

3. How
- How do you collaborate online?
- How do you involve user in the process?
- How do you communicate with users?

4. What
- What do you need, what do you prepare for involving users?
- What is Ford's expectation from the users? How do you manage expectations?
- What kind of limitations and difficulties there when you involve users in the process?
- What kind of advantages of using online tools are there?

Among the research questions, the main purpose of the interview was to find out what are the expectations for the users and how do the desingers, or other project stakeholders manage these expectations. Even though several specific questions have been formulated to answer these questions, the interviews were generally open-ended. This is because interviewees have different roles in the design process, and to embrace more diverse perspectives beyond the bias.

Interview environment
Interviews generally happened in a digital environment, via online meeting applications, zoom or Webex. However, before interviewing Ford employees, the first two interviews with ID Studio Lab designers took place in the physical environment.

Figure 18. Interview with an ID Studio Designer

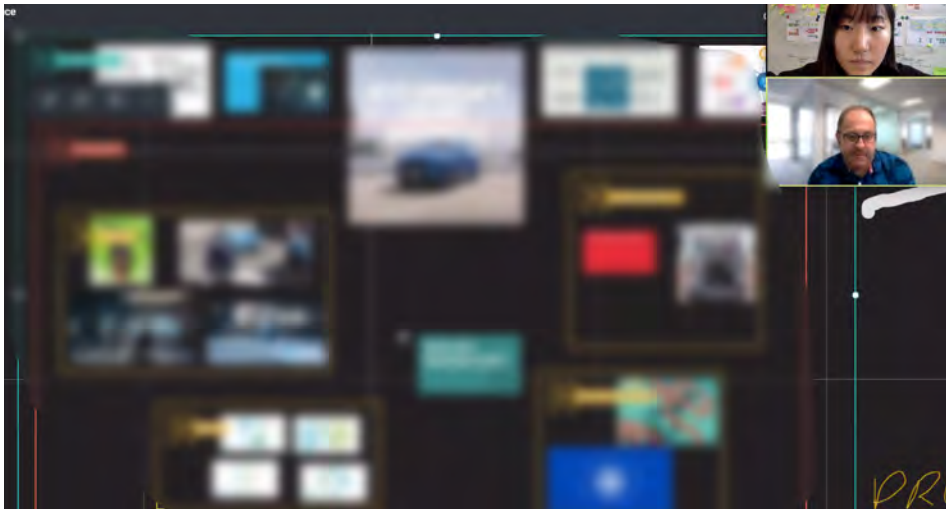


Figure 19. Interview with Ford's employee

Figure 18 shows how the physical interview took place. In order to find out what kinds of design activities are proceeding and what properties are essential that users have in the process, a triple diamond template was prepared. Participants drew a journey map of user involvement in a design process based on their own experience.

In the online interview, instead of paper or whiteboard templates, an online tool, Bluescape, was used. Figure 19 shows the online interview environment. There were already main design activities in the template as examples, such as interview, questionnaire, shadowing, etc. (See appendix I for details about the interview templates). Interviewees added more activities, chose what kinds of activities can be done online or offline, and wrote what kinds of limitations are there. All the interviews were recorded for note-taking in the future. However, because of the NDA at Ford, the interview script can not be published in this report.

4.1-2 Interview Questions

Even though the interview happened in an open-ended form, Several questions are formulated in advance to guide the interview.

Background Information

1. What is your role in a design project?
2. Does Ford have a fixed design process?
3. Do you have any experience of involving users in a design process?
4. What was your interaction with users? (direct/indirect interactions)

Limitations of a Digital environment

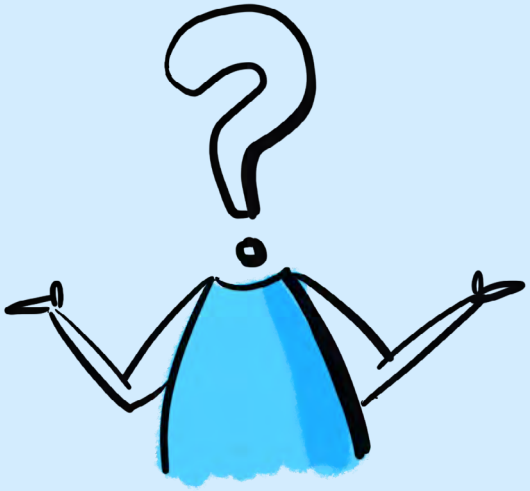
1. How do you communicate with them? (online / offline)
2. Compare to offline communication, what are the online environment's disadvantages?
3. What kind of difficulties are existing to involving users in a digital environment?
4. Are there advantages of using online environment?

Journey mapping

1. What kind of activities you do in a design process?
2. Which activities could be done online? Is it not possible to do it online?
3. Why it is difficult?
4. What are your expectation for users? What kind of the qualities do you want users to have (When you involving user in the project)
5. What are their expectations you think?
6. What do you do for achieving these properties from the users?

4.2 Interview Findings

4.2-1 Who is the User?



Through interviews, Ford's users and what people are involved in Ford's design process were discovered. There are two types of users in this project. The first is Ford's users who use or are associated with Ford's products and services. The second is the user of this project. Beyond Ford's user, they are the ultimate users who will use this graduation project's solution. I figured out who is involved in a Ford design process and who is defined as users. There are three groups of people in the design process: Facilitator or designers, stakeholders, co-designers, Direct users who use Ford's products.

Facilitator : Session leader

People who lead the design process and involve users in the process. They plan the design activities for gathering data from the users and also engaged in the decision-making process. For example, design researchers, user experience designers and project managers at Ford, and external design consultancy etc.

Indirect users : Co-Designers

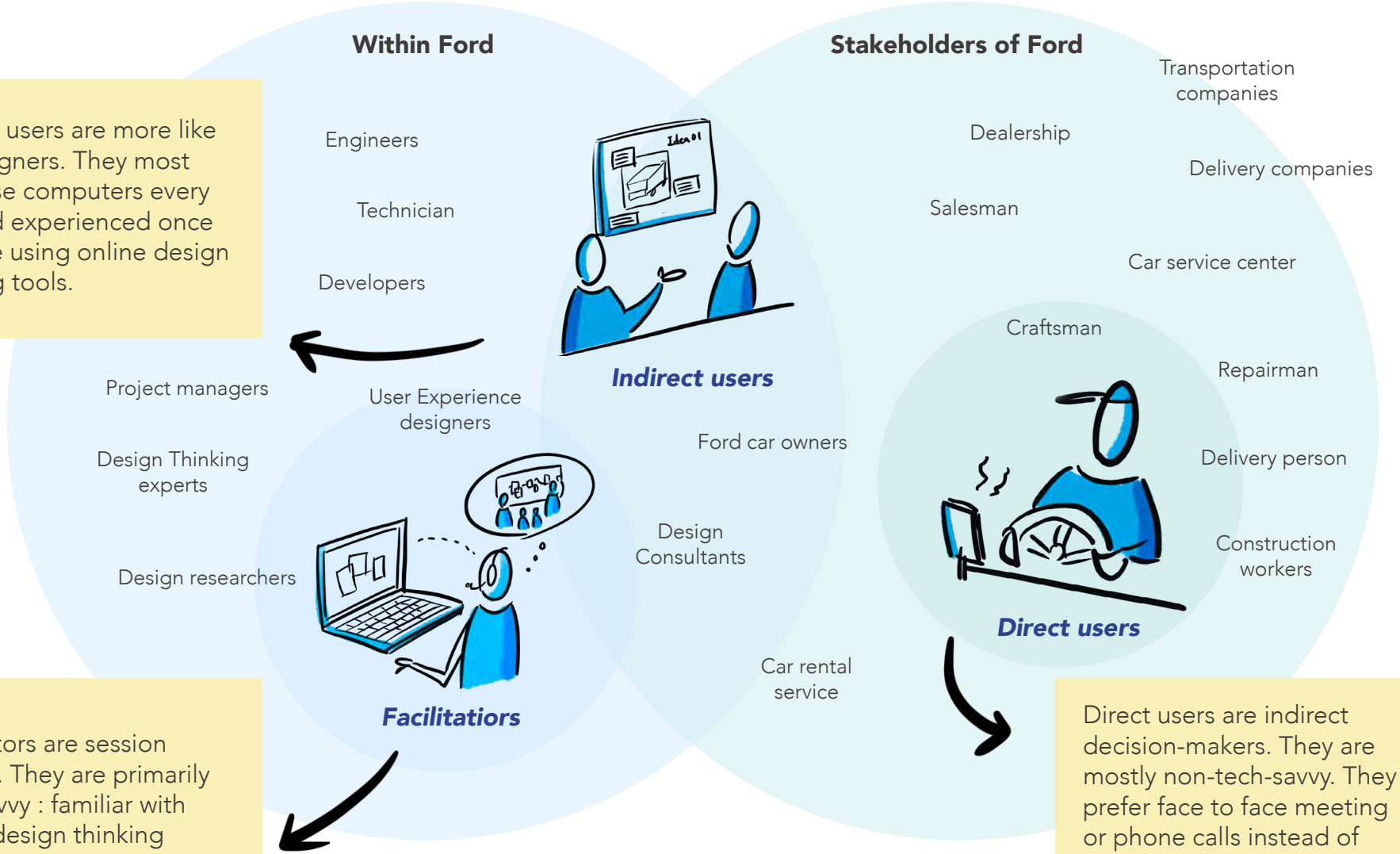
People who are engaged in the products or service but not directly use it. They sometimes lead the process together with designers as well. They have pretty prominent roles in the decision-making process—for example, high-level employees in organisations such as delivery companies.

Direct users: Indirect decision makers

People who use the products or service of Ford directly. They could be owners of Ford's products but not necessarily. Among these direct users, there are digital illiteracy people who only prefer face to face meeting. Craftsman and Parcel deliveryman are included here.

Stakeholders map

Indirect users are more like co-designers. They most likely use computers every day and experienced once or more using online design thinking tools.



Facilitators are session leaders. They are primarily tech-savvy : familiar with online design thinking tools.

Direct users are indirect decision-makers. They are mostly non-tech-savvy. They prefer face to face meeting or phone calls instead of using computers.

4.2-2 Ford's design thinking approach

During the interview, I found out that Ford has its own design thinking approach to solve critical challenges. D-Ford is a human-centred design lab that works within Ford to champion the user's voice, including the company's customers, employees, and business partners. D-Ford design thinking approach helps the company create business agility by teaching the overall organization to experiment with different tools and methods.

Design Thinking approach at Ford

Ford is one of the companies that actively brought design thinking into the corporate culture. Ford is in the midst of an important shift in the transportation business. They are trying to combine evolving technologies with their products and services to provide solutions tailored to customer needs.

D-Ford is a human-centred design lab, engaging users, consumers, and other companies in the design process. They try to uncover hidden insights and opportunities by using Human-Centred Design. Just as companies are creating their own design thinking approach, D-Ford has developed their own design thinking methodology.

D-Ford created the following diagrams based on the Design at Stanford (d.school) design thinking process, Empathise, Define, Ideate, Prototype and Test. See figure 20.

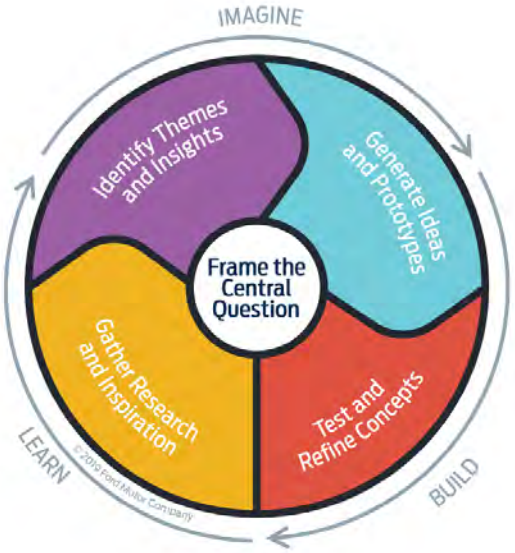


Figure 20. Design Thinking Model at D-Ford

D-Ford defines design tinkering as this. 'A human-centred approach to solving complex, open-ended problems.' There is Framing the central question in the middle of the model. D-Ford's entire design tinkering process is to reframe this central question continually. This process is based on three main design activities.

Learn, about people and context.
Imagine, New possibilities.
Build, and test ideas quickly.

Among the Design Thinking mindsets from IDEO, D-Ford re-formulated key mindsets by themselves which are

Be curious
Be Optimistic
Be Empathetic
Be collaborative.

The first stage is gathering research and inspiration. The primary purpose of this step is defining customer, planning research, and collecting data. Second, in the identify themes and insights step, we find patterns and relaxations in the gathered data. Based on the analysis results of these data, we obtain insights and reveal uncertainty. The third step is generating idea and prototyping. Based on the insights obtained from the previous stage, we brainstorm ideas and make them ourselves. At this stage, the key is to create prototypes quickly and get feedback quickly to develop ideas further. Finally, you test the created prototype with the user and redefine and develop the concept based on the test results.

Cross-functional research team

As a human-centred approach, a day in the D-Ford team's life is conducting a type of ethnographic research where the researcher follows and observes a user through a typical day, week, or month. This activity's objective is for the researcher to understand the routine and usual activities of a user that the user performs by mere habit and that the user would perform subconsciously. Ford took the time to observe user behaviour because it uncovers hidden insight and unconscious behavioural patterns that fail to surface in interviews. To increase the effectiveness of field research, Ford created a cross-functional research team. Therefore, it could be a challenge to make team members from different fields communicate fluently.

Challenges during the Covid-19 crisis

As mentioned in chapter 1, nowadays, because of the Covid-19 crisis, it is hard to conduct field research such as ride along with users or visit users workplace to observe etc. To fill some of the gaps, Ford uses research tools such as online diaries where individuals can share comments with photos and videos. However, there are limitations in using these tools. In that sense, I emphasize once again why this project is needed to solve these challenges. The next two pages show how the Ford team conducted field research before the Covid-19 crisis based on D-Ford Design Thinking approach.

4.2-3 How and when involve users in a design process?

Interviews showed that the users mentioned earlier were being involved in various ways in Ford's design process. Based on Ford's Design Thinking process, I organized the design activities that Ford conducts. Each stage has a different purpose. This graduation project focuses more heavily on learn and imagine phases because it focuses on gathering data from users.

Gather Research and Insiration

The purpose of this step is to understand the user and the context. The main goal at this time is to learn something from the user. The design team conducts interviews to understand user or performs activities such as questionnaire, surveys, and observation. Through these activities, what designers expect from users is honest and not biased answers. Designers expect to know the user's desirability. More information about expectations for the user is discussed on page 40.

Identify Themes and Insights

Once the overall understanding of context and user is complete, the insight is obtained from the previous phase with the gathered data. To find out more specific user behaviour patterns, conduct co-creation, role-playing, and sending fake news. Designers examine the user's response to these stimuli and capture opportunities in future design directions. If a project is related to the service, conduct a co-creation design thinking sessions with the user to determine what parts of the service can be upgraded.

Gernerate Ideas and Prototypes

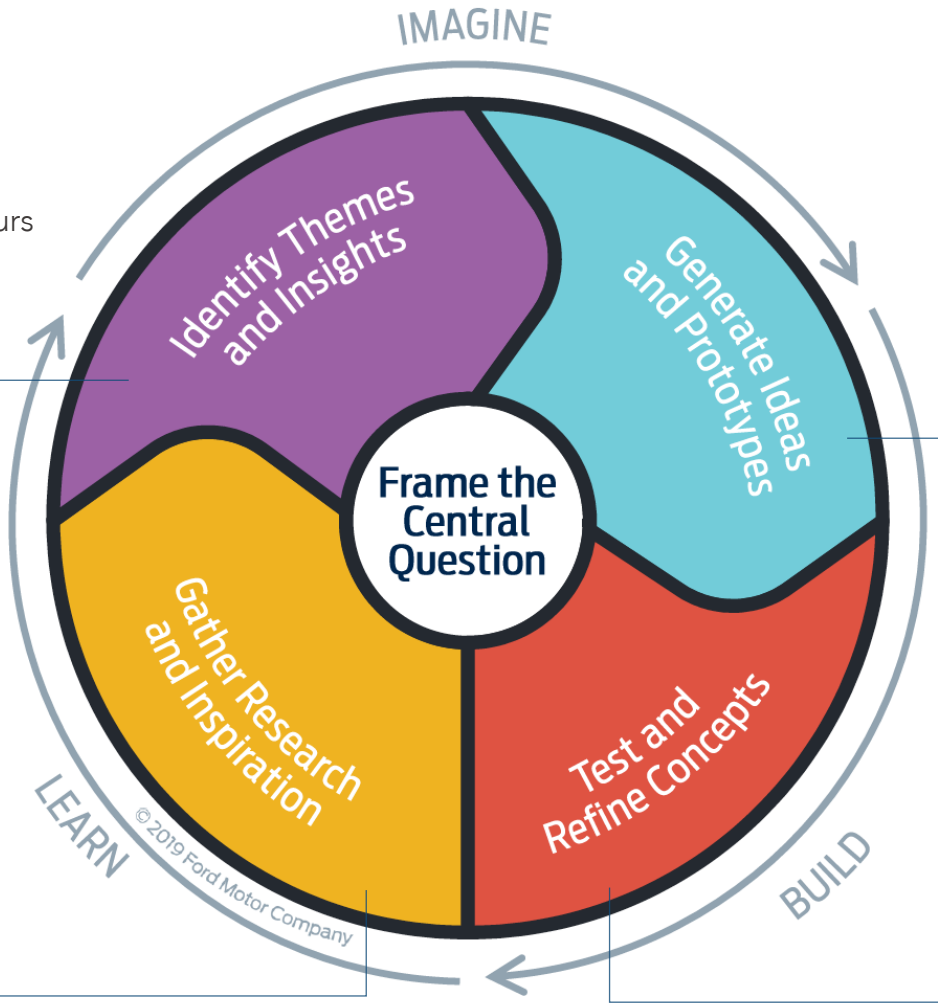
When the design direction and opportunity are taken, ideas are generated based on it and prototypes are created. At this time, designers want to be out of the box by stimulating the user's thoughts and stretching it. For this purpose, methods such as Sacrificial Concept prototyping and Speed dating are used. By obtaining user responses and feedback on the designers' prototypes, we apply them to the following prototypes. This process does not end once but is repeated many times, resulting in increasingly concrete ideas.

Test and Refine Concepts

Finally, when the concrete concept is developed, a final product or service is created by producing it and testing it. The engineering team usually takes these last steps in addition to the design team.

Design Activities
- Co-creation
- Role-playing
- Sending fake news
- Showing Youtube video

Purpose of the activities
- To Identify opportunities
- To find out what can be improved
- To find patterns of users behaviours



Design Activities
- Sacrificial Concept
- Desirability test
- Co-creation
- Speed dating
- Experience prototyping

Purpose of the activities
- To stretch user's idea
- To touch the end of the idea and boost extrem ideas
- To see user's reaction
- Get feedback and opinions

Design Activities
- Interview
- Questionnaire
- Surveys
- Observation
- Ride-along
- Shadowing

Purpose of the activities
- To understand the context
- To undeerstand the user
- To learn something from the user
- To know user's desirability

Design Activities
- Usability test
- Pilot test

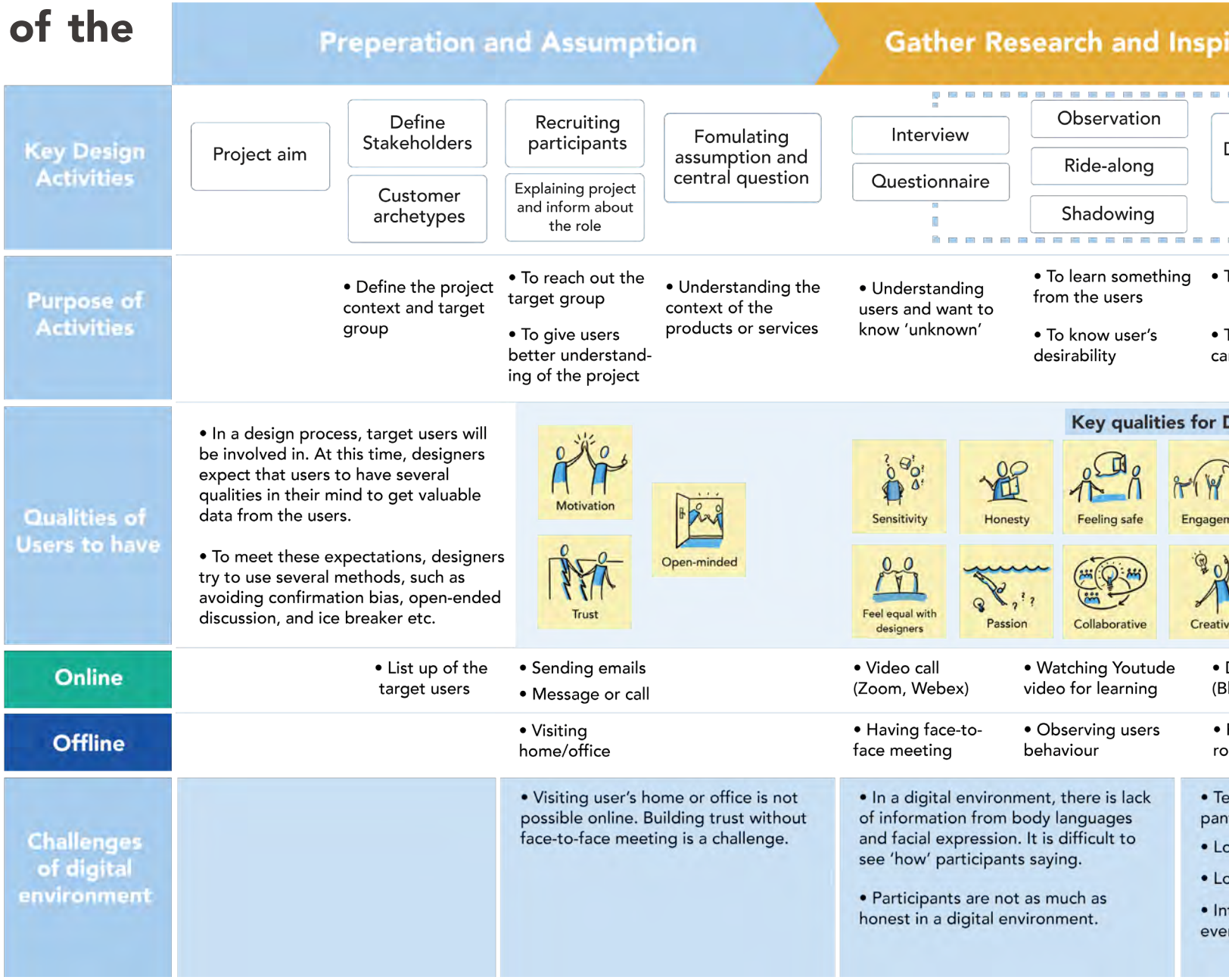
Purpose of the activities
- To validate the concept
- To evaluate the concept

4.3 Journey map of the design process

Based on interviews with Ford, a journey map of the design process was created. As well as the purpose of Ford's key design activities and its purpose, the journey map shows users' qualities to have in each activity.

Users are participating in this design process include both direct and indirect users, as mentioned earlier. In Design Thinking and Co-creation sessions, indirect users are mainly involved as co-creators. The user's mind-sets at this stage has a significant impact on the design process as core elements.

The challenges of the digital environment show specific difficulties and limitations in each term of the design process. Row version of the journey map can be found in appendix II.



ration	Identify Themes and Insights			Generate Ideas and Prototypes			Test and Refind the concept
Design Thinking sessions	Observe users reactions Fake news Role-playing	Showing video of ideas, cases or story	Co-creation sessions	Showing extreme ideas	Sacrificial Concepts	Low-fidelity prototyping and test	Usability test Final product
Iteration							
To get inspiration To find out what n be improved	• To stretch their thinking • To see how users react	• To identify opportunities • To find out patterns	• To collect different perspectives • To get insights from user's perspectives	• To stretch user's thinking • To see how users react of the ideas	• To touch the end of the ideas	• To get feedback and opinions	• To evaluate the prototype • To validate the final product
Design Thinking On the same page Confident	 	Key qualities for Design Thinking      		 			• In this stage, usually engineering team proceed tests.
Digital white board (luescape,Miro,ppt)	• Sending video link or pictures via email or messages		• Digital white board (Bluescape,Miro,ppt)	• Sending video or images of the concept		• Via video call see how participants use	
Physical meeting om	• Doing activities face to face	• Physical white board, disposable tools such as post-its, markers, and cardboards		• Showing physical prototypes or explain ideas face to face		• Physically see how participants use	
chnology problems make partici-ts difficult to be engaged. se the connection between people. se emotions and humanity. trovert people can easily hide. Not ry one can contribute equally.	• Not possible to make physical prototypes during the design thinking session. • Existing tools are too tide and it is difficult to have scrappiness. That makes participants be afraid of failure. • Existing tools are not intuitive for everyone.		• It is difficult to show physical prototype. This can cause misunderstanding of the concepts and ideas. • It is impossible to invite users to try the prototype. In that case, getting insignts from how users experienced the prototype is not possible.	• Because of the users misunderstanding about the prototypes and ideas, getting valuable feedback and opinions are difficult.			

3.4 Qualities of users to have

From the journey map, the most critical key qualities were selected. On the right page, illustrations of six key qualities are shown. These qualities are related to design thinking among the mindset users should have. These qualities have in common with the successful design thinking approach suggested by IDEO. (See page 25.) Everyone involved in the design process, including Indirect users and direct users, must have this in mind. The environment should guarantee to support it to lead the design process successfully.

Motivation

The first important thing is motivation. Participants should fully understand their role, understand how much influence they have in the design process, and be willing to participate.

There are several ways to bring motivation. First, participants should be fully aware of their roles and influences. A designer, or design team, should deliver sufficient information about this. Second, sessions or topics should be fun and interesting for them. Third, their thoughts, opinions and ideas should be fully respected during their participation.

Confident

When conducting design activities, the most important factor for participants is confidence. In design thinking sessions, all the say, do and make activities, participants should be free to express their opinions.

To encourage confidence, we need an atmosphere that respects diversity and does not criticise it in the design thinking session. Participants should feel that they are equal to the designers.

Creativity

Based on confidence, creativity can be developed. The point of design thinking is that it always looks at the problem with a new approach and perspective than before. Once you try anything, you need mindsets that try and lead you with confidence, even if it doesn't make sense.

There are countless ways to stimulate creativity. There are word association techniques, mind maps, collages, and storytelling. Also, forming a creative atmosphere is critical to encourage each other's ideas and develop them together.

Passion

When participants have passion, they are willing to pay attention to the session and keep generating ideas. Passion for solving problems and taking on new challenges will lead to bringing a creative solution. In that sense, passion encourages creativity and confidence.

To bring passion into a session, icebreakers for warming up and bring in emotions has been using. However, strong motivation is also the core value to evoke passion.

Feeling safe

Shaping a safe environment can make participants express their opinions and idea freely. Sometimes hierarchy of participants discourages participants feel free to talk.

Make participants feel equal to everyone. It is not easy because it does not happen by just saying that you are equal. The Key is that forming an atmosphere of feeling comfortable and friendly.

Being on the same page

Everyone in the session should pay attention and engaged together in the activities. Sharing enough information and explanation are needed, and participants should listen carefully to others.

It is easy to be on the same page in an offline environment by communicating face to face. However, the online environment is the challenge of being on the same page. This challenge will be dealt with again in chapter 5, Design Direction.

Interconnection of key qualities

These qualities are interconnected and influential to each other. In other words, proper motivation is required to participate in design tinkering sessions and gain confidence actively. When confidence is encouraged, creativity is created, and passion for the session is created. Confidence is also linked to feeling safe. You can feel the same as others and confidently express your thoughts and opinions in a respected environment. Finally, being on the same page is also possible when participants actively engage in activities. The fact that they are together and participating will add to the enthusiasm of the participants.

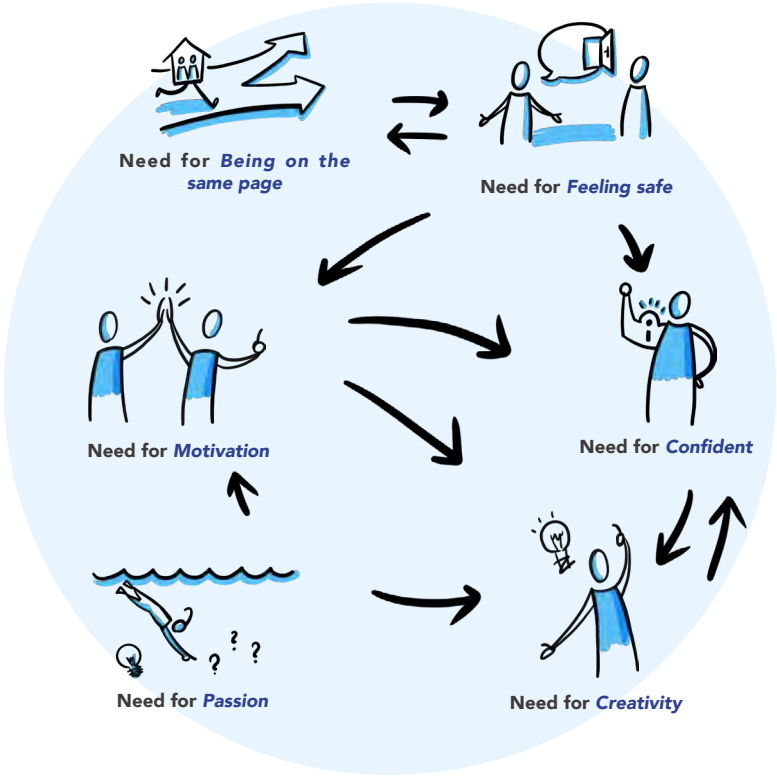


Figure 21. Interconnection of key qualities

Figure 22. Six key mind-set of users to have

3.5 Take aways

User group

User groups engaged in a design process in Ford are ***Facilitator, Indirect users(Co-designers) and Direct users(Indirect decision-makers)***. (See page 32) They have different levels of understanding of design thinking and online collaborative tools.

Ford Design Thinking approach

Ford has its own design thinking approach. Each phase has a different purpose of doing design acitivites. To increase the effectiveness of field research in the process, Ford creates a cross-functional research team. However, the field research faced challenges of conducting field research due to Covid-19.

Qualities of users to have in a design process

In the design process based on D-ford's design thinking, there are essential mindsets; thus, qualities that users should have. Look at Figure 23. The design process can be successful only when an environment is created in which these six important qualities are kept. Keeping these qualities in an online environment is more challengeable than in a physical environment. A final solution should be derived to keep and boost these qualities.

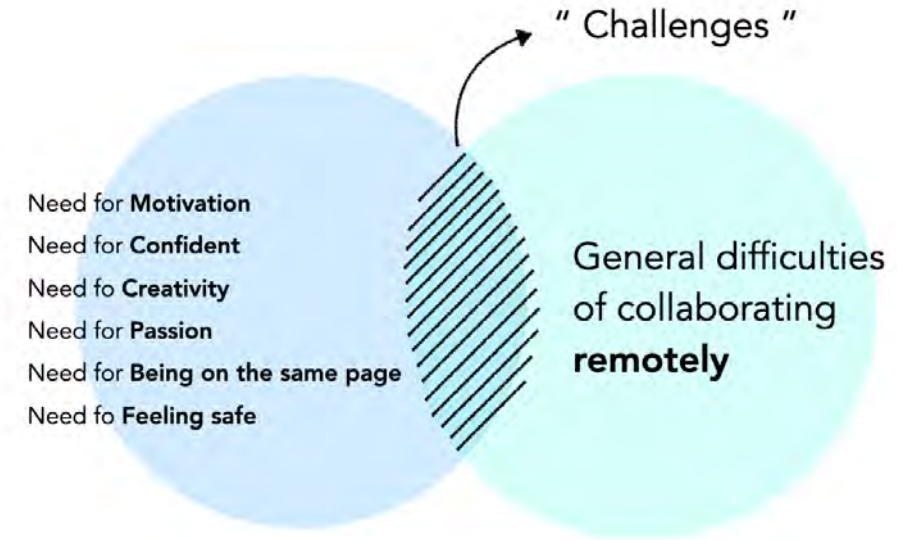


Figure 23. Six needs for involving users

Answering Research question 01. User involvement

(1) Who is engaged in Ford's design process? ***v***

(2) How and What activities the user involved in? ***v***

(3) What qualities user need to meet designer's expectations? ***v***

Chapter 5.
Design Direction

This chapter presents the direction of design in the future by aggregating the problems found in field research. By defining a problem statement, the design solution is carried out with the design requirements that the solution must meet, referring to them.

Chapter Content

Design Direction

A central problem statement is formulated based on the field research in the previous chapter(chapter 4) and the current online collaborations' problems in this chapter. There are two categories of online tools—first, video meeting tools, such as Webex and Zoom. Second, Digital whiteboard application, such as Miro, Mural, Bluescape. Mainly, these tools are being used together for a co-creation session. From the interviews in field Research, I discovered the limitations of the tools used primarily in Ford. In particular, these difficulties point to the problems that Bluescape, Miro, Zoom, and Webex tools have compared to offline environments. In order to determine the future direction of the design, I combined these issues and included them as a problem statement.

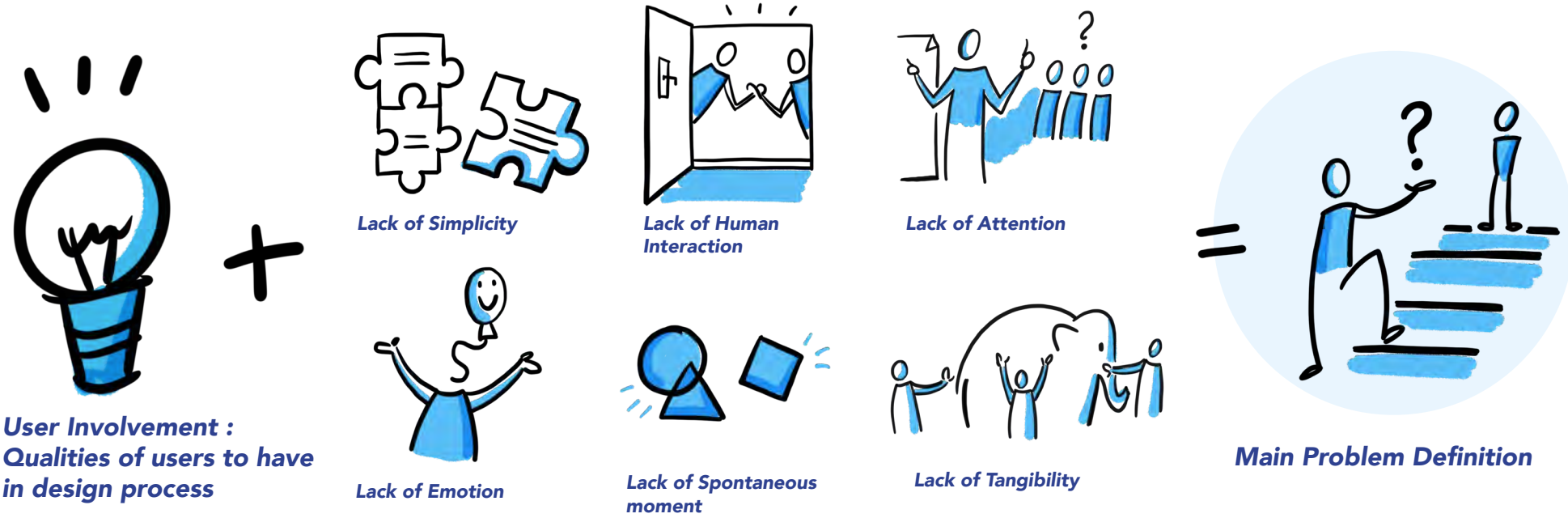


Figure 24. The process of defining main problem

5.1 Target user

There were three main types of people involved in the design process identified by field research. First is facilitator, second, co-designer, or indirect users, and finally, direct users. They have different abilities to deal with online collaborative tools.

A facilitator is a designer who can handle difficult and complex tools. Since they are session leaders who lead sessions, they have a deep understanding of online collaborative tools and have the ability to control them skillfully. Indirect user groups co-designers have used online meeting tools or digital whiteboards such as Miro and Bluescape once or twice. Finally, the direct user group is a user who gives insight and information to designers rather than participating in the design process as a co-designer. Ford's target users are people who are not close to technology like Handyman.

Change of the target user group

The primary target users are Facilitator and ***Co-designer***. Field research has found that design thinking sessions at Ford can be divided into four primary purposes. See the picture below. As shown in the figure below, most of Ford's online design thinking sessions involve stakeholders associated with the project in Ford or Ford. Through interviews, I found that Ford is having challenges in conducting these design thinking sessions online in general. Before involving direct user, I decided that the Ford team, or the project's stockholders, should communicate and manage smoothly in the design process. In other words, I concluded that the most urgent priority was to come up with a solution that would help Ford stakeholders do well online collaboration as co-designer.

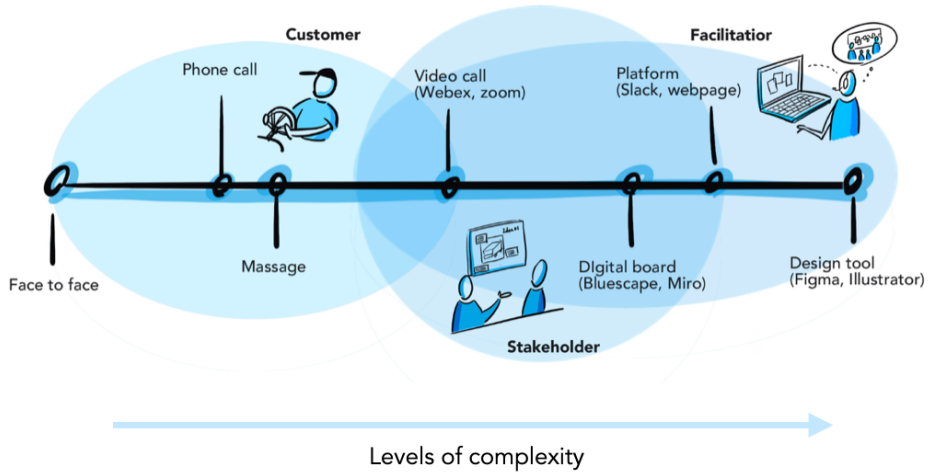


Figure 25. User capabilities according to the Complexity of online Tools

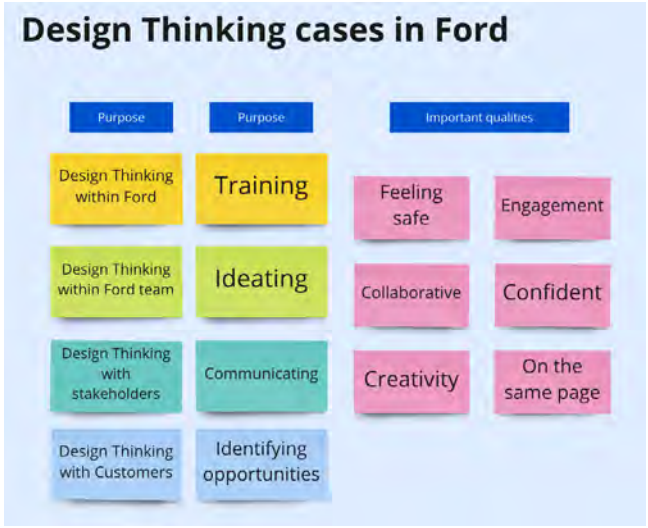
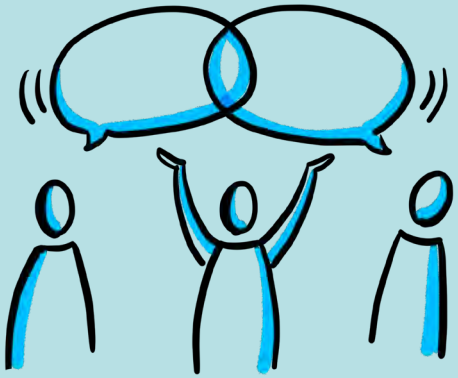


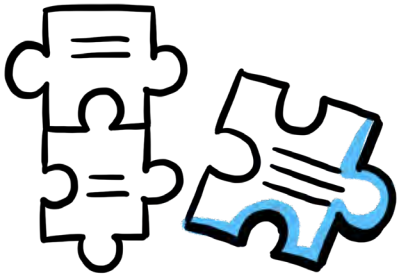
Figure 26. Four cases of Design thinking session in Ford

5.2 Current problems of online collaboration

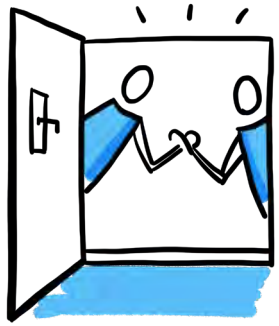
What is lacking in current collaborations in a digital environment?



Including all four design thinking session cases mentioned earlier, I discovered the difficulties of online collaboration currently experienced at Ford. These challenges are marginal to existing online tools such as Webex and Bluescape, the main tools used at Ford. Even though these challenges are discovered based on these tools, the lacks of qualities such as the absence of human interaction in the online environment can represent the entire online environment's limitations.



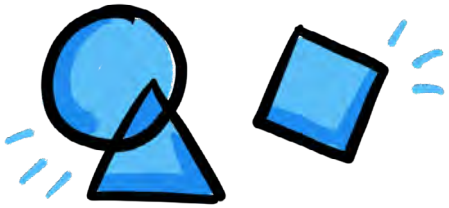
Lack of Simplicity



Lack of Human Interaction

Lack of Attention

Lack of Emotion



Lack of Spontaneous moment

Lack of Tangibility

Lack of Simplicity

The current tools are pretty complex for non-designers, and too much information on the tools make it more complicated. For this reason, Ford is using different tools per stakeholders. There are needs for an intuitive tool, which is like a universal language, easy and simple so that everybody can join the co-creation.

"We use Miro, Figma, Invision, Mural etc. We are looking for the most intuitive tool." P1

"Main problem is, the tools we use day to day base, are generally too complex, for our research participants. For them, it is difficult to use it without primary experience." P1

Lack of Attention

When there are many participants in a co-creation session, some participants don't show their face, don't respond and be hidden. It makes the facilitator doesn't know they are paying attention or not. It makes participants and the facilitator challenging to be connected and bond.

"It is difficult to control everyone, so we don't know who is paying attention or not." P8

"Some people just don't show their face, so it is difficult to bond and know each other online." P8

Lack of Human Interaction

The main challenge of online collaboration is the lack of human interaction. Catching nonverbal interaction is difficult, so they miss lots of information, feelings and get misunderstandings. Lack of human interaction cause difficulties in engaging sessions and loose connection between participants and facilitator.

"We haven't found a good way of replicating, sort of the co-creation real life. Normally, we have physical interaction, but in digital, it is really difficult." P1

"What we miss is the connection and the human interface point." P6

Lack of Emotion

Showing emotions or feelings for participants are difficult in online tools, Bluescape, Miro, Mural etc. It makes the co-creation dry and challenging to create an opened and safe environment. Therefore it isn't easy to make people passionate, fully engaged in the session, and empathising with each other.

"We are trying people to be Pixar pictures for about get the emotion there and that passion." P6

"I think Mindset is missing in the session. Collaborative, openly, together with people." P2

Lack of Spontaneous moment

The current tools are different from the physical environment. In the physical environment, participants can use post-it cardboard, and it is not fixed so that participants feel free to do it. These physical tools are universal and intuitive. In that case, it is easy to catch the spontaneous moment. However, in a digital environment, participants feel difficult to do spontaneously.

> *"Using post-its, papers, markers, those tools are quite disposable, it is not precious so it doesn't matter if I make mistakes, which makes them feel free to mass the stuff." P1*
>
> *"We tried to maintain the scrappiness of it, by getting people to try engage, draw, and write rather than type." P6*

Lack of Tangibility

It is currently impossible to show a physical prototype that can be a good communication tool, so that it makes it much difficult to understand and follow the session. Interviews said that if they should choose one, then definitely go with a physical session.

> *"A picture is worth a thousand words, and an object is worth a thousand pictures. Showing physical prototypes and idea is much better." P1*
>
> *"It is impossible to create a physical prototype so now we create a storyboard and present during the sessions." P4*

Based on the six issues of the online tools and environment, I found that the bottom line lacks participants' full engagement.

Online engagement

Most people know what "engagement" feels like[27]. I defined "engagement" as having a connection with people in a session and entirely focused on a collaborative session. It means paying attention to what is happening in the session, keeping concentrations, and following the facilitator while having proper autonomy.

The lacks, as mentioned earlier, of an online environment interferes with such fragments for engagement. Limitations, such as lacking human interaction in an offline environment, lack of emotion, and the inability to create physical prototypes reduce participants concentration due to insufficient connection to the session.

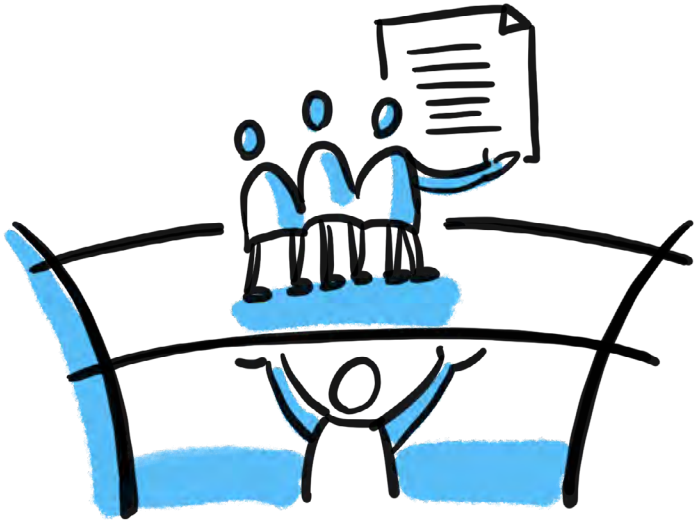


Figure 27. Having full engagement

5.3 Problem Statement

Based on the challenges of involving users and challenges of online collaboration, a problem statement formulated.

"How can we boost full engagement of non-designers who don't have much experience of using online tools in online co-creation sessions?"

What ?
The solution should be able to boost full engagement of users so that the communication between facilitator and users should be fluent and efficient.

Why ?
Fluent and efficient communication between facilitator and users is essential for a successful co-creation session. Full engagement of the user is a key component of efficient communication.

Who ?
The users are non-designers with no experience using online design thinking tools. By providing an intuitive tool to use without learning, a solution can boost users' full engagement.

How ?
Developing an easy and intuitive way of controlling design thinking tool, simple and fun design toolkits and guidelines for co-creation sessions based on sessions' different purpose.

When ?
Design thinking and co-creation sessions online in an early design process for understanding users, gathering data and finding opportunities.

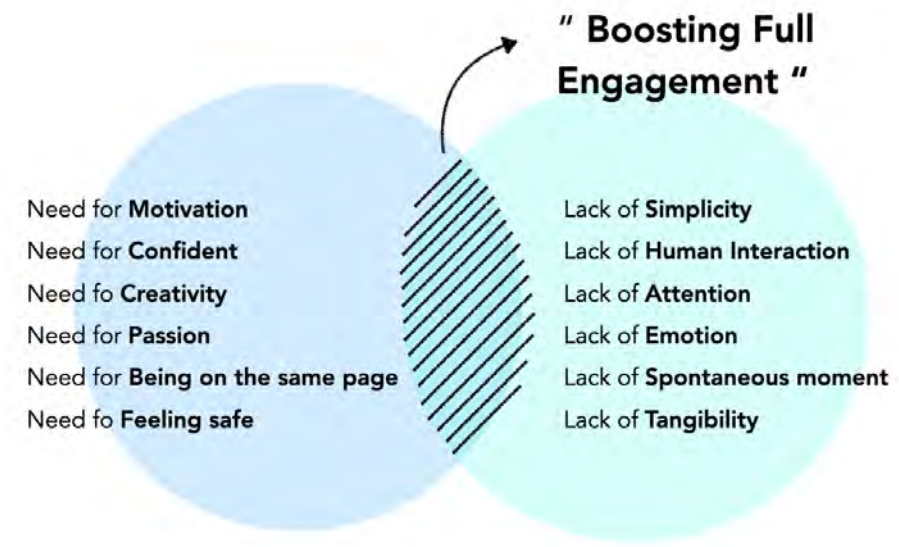


Figure 28. Main findings and challenges

Solution = An intuitive tool for everyone
Although the target group has been narrowed down to stakeholders, who are a direct user group of Ford, the ideal solution is to develop an intuitive tool for everyone. As mentioned earlier, Ford has various people, and they have different levels of understanding of design thinking and online collaborative tools. In that sense, similar to a physical environment, which is the same for everyone, the solution should provide intuitiveness. Therefore, the tool should cover the variety of stakeholders of Ford and almost everyone. Details about the requirements of the design can be found next page.

5.4 Requirements of Solution

The solution should meet these design requirements below.

Requirements of the design

Easy to use
Using this tool, participants should be able to concentrate on the session without technology interruption. Thus, the tool should be not difficult for people who are not tech-savvy.

Confidence
Participants should be confident to use this tool without much experience in advance.

Creativity
The tool should be able to evoke creativity during the session.

Collaboration
The tool should be able to encourage collaboration.

On the same page
Participants should feel that they are on the same page and easy to follow up with a facilitator.

Safe environment
The digital environment with the tool should make the participants feel safe to express their thoughts and opinions, not to be afraid of failing and making mistakes. Also, feeling equal with other participants or the facilitator is essential for a successful co-creation session.

Answering Research Question 02. Online collaboration
(1) What difficulties are there in online collaboration? ***v***

(2) What properties are lacking in the current online tools? ***v***

(3) How can we take advantages of online environment and use it better than before? ***See Chapter 6.***

This chapter shows you the research focused on the difficulties of collaboration in an online environment and online tools' limitations.

The next Chapter 6 Design Iteration demonstrates how to exploit an online environment's advantages by experimenting with the online environment's different technologies. The answer to research question 2-3 can be found at the end of Chapter 6.

Chapter 6.
Design Iterations

This chapter deals with design iteration cycles. It uses the "experience prototyping" approach mentioned in chapter 2 to explore various technologies and demonstrate the process of developing online collaborative tools. Two large iteration cycles refer to two user tests and produce the final concept by analysing the results and implementing feedback after each user test. This process sets the stage for the final concept.

Chapter Content

Design Iterations

Based on the design direction of chapter 5, there were three large iteration cycles. However, prototyping and evaluation processes were repeated every week (See chapter 2). In the first cycle, prototypes were assembled from the every week prototype, form a scenario and tested. In the second cycle, the direction of the design was determined based on the insights obtained during the first prototype test, and this was followed by feedback from project team members related to Ford Design. The second cycle was not a user test but, more likely, a session to introduce projects and ideas and gain insight into them. In the third cycle, a final prototype testing session was conducted by defining the concept and creating a working prototype based on the participants' advice and needs in the second session. This chapter deals with the first and second cycles, and the final design cycle will be dealt with in chapter 7, Final Design. The diagram below, figure 29, shows the illustration of the design iteration process.

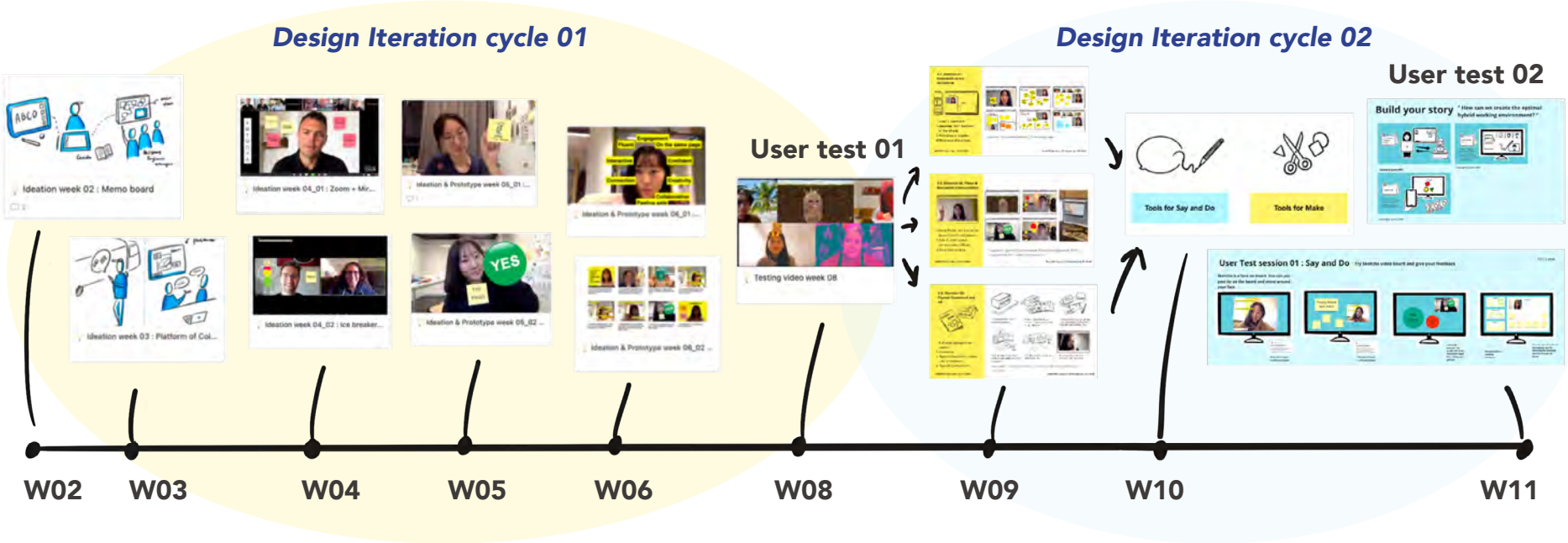


Figure 29. Design iteration cycles process

6.1 Design Iteration Cycle 1

6.1-1 Concept : Face on Board

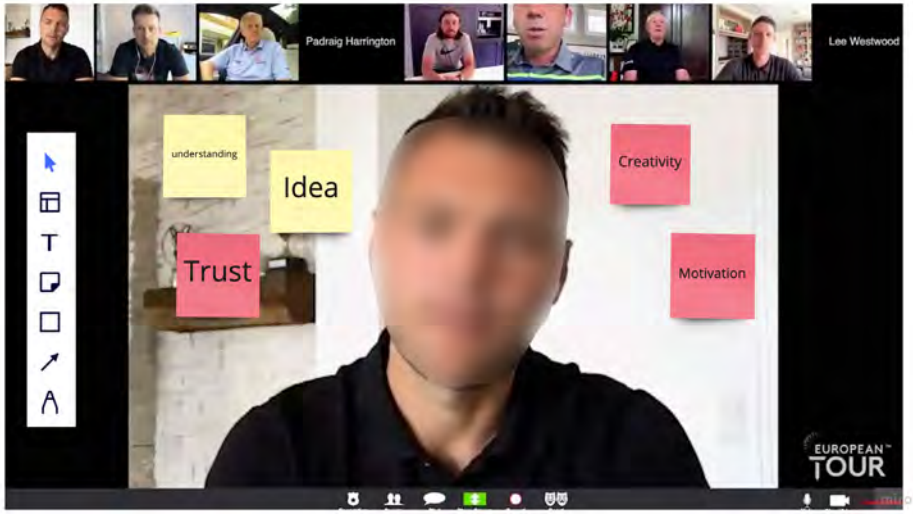


Figure 30. Ideation week 04, Combination Zoom and Miro board idea sketch

During the interviews with Ford employee, one of the findings was that it is very uncomfortable to use a digital whiteboard separately with a video call application. For using these whiteboards, people should create a board on a separate webpage and share the link. Even though it looks simple, people should wait for other people to enter the right place and check it.

It is also hard to draw other people's attention because many people get lost and don't know where they should look at.

Based on this problem, an idea came out, combining video call application and digital whiteboard. See figure 30.

Design Brief

Sketcho, sketch plus video concept is a face-on digital board and templates for guiding a co-creation session to enhance facilitator and participants' engagement.

Main feature of the idea

This first idea's main feature is that people can directly add post-its beside on their face during online meetings or online sessions. The biggest advantage of this idea is that it is able to catch spontaneous moments by putting people's ideas immediately on their video.

C6

The second feature is using gestures for communication. Some interviewee said it is difficult to catch body languages in the online environment. However, if we borrow technology for emphasising this body language, catching nonverbal expression will be possible.

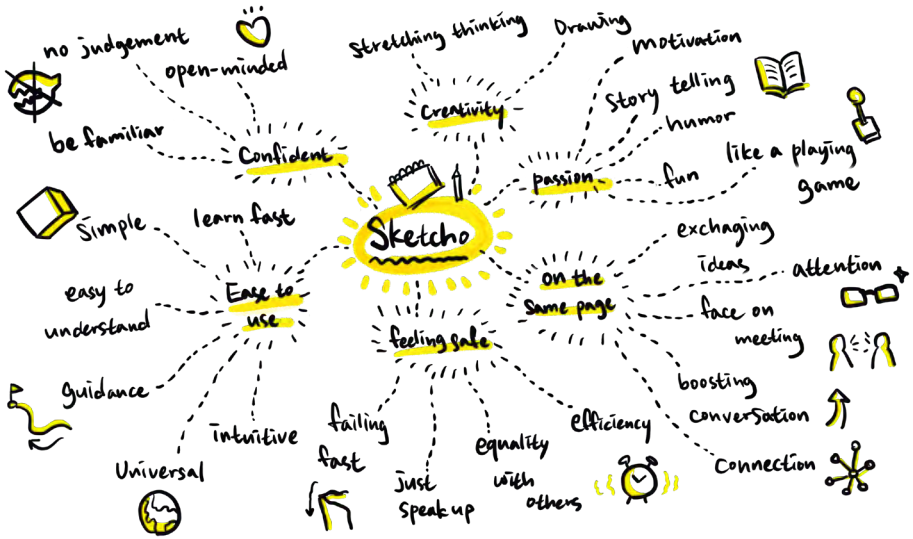


Figure 31. Sketcho Concept Mindmap

Use of AR technology

Augmented reality(AR) is an interactive experience of a real-world environment where the objects that reside in the real world are enhanced by computer-generated perceptual information. AR can be defined as a system that fulfils three basic features, a combination of real and virtual worlds, real-time interaction, and accurate 3D registration of virtual and real objects.

Nowadays, for entertainment, lots of social media provides AR filter function. Even the Zoom meeting application also provides filters that people can use during the meeting, such as changing background, changing face to cats or dogs, wearing virtual hats etc. AR technology can also be used in a productive way besides entertainment. Figure 32 shows the example of using AR with gesture tracking technology for presenting rules of co-creation. This simple prototype created using Lens studio, and it can be used on video meeting application such as Zoom, Webex and Skype.

Figure 32. Presentation Experiment using AR and gesture tracking technology

Gesture communication

Nonverbal communication simply defined as 'other than words'. [28] However, the meaning of nonverbal communication is much more complex than just other than words.

Nonverbal behaviour is encoded with varying degrees of control and awareness.[28] It is more like a cognitive response that takes place immediately and automatically following the perception of the stimulus. By observing this response, we read other's mind and thoughts quicker than words. In that sense, gestures can enhance and help fluent communication.

We all have experienced that a presenter who shows body gestures during their presentation is better than another presenter who is only speaking. Gesture helps other understanding better, and it gives somehow feelings of connection with each other. In an online environment, especially where we hardly find human interaction and connections compared to an offline environment, gesture communication can enhance connection and help the flow of communication better.

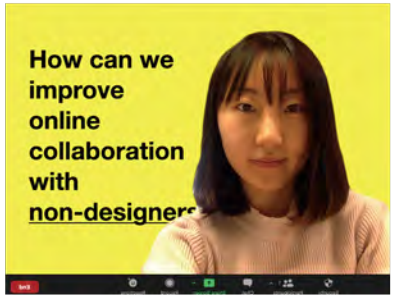
Tools for AR and Gesture tracking technology

There are lots of software that provides tools for quick prototyping by using AR, gesture or object tracking technology. One of the simplest tools is Lens studio with a Snapchat filter and Unity Vuforia. For more elaborated prototyping, such as customising gestures, teachable machine and p5.js also can be used.

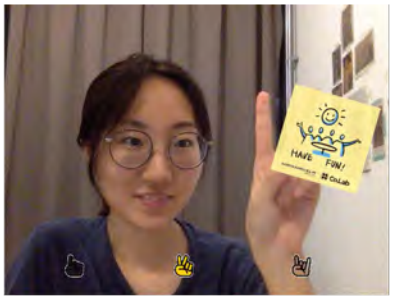
In this project, rough prototypes were created using Lens studio and Snapchat filter. In order to conduct a user test via Zoom, it was inevitable to choose a tool that is compatible with Zoom for performing a user test.

6.1-2 User Scenario

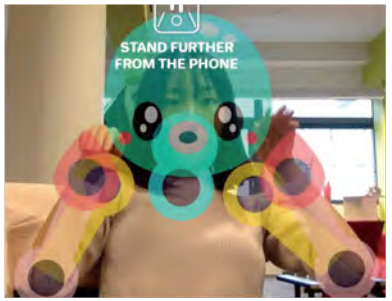
By collecting and refining rough prototypes, a user scenario for the first user test created. The main quality is 'face on board'. The whole session proceeds to share a face with each other. Presentation slides also shared in the background and using gesture, and the facilitator explains rules. In terms of the ice breaker, a Snapchat filter will be used for introducing participants themselves. In the main session, a flower association activity on the facilitator's face happens, and the participants' activity follows. At the end of the activity, by raising hands, participants can vote on ideas. See figure 33 below.



1. FACILITATOR PRESENTATION : The session agenda, using vitual background



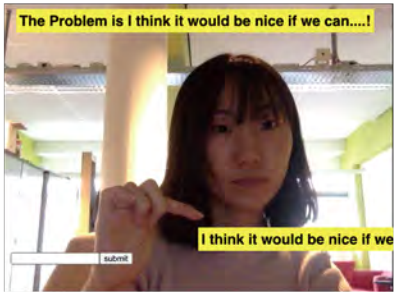
2. FACILITATOR PRESENTATION : Explaining rules using vitual background & gesture, snap filters



3. ICE BREAKER : Using various fillters, participants introduce themselves

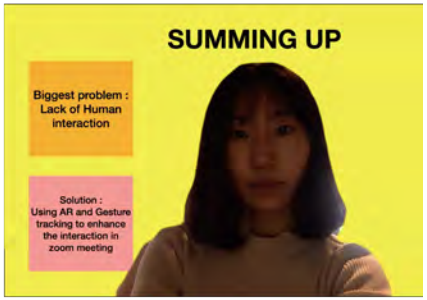
4. FLOWER ASSOCIATION : Using the prototype, the participants ideate problems.

5.FLOWER ASSOCIATION 2 : After One circle, the participants ideate a solution per a problem.



6. PRESENATION OF THE IDEAS : Participants presents problems and their ideas, and select what they like the most.

7. VOTE : Each participants has one idea, and the pariticpants vote for the one idea.



8. CONCLUSION : The facilitator sum up the session

Figure 33. User Scenario for the first user test session

6.1-3 User Test

Test set-up

Four participants were selected by three divisions, designers(facilitators), non-designers, and office men or students such as business or human resources. The duration was 90 mins for co-creation, evaluation for 20 mins. After the session, participants had an evaluation phase to know how the participants think about it. It was a free discussion and questionnaire also handed to collect the data.

Prototype

Zoom, zoom filters, p5 prototype. This prototype test's main focus is only using zoom video rather than Miro, Bluescape, or other links to see whether co-creation is possible to go fluently without other links.

Research Question

This test session is for evaluating the face, visual & gesture elements during a co-creation session. In order to provide a context of the session, a central question was given: "How can we engage craft man to become more digital?"

Gesture

•The visual elements of the gesture on the video help participant's engagement?
•The gesture communication help participant's engagement?
•The visual elements of the gesture on the video help participant's to express their emotions?

Face to face virtual

•Seeing face each other help to communicate better?
•Seeing face each other help to engagement?

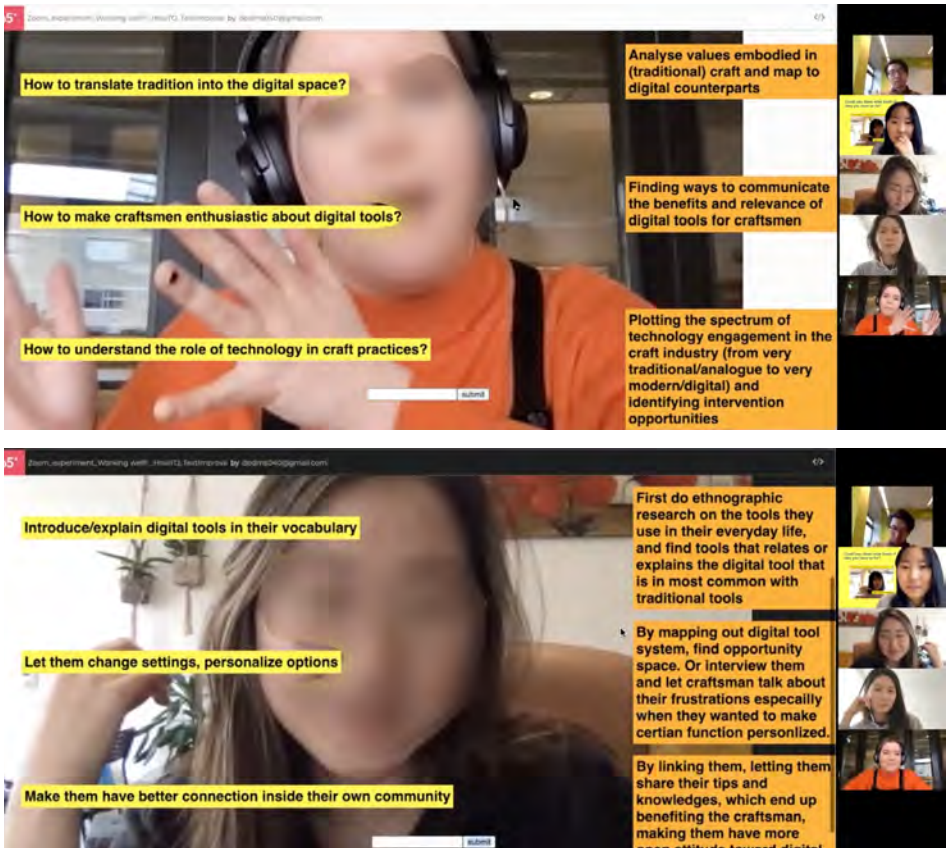


Figure 34. First prototype test session capture

•Seeing face each other help participants feel connected?

Overall Co-creation session

•Does the co-creation session have enough narrative story/ guidance?
•Does the session encourage creativity?
•During the session make participants feel safe enough?
•Does the atmosphere of the session create enough collaboration?
•The participants are being on the same page during the session?

6.1-4 Test Results

The overall test session was a success. Some participants have different opinions on the most important features I wanted to test, face-to-face discussion, and sharing with Post-it on their faces. Some participants said that looking at one's face prevents one's concentration when posting on one's own face. In addition to that, there are limitations to a low fidelity prototype. The biggest limitation was that they had to share their ideas using p5, so it was impossible to see each other working in a gallery view via zoom. It decreased the feeling of connection with each other. See the feedback from participants below.

Feedback from participants

Positive feedback

Participants said that the tool makes people smile and laugh, especially using gestures and AR ice breaker. These elements could be improved to give a feeling of informal meeting and bring in emotions.

"In the physical environment, you can see non-verbal communication. So it already helps the meeting to be informal. It can also be popping up the ideas, and people can see it, it could be more real-time and informal." p1

"I really like this concept and think it could have many applications beyond the current design context! I would recommend looking into making all participants' video and gesture-related outcomes (e.g. post-its, voting buttons) visible for everyone, like in the gallery view on Zoom, as this would really increase the feeling of co-creation and togetherness." p2

Critical feedback

It is possible for each person to do an activity using the prototype. However, there was critical feedback about collaborating using this tool. There was also feedback that the face interfered with the concentration.

"Working on my face was a bit weird and distracting. However, it is not collaborating on the same board. How can we collaborate? Because it is just a prototype?" p4

"The voting and distraction on the face could be better when we can see people in a gallery view." p1

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Google Questionnaire results

In the session, participants felt that there are not much freedom to explore ideas, because of the fixed form of the board on the face. The row data of collected answers can be found in appendix III.

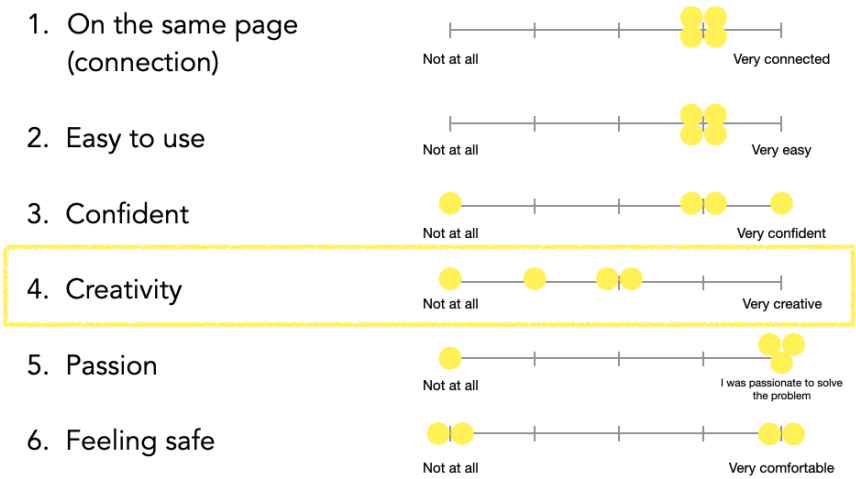


Figure 35. Google questionnaire answers

Discussion
Since the first user test, the insights obtained are simply that the board on the video has a minimal view when the user feels it. The board on the video does not have much margin, so only limited information can be shared, and there is also a point of contention about sharing information between each other, namely video boards. In addition, there was an opinion that posting ideas on your face sometimes hinders the process of generating ideas and makes it difficult to concentrate.

However, there was also positive feedback. AR-enabled icebreakers to take advantage of online environments that could not be achieved in a physical environment. It was ideal for attracting the interest of participants because it was highly likely that they could wear different types of AR items.

Finally, communication using gestures has both advantages and disadvantages. Participants were very interested in the technique of recognizing gestures and enjoyed challenging them many times. Nevertheless, he was not sure where to use his gestures. In this test, we used it as an expression with hands up when voting with yes-no, but there were problems such as the fact that anonymity was not preserved in voting, which offended participants and made it difficult to see technically.

Three Direction
Based on the feedback and the Say, Do and Make technique (See page 26), Three different ideas came out. First, the idea of creating a sketch board that would complement the main concept of the video board. The video can be moved, and the size can be changeable. This idea is an extension of the Sketcho, the first prototype. However, the working collaborative will be possible to use it. The second is using gesture recognition technology to develop ideas from gesture communication and help communication more smoothly in co-creation sessions. Finally, AR should be used to overcome the limitations of expressing ideas in online co-creation.

The three directions can be defined as representative of Say, Do, and Make activities, respectively. Please look at the diagram below. Direction 01 directly affects co-creation, but Direction 03 can be used for activities such as role-playing and ice breaking, so Direction 03 corresponds to making by using AR and AR to select ideas of participants. See figure 36.

Direction 01 : Say and Do
Combination of video and idea board. There are templates created by a facilitator in advance. The session follows the order of the templates on the left side of the board. As participants can

Figure 36. Three different directions related to Say, Do and Make

see the order of the session there, it is easy to follow the session. In addition to that, people can move their video freely and resize it according to the context.

Direction 02 : Do

Using gesture tracking technology and AR, communication in a session can be more activated than before. Non-verbal communication and AR elements help the session to be informal and give a fun element.

Direction 03 : Make

AR technology can be used for building a prototype or creating a story. Combining physical objects and AR will be easy to use and enable to deliver ideas in a fun and joyful way in a session.

Figure 37,38,38 shows direction 01,02,03 respectively.

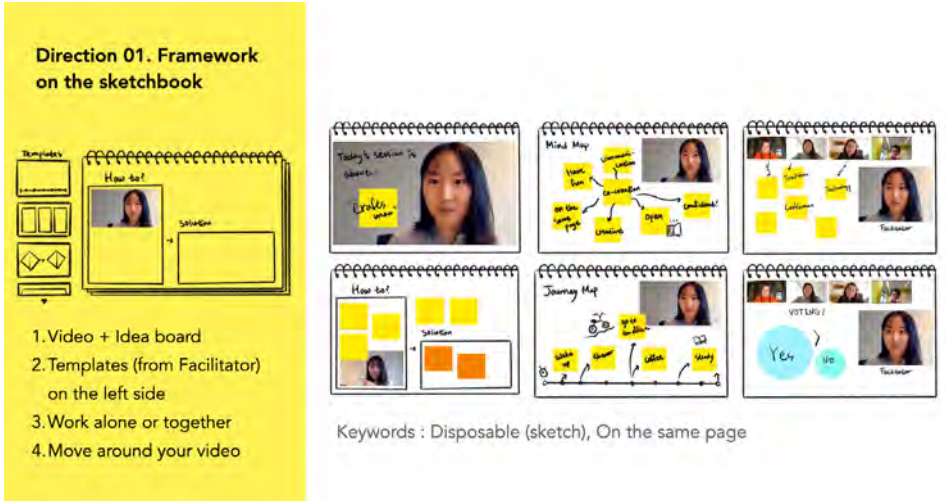


Figure 37. Direction 01, Framwork on the sketchbook

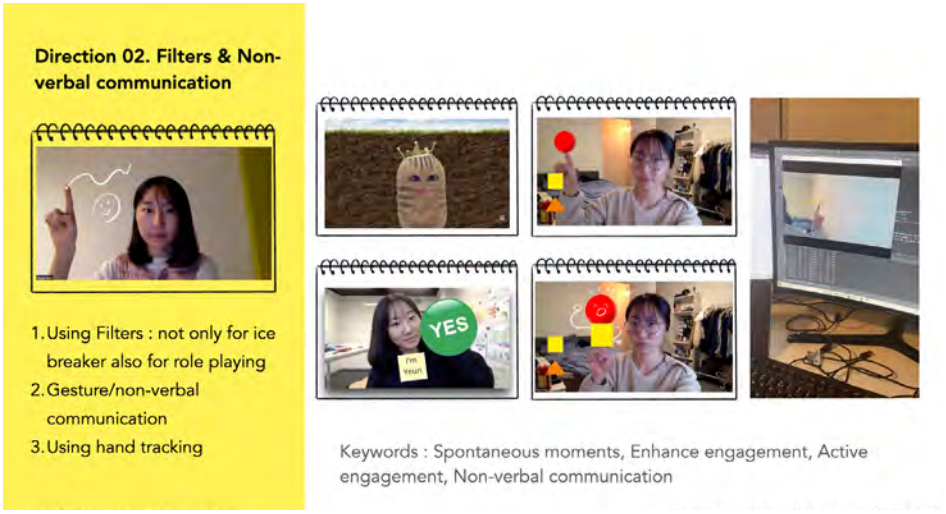


Figure 38. Direction 02, Filters and non-verbal communication

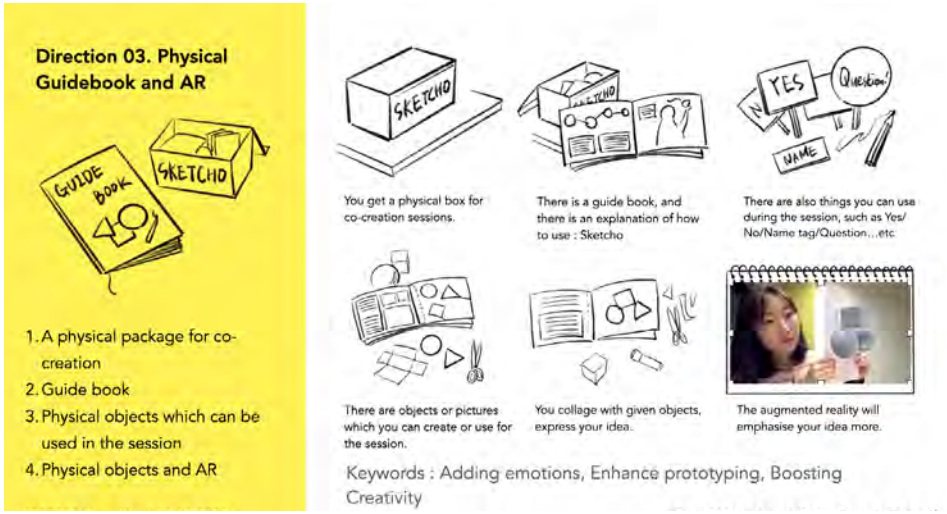


Figure 39. Direction 03, Physical guidebook and AR

6.2 Design Iteration Cycle 2

6.2-1 Concept : Tools for Say, Do and Make

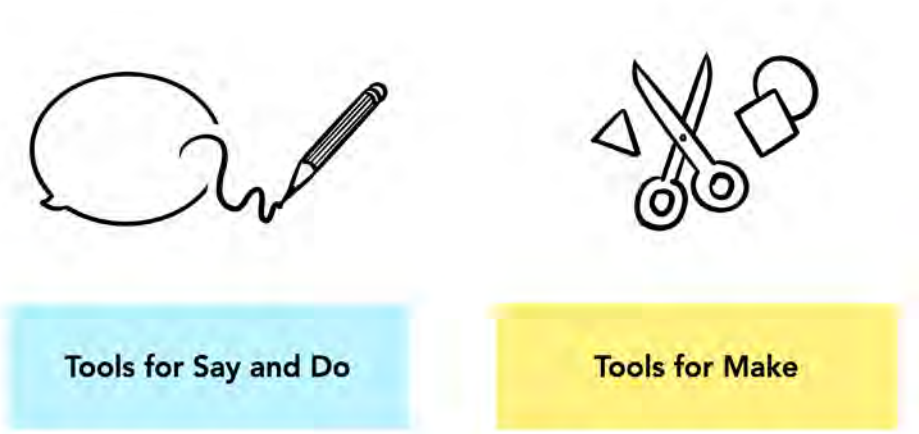


Figure 40. Combination of tools Say, Do and Make

At the end of cycle 1, a combination of direction 01 and 03 was chosen for cycle 2. As chapter 3 shows, the co-creation session should include three acitivies(or technique), Say, Do and Make. Say and Do is more about sharing experience, ideas, defining and reframing problems. On the other hand, Make is more about building a rough prototype, creating storyboards, and very first rough idea testing could be involved. These two aspects are equally crucial in a design process, and it is hard to decide one direction because of the transitions of Say, Do and Make. Say, Do, and Make activities are interconnected with each other, and by then, a participatory design can be complete.

In addition to that, because this project is a design project, especially following design iterations, it is worthy of testing and getting feedback about both tools and choosing careful based on reasonable grounds from the users. In that sense, rather than showing participants a prototype with two-direction completeness, a testing session proceeded by demonstrating directions and concepts and getting enough feedback and inspiration.

Tools for Say and Do

Tools for Say and Do came from design direction 01. It is a sketchbook concept, and people can move their video and resize it according to the situation. A digital board are embedded on the sketchbook so that it is possible to work collaboratively while seeing each other's faces. As people have the freedom to move video and resize it, there are many possibilities of using board space in a variety.

The feature of moving around video makes people be able to communicate fluently, as a gesture. People can move in front of a specific post to highlight an idea, for example.

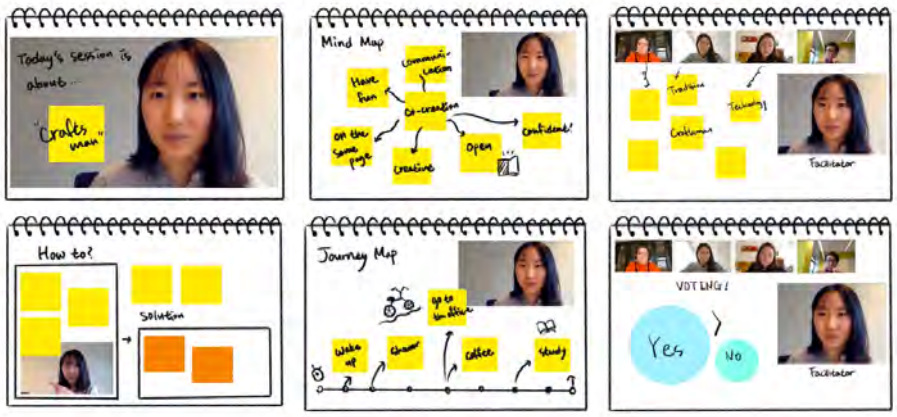


Figure 41. Direction 01 idea sketch

Tools for Make

Tools for Make concept came from design direction 03. The original idea of the Make tool is using AR technology for showing ideas. However, even though there are positive reactions from other designers and potentials of using AR, it had a risk to develop further before getting supportive feedback. For this reason, the Make tool developed as a storyboard kit for a co-creation activity within the second user test.

Figure 42 shows the storyboard kit for user test. This storyboard kit is created for a specific central question which participants will work on during the session. The question is, "How can we create the optimal hybrid working environment?"In order to customize the kit to the central question, there are products of office and home furniture.

There are two main values of this kit. The first is to encourage participants to create a storyboard more freely. In the user research, I found that many people are afraid of making a mistake and feel uncomfortable drawing on the digital board. This storyboard kit will help to create a story in their mind without any difficulties. The second is to experiment with AR elements for enhancing the created story. AR elements have colours on them for making the distinction clear.

Original idea of AR kit

This AR kit's initial idea was not only 2D drawings, but if participants put these elements on the camera, it shows 3D objects. For example, the emoji graphic can be displayed as a 3D smile object, and it even animated on the video.

However, this idea could not realise in the user test, so only coloured 2D graphics were used. Even though it was not realised in the session, it was enough to show the possibilities of using AR elements in storyboard activities. See the next page about the user test set up.

Figure 42. Storyboard kit of Tools for Make

6.1-2 User Test Scenario

Before a full-fledged session of testing prototypes, drawing ideas, and giving feedback, there is a pre-session. The purpose of having a pre-session is to provide enough information for participants about this graduation project and to get feedback about the three previously mentioned (figure 36) design directions. For more information on participants' feedback of design directions, see appendix IV.

Apart from getting feedback about the design direction, the main test session is divided into two parts. First, participants tried tools for Say and Do. As a low-fidelity prototype, small elements of the concept were tested. See figure 43. The first element is a post-it on the video, which was the main feature of the first user test. The second is moving around face video with a mouse. These two features were created in p5 js library. The third and fourth elements are showing gesture voting idea and sketchbook interface concept. These two elements were created as graphics in order to show ideas and collect feedback about it. The first part of the user test is closure to open discussion session rather than a user test. Since this user test session is the first time with Ford employee, rather than providing passive user testing to participants, it was essential to conduct an open session to listen to and accept their opinions actively.

The second part of the test is creating a storyboard using a storyboard kit. After exploring the say and do tools, participants become more sensitive about the topic, "hybrid working environment". Based on inspirations from the first part, participants can create their idea story of the hybrid working environment.

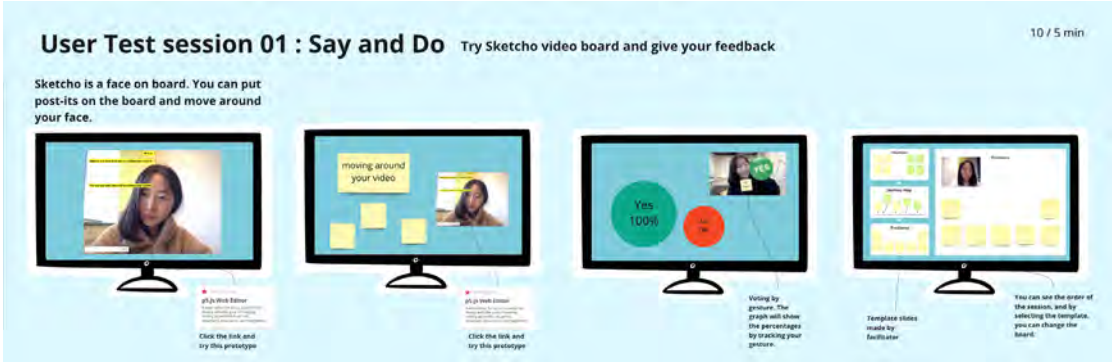


Figure 43. First part of the user test, Tools for Say and Do

Figure 44. Second part of the user test, Tools for Make

6.1-3 User Test

Test set-up
Participants : 6 people in one session
Participants are Ford employees, and most people have experience with design thinking and co-creation sessions using online tools. The duration was 90 mins for co-creation as the same as the first user test. Participants in this test were not the same people who participated in the first user test. So I provided an overall presentation about this graduation project at the beginning of the session for around 30 mins. After the session, there was an open discussion about the whole session and feedback.

Prototype
Zoom, Miron and p5.js prototype. The main focus on this prototype test is to collect how Ford employee think about the new concept Say, Do and Make tools and listen their own story about the idea.Figure 45 shows one of the tools for say and do prototype created by p5.js

Research Question
This test session is for evaluating two concepts, tools for Say and Do, and tools for Make.

Tools for Say and Do
•How Ford employee think about post-it on face video?
•How Ford employee think about moving video around a digital board?
•How Ford employee think about voting system using gestures?
•How Ford employee think about sketchbook concept, slides on the left side of the interface?

Tools for Make
•How Ford employee think storyboard toolkit?
•How Ford employee think AR element idea on storyboard?

Something to point out about Tools for Make
There are two sides of testing tools for Make in this session. First thing is to test storyboard toolkit. Second thing is A toolkit for discovering problems and gaining insights through stories created by participants.

Overall Co-creation session
The main purpose of the project was to gather data about how Ford employee think about the concept and draft of the idea. This session held in a diverse stage of the idea, in order to decide the final design direction of the project.

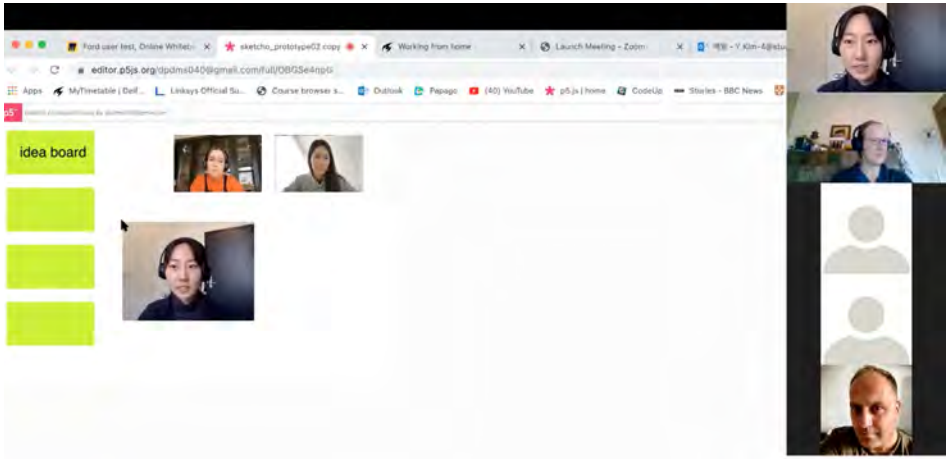


Figure 45. Demonstration of tools for say and do in the test session

6.2-3 Test Results

Feedback from participants
In terms of tools for Say and Do, participants gave positive feedback about focusing on the video. Participants said that moving around video gives feelings of standing in a physical room. In addition to that, templates and video overlay for facilitator and team would work well to connect ideas to face. However, some participants worried about the difficulties of getting used to the tool because it looks a bit complicated. In that case, participants suggested an idea of a guide book or a clear introduction of the tools before starting a session.

In terms of tools for Make, participants had interested in AR elements, but since the AR kit was only giving a source of the idea, not working, they hardly understand the idea explicitly. Despite limitations, participants created their own story of the idea, and it gave lots of insights into a hybrid working environment. Figure 46. shows three stories created by participants.

Stories created by participants
Every two participants formed three teams and created three different stories. Three different stories, but the mainstream was in common.

Most of the participants said there were emotionally dry in the current online collaborative working environment. There is no opportunity to drink coffee together, have informal conversations. People only work, and even other people don't know what they are doing if they turn off the camera. In particular, in situations where creativity and open-minds are needed, such as design thinking sessions, everyone thought that bringing in emotions is a very important part.

Thus, there are barriers, rigidity in the current hybrid working environment. It loosens the connections between people.

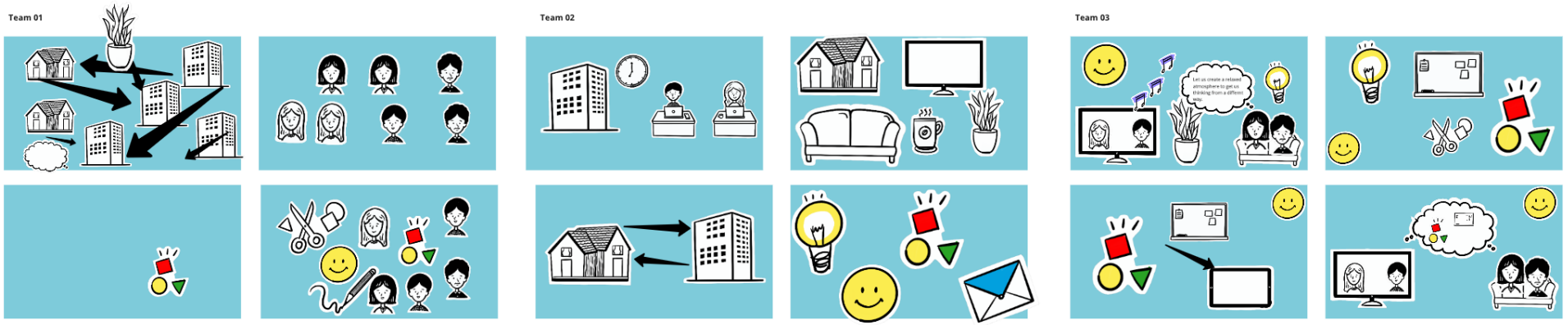


Figure 46. Second part of the user test results : Tools for Make storyboard

People rarely feel togetherness even though they are working collaboratively. Below text is what participants emphasized while explaining the storied they created.

"The most important thing that's also a little bit of problem now with home office, this is the last thing emotions, so it's quite difficult currently, to capture the emotion of your colleagues. Now we can see already here that most of us, we don't have switched on the camera."

"We also talked that it's also discussed a lot in the company, that's been very beneficial. If you're in the office, do you just go having a coffee, and then you have a coffee conversation at the coffee machine that is related to your work, but it was not set up, because it just came up because of the situation that you're talking at the coffee machine. And this is also something that is very difficult to achieve."

"We want to have a relaxing environment everywhere. But we want to connect through the different locations by seeing each other, not individually. Also, if there are teams or groups, we have face to face connection here. So we can think and spark ideas."

Discussion

The insights obtained from this test are divided mainly into two categories. First, feedback on Tools for Say and Do, which is comments on more detailed features of the tool. The second is the insight gained via the Tools for Make activity, which is about the hybrid working environment's lack of emotion and connectivity.

Simple interface

Since this test session delivers a large amount of information and required various activities, some participants had difficulty using the tool. They stressed that Tools for Say and Do should not be too complicated. It should be made into a simple form.

C6

Need for guidance

There was an opinion that a guide is needed before using the tool to understand the tool better.

The role of the facilitator

There were comments about the role of the facilitator using online collaborative tools. Unlike ordinary participants, a facilitator should have a wider influence and power of control of the tool in order to lead participants properly.

Break time

There were lots of discussions about break time or informality in the activity of creating a storyboard. The break time here refers to having an opened atmosphere, having small talks or coffee since it is almost impossible to have this atmosphere in online meetings. Participants are eager to solve this problem.

Bring in emotions

This is a problem in the same context as Break time. It is common to rarely see people's faces and not know how other people feel

in an online meeting. A solution is needed to bring humour or interesting elements which can evoke emotions and make online meetings more enjoyable.

Use of avatar

This opinion stems from the premise that there are many people who turn off their cameras in online sessions. As there are people who are reluctant to show their faces, the idea of using avatars came out. It is a way of respecting privacy, but it still allows people to express their emotions.

Further Direction

Participants were quite positive on Tools for Say and Do. The features of moving around the video and working together while seeing each other's faces would be a great help to collaborate. An insight obtained from the storyboarding activity, which is to bring in emotions via informal meeting, can be integrated into Tools for Say and Do.

Answering Research Question 02. Online collaboration

(3) How can we take advantages of online environment and use it better than before? ***v***

The design iteration process demonstrates that there are lots of possibilities of using technology in online collaboration. Nonverbal communication using gesture tracking technology and idea generation by building prototypes using AR can be used for online collaboration. These technologies help not only fluent communication but also add fun elements to online collaboration. It shows a great advantage of an online environment. Unlike physical space, the online environment is another world with infinite possibilities that we can create through technology.

Chapter 7.
Final Design Iteration

This chapter contains the final design concept. In this chapter, a problem statement is newly defined based on the previous design iteration cycles. According to the new problem statement, a core value and feature defined for the final design concept 'Sketcho'. It explains the final prototype details and contains the final user test. Finally, before evaluating the user test, it suggests the further possibilities of using Sketcho tool.

Chapter Content

Final Design Iteration

7.1 Reframing Problem Statement

After two design iteration cycles, the initial problem statement reframed. The phase of boosting full engagement implies a variety of meaning so that it was difficult to narrow down the focus. From the insights in the previous cycles, it was found that a sense of togetherness is the ultimate value of full engagement.

The reformulated problem statement is :

"How to nudge collaboration, and enhance sense of togetherness and bring emotions during online co-creation session?"

Among the new problem statement, there are two parts. First "Sense of togetherness" and second, "Bringing emotions". A combination of these two qualities will be able to embrace "full engagement" at the end. By enhancing the sense of togetherness, people can feel they are engaged in a session, which will increase attention and concentrations. By bringing emotions, such as senses of humour, fun and enjoyable experience, people will be able to be at the session's moment. I refer to emotion in this report as a strong feeling deriving from one's circumstances, mood, or relationships with others but more specifically, positive emotion.

The figure below illustrates a new framed problem statement. Sense of togetherness and bringing emotions will embrace collaboration of participants, and by achieving this, full engagement can be brought up. To achieve a sense of togetherness and bringing emotions, specific conditions of the online environment tag along. Details about these conditions are described on page 68, Core value of the final design.

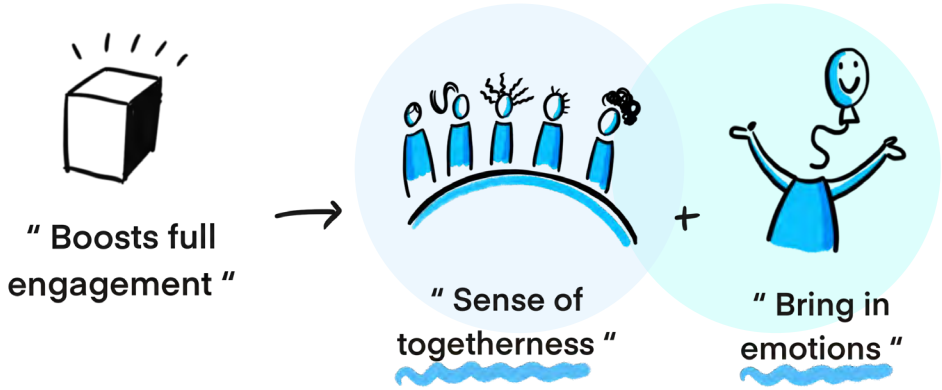


Figure 47. Reformulation of the problem statement

7.2 Core values of the final concept 'Sketcho'

To enhance a sense of togetherness and bringing emotions, specific conditions follows. In a physical office room, we literally share a room so that people move around the office. Imagine. If a session held in a physical location, how people act? There are coffee spaces for informal conversation, and sometimes people can go for a walk together for a while. People share a space and have the freedom to move around. These kinds of side activities are missing in the online environment. To embrace a sense of togetherness, a feeling of ***"Sharing a space"*** is the crucial factor.

In terms of bringing emotions, to break a serious and rigid atmosphere online, it is needed to bring humour and human touches to the environment. The right side figure shows core values for enhancing a sense of togetherness and bring emotions.

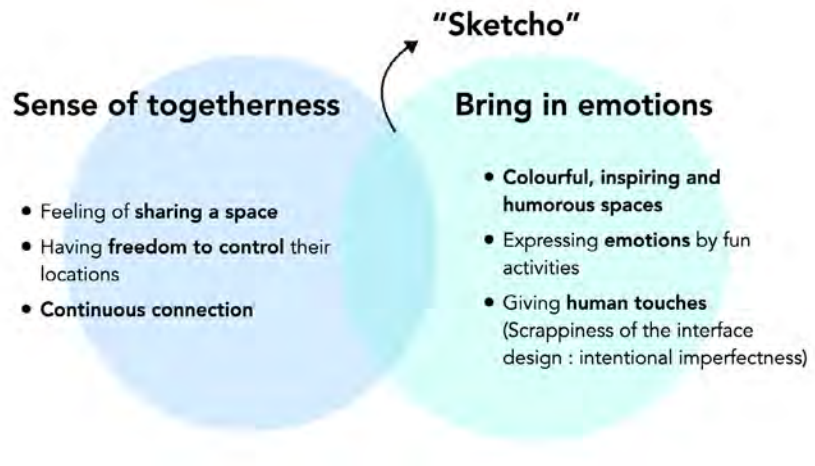


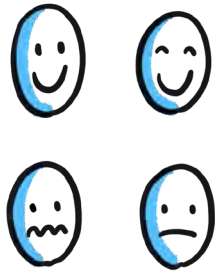
Figure 48. Core values of Sketcho

Sense of togetherness **Bring emotions**

Feelings of sharing a space

Colourful, inspiring and humorous spaces

Having freedom to control video locations



Expressing emotions by fun activities

Continuous connection

Giving human touches

7.2-1 Final concept features for Sense of Togetherness

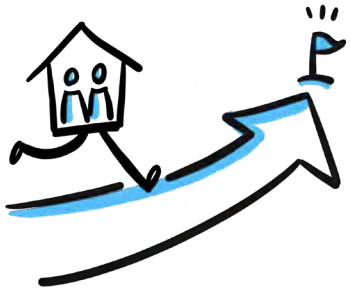
The term togetherness is a happy feeling of affection and closeness to other people. To give a closeness to people,' Sharing a virtual space' became the main feature. Together with this feature, people can also move around rooms like walking around a physical space. The last element is a continuous connection, which means everything, such as activities using a digital board or sharing spaces, happens in Sketcho space without leaving the room.

Feelings of sharing a space

People share a space and music and sounds. The space representative a physcial space. There are formal and informal spaces according to the context of use such as a cafe, presentation room, party room etc.

Having freedom to control their locations

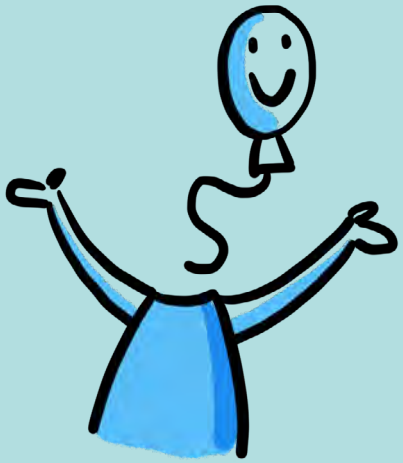
People can move around their videos like a physical place. There are two concept of moving around. First, people can move their video within a room. Second, people can also move to other rooms freely. There is autonomy of going to breakout room for example.



Continuous connection

On Sketcho, people always see other's faces during the session, even they are working on the digital whiteboard and showing slides. It enhance a feeling of connection and it can also help communication.

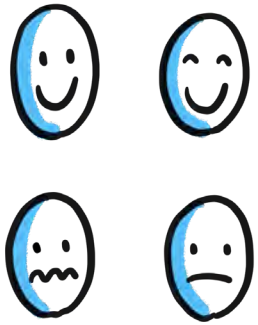
7.2-2 Final concept features for bringing emotions



Sketcho provides features for bringing emotions into the online environment. First, there are pre-made backgrounds that are inspiring and humourous. Giving different backgrounds according to the moods of the meeting will bring out people's emotions at the meeting. Second,there are backgrounds for fun activities, such as a playroom and outfit room as an ice breaker before starting a formal meeting. Last, the background style representatives sketchiness to encourage human interaction.

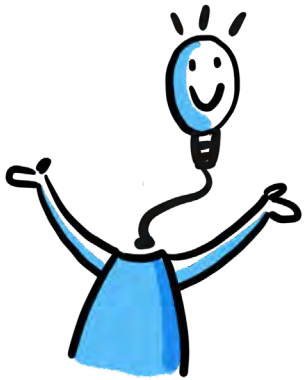
Colourful, inspiring and humorous backgrounds

People can choose backgrounds according to their purpose, and there will be lots of humorous backgrounds where people can play with. The background can be an inspiring drawing, or it can be a picture of Paris, for example. Tons of possibilities are here.



Expressing emotions by fun activities

The outfit is one of the self-expression, especially the mood of that day. As an example of an ice-breaking activity, an outfit room is created. Choosing outfit and showing them to others, it brings the emotion into the online. Other activities, using playgrounds, theme parks, aquariums, can be added.



Giving human touches

Sometimes perfectness is harmful to creativity. Scrappiness encourage people just to do it in a session. Sketcho's interface is designed like a sketch to give a human touch to the application rather than a fancy graphic application.

7.3 Final Prototyping

High fidelity prototyping
The goal of this graduation project was to deliver a working prototype. First, the meaning behind this purpose is to conduct the final user test in a real context and then deliver meaningful insights for further development of the online collaboration projects. Secondly, as a designer, to communicate the exact concept with participants and audience, it was unavoidable to build a product that can be actually experienced. Add to that, reframed problem statement that includes enhancing a sense of togetherness can only be measured when participants try together a working prototype.

7.3-1 Prototyping tools

WebRTC
Two main tools were used for the final prototype. First of all, to create real-time communication between participants, Web Real-Time Communication(WebRTC) SDK was used. WebRTC is a free, open-source project providing web browsers and mobile applications with real-time communication(RTC) via simple application programming interfaces (APIs)[30]. It allows audio and video communication to work inside web pages by allowing direct peer-to-peer communication, eliminating the need to install plugins or download native apps[30]. To create connections between multiple participants, webRTC was used.

p5.js
P5.js is a JavaScript library for creative coding, with a focus on making coding accessible for artists and designers. The foundation of p5.js library is processing. Processing is a free graphical library and integrated development environment(IDE) built for the electronic arts, new media art, and visual design communities with the purpose of teaching non-probrammers the fundamentals of computer programming in a visual context.

In order to integrate WebRTC and p5.js, p5 livemedia library is used for the final prototype. p5 livemedia library uses live stream function from p5.js, and for peer to peer connection, it uses Web RTC. Since the final concept includes lots of visualisations, use of p5.js library was inevitable. For running a public server, the final prototype borrowed p5 livemedia server, https://p5livemedia.itp.io.

Heroku
To publish the final prototype on the web, a cloud platform service, heroku is used. As the final prototype use node.js modules, using heroku for hosing a server was the best option.

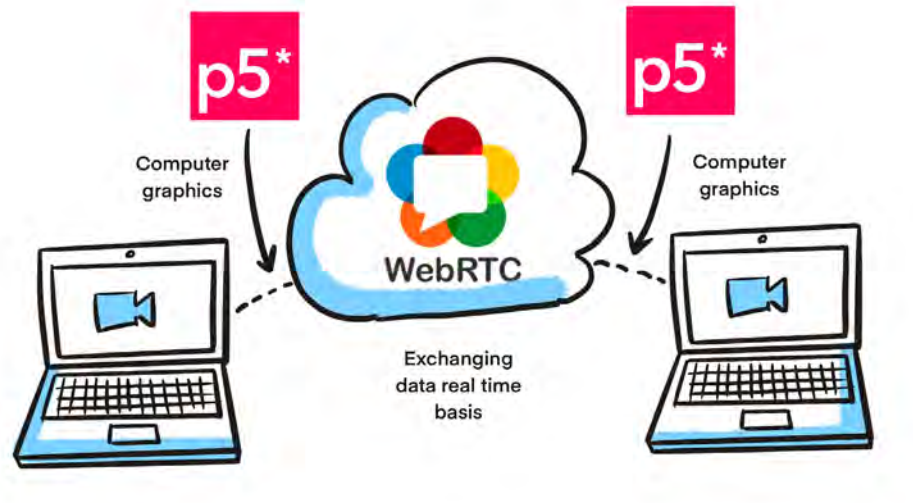


Figure 49. Second Part of the user test, Storyboard kit example

7.3-2 Sketcho App Demo

Sketcho demo application is created for high-fidelity of final user test. This demo application is a working prototype for measuring the "sense of togetherness",, which is the design's primary value. Despite the aim of building a working prototype, there are several limitations as a prototype.

Because this prototype has been built only for two and a half weeks, delicate implementation could not be made. If we consider the standard application development takes around 3-6 months, some errors and limitations of the features' details are reasonable. However, most of all, the central part of sharing a space has been built implemented for the final user test.

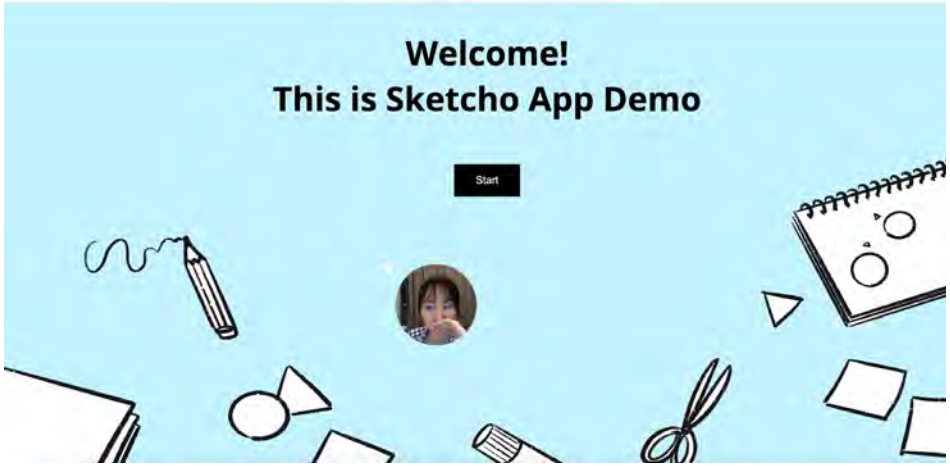


Figure 50. Sketcho app demo landing page

Limitations of the prototype

Audio and Mute function

Using WebRTC, it is not difficult to get the user's audio. However, the visual element code of p5.js used all peer connections instead of getting individual data to create a mute function became more complicated. In that case, rather than using audio via the Sketcho demo app, a decision made of using Zoom audio during the user test.

An error of the server

The sketcho app server is sometimes unstable. An error occurred regularly on the server, so some people should reload the app page regularly.

C7

An error of the camera accessability

There is an unknown camera access error. It seems that the camera assessment setting of the web page causes this problem. However, the exact cause is unknown.

Bug of connection

When the app start and a person entered the room, there is an error in peer to peer connection. People's location is changing arbitrarily at this point, so people have to reload to see the others' exact location. This problem seems in the process of transferring data from p5.js.

Digital board: Borrowing Miro board

Because of the time limitations for building this prototype, creating an independent digital board for integrating into Sketcho is impossible. Rather than making a digital board, Miro board is embedded into the Sketcho app.

User scenario

Session preparation

Facilitator can design a session flow by creating rooms using Sketcho. Sketcho demo app is an example session created by a facilitator.

First, facilitator sign in or login in Sketcho. She or he can create a session. According to the purpose of the session, facilitator create numbers of rooms and name on the rooms. Each room can representative each activity. In order to create appropriate rooms for the session, facilitator can choose a background for a room respectively. After decide numbers of rooms and background, facilitator can embed slides, videos and digital whiteboards in rooms. For example, in Sketcho demo app, in the main session, there is a embeded presentation slides. After finishing all the settings of the session, facilitator can share the link of the session to session participants.

Session flow

The session flow is a recommended example. Details of activities can differ according to the purpose of the session.

1.Preparation room

Preparation room is a waiting room. While waiting for other participants, people can have a small chatting in a cafe with vitual coffee. Facilitator can put a background music such as jazz in advance.

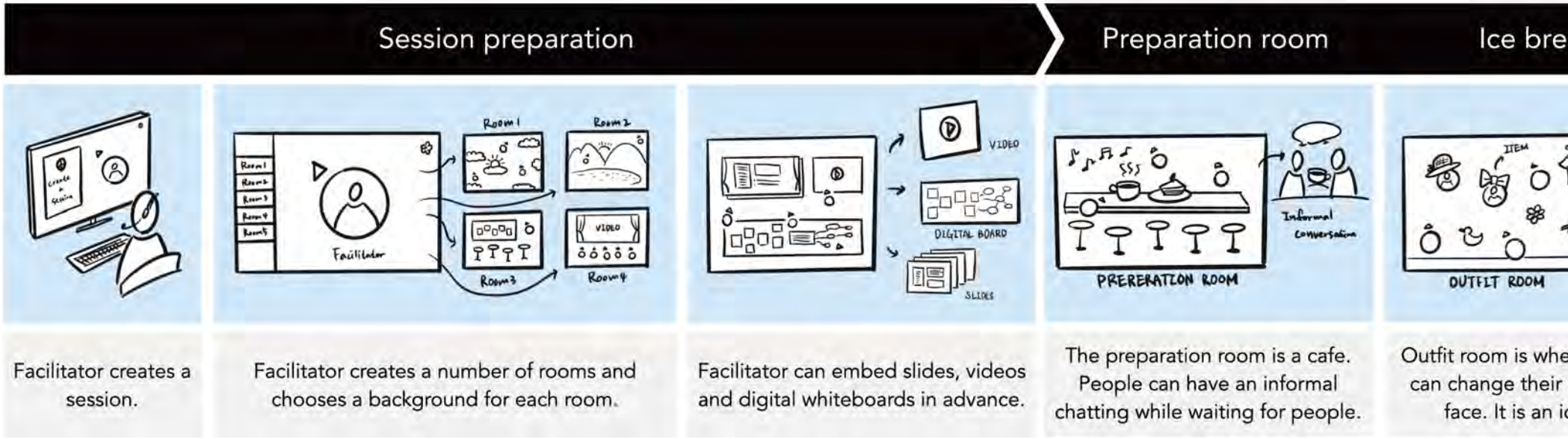


Figure 51. User scenario of Sketcho

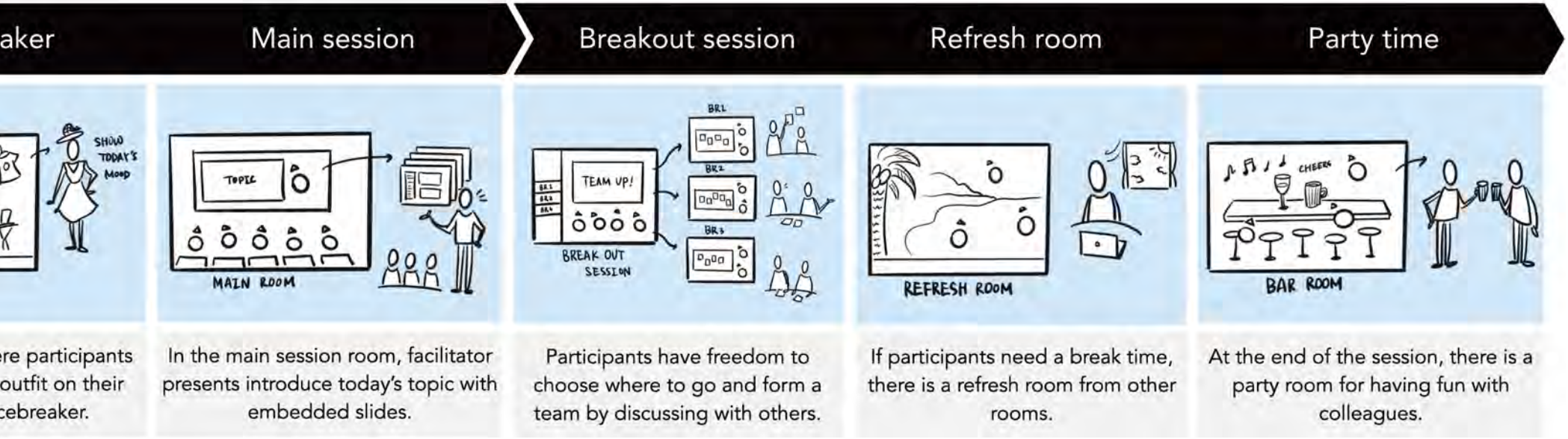
2.Ice breaker: Outfit room
Before diving into main session, ice breaking moments will be needed. In the demo app, outfit room created for a small activity to showing participant's today's mood. There are items which participants can put on their video. This activity is for warming up the session, give a sense of humour before the main session.

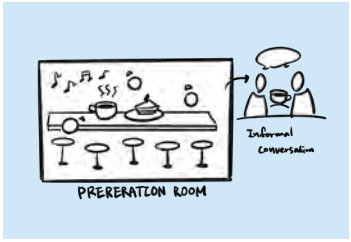
3.Main session room
In the main session room, facilitator can put slides or video for introducing the session on the whiteboard. Participants can sit on the desks and listen. A digital board could be embedded if need.

4.Breakout session rooms
There are breakout rooms which already created by the facilitator in advance. Participants have freedom to choose where to go and form a team by discussing each other. In the breakout room, a digital board could be embedded for co-creation.

5.Refresh room
If participants need a break time, there is a refresh room where can be separated from other rooms. One of the theme can be a beach with the sea sound.

6.Party time
At the end of the session, there is a party room for having fun with colleagues. There is bar music and virtual drinks.



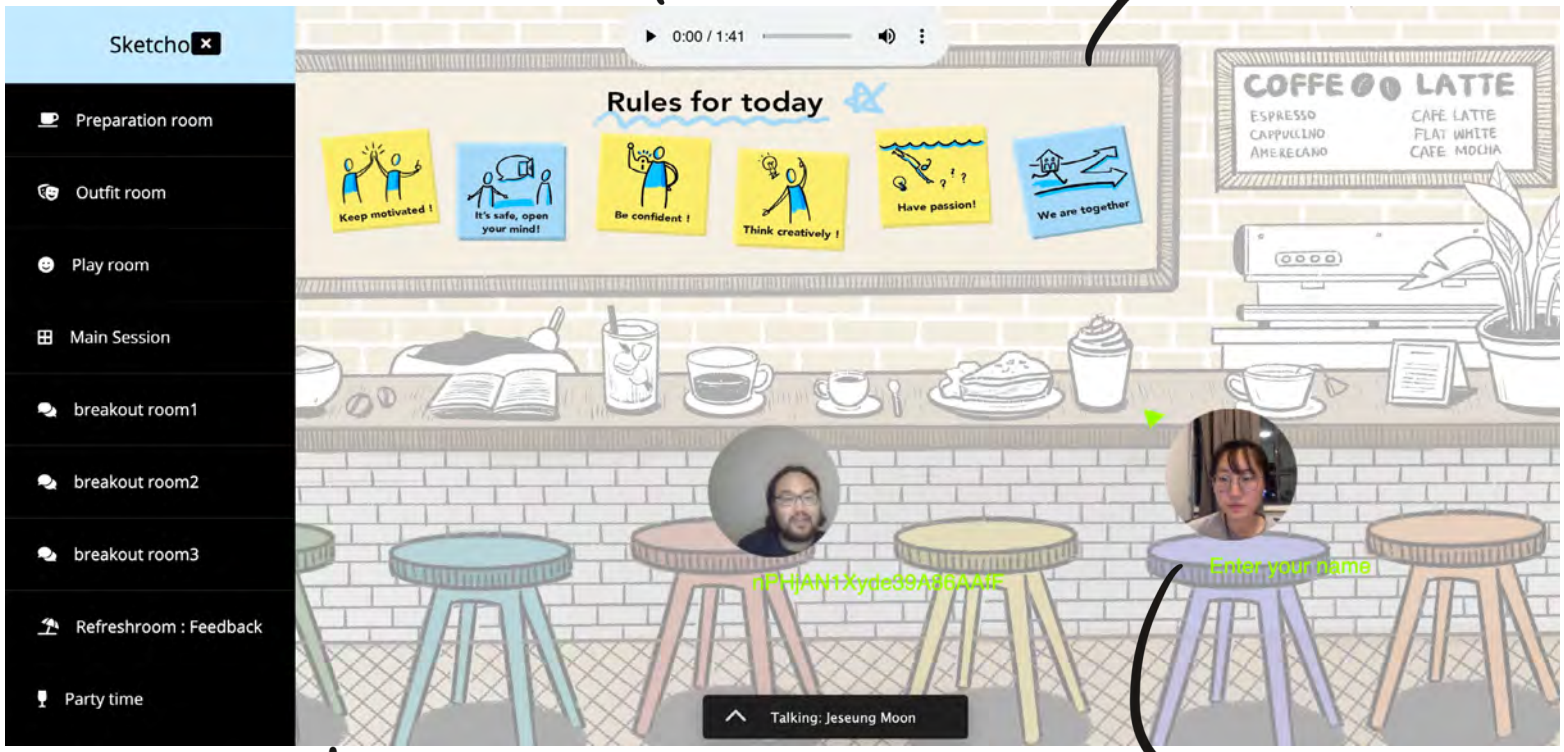


Preparation room
Participants can have a vitual coffee time with small chats before the session.

Cafe music
Jazz music embedded as a background music.

Board for session introduction
A board which facilitator can put rules or introductions before the session.

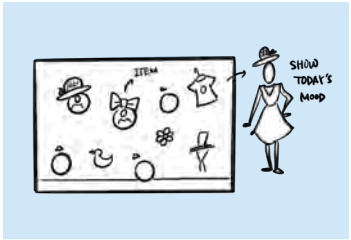
Menu of the different rooms



Flow of the session
Basically, the session flows according to the order of the menu, from top to down.

Cafe Background
In order to create a comfortable environment, cafe image is adopted.

Name tag
Participants can put their name or nickname on their video. It follows the video.



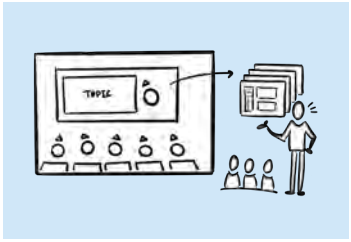
Outfit room
By moving video, participants can put fashion item on their face.

Hats and accessories
Items are on the top of the layer, so participants can go under the item so they can put on the items.

Menu button
If a participant clicks this button, they can see and go to different rooms

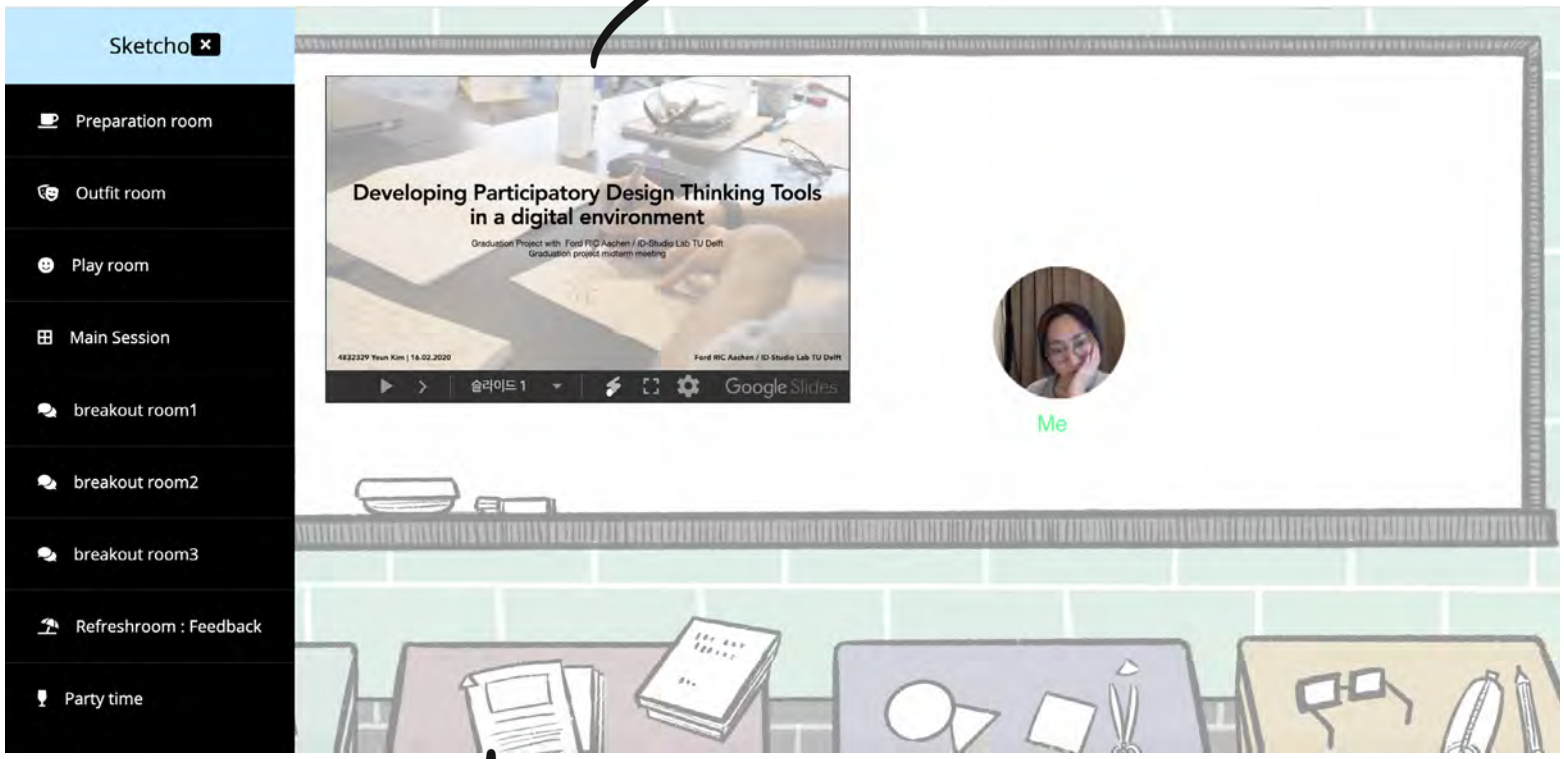
Closet background
The room concept is a closet where participants can express their mood by fashion items.

C7



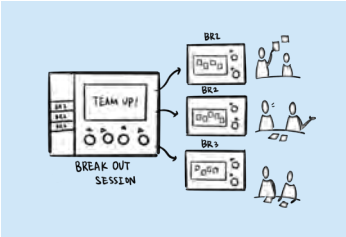
Main session
The main session room is a space where the actual design thinking session starts. Facilitator can show a presentation slides here.

Embedding slides
presentation slides can be shared in advance.



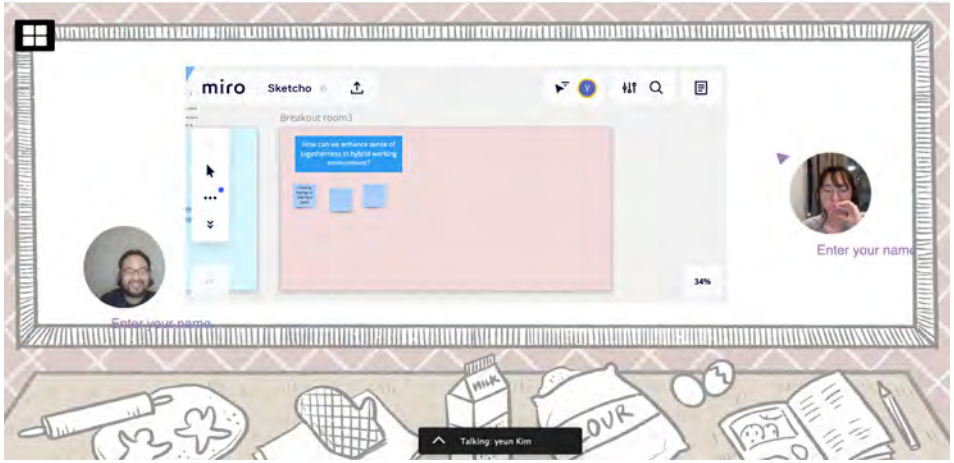
Breakout rooms
After the main session, participants can form a team and move to the breakout rooms by themselves.

Class room background
To give a sense of learning, a class room background with a whiteboard and desks were created.



Breakout rooms

Breakout rooms can be created by facilitator in advance. Participants have autonomy to move to a breakout room by themselves. Participants can work on the embedded digital board together with a team.



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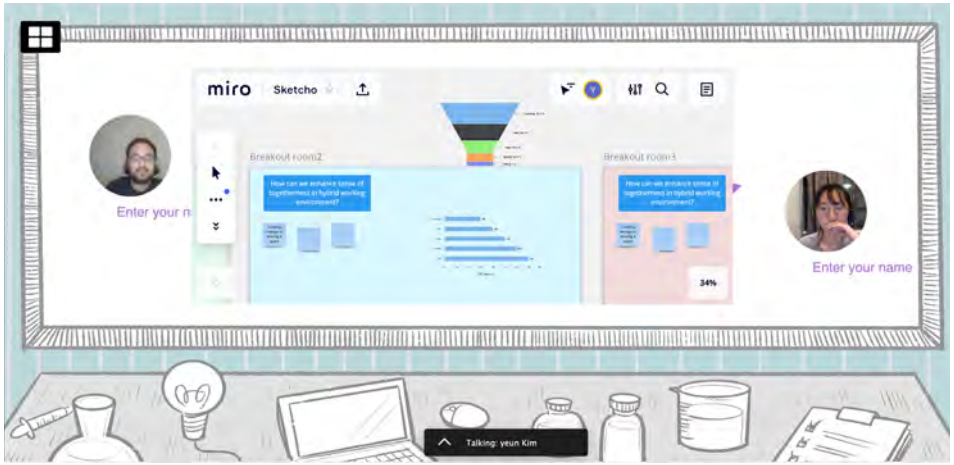
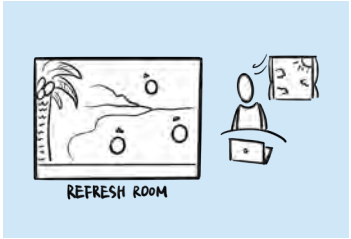
Embedding a digital board

A miro board can be embedded in advance. Participants can work on an assignment while seeing each other's face.

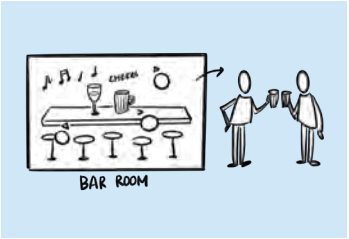




Refresh room
Refresh room is created for a break time. As a spare space, participants can stay a while when they want to be apart from the main sessions.

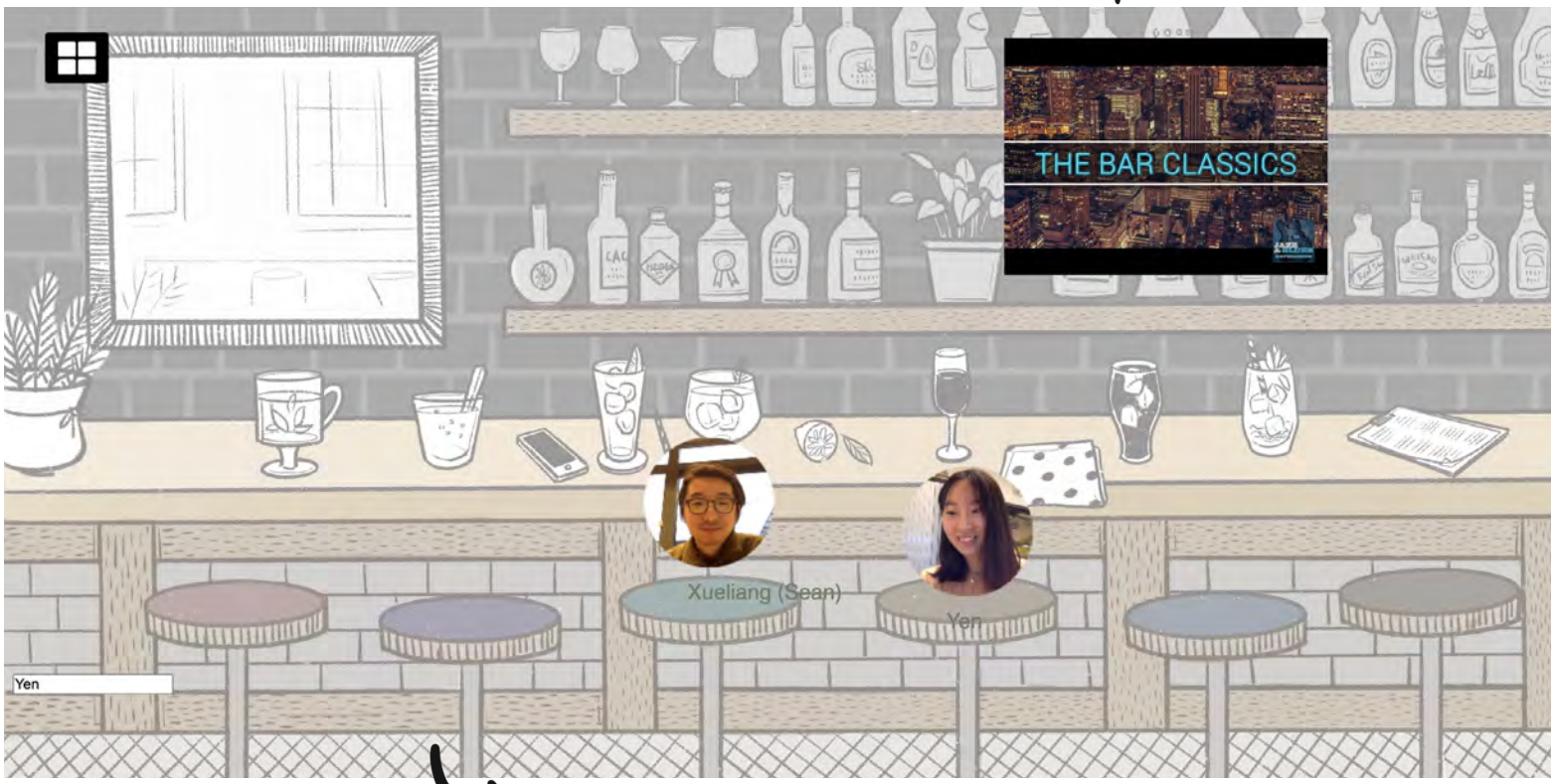
Beach music
To refresh a nature sound can be embedded.

Beach background
A beach background used for refeshing people. Here, nature images or drawings can be used to give a relaxation moment.



Party room
At the end of the session, participants can have a informal chatting in a bar. For example, in a physcial session, people have a small talk with some drinks after the session. It will boost socializing of participants.

Youtube video
Background music can be embedded as a youtube video.



Bar background
Similarly with the cafe background, a bar image used for giving a sense of being in a bar together with other participants.

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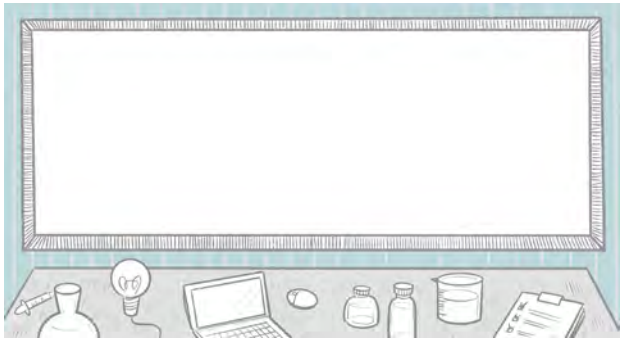
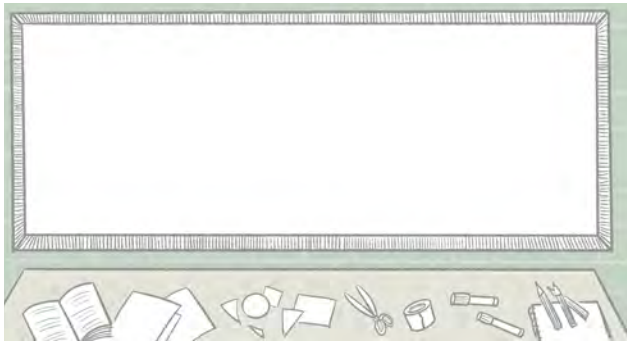
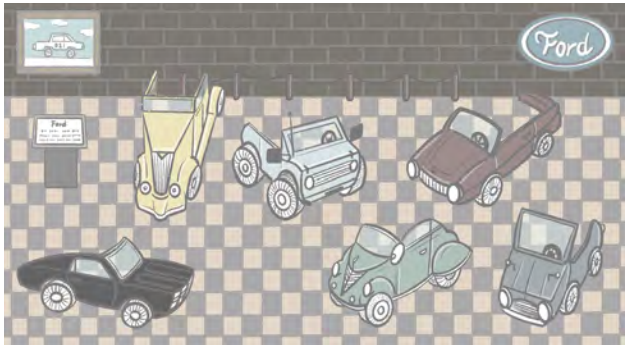
Various themes of rooms







7.3-2 Sketcho Website

A website created for introducing the Sketcho application. On this website, there is a short introduction about Sketcho, such as which service it provides. People can try the final prototype on the website, an example session room created by a facilitator. It is a showcase for showing Sketcho to the public. There is another version of a session room created by other designers. It offers other possibilities of using different backgrounds. (See page 89)

In addition to that, people can also find a digital co-creation guide for improving online sessions. It provides tips for digital co-creation session both for facilitator and participants.

7.3-3 Sketcho Brochure

In the second user test session, I gained insights from feedback about a tool guide. Simple guidance is essential for those who have little experience participating in online co-creation sessions.

Sketcho brochure provides a short introduction about Sketcho application and give tips for online collaboration sessions both for facilitators and participants. Facilitators and participants can keep these tips in their mind to have a successful online collaboration session before starting the session. The brochure reminds crucial qualities we should not forget, a sense of togetherness, and should bring emotions into an online session for boosting full engagement. At the end of the brochure, there is a QR code to try Sketcho application.

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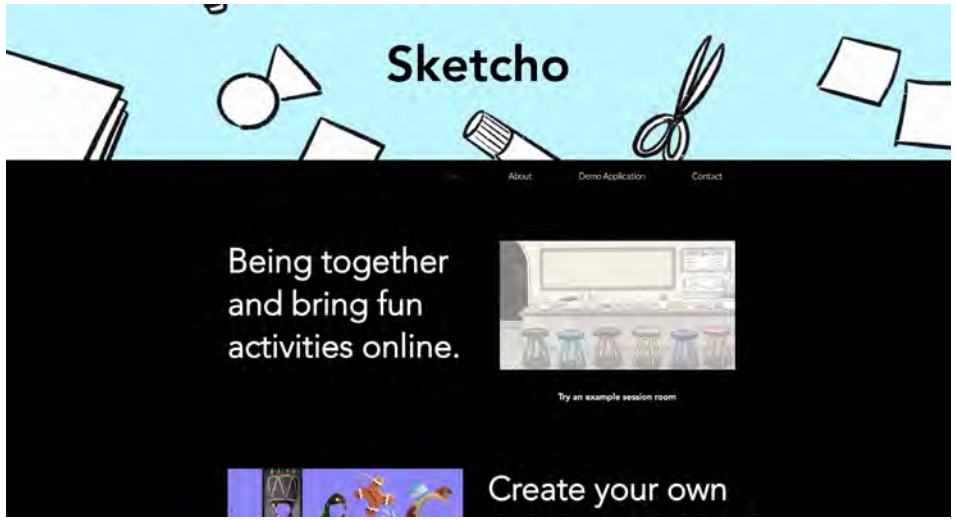


Figure 52. Launch page of Sketcho website

Figure 53. Brochure for digital co-creation by Sketcho

7.4 Final User test

Final user test is conducted with Ford employees for evaluating the final concept ***"Sketcho"***

Test set-up
Participants : 6 partcipants.
Most of the people who participated in the last user test participated. Duration is 90 mins for a session itself. Although most participants were aware of the graduation project, some background explanation sessions are needed for those who did not know. Since then, participants experience the prototype and have an open discussion session. As a facilitator, I introduced each room to people and moved together. At the end of the session, the refreshed room is used for getting feedback. There are embedded a Miro board and google questionnaire form (Appendix V).

Research Question
•How people interact in Sketcho application?
•Does the sharing space concept enhance a sense of togetherness?
•Does different themes of rooms evoke positive emotions during the session?

Sense of Togetherness
•Does sharing a space concept help participants to feel 'connections' with others?
•Does the sharing space concept help participants to be on the same page with others?
•Does the sharing space concept help participnats to be fully engaged in the session?
•Does sharing space concept help communication to be fluent?

Autonomy
•Does having autonomy to form a team and move to a breakout help enhancing togetherness? (How autonomy of moving around and sense of togetherness related to each other?)

Bring in Emotions
•Does different themes of background boost creativity?
•Does different themes of background give inspirations to participants?
•Does warming up rooms such as outfit room and playroom make the session more enjoyable?
•Does the sketchy style of background help participants to be more comfortable?

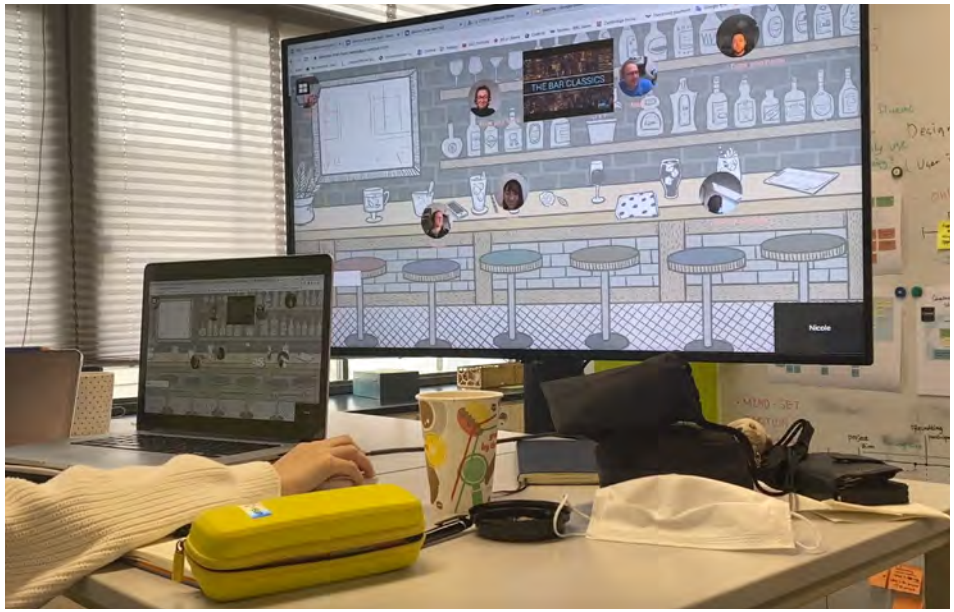
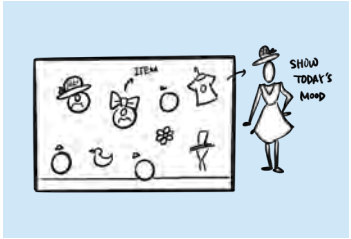
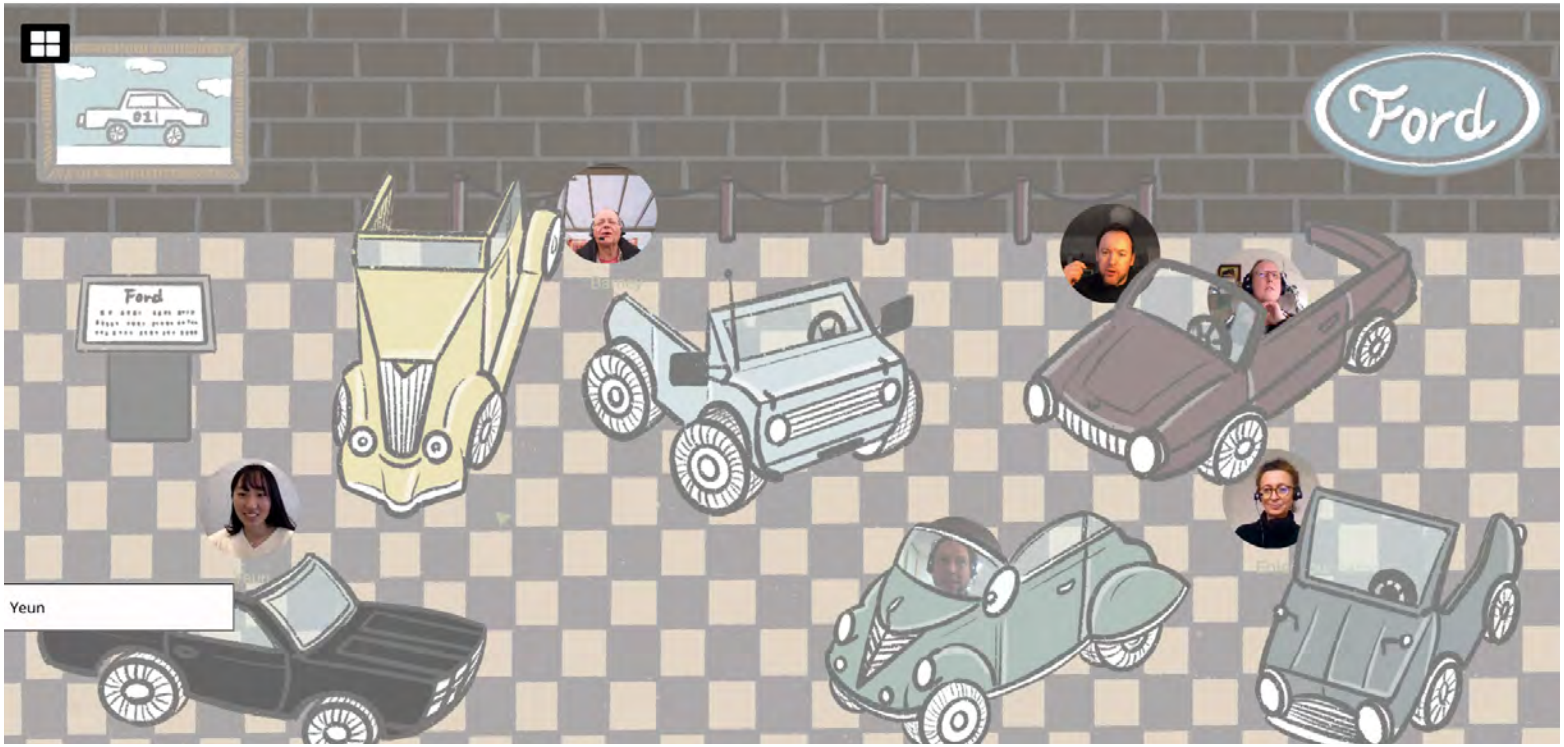


Figure 54. Final user test set-up



Play room, special edition for Ford

A special background was created for Ford user test. Before starting a main session, as an ice breaker, playing around video in a Ford car museum activity happened. Participants could put their video on a favorite car.



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Test results

Overall experience

Overall, the participant's reaction to the final concept, "Sketcho" was very positive. At the beginning of the session, I share the prototype link and let participants explore different spaces. As the interface is also easy to understand, participants move around without any hesitation. Participants actually enjoyed looking around different rooms and seeing other's movement. It definitely enhanced a sense of togetherness and brought emotions into the session. See the overall feedback below, figure 55.

Increasing feelings of togetherness

It is hard to say how it increased a sense of togetherness. However, participants left positive answers on the google questionnaire related to a sense of togetherness. Answers to the questionnaire can be found in appendix V. Why people like to customize spaces. Most of the participants said that they felt strong connections with each other. By sharing their movement while seeing each other's face, the connection between participants became stronger.
As they can work on an embedded digital board seamlessly, being on the same page could also be achieved well. In terms of communication, it is difficult to say that Sketcho the concept make the communication much more fluently, but the feature which participants can point out by their location shows the potential use for a fluent communication.

Figure 55. Feedback from participants

"It's really interesting to see how people can interact with in a conference or session."

Autonomy to control their location

Having the autonomy to move to other rooms could conflict with being together. At the beginning of the session, participants moved around so that I had to gather them to be in the same room. However, having the autonomy to form a team and move to the breakout room helps togetherness. Participants could choose to be together with others or not. The feelings of being together were enhanced because participants could actively choose to be together or not. In addition to that, in the breakout room session, participants could work on the same Miron board. Even though they are separated, the fact that they can share the necessary information further strengthens the feeling of being together.

"It's nice that we can choose breakout rooms and it's good to see how other people are working on the same board in the different breakout room."

Bringing in emotions
Emotion here used as a positive meaning. People experience products or services, these trigger emotions through the senses through knowledge or expectations[17]. Especially, in the session, the outfit room and play room triggered participant's emotion, which is playful and fun experience. I could see participants are smiling during the activities.

"After stressful morning, having this fun activity of outfit room is really good to have."

"I love the avatars! Some of the backgrounds related to the breaking sessions could be related to the spaces you actually work in like the a maker space or so."

Feedback for detail features
While interacting with the final prototype for almost one hour, participants and I had a discussion of how detail features could be improved.

Position of the face
Postion of the face could be adjust in advance, before entering the main room.

Window resolution
Window resolution was different from people to people. It should be considered in the future development.

Layer of the videos
layers of the face video were different as well. It would be nice that facilitator is the on the top or make it sure people's faces don't overlap could be a way.

Presentation mode
Embedded presentation slides is too small. As much as big slides is better to show. In the presentation mode, presentation slide can full the screen and when someone want to say, then the person can appear on the top of the presentation.

Room closing function
During the user testing session, sometimes participants stayed in different rooms from the main session. To prevent this, one participant suggested adding a room-locking function. However, autonomy also should be maintained so that this function should be carefully considered.

Information who is where
In the breakout session, there is no information where other participants. If there is information of who is in the each room, the session would be more fluent.

"If you're working with like multidisciplinary team, you want to make sure you've got a person who brings team in one room, so you kind of may want to have a bit more definition about who's in there. I think that's what works."

Professional backgrounds
Now the background style is sketchy. More prefessional styles of backgrounds could be used for formal meetings. It could be even a picture instead of drawings or illustrations.

"Backgrounds should be configurable and adjustable to the audience, sometimes a more professional background would be better."

"what might be interesting also is to try out various experience with a different type of backgrounds, because now it's all sketchy and gleeful. But I could also imagine that we put in more photographic background."

Upload your own backgrounds

Uploading your own backgrounds concept resonated with people. It implies lots of possibilities. It could be used not only for design thinking sessions, but also interviews, conferences, or interactive workshops. I explored more possibilites of backgrounds with other designers after the test. See the next page.

"It would be interesting to combine tools here. So you have like a city drawing or ballot that is based on one or the other parts you have like kind of like food, football, earthquake, and like the miro tool, for example. You name it, and then that on the other one, observe people around so you see us talking, and I interact with lots of things."

"I think the 'upload your own backgrounds' is a really powerful feature in the right hands. We just did a load of interactive workshops and I can imagine we could have done some really fun things with this tool and creating our own backgrounds."

"Personally I would love to see the tool focus on use cases like facilitating creative workshops and user feedback sessions."

"Totally loved the sketchy style and the ideas for the different rooms for different purposes, could see lots of situations where these could work. Liked how the people present started playing about quite quickly, could totally see this working in workshops and stuff like that."

Conclusion

Participants were quite positive about increasing the overall goal of "feeling togetherness" and bringing emotions into the session. The participants had a conversation actively throughout the session, and there was a constant discussion. Despite meeting the overall design objectives, detailed features were likely to improve considerably.

Apart from the achievement of the design goals, there were various discussions regarding the context of using the Sketcho tool and the possibility of using various backgrounds. For example, only one style of background is used in the prototype, so it seems necessary to show the background depending on the context of the different styles used.

Along with the good points ahead, there was also a limitation. There is a limitation that some participants were confused about the context of the use of the Sketcho tool. The confusion caused because the test session was not the same as an actual setup of the co-creation session. More details on the Sketcho tool Context of use are given in chapter 8 below.

7.5 Possibilities of using various backgrounds

Among the feedback from the final user test, the most significant insights are that participants liked the concept of "uploading your own backgrounds". People could imagine that there are lots of possibilities for using different backgrounds. Even it could also work for other situations, not only for collaborative design thinking. In addition to that, different styles of backgrounds are expected to convey different feelings and emotions to participants.

For exploring the different possibilities of using the backgrounds, I asked other designers to create their own backgrounds with stories about how people will interact with them.

Before they create backgrounds, I explained what Sketcho application is and the purpose of the app. Most of them have enough experience in facilitating a design thinking session, so that there was no need to give them much explanation. The designers created the background based on their own experiences, thinking about how people would interact with their background in a session.

Various backgrounds created by designers, there are an ice-breaking session, converge and diverse sessions. See the next page to see the other designers work. In order to explore the various possibilities of the backgrounds, other designers' background paintings will be made into separate apps from the Sketcho final app. This last application will be presented in the final presentation as a showcase rather than going through user testing.

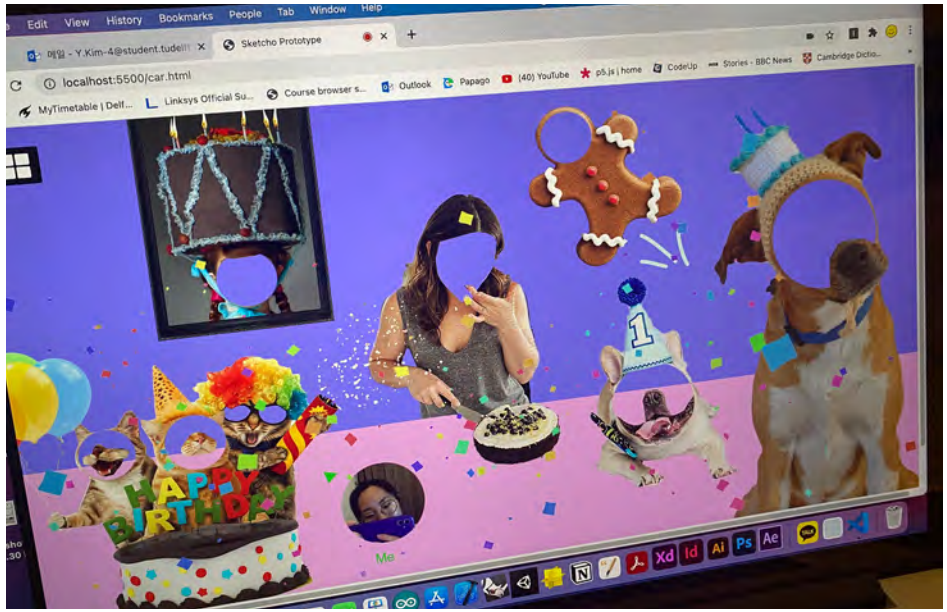


Figure 56. Ice breaker background created by other designer

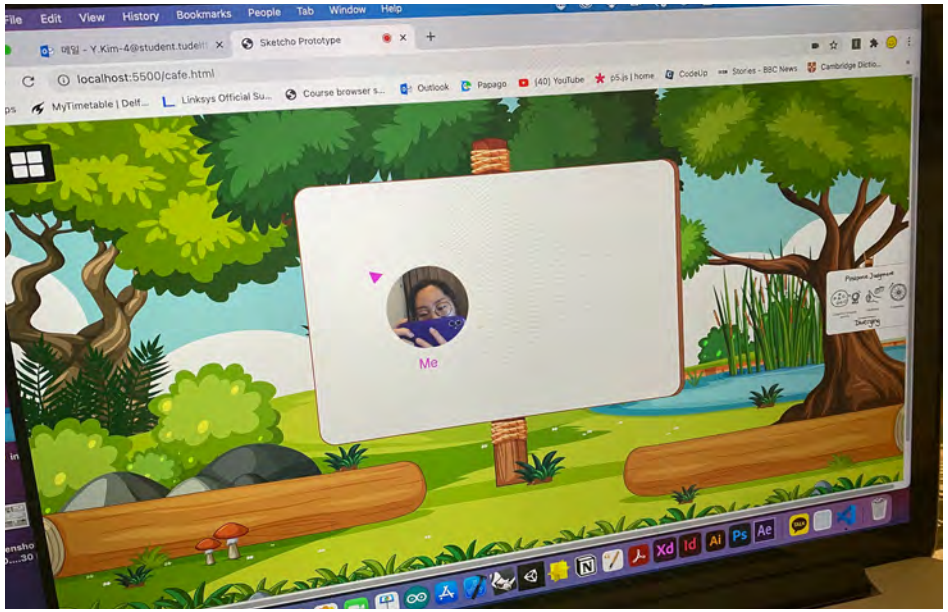
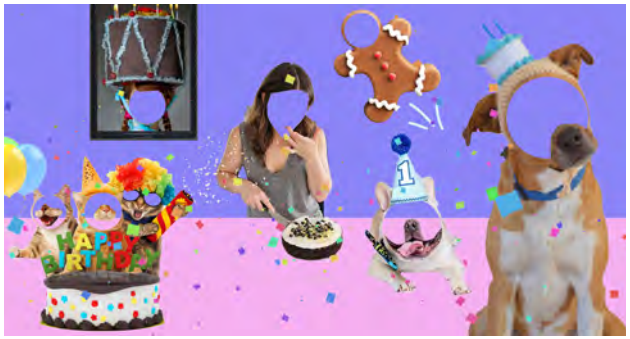
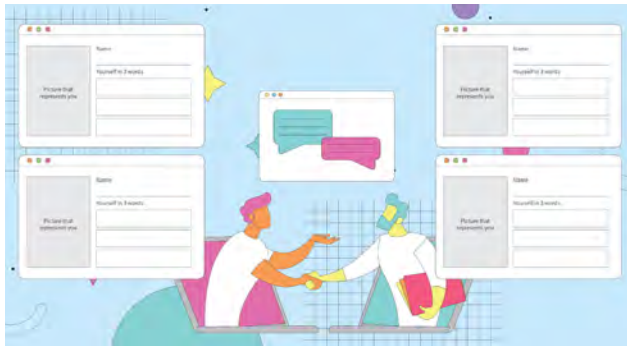
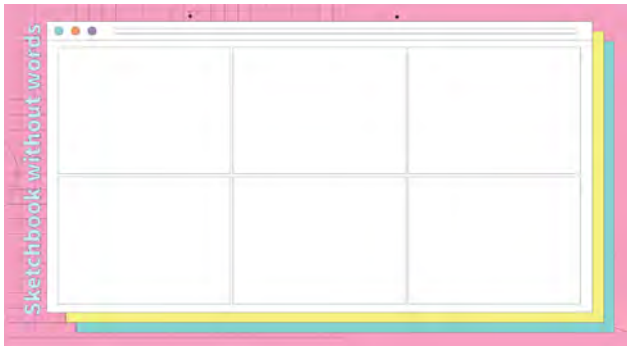


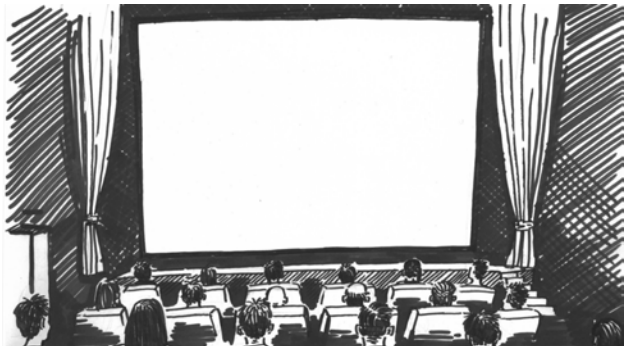
Figure 57. Diverse background created by other designer

Backgrounds from other designers









Chapter 8. Evaluation

This chapter contains evaluations of this project. There are three levels of evaluations. The first level is an evaluation of the final concept Sketcho. The final user test part in chapter 7 shows an evaluation of the concept from a narrow perspective, and here I compare the overall feedback with the design requirement in chapter 5. The second level of evaluation is about the design goal. I figured out why and how Sketcho could achieve the design goal based on references. Third, the overall evaluation of the project. After that, I attached a short personal reflection about this master graduation project.

Chapter Content

Evaluation

This design project has been an enjoyable experience. At the beginning of the project, my supervisory team and I discussed focusing on user involvement in a design process using a design thinking approach. However, the project direction went through quite differently than what we expected. Nevertheless, I believe that this graduation project has been a quite satisfactory process and results. In this chapter, I reflect on this design project as a whole. There are three levels of the evaluation.

First is an evaluation of the final design concept, which is Sketcho, an online co-creation meeting application and guide and rules for it. It deals with more elaborate features and details, such as different backgrounds.
Second, an evaluation of the design goal. The design goal has been changed from the beginning of the project. Did I achieve a "***sense of togetherness***" and "***bringing emotions***" via application design? Does this sense of togetherness and bringing emotions to influence "***full engagement***"?
Third, the entire project is evaluated. Together with project approach, setting the design goal, which is about a sense of togetherness and bringing emotions, is the right decision? Coming back to the project starting point, how this project direction and solution can improve user involvement? I had to make decisions during the entire project, and sometimes the direction changed quite many, so the connection between user involvement,and sense of togetherness and bringing emotions might not be described clearly. As the end of the project, I want to make it clear the starting point and the final result is considerablely interconnected.

The figure 58. shows how the design goal has been changed during the whole design process.

Figure 58. Changes of the design goal

8.1 Evaluation of the final design concept

8.1-1 Reflection of the design requirements

This part deals with the requirements of the solution on page 50. It discusses how much Sketcho, the final concept, met the requirements of the solution.

Easy to use

The final concept Sketcho provided a simple interface. There is no need to explain how to use it. The idea of sharing a "space" is easy to understand for everyone. However, the final user test has a limitation. Since the interface details are not entirely complete, it isn't easy to judge that Sketcho is completely easy to use in terms of usability. But in general, the concept of sharing a space and moving to other rooms according to the session order helped people to use Sketcho without much explanation about the interface.

Confidence and Creativity

The final user test was not carried out with the full design thinking session implemented. On top of that, despite the fact that the concept of self-confidence and creativity is quite challenging to measure, the theme of different backgrounds tends to encourage creativity and inspired the participants. In terms of confidence, it is true that Sketcho's simple interface actuation method has helped participants not to get lost in the session, and it may boost confidence. However, in terms of enriching confidence, various elements, especially interactions and atmospheres between participants, exert more influence, and more research is needed on this.

Collaboration

There is no doubt that Sketcho has improved collaboration. People were able to see each other's faces and carry out activities together, and places with diverse themes fostered people's affinity, which brought them together even more strongly. The collaboration aspect was successful.

On the same page

Whether the Sketcho concept helped participants stay on the same page is open to debate. As the session progresses, participants have to move from room to room, and this autonomy can occasionally interfere with following the main session. Nevertheless, having freedom is worthwhile because it allows you to choose what you have together and strengthens the feeling of doing it together. Therefore, Sketcho achieved "being on the same page" in a half way. But it should be implemented to have a system to supplement participants can remain on the same page, such as instruction by the facilitator or broadcast function to every room.

Safe environment

A safe environment is also a difficult factor to measure. Participants must participate in the session in a secure environment where they can freely speak what they want to say and express their ideas without hesitation. Such a part, similar to confidence and creativity, there are so many influential elements to create a safe environment. In that sense, it is hard to say that Sketcho concept has accomplished it perfectly. Nevertheless, backgrounds for informal meeting for such as ice-breaking activities and cafe spaces, reminded participants they are in the equivalence. I would say that this requirement was met reasonably because it deepened the intimacy between the participants and created an environment where they could participate comfortably in the session.

Limitation of the final concept
There are several limitations in the final concept Sketcho. Among them, three main limitations in capacity of accomodating people, cumbersome of facilitators, and the heaviness of the application program.

Limited capacity of accomodating people
Limited capacity. Unlike meeting apps like zoom, the number of people accepted is limited because it is sharing space. It seems that the final concept suitable for accommodating up to 10 people.

Designing sessions as a facilitator
The main feature of the concept is that the facilitator customizes all the spaces to fit the sessions you are going to proceed with. However, it can be troublesome because the facilitator has to create not only one room but also multiple spaces in one session. In order to do this, it will be necessary to provide a pre-made template.

The heaviness of the program
The program may become heavy. Together with exchanging video and audio data from the other party, the program is likely to be significantly heavier because it has to exchange video location data from other people in real-time. To create a fluid online session environment, you need to devise ways to make programs as light as possible.

8.1-2 Context of use
In the beginning of this project, the research questions about context of use brought up (See page 14, Research Questions).

Answering Research Question 03. Context of Use
(1) Who will be the stakeholders of the project result? ***v***
Since this project was started focusing on Ford, the second and the final user tests were also carried out within Ford. Therefore, the primary stakeholder was employees in Ford, as it was based on Ford employees' evaluations. Nevertheless, the project results can be applied to ID studio lab students and even to all fields that require online collaboration.The final concept meets the primary idea to provide a solution that people at the general level can use.

(2) Where the final solution can be used? Online, Offline or hybrid? ***v***
Basically, the main goal is to be used in an online environment. It is also likely to be used in hybrid mode. It is possible to create a variety of places that cannot be done in an offline environment, and to present the possibility of doing a variety of activities based on this.

(3) What new things the final solution can bring in the current situation? ***v***
Sketcho presents a new direction for the online collaborative working environment by demonstrating various possibilities of creating new virtual spaces and utilizing them in multiple ways.

8.2 Evaluation of the design goal

As the design approach is "experience prototyping", the conceptualisations and prototyping took the lead and research collected to support the concept later. I agonized that why the concept "Sketcho" enhance a sense of togetherness and bring in emotions with people. Even though I came up with sharing a space concept which is abstract and with ideological reasons, it is obviously gave people a sense of togetherness and emotional experience. I want to make the reason clearly.

8.2-1 Achievement of the design goal

The final design goal, ***"How to nudge collaboration, and enhance sense of togetherness and bring in emotions during online co-creation session?"*** successfully addressed. As it mentioned ealier in chapter 7, participants said that they felt the connections each other and engagement in the session. Even though measuring "feeling" has limitations, the features of sharing a space enhanced their experience of togetherness obviously. If someone ask that does a sense of togetherness and bring in emotions boost "***full engagement?"*** : I would say YES.

A term engagement is used in this project as a situation of having attention fully focused on a particular task.[12] Combination of sense of togetherness and emotions in online environment helped participant's to pay attention to the session.

Sense of togetherness = high degree of commonality

Sharing a space is highly related to the degree of commonality. [13] In a space, people is seeing the same objects, listenning the same sounds and even share their locations. In Zoom meeting application, for example, we see each other's face and share screens but we don't share the same view. However, the final concept Sketcho provides sharing a view together with faces, which can be a cafe, bar and classroom. High degree of commonality created by sharing the same view and it enhanced a sense of togetherness.

A sense of togetherness = we-experience

However, someone can argue that we share a vitual space not a physical space. In the report, "sharing a space" means sharing experience. A term we-experience is used to capture an experience where the individuals involved are sharing an experience together[7]. Sketcho strengthens feeling of togetherness by creating a space where you can share experiences online with others. Here, individuals involved in activities happening in 'a space', and it is an affective feeling of

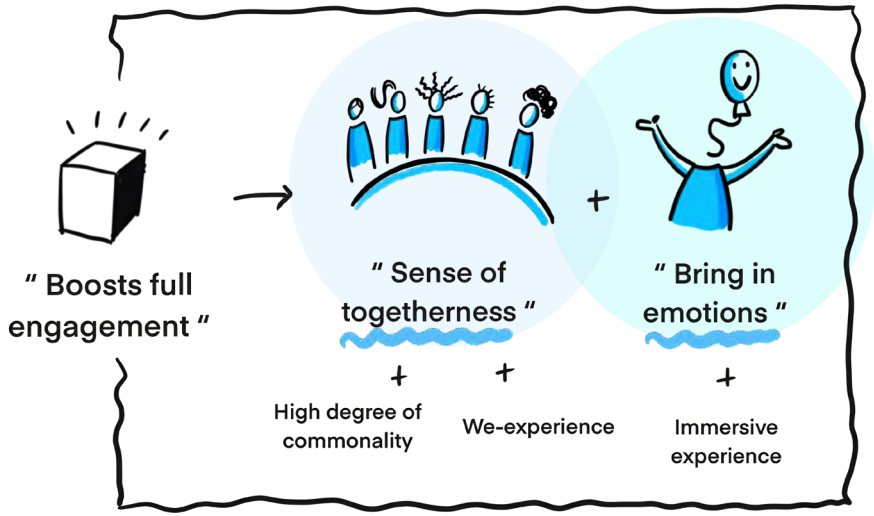


Figure 59. Achievement of design goal

togetherness with others as a we.[16]

Bring in emotions = Immersive experience
An emotion is elicted by an evaluation of an event or situation as potentially beneficial or harmful.[15] People establish their position on environments according to their emotion. Emotion is a stimulus for people's well-being.[15] People influenced by emotions and designers design an experience by using it.

Sketcho provides ice breaking activities such as outfit room and play room and it evokes enjoyable experience before starting a main session. These ice breaking activities mainly focused on expressing people's mood with various items. It give a chance to show their feeling, mood and conditions today. Through these activities that bring out positive emotions such as fun, joy amusement. By then, people immerse themselves in activities in the online environment.

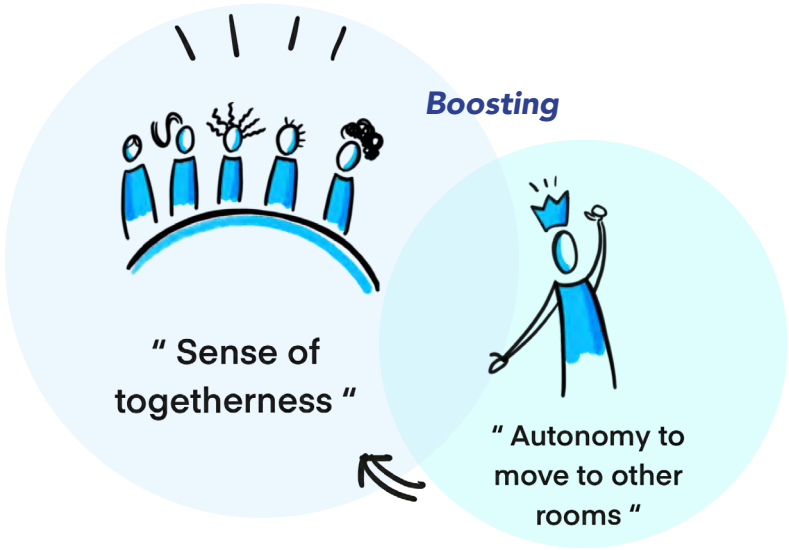


Figure 60. Autonomy contributes to a sense of togetherness.

The relationship between a sense of togetherness and autonomy
Autonomy has been defined as "a state of being independent or self-governing"[35]. In the narrowest sense, design for autonomy means supporting the user in feeling a sense of freedom and control within a software environment [34]. In principle, It seems that a sense of togetherness and autonomy to move to other rooms conflict with each other in Sketcho final concept. However, from the user test, I found that having autonomy contributes to the sense of togetherness. In Sketcho, people can be active instead of remaining passive during the session so that they can choose whether they will be together with others or not. Having control of their location, which can be defined as self-efficiency [33], enhances self-motivation to be together with others. This motivation increases the feeling of togetherness.

8.2-2 Why people like to customize spaces

Sketcho provides room for people to create diverse backgrounds that suit their needs and make it an interactive space. This opens up a wide range of possibilities for using a virtual space for various collaborative activities. In particular, the fact that people can use backgrounds they want is related to aesthetic experience as well. Because people can create or select the backgrounds which fit their preference, aesthetic pleasure can also be satisfied. An aesthetic experience can give rise to an emotional experience, because aesthetic experiences involve pleasure and displeasure [11].

Creating a positive virtual space
People have an innate capacity to experience and respond to their surroundings.[15] People react the same way not only in physical environments but also in online environments. It is essential to bring positive emotions and experiences to the online

collaborative working environment. To create a more positive and comfortable online working environment, we need to open up various possibilities in the online environment. Although it is clear that universal tastes exist, everyone has their distinct aesthetic pleasure and desirability. Therefore, it is not a perfect solution that only an interaction designer design a virtual space. Like the Sketcho concept, everyone should contribute to the online environment's evolution by providing autonomy for the public to create a place that suits their intentions and preferences.

Recommandation for other designers

Final concept Sketcho is one example of enhancing a sense of togetherness and bring in emotions in a digital environment. I think there are still lots of potentials to use technology as a tool for online collaboration. As page 66 mentioned, there are several ways to provide a better online collaboration experience. There is also a direction that uses nonverbal communication in a different direction from Sketcho, which focuses on strengthening the feeling of being together, on making communication more fun and informal. Using the concept of Tools for Make, it is also possible to combine physical objects with AR to solve the lack of tangibility prototyping building activities of online sessions. The online environment is very wide and has infinite possibilities, so I hope other designers to explore infinite imagination as a designer.

Figure 61. Everyone should be able to contribute to create online working space

But what I want to add is that we shouldn't focus too much on technology. Of course, all the various technologies that have developed now can be applied to the online environment, but as a designer, it is desirable to use the appropriate technologies that fit people's emotions and experiences. I had an idea of using object tracking or guest tracking techniques for communication and drawing session while expanding technologies after the first design period. However, I still felt the limitations of technology to apply this idea in practice, and user needs were ambiguous. I personally emphasise focusing more on how to use technology online than on technology, especially on the quality that improves people's emotions, feelings, and experiences, rather than not just convenience.

8.3 Evaluation of the project

The initial starting point of the project changed in the process. I would like to answer the clear reason why the project direction has changed, how the design goal is related to user involvement, and whether this was the right direction.

8.3-1 Reflection on the project approach

My project approach, ***"Experience prototyping"***, was reasonably appropriate. It was a challenging topic for the general process because it was about designing people's experiences and interactions in online collaboration. Although prototyping was carried out periodically, sometimes the project was slightly off-topic, and sometimes it became too technical. However, every time this happens, feedback through user tests has paved the way for the project. The balance between trying things out and listening to others' opinions or learning from others' perspectives is crucial.

This project's approach is of great value not only to the final result but also to the insights gained from the process. Exploration of technologies that can be used in an online environment provides the potential for the future development of the online working environment notion. Sketcho is just one example of these various possibilities for development. In that sense, I want to recommend this ***"Exploring by doing"*** practice to other designers who will follow this project topic to discover a new notion of using technologies in online collaboration.

8.3-2 Connection from start to end

The project first started with a topic which is Ford's user engagement in an online environment. However, during the research, I found that there are challenges for Ford users and online collaboration and design thinking sessions within Ford. It is why the design direction has changed during the process. If Ford's online collaboration is not working correctly, how can we attract external people from Ford to collaboration? In addition to that, Ford's direct user group will also be able to use a service or product if a tool is universal without explicitly targeting them. For this reason, the direction of the project shifted from Ford's user involvement to online collaboration.

Nevertheless, there is still a part that Sketcho can contribute to user involvement. The final design goal, which is enhancing a sense of togetherness and bring in emotions, applies to everyone. Everyone needs to have a sense of togetherness and feel each other's emotions from Ford or ID studio lab or other people from outside, or even for the elderly when we organise an online session with them. The feeling is universal. In that sense, the design goal set perfectly for everyone. When designers want to involve users in the design process, and if they hold a design thinking session online, the sense of being together and bringing in emotion to make them fully engaged in the session is indispensable.

In terms of the final result, the details of features of it could be improved for people such as the elderly or non-tech-savvy, such as simplify interactions or make more prominent features. However, the design goal is for a feeling. They still need to feel being together with designers or facilitators and bringing humour or joy in an online session to engage fully. Thus, the design goal is open for everyone and can be adapted for user involvement as well.

8.4 Personal reflection

I was fortunate to work on this project. Before starting my graduation project, I had a passion for collaboration and design thinking while working as an intern at KLM. I took on this topic that really perfectly matched my experience. In particular, even though there were challenges in proceeding with the project but I could lead the project well because it was related to the "digital environment" that everyone needed in the difficult situation of Corona. I am also very grateful that I can proceed as a design project with an experience prototyping approach, which I am good at. Personally, I think it is the most satisfactory project within the master's courses at TU Delft.

When I started the project, I had no idea how the results would be. However, as I concentrated on the moment and moment from I began the project, trust me, and follow the supervisory team's advice, I was able to get very satisfactory results.

However, there is always something that could be better. Many things can be improved, such as research, reporting, and English ability. I am very grateful to the supervisory team for understanding this part. I think it's precious to grow my limits while studying the research, logical processes, and methodology that I lack.

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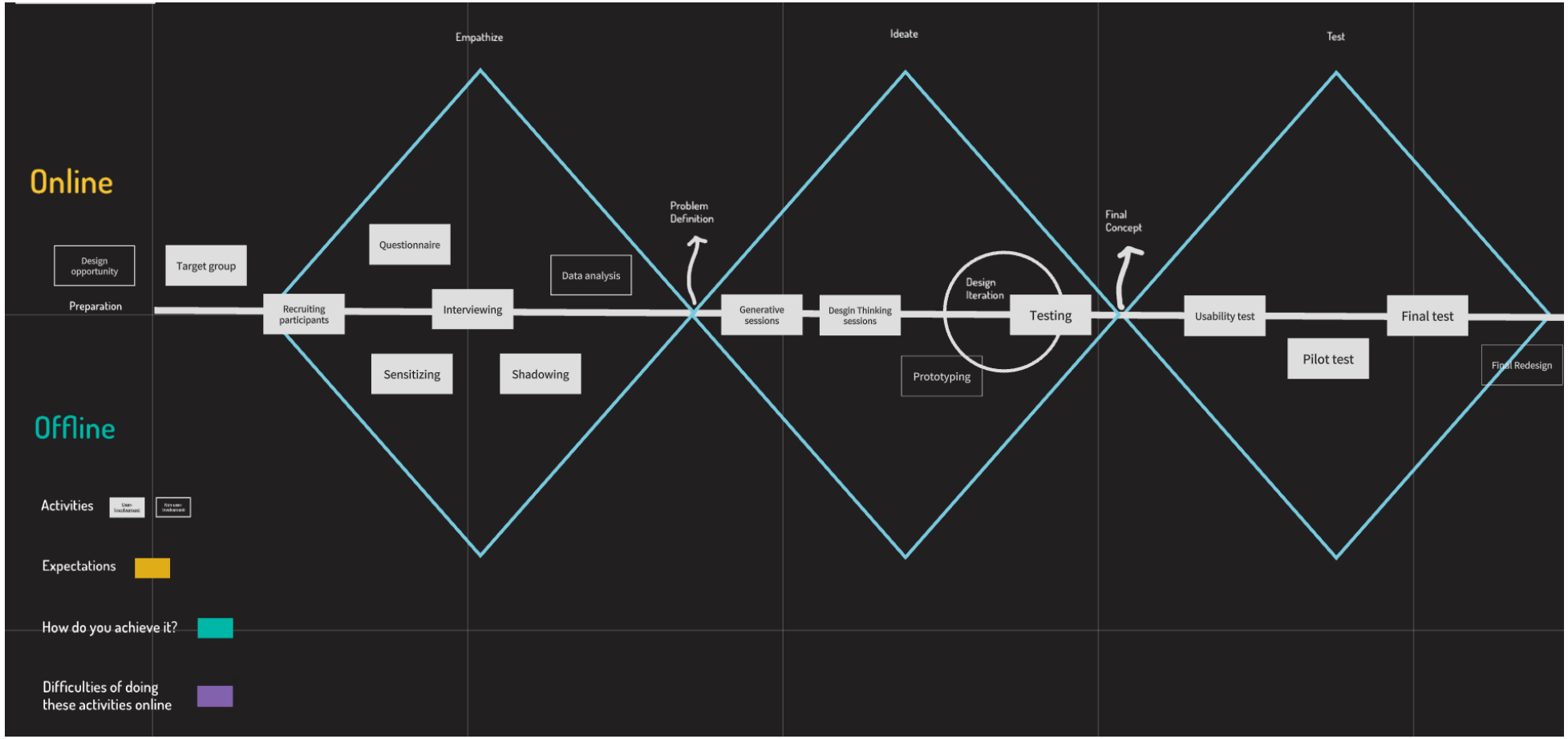
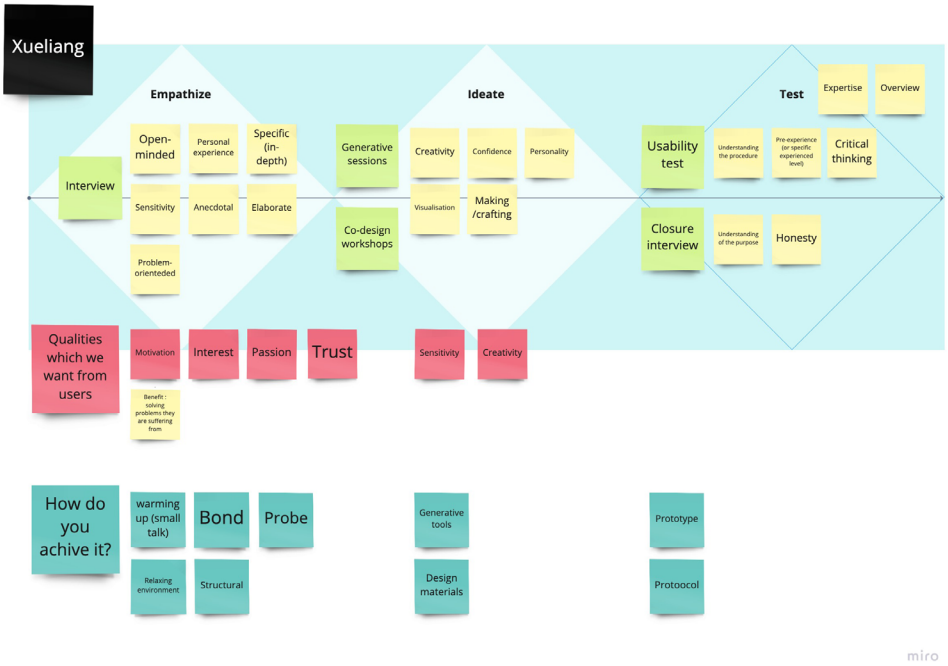
Appendix

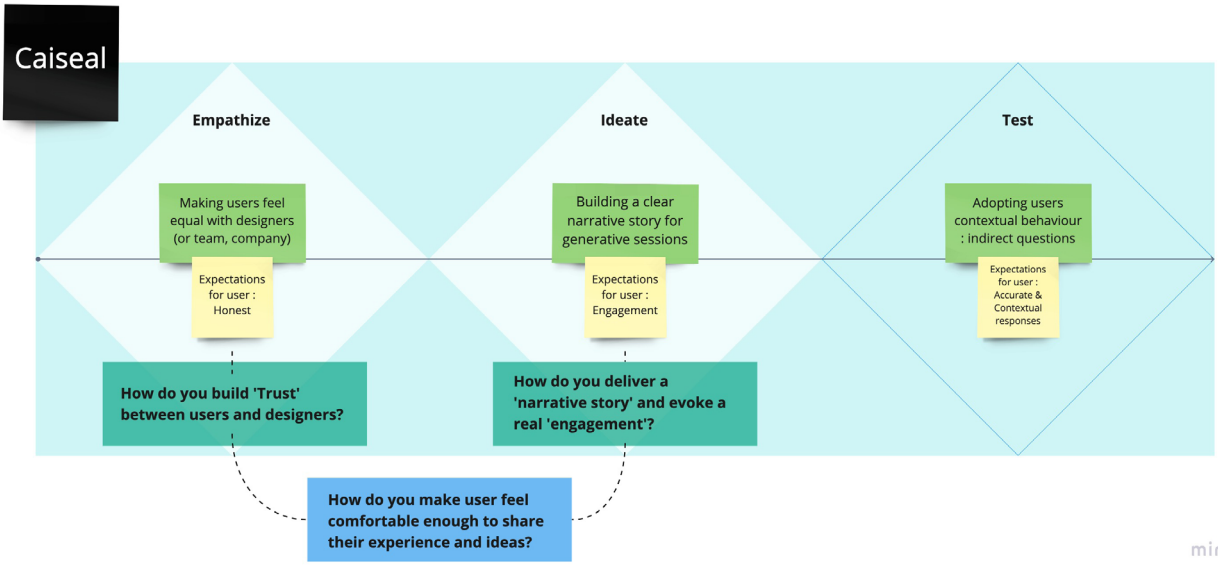
Appendix

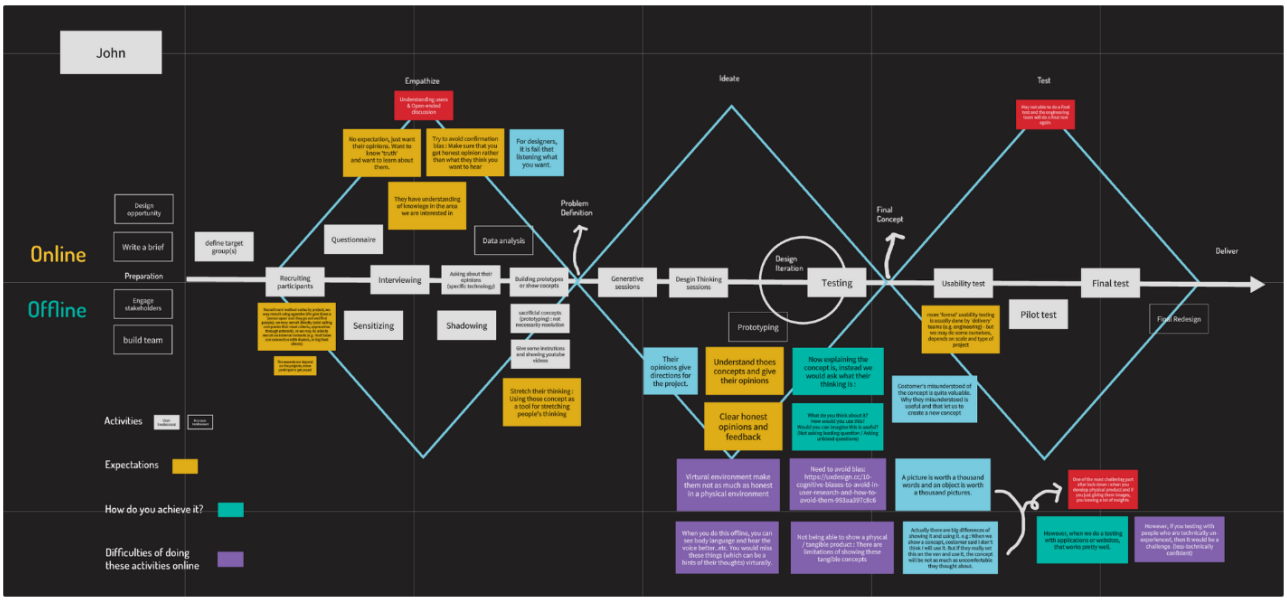
Appendix I

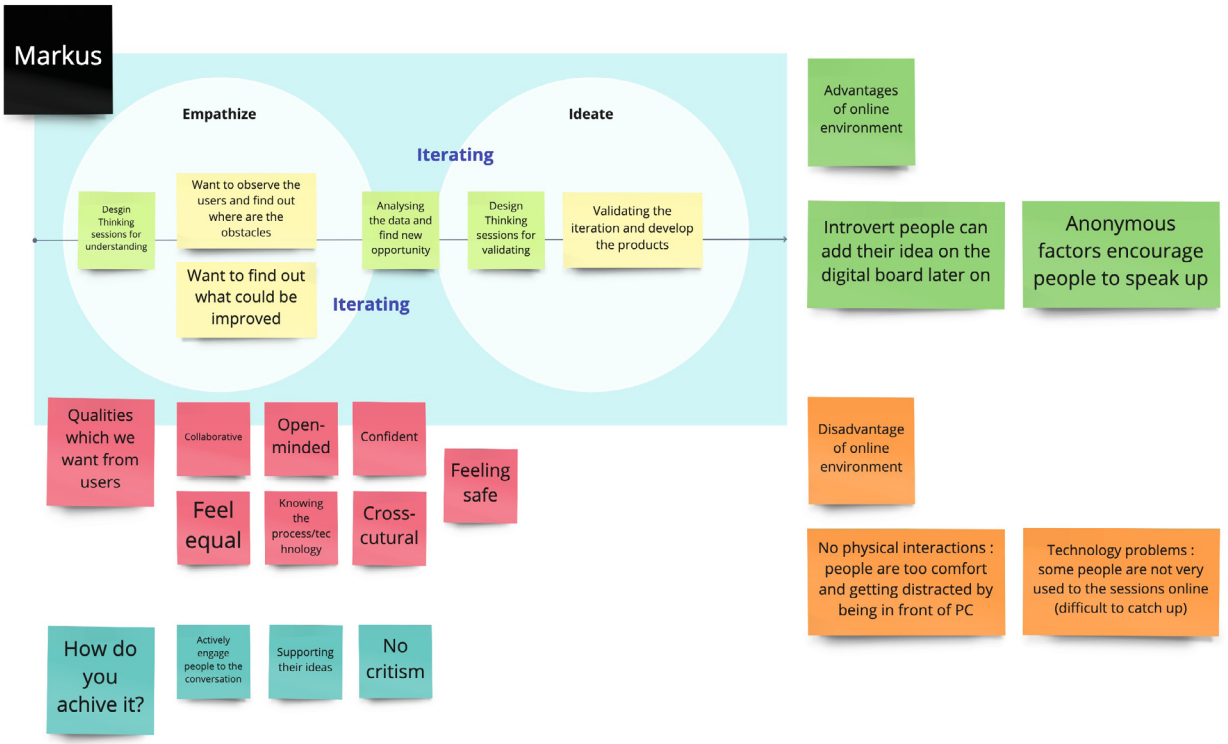
Interview template and collected data

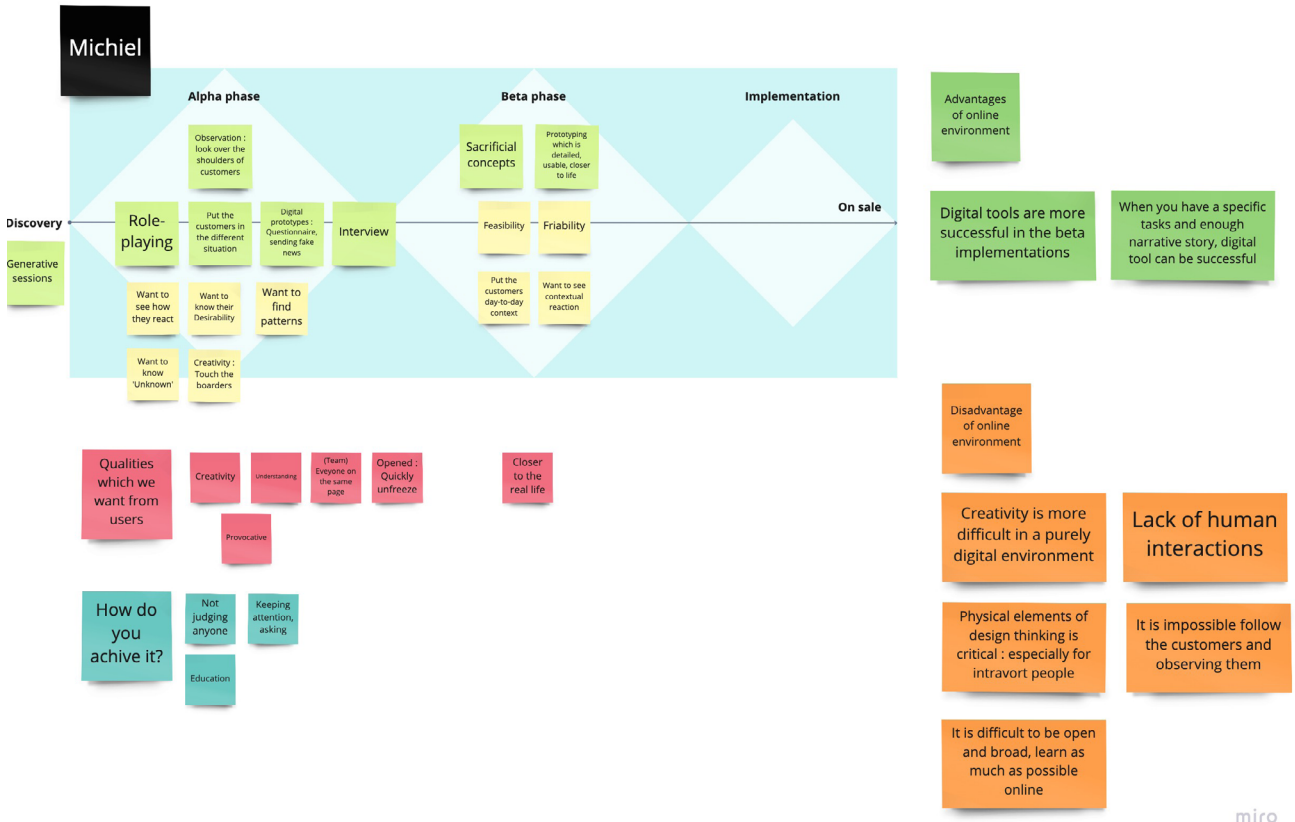



Xueliang
Empathize
Ideate
Test
Interview
Open-minded
Personal experience
Specific (in-depth)
Sensitivity
Anecdotal
Elaborate
Problem-orientedted
Generative sessions
Co-design workshops
Creativity
Confidence
Personality
Visualisation
Making /crafting
Usability test
Closure interview
Understanding the procedure
Pre-experience (or specific experienced level)
Critical thinking
Understanding of the purpose
Honesty
Expertise
Overview
Qualities which we want from users
Motivation
Interest
Passion
Trust
Sensitivity
Creativity
Benefit : solving problems they are suffering from
How do you achive it?
warming up (small talk)
Bond
Probe
Relaxing environment
Structural
Generative tools
Design materials
Prototype
Protoocol
miro


Caiseal
Empathize
Ideate
Test
Making users feel equal with designers (or team, company)
Expectations for user : Honest
Building a clear narrative story for generative sessions
Expectations for user : Engagement
Adopting users contextual behaviour : indirect questions
Expectations for user : Accurate & Contextual responses
How do you build 'Trust' between users and designers?
How do you deliver a 'narrative story' and evoke a real 'engagement'?
How do you make user feel comfortable enough to share their experience and ideas?
miro

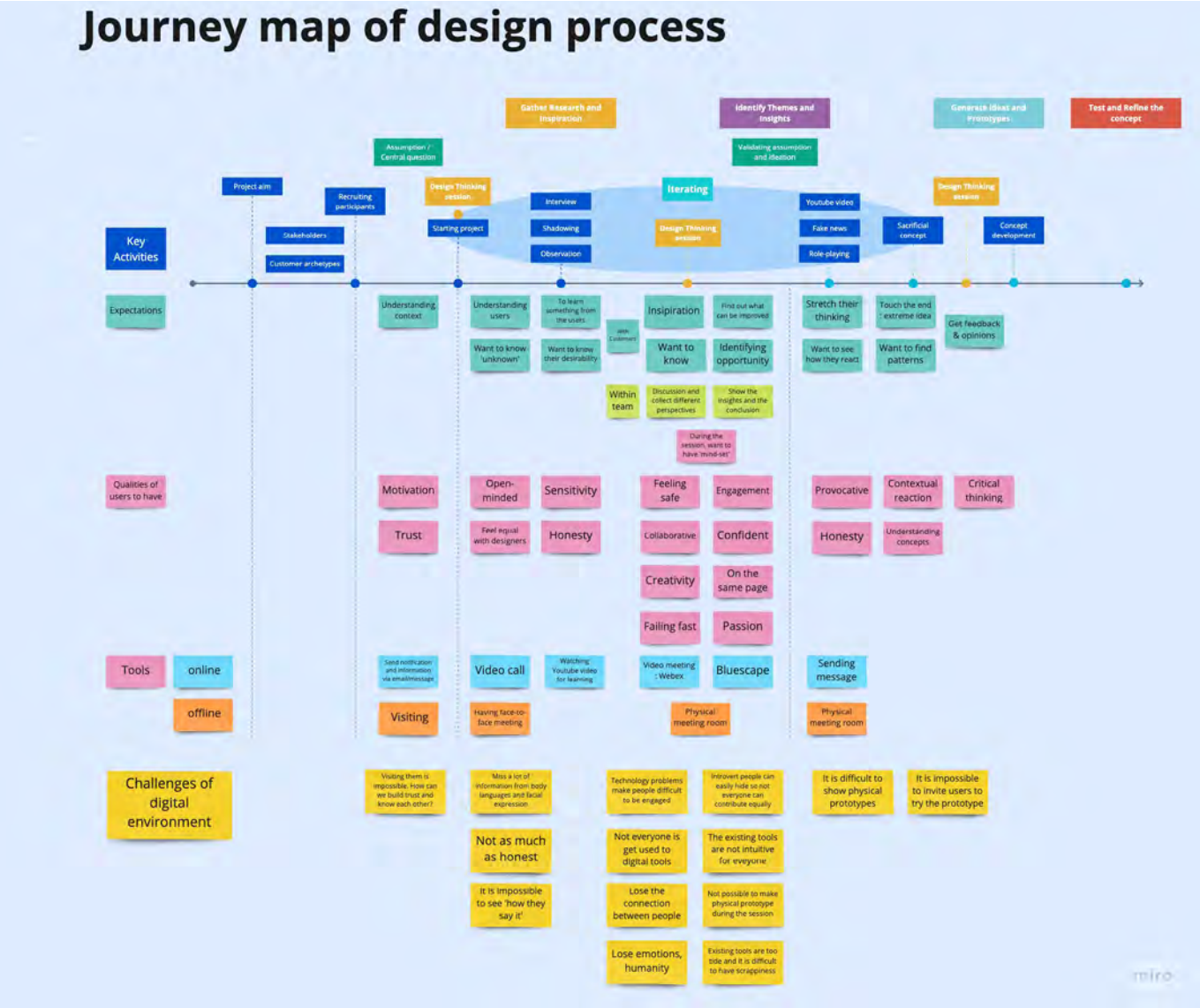

John
Online
Offline
Preparation
Design opportunity
Write a brief
Engage stakeholders
build team
define target group(s)
Empathize
Ideate
Test
Problem Definition
Final Concept
Deliver
Recruiting participants
Interviewing
Questionnaire
Data analysis
Sensitizing
Shadowing
Generative sessions
Design Thinking sessions
Design Iteration
Testing
Prototyping
Usability test
Pilot test
Final test
Activities
Expectations
How do you achieve it?
Difficulties of doing these activities online


Markus
Empathize
Ideate
Iterating
Design Thinking sessions for understanding
Want to observe the users and find out where are the obstacles
Want to find out what could be improved
Iterating
Analysing the data and find new opportunity
Design Thinking sessions for validating
Validating the iteration and develop the products
Advantages of online environment
Introvert people can add their idea on the digital board later on
Anonymous factors encourage people to speak up
Qualities which we want from users
Collaborative
Open-minded
Confident
Feeling safe
Feel equal
Knowing the process/technology
Cross-cutural
Disadvantage of online environment
No physical interactions : people are too comfort and getting distracted by being in front of PC
Technology problems : some people are not very used to the sessions online (difficult to catch up)
How do you achive it?
Actively engage people to the conversation
Supporting their ideas
No critism
miro


Michiel
Alpha phase
Beta phase
Implementation
Discovery
Generative sessions
Role-playing
Observation : look over the shoulders of customers
Put the customers in the different situation
Digital prototypes : Questionnaire, sending fake news
Interview
Want to see how they react
Want to know their Desirability
Want to find patterns
Want to know 'Unknown'
Creativity : Touch the boarders
Sacrificial concepts
Prototyping which is detailed, usable, closer to life
Feasibility
Friability
Put the customers day-to-day context
Want to see contextual reaction
On sale
Advantages of online environment
Digital tools are more successful in the beta implementations
When you have a specific tasks and enough narrative story, digital tool can be successful
Qualities which we want from users
Creativity
Understanding
(Team) Eveyone on the same page
Opened : Quickly unfreeze
Provocative
Closer to the real life
Disadvantage of online environment
Creativity is more difficult in a purely digital environment
Lack of human interactions
How do you achive it?
Not judging anyone
Keeping attention, asking
Education
Physical elements of design thinking is critical : especially for intravort people
It is impossible follow the customers and observing them
It is difficult to be open and broad, learn as much as possible online
miro

Appendix II

Row version of Journey map



Appendix III

First user test materials and results

Developing participatory design tools in a digital environment

Graduation Project : ID Studio Lab TU Delft | Ford

Master student Design for Interaction Yeun Kim

Agenda today

1. Introduction of the topic we will work on : (10 min)
"How can we engage craft man become more digital?"
2. Instruction of co-creation session (5 min)
3. Ice breakers (10 min)
4. Flower association, What is characteristic of Craft man? (20 min)
5. Ideation, "How can we engage craft man become more digital?" (20 min)
6. Voting on the best idea (5 min)
7. Evaluation of testing session (20 min)

Total : 90 min

Preface : Sketcho

'Sketcho' Sketch + Video
Digital Co-creation Toolkit

"**A Face-on Digital Board** and **Templates for guiding a co-creation session,** in order to enhance engagement of facilitator and participants."

Preface : Sketcho

Rules of co-creation

Ice breaker

Ice breaker

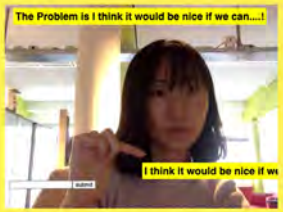
Pick a filter which show your characteristics!

"How can we engage craft man become more digital?"

Let's ideate, what things are craft man's characteristics?

Let's ideate, what things are craft man's characteristics?

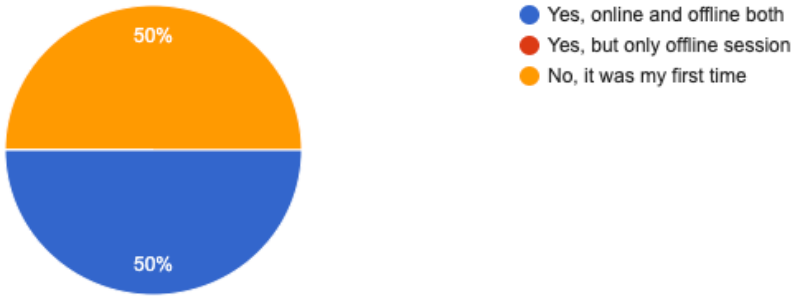
Could you share what kinds of idea you have so far?



Voting!

About your experience : before this session, have you ever participated in co-creation session?

응답 4개



1. Overall experience

1-1. How was the overall experience of this session?

응답 4개

It was bit loose. Would have been nice if it's more fast paced, get to the point. Yet it was a novel way of doing online meeting, which definetely is a fun way of engaging.

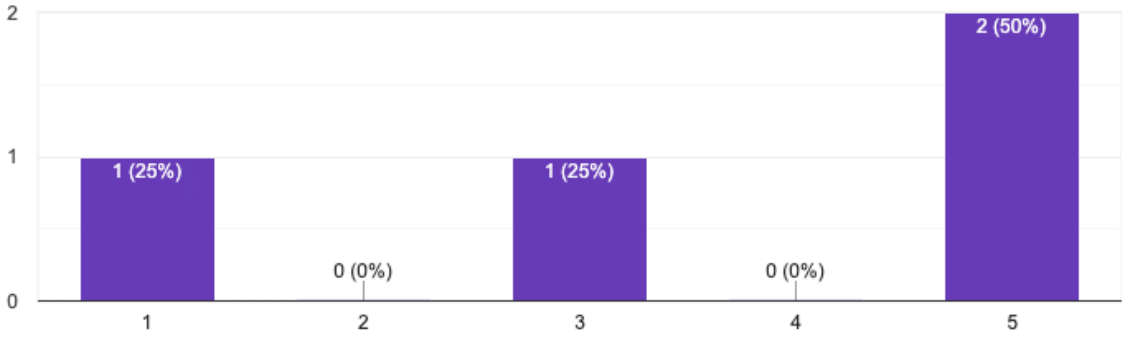
interesting, very structured, but not very flexible

It was a great opportunity to talk about this topic.

I enjoyed it! The prototypes were engaging and easy to use, and it was great to share ideas with others.

1-2. (On the same page) How much did you feel engaged in the session?

응답 4개



1-2. (On the same page) How much did you feel engaged in the session?

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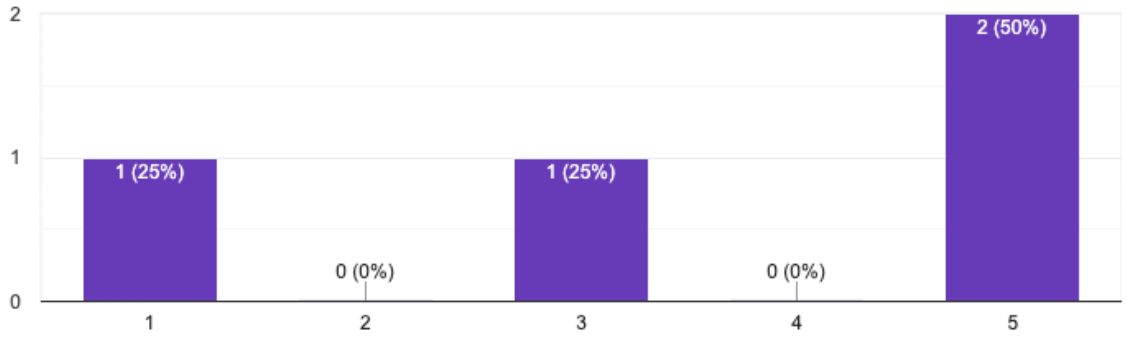

1-3. (On the same page) How much the communication was fluent during the session?

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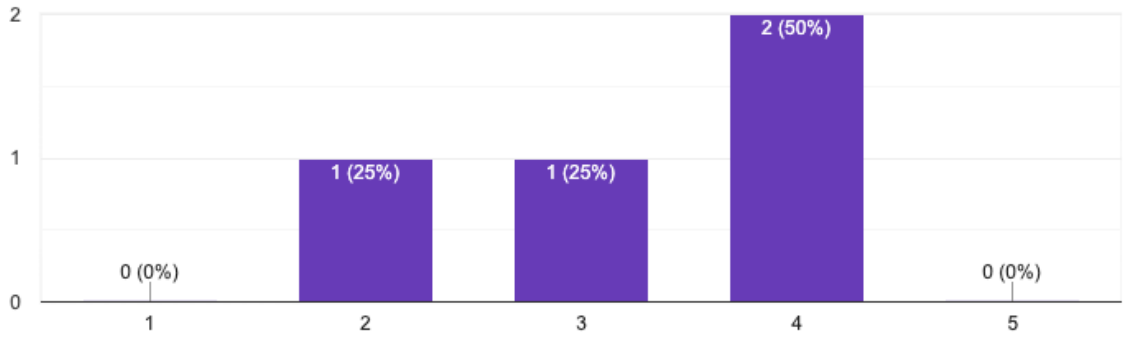
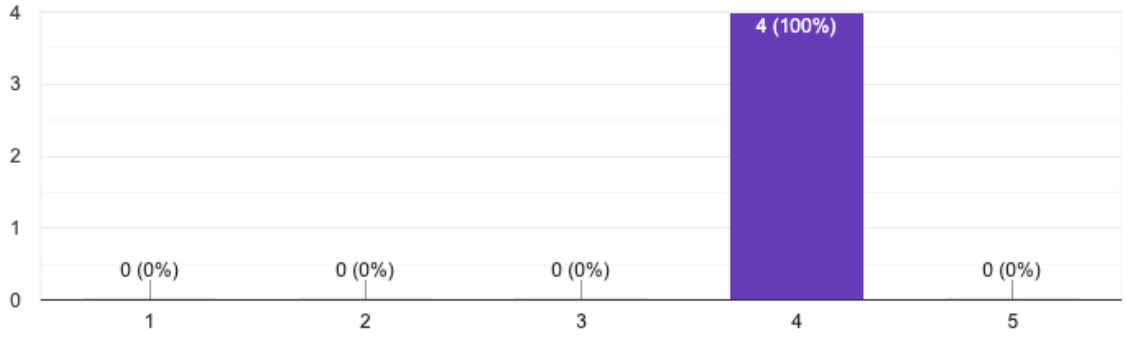


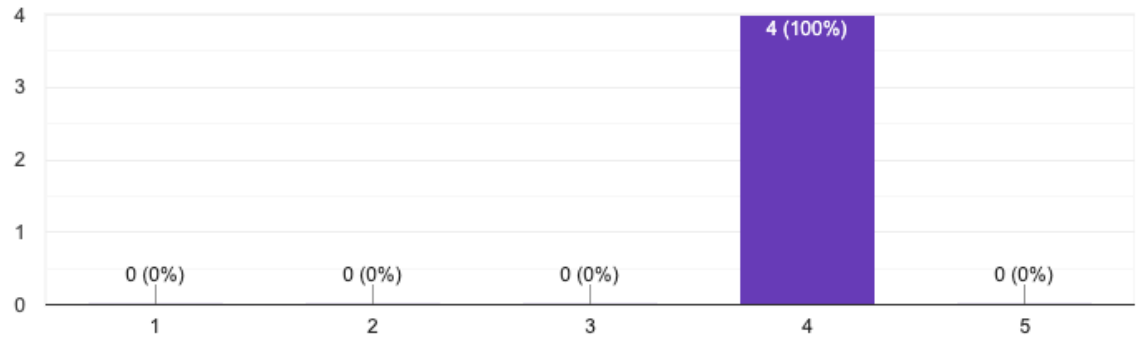
1-4. (On the same page) How much did you feel connected with other participants and facilitator?

응답 4개



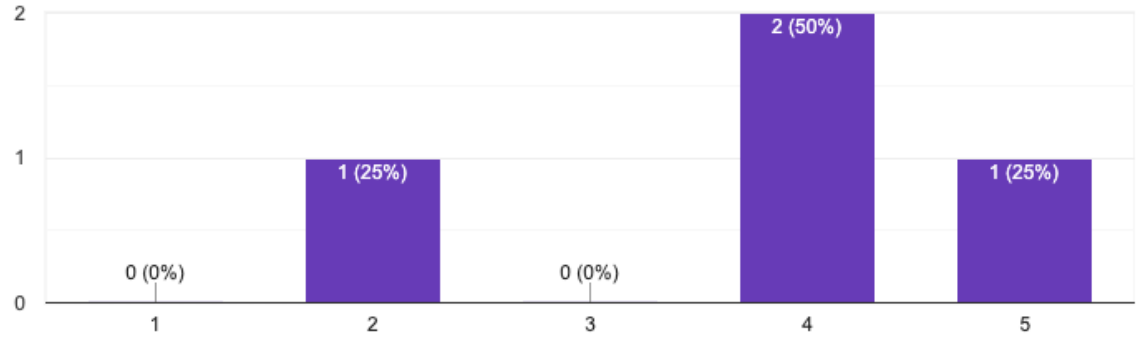
1-5. (Easy to use) Did you feel easy to use this tool?

응답 4개



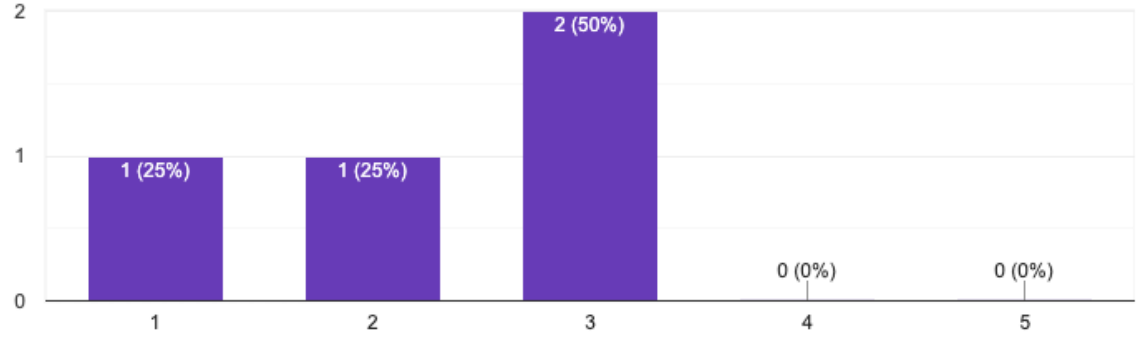
1-6. (Confident) How much did you feel confident during the session?

응답 4개



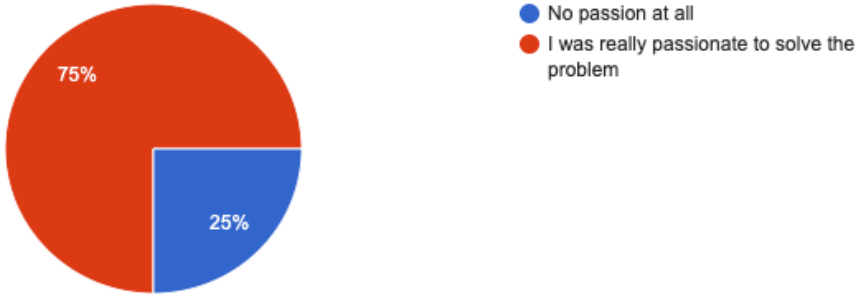
1-7. (Creativity) How much do you think you were creative during the session?

응답 4개



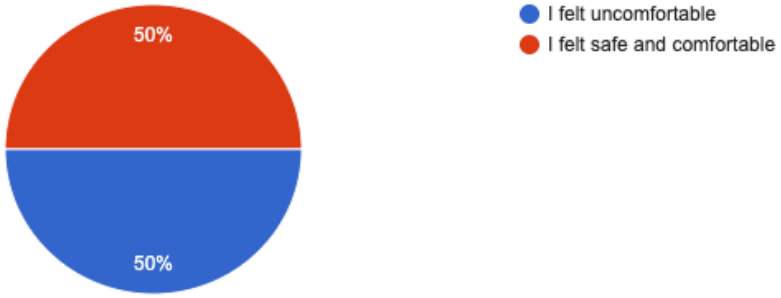
1-8. (Passion) Do you think you were passionate to solve the problem?

응답 4개



1-9. (Feeling safe) Did you feel safe to share your ideas?

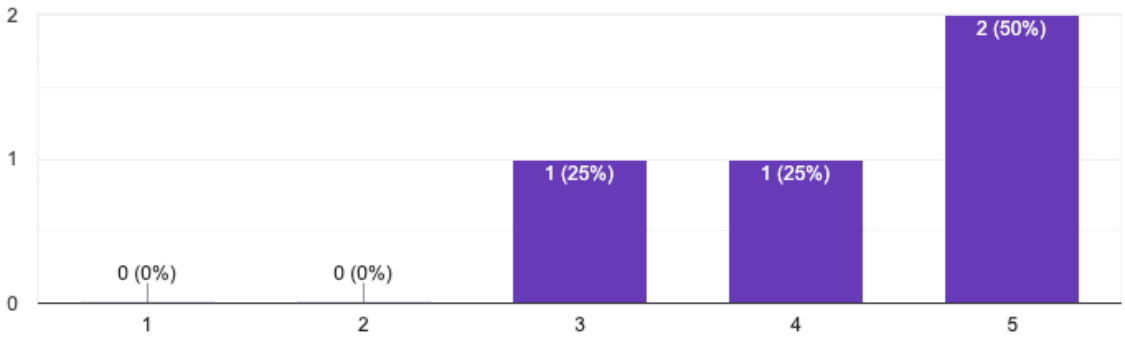
응답 4개



2. Elements of the tool

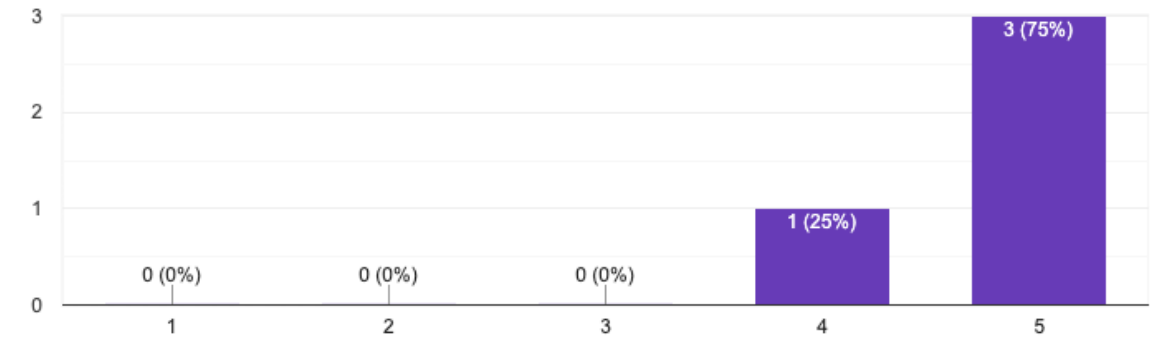
2-1. Presentation on the background helped me to follow the session better.

응답 4개



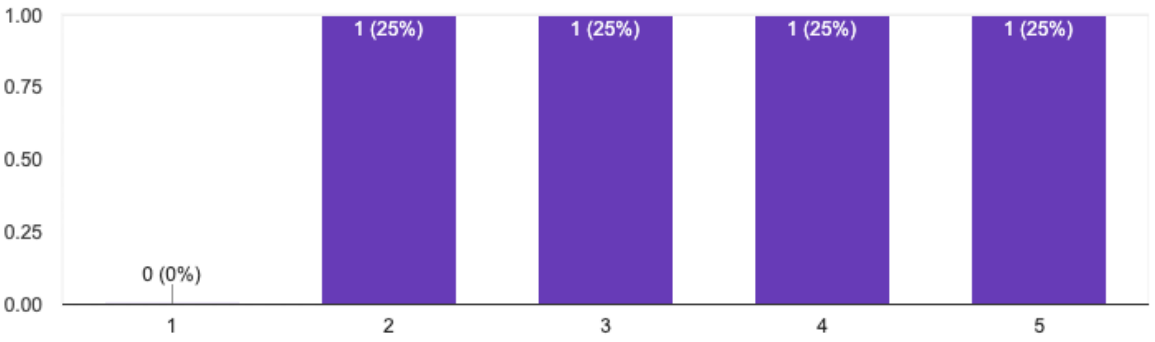
2-2. Ice breaker using filter helped warming up the session and enough to open my mind

응답 4개



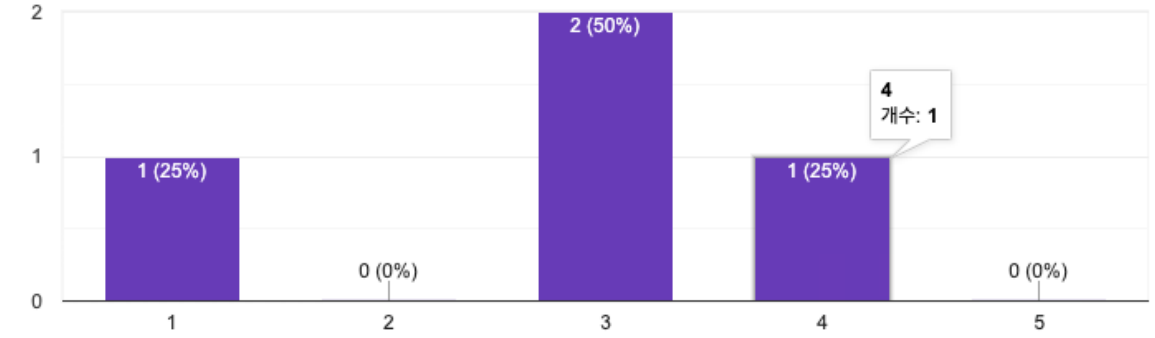
2-3. Flower association exercise on facilitator's face helped me to engaged more in the session.

응답 4개



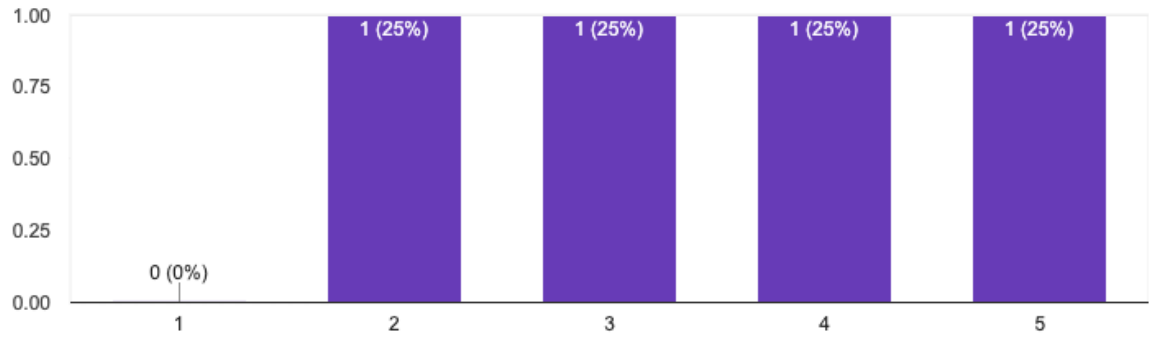
2-4. Post-its on the video helped to understand other's idea better.

응답 4개



2-5. Using gestures and visuals helped to communicate better.

응답 4개



2-6. Please give any other opinions, feedback, recommendations about the session or tools.

응답 4개

Would love to see further exploration! It's exciting tool.

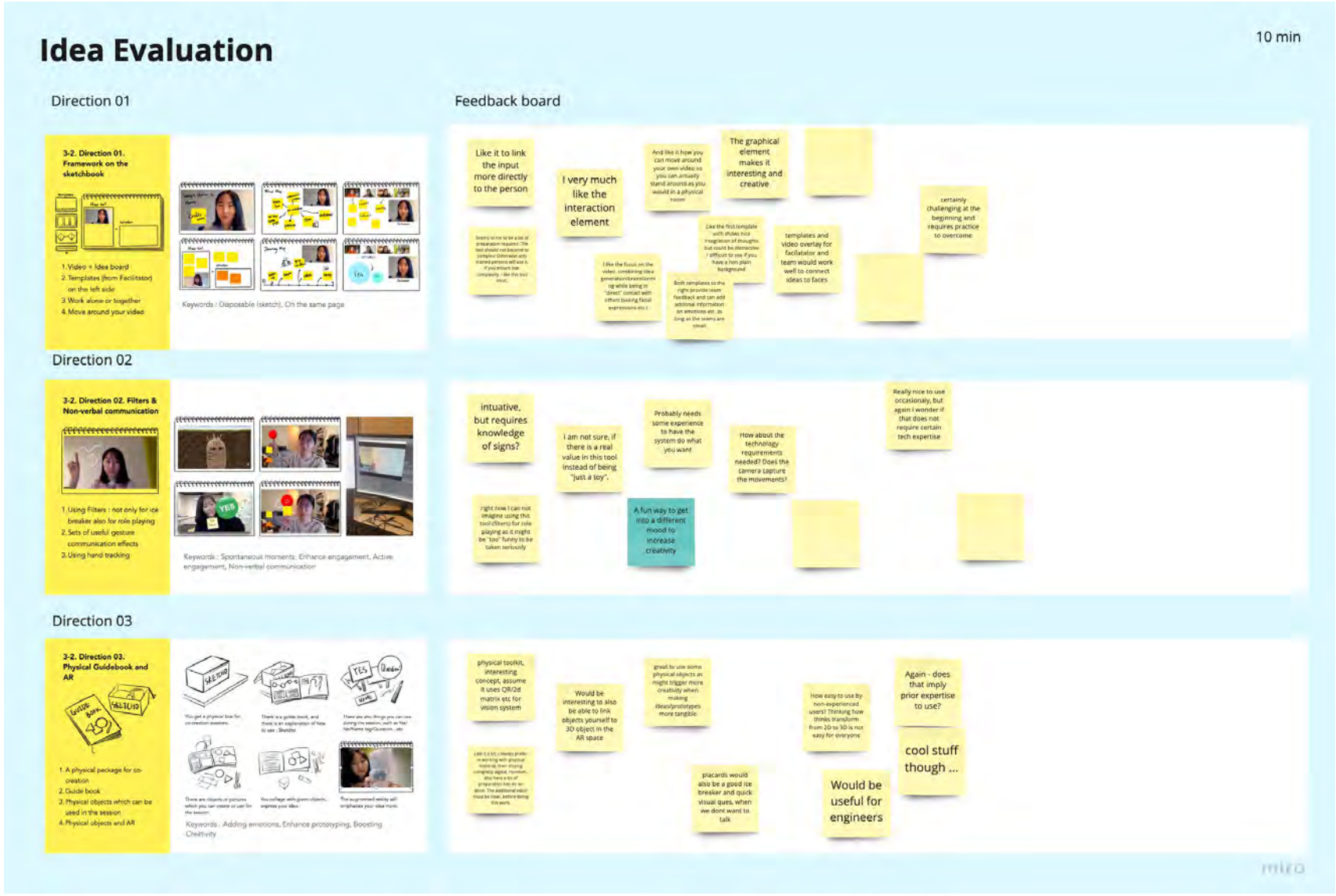
to make the tools more spontaneous, and in real time; add features that amply or visualise people's body language and facial expressions.

It may be hard to understand to use a new tool for those who are not comfortable with digital tools, but it will not be a problem if everyone help each other. But it's a good way to boost engagement and share each opinion.

I really like this concept and think it could have many applications beyond the current design context! I would recommend looking into making all participants' video and gesture-related outcomes (e.g. post-its, voting buttons) visible for everyone, like in the gallery view on Zoom, as this would really increase the feeling of co-creation and togetherness.

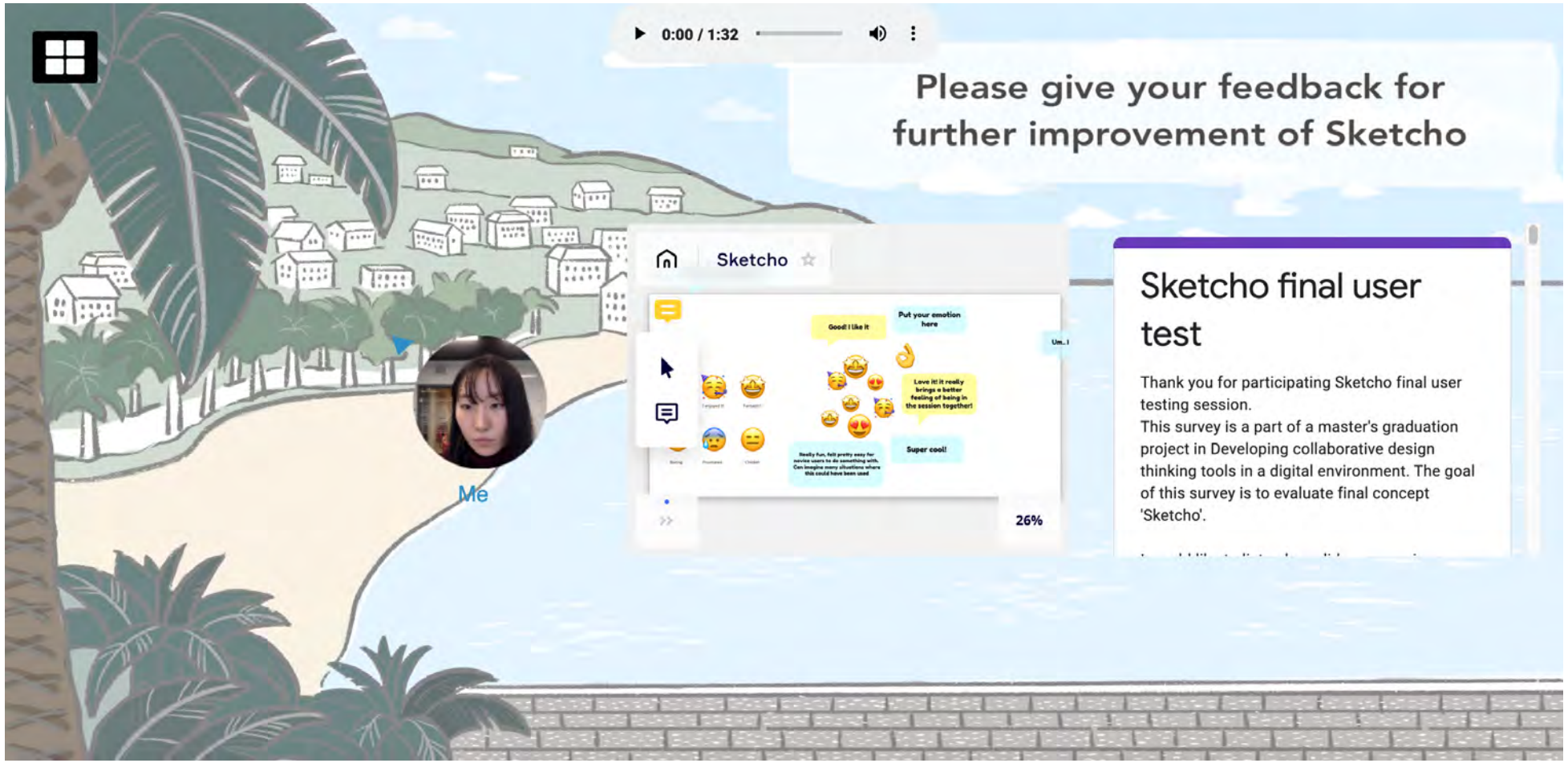
Appendix IV

Second user test session : feedback on three directions



Appendix V

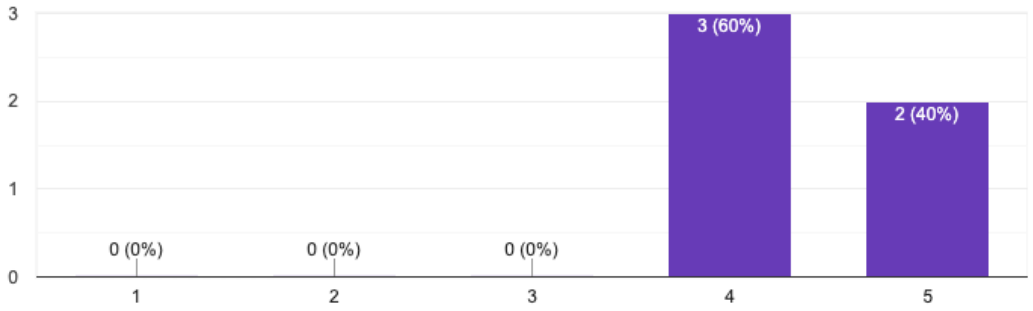
The final user test materials and results



Overall Experience : 1. Sense of Togetherness

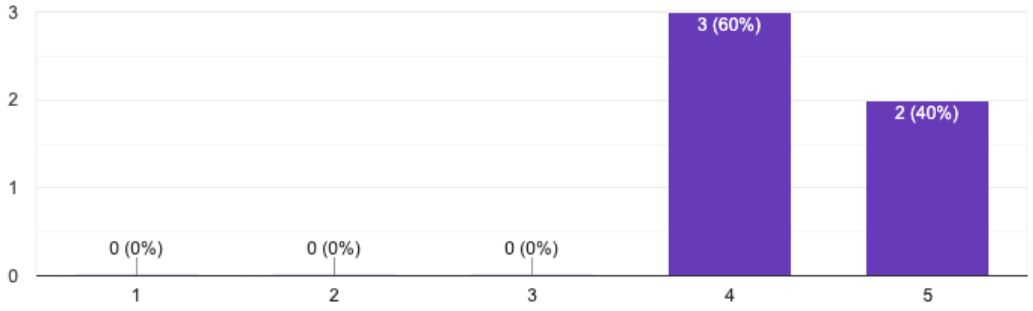
1-1. Sketcho's concept of sharing a space helped me to feel a 'sense of togetherness' with other participants during the session.

응답 5개



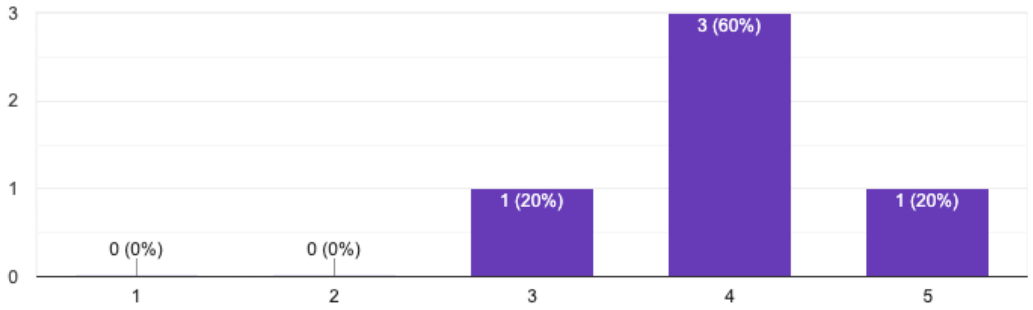
1-2. Sketcho's concept of sharing a space helped me to feel 'connections' with other participants during the session.

응답 5개



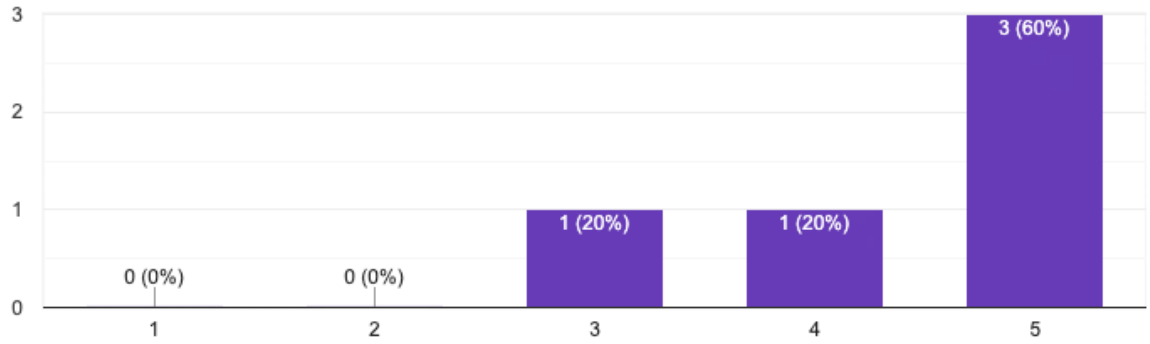
1-3. Sketcho's concept of sharing a space helped me to be 'on the same page' with other participants during the whole session.

응답 5개



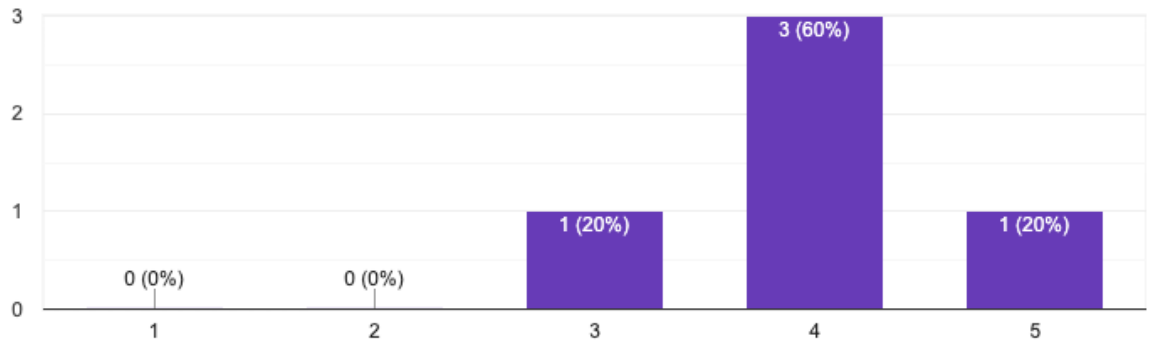
1-4. Sketcho's concept of sharing a space helped me to 'fully engage' in the session.

응답 5개



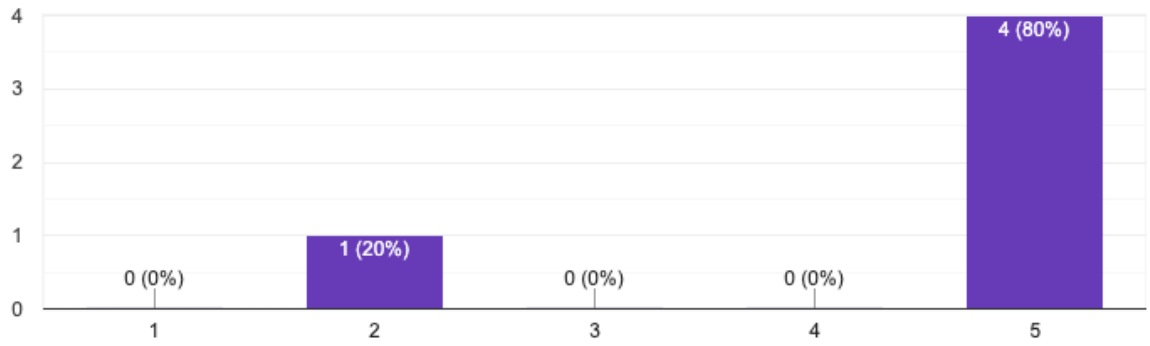
1-5. Sketcho's concept of sharing space helped communication between participants and participants or participants and facilitator to be fluent enough.

응답 5개



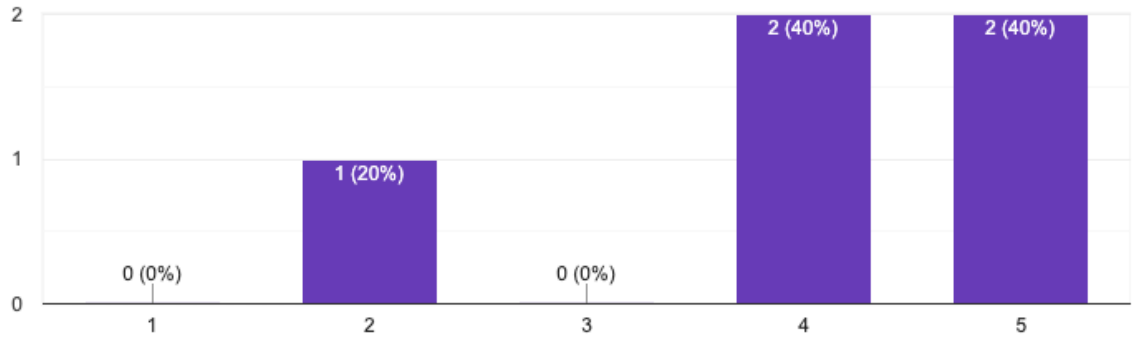
1-6. Having the autonomy to form a team and choose a breakout room by myself enhanced togetherness.

응답 5개



1-7. I felt having the autonomy to move into other rooms helped fluent progress of the session.

응답 5개



1-8. If you have more feedback about a sense of togetherness, please feel free to write here.

응답 2개

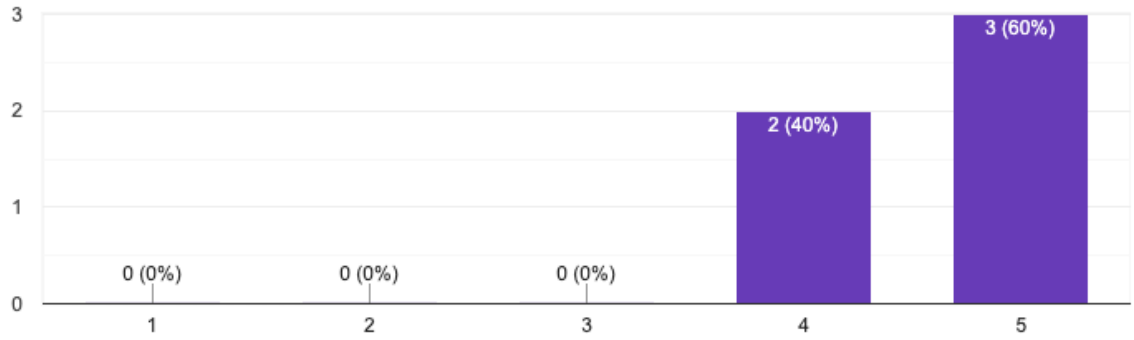
Difficult to answer some of these questions without trying the prototype out in a 'live' setting, would be cool to try it for some different workshops and stuff to see how it felt.

Enjoyed it absolutely !!! really well done - I just had to fight with being kicked off regularly

Overall Experience : 2. Bring Emotions

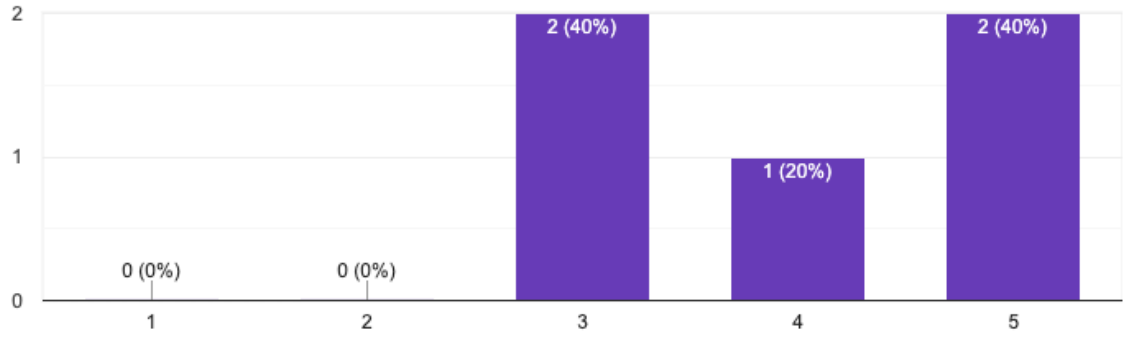
2-1. Background of different themes of Sketcho boosted 'creativity' during the session.

응답 5개



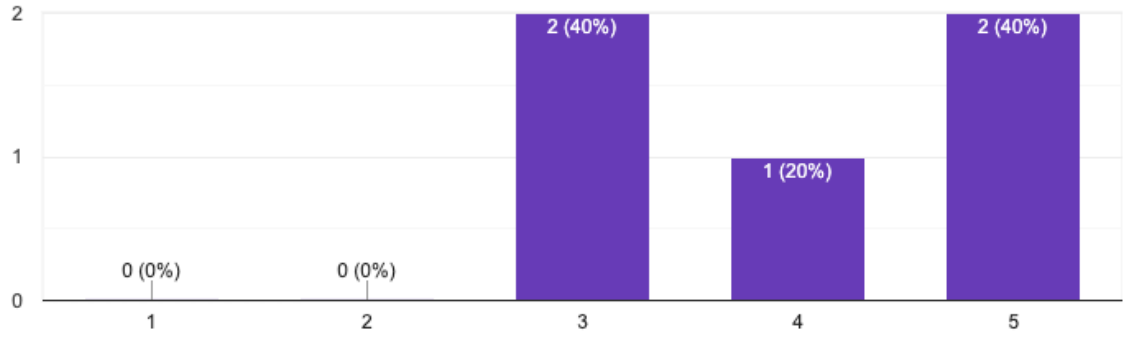
2-2. Background of different themes of Sketcho inspired me during the session.

응답 5개



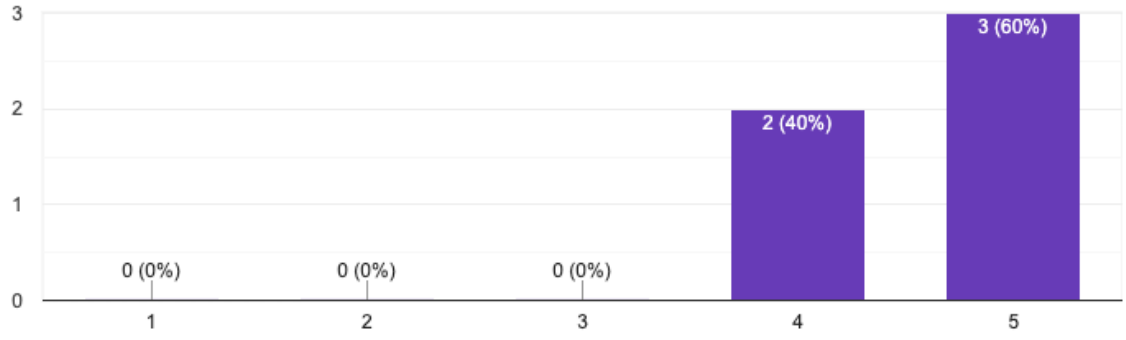
2-3. The outfit room helped to warm up the session and made the session more enjoyable.

응답 5개



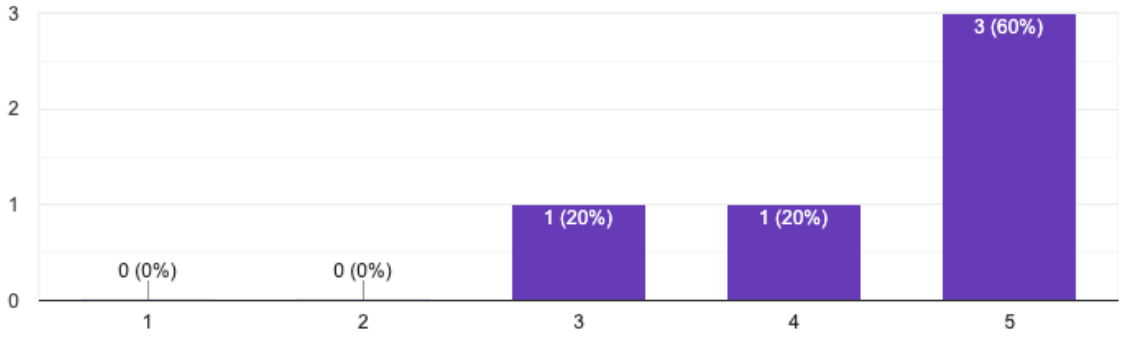
2-4. The playroom helped to warm up the session and made the session more enjoyable.

응답 5개



2-5. The background sketchy style helped me to be more comfortable and think creatively.

응답 5개



2-6. If you have more feedback about bringing emotions, please feel free to write here.

응답 3개

Backgrounds should be configurable and adjustable to the audience, sometimes a more professional background would be better

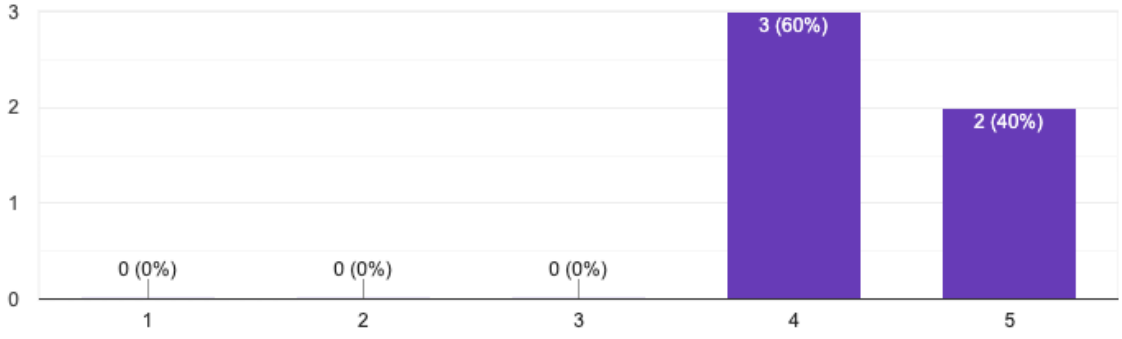
Totally loved the sketchy style and the ideas for the different rooms for different purposes, could see lots of situations where these could work. Liked how the people present started playing about quite quickly, could totally see this working in workshops and stuff like that

I love the avatars! Some of the backgrounds related to the breaking sessions could be related to the spaces you actually work in like the a maker space or so

3. Design Requirements & general questions.

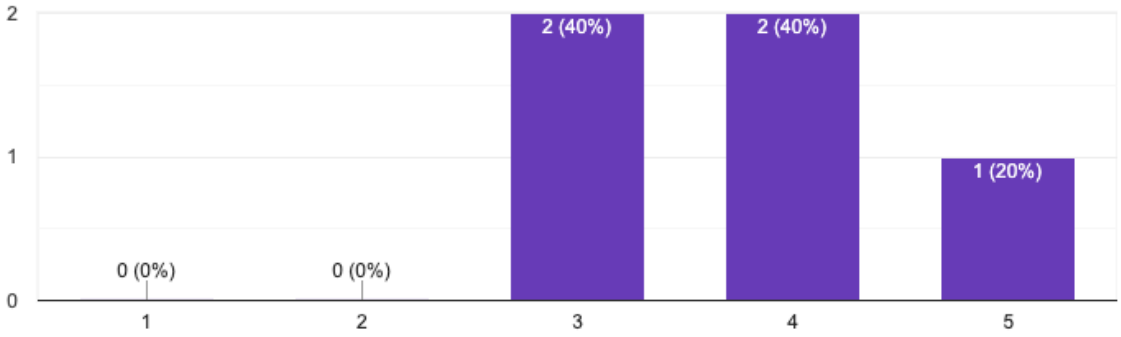
3-1. Compare to other collaborative tools (such as Bluescape, Miro and zoom), It was easy to understand how Sketcho tool works.

응답 5개



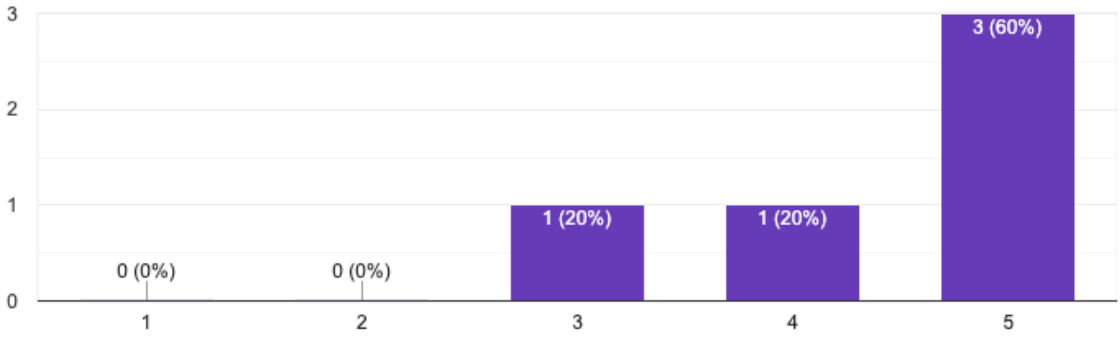
3-3. Compare to other collaborative tools (such as Bluescape, Miro and zoom), I could not be afraid of making mistakes during the session.

응답 5개



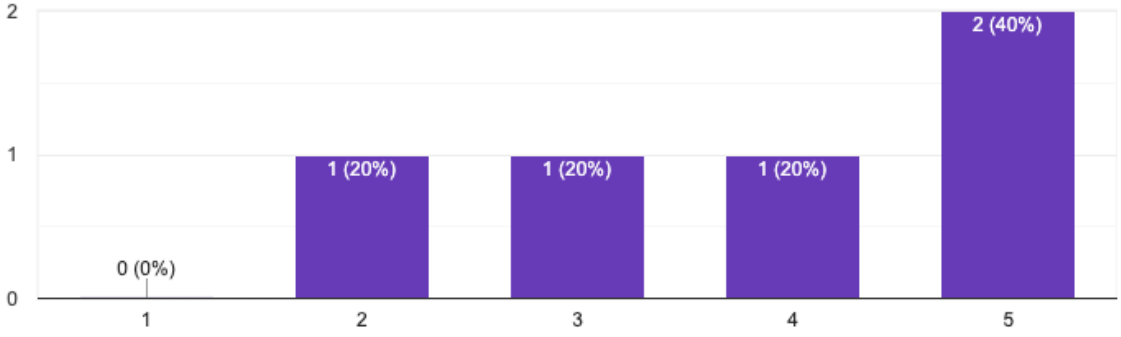
3-4. Compare to other collaborative tools (such as Bluescape, Miro and zoom), I could be more passionate to be involved in the session.

응답 5개



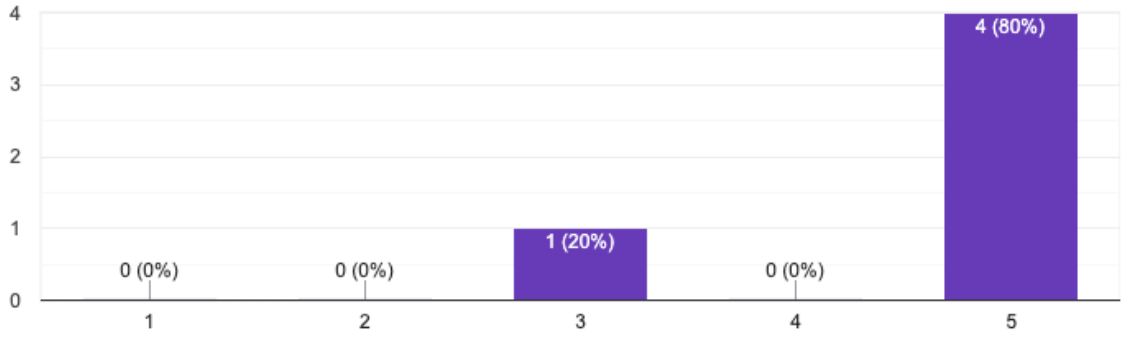
3-5. Compare to other collaborative tools (such as Bluescape, Miro and zoom), Sketcho tool helped me to catch up the session and follow other participants or facilitator.

응답 5개



3-6. Compare to other collaborative tools (such as Bluescape, Miro and zoom), I felt more equal with other participants and facilitator.

응답 5개



4. If there are any other opinions, feedback or ideas, feel free to write here. Thank you so much for your participation.

응답 1개

Again, difficult to answer some of these qs with the type of demo we had, would be keen to try it in a live setting to get a better understanding.

Overall, I thought the prototype was awesome, definitely the team in D-Ford would be happy to use this and test it out if you'd be interested. And could definitely see situations where this would be used.

I think the 'upload your own backgrounds' is a really powerful feature in the right hands. We just did a load of interactive workshops and I can imagine we could have done some really fun things with this tool and creating our own backgrounds.

I think maybe you need to make a decision about what sort of situations/circumstances you want to support, some of the other discussions about sharing CAD and stuff like that, I could imagine this tool getting very 'heavy'. Personally I would love to see the tool focus on use cases like facilitating creative workshops and user feedback sessions, but then I am biased as that's what I'd like to do ;)

DESIGN FOR our future

TU Delft

IDE Master Graduation

Project team, Procedural checks and personal Project brief

This document contains the agreements made between student and supervisory team about the student's IDE Master Graduation Project. This document can also include the involvement of an external organisation, however, it does not cover any legal employment relationship that the student and the client (might) agree upon. Next to that, this document facilitates the required procedural checks. In this document:

- The student defines the team, what he/she is going to do/deliver and how that will come about.
- SSC E&SA (Shared Service Center, Education & Student Affairs) reports on the student's registration and study progress.
- IDE's Board of Examiners confirms if the student is allowed to start the Graduation Project.

USE ADOBE ACROBAT READER TO OPEN, EDIT AND SAVE THIS DOCUMENT
Download again and reopen in case you tried other software, such as Preview (Mac) or a webbrowser

STUDENT DATA & MASTER PROGRAMME

Save this form according the format "IDE Master Graduation Project Brief_familyname_firstname_studentnumber_dd-mm-yyyy".
Complete all blue parts of the form and include the approved Project Brief in your Graduation Report as Appendix 1 !

family name	Kim
initials	Y — given name: Yeun
student number	4832329
street & no.	
zipcode & city	
country	
phone	
email	

Your master programme (only select the options that apply to you):

IDE master(s):	( ) IPD ; (★) DfI ; ( ) SPD
2nd non-IDE master:	
individual programme:	- - (give date of approval)
honours programme:	( ) Honours Programme Master
specialisation / annotation:	( ) Medisign ; ( ) Tech. in Sustainable Design ; ( ) Entrepeneurship

SUPERVISORY TEAM **

Fill in the required data for the supervisory team members. Please check the instructions on the right !

** chair	Froukje Sleeswijk Visser	dept. / section:	HCD/DCC
** mentor	Janus Keller	dept. / section:	HCD/DCC
2nd mentor	Nicole Eikelenberg		
	organisation: Ford		
	city: Aachen	country:	Germany

Chair should request the IDE Board of Examiners for approval of a non-IDE mentor, including a motivation letter and c.v..

Second mentor only applies in case the assignment is hosted by an external organisation.

comments (optional): Whereas F. Sleeswijk Visser brings expertise from a more strategic perspective, I Keler brings in expertise on deveopment of conilne collaboration tools. They bring in quite different expertse which exactly fits the information need.

Ensure a heterogeneous team. In case you wish to include two team members from the same section, please explain why.

Procedural Checks - IDE Master Graduation

APPROVAL PROJECT BRIEF

To be filled in by the chair of the supervisory team.

chair Froukje Sleeswijk Visser date 26 - 10 - 2020 signature

Digitally signed by Froukje Sleeswijk Visser - IO Date: 2020.10.26 16:43:20 +01'00'

CHECK STUDY PROGRESS

To be filled in by the SSC E&SA (Shared Service Center, Education & Student Affairs), after approval of the project brief by the Chair. The study progress will be checked for a 2nd time just before the green light meeting.

Master electives no. of EC accumulated in total: _____ EC

Of which, taking the conditional requirements into account, can be part of the exam programme _____ EC

List of electives obtained before the third semester without approval of the BoE

★ YES all 1st year master courses passed

NO missing 1st year master courses are:

name _____ date - - signature _____

FORMAL APPROVAL GRADUATION PROJECT

To be filled in by the Board of Examiners of IDE TU Delft. Please check the supervisory team and study the parts of the brief marked **. Next, please assess, (dis)approve and sign this Project Brief, by using the criteria below.

- Does the project fit within the (MSc)-programme of the student (taking into account, if described, the activities done next to the obligatory MSc specific courses)?
- Is the level of the project challenging enough for a MSc IDE graduating student?
- Is the project expected to be doable within 100 working days/20 weeks ?
- Does the composition of the supervisory team comply with the regulations and fit the assignment ?

Content: APPROVED NOT APPROVED

Procedure: APPROVED NOT APPROVED

comments

name _____ date - - signature _____

Initials & Name Y Kim Student number 4832329

Title of Project Developing Participatory Design Thinking Tools in a digital environment

Personal Project Brief - IDE Master Graduation

TU Delft

Developing Participatory Design Thinking Tools in a digital environment — project title

Please state the title of your graduation project (above) and the start date and end date (below). Keep the title compact and simple. Do not use abbreviations. The remainder of this document allows you to define and clarify your graduation project.

start date 12 - 10 - 2020 — 12 - 03 - 2021 end date

INTRODUCTION **

Please describe, the context of your project, and address the main stakeholders (interests) within this context in a concise yet complete manner. Who are involved, what do they value and how do they currently operate within the given context? What are the main opportunities and limitations you are currently aware of (cultural- and social norms, resources (time, money,...), technology, ...).

With Covid-19 situations and increasing working from home needs, both ID-studioLab and Ford need better online collaborative design tools and collaborative design activities that are optimised for online use. Tools such as zooming, teams, classrooms, mazes, cones, and murals are handy for design thinking activities, but it's indeed difficult to proceed as smoothly as offline collaboration.

In addition to that, in this situation, involving users in the design process becomes much more difficult. There are many benefits of user involvement, such as improving the quality of the system arising, avoidance of costly system features that the user did not want and increasing participation in decision-making within the organisation etc [1]. However, because of this limited online environment, it is a challenge for Ford to get the involvement of users in the early design stage.

The main opportunity is to develop a new online possibility of user engagement in a design process. The challenge is to create a fluent tool for both users and designer/engineers in a user-centric research project. Therefore, I would like to develop a guideline for Ford's Smart Vehicle Concepts team, which allows them to proceed fluent participatory design process online in this graduation project.

References:
[1] 1.Kujala, Sari. "User involvement: a review of the benefits and challenges." Behaviour & information technology 22.1 (2003): 1-16.

Keywords:
User involvement, User-centered Design, Participatory Design, Contextual Design, Collaborative Design Thinking.

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introduction (continued): space for images

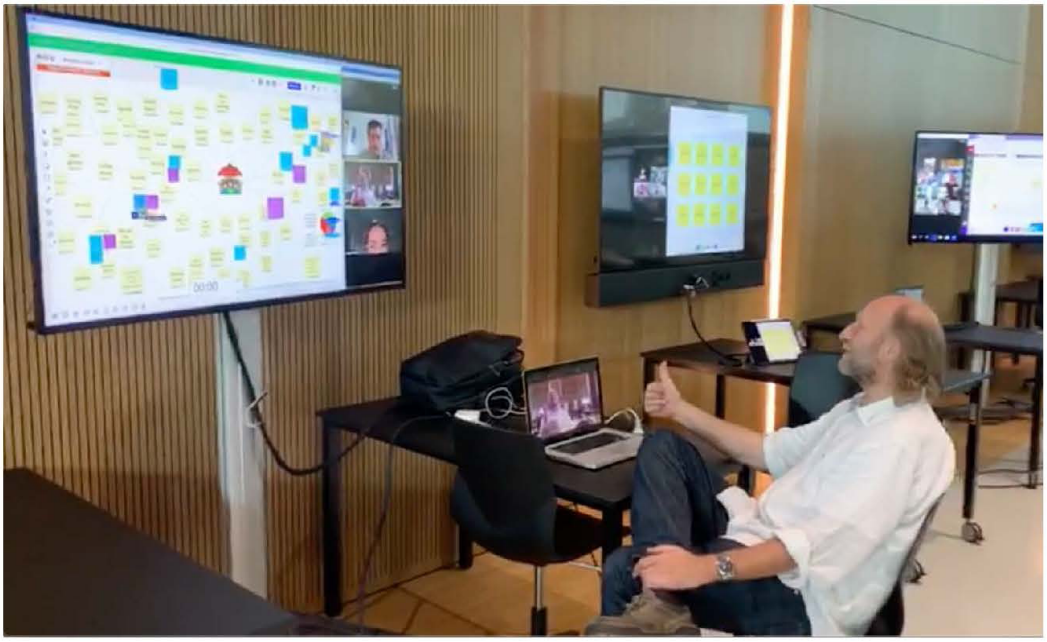


image / figure 1: A Design Thinking session via zoom and Miro board during Creative Facilitation course.

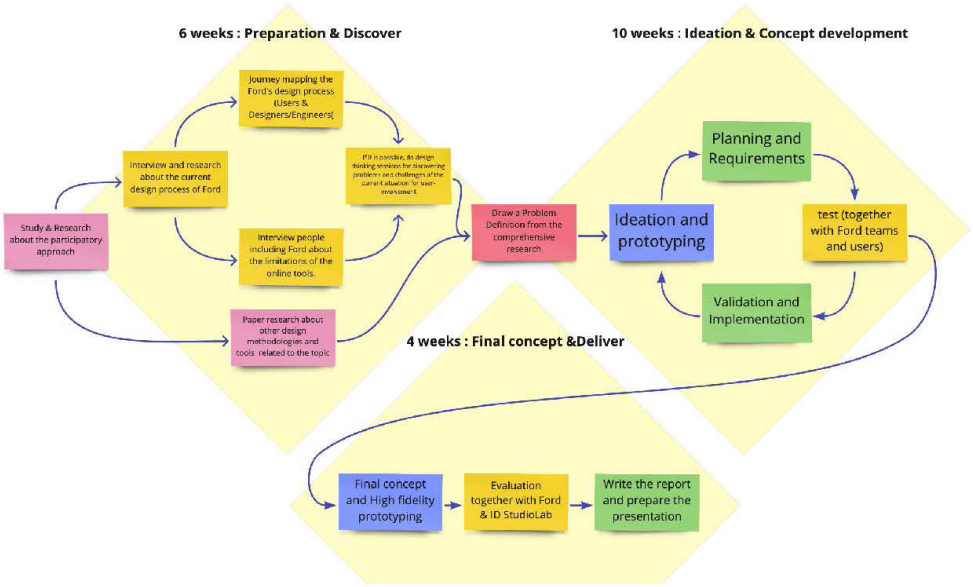


image / figure 2: The graduation project process following a Triple approach.

Initials & Name Y Kim Student number 4832329

Title of Project Developing Participatory Design Thinking Tools in a digital environment

PROBLEM DEFINITION **

Limit and define the scope and solution space of your project to one that is manageable within one Master Graduation Project of 30 EC (= 20 full time weeks or 100 working days) and clearly indicate what issue(s) should be addressed in this project.

In Participatory Design, users are involved in various stages in the design process. In this project, I focus on the design research part to learn about the context and needs of users. Ford wants to gather data about these issues and understand the user needs with new (hybrid) online user gathering tools.

In this participatory design, participant's cointerpretation of the research is an essential part of the design process. [1] The design process should be understandable for not only engineers but also users to develop and refine a design. However, it is not easy to get to involve users and to get the whole team from the world to be the one in a digital environment.

The main challenge of this project is "To get involved users in the early design process more fluently in a digital environment."

and the detailed challenges are: "In a digital environment",
1. To keep the engineers, designers and users on the same page during the whole design process.
2. To ensure all target users to be comfortable to communicate and participate in the design process online.
2. To keep the results of the participatory design to be valuable for Ford; which means that not only it should cover the user's involvement fluently, but also the interpretations of the results should be well made by collaboration with designers, engineers and even users.

References:
[1] Spinuzzi, Clay. "The methodology of participatory design." Technical communication 52.2 (2005): 163-174.

ASSIGNMENT **

State in 2 or 3 sentences what you are going to research, design, create and / or generate, that will solve (part of) the issue(s) pointed out in "problem definition". Then illustrate this assignment by indicating what kind of solution you expect and / or aim to deliver, for instance: a product, a product-service combination, a strategy illustrated through product or product-service combination ideas, ... In case of a Specialisation and/or Annotation, make sure the assignment reflects this/these.

This project aims to develop participatory design thinking tools and guidance for fluent user involvement in a digital environment. The first phase of this project will be user involvement in the design research, mainly focusing on gathering data from users. The role of the user in this research will be a co-creator of the design, and the main issue is that how users can be comfortable in a design process.

In order to embody the user-centred design, this project aims to create a guidebook or website using a participatory design that involves the user in the early design stage as a methodology. This process is iterative to meet users specific needs, allowing users to participate in ideations and evaluations as well as testing sessions. For developing these tools, basic research on participatory design is required, and further research on Ford's existing design process must be carried out. In addition to that, solutions are reflected in the guide by conducting research, interviews, questionnaires, etc. on other elements that are difficult for users to participate in the digital environment.

For this development, I will first create a journey map for Ford's design process and user involvement and set the direction for improvement based on this. After that, I plan to test various participatory design thinking tools, preferably with Ford team and accessible users. After receiving feedback from multiple tests, the final result will be a simple participatory design tool deliver along with the well-organised guidebook or website.

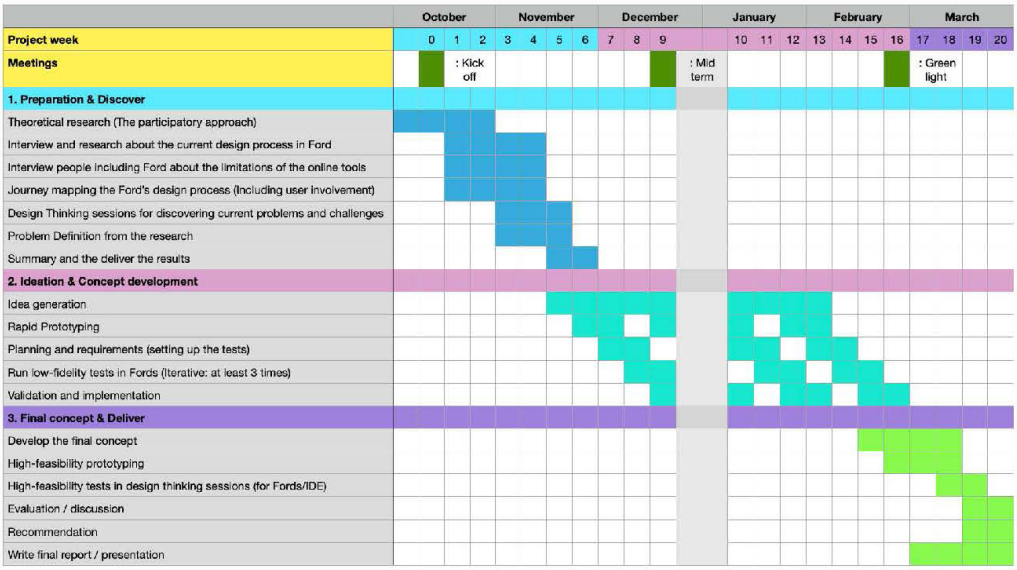
Initials & Name Y Kim Student number 4832329

Title of Project Developing Participatory Design Thinking Tools in a digital environment

PLANNING AND APPROACH **

Include a Gantt Chart (replace the example below - more examples can be found in Manual 2) that shows the different phases of your project, deliverables you have in mind, meetings, and how you plan to spend your time. Please note that all activities should fit within the given net time of 30 EC = 20 full time weeks or 100 working days, and your planning should include a kick-off meeting, mid-term meeting, green light meeting and graduation ceremony. Illustrate your Gantt Chart by, for instance, explaining your approach, and please indicate periods of part-time activities and/or periods of not spending time on your graduation project, if any, for instance because of holidays or parallel activities.

start date 12 - 10 - 2020 12 - 3 - 2021 end date



The project will be following a Triple diamond approach, which is consist of Preparation and discover & Problem Definition, Ideation & Concept development and Final Concept & Deliver (See Figure 2 on page 4).

- Preparation and Discover & Problem Definition: In the first 3 weeks, I will explore the context and do literature research about Participatory Design Methodology, existing design thinking tools. Interviewing is also planned for figuring out problems of the current user involvement. After this research, I will create a design process journey map of the users and designers/engineers. At the end of this stage, the problem definition will be drawn and based on the problem, and the next step will be to proceed.
- Ideation & Concept Development: For a high fidelity of the final deliverables, I planned a short consuming on discover & Problem Definition and put more time on developing the concepts and testing sessions. In this period, I will conduct at least three times of cycles of the prototyping, testing and evaluations. This testing is supposed to be conducted with Ford team. Before the mid-term meeting, I am planning to go at least one user test with a low fidelity prototype. So I would like to the feedback of the project direction in the mid-term. At the end of this cycle, the final concept will be developed. The final concept will be confirmed in the green light meeting together with the whole testing sessions.
- Final Concept & Deliver: At least 2-3 weeks will be spent on building a high feasibility prototype. The final prototype test will be done within 2 weeks, and then together with Ford and Supervisor team, the final deliverable will be evaluated. The report is supposed to be done meanwhile of the whole final concept stage.

MOTIVATION AND PERSONAL AMBITIONS

Explain why you set up this project, what competences you want to prove and learn. For example: acquired competences from your MSc programme, the elective semester, extra-curricular activities (etc.) and point out the competences you have yet developed. Optionally, describe which personal learning ambitions you explicitly want to address in this project, on top of the learning objectives of the Graduation Project, such as: in depth knowledge a on specific subject, broadening your competences or experimenting with a specific tool and/or methodology, ... Stick to no more than five ambitions.

Experience and career:
I did my internship at Co.Lab which is a design consultancy in AFKL as a visual thinker. During my internship, I have experienced design thinking approaches and workshops. It inspired me about how design thinking can be applied to the company. In this experience, I found opportunities to use design thinking to have an efficient and innovative impact on the way people work in organisations.

After I finished my internship, I took a course "Creative Facilitation". I enjoyed the course and designed my own Creative session for a client. That experience would help me a lot to proceed with this graduation project, and I want to use this experience as a stepping stone for my career direction as a facilitator and design thinker.

Challenge :
The Creative Facilitation course was online so that we could not experience everything as same as an offline course. The online tools that existing today have many advantages. However, the obstacles in proceeding with the facilitations were present. Because of the limitation online, and I realised that it is also challenging to keep motivated and to set one's mind to be Design-Centric before and after the sessions.

Future goal :
I want to work as a user researcher and design thinking facilitator after graduation. John Kolko said, "The idea of design, which is mainly used in product design, is now infusing corporate culture." The design thinking approach will spread all over the world and become a culture. I think it's a great opportunity to make tools for the future as well as for the situation in Covid-19. With that in mind, I would like to create a high-feasibility tool that can be used for Ford and IO. After graduation, I would like to continue my career with this experience, and then start my design thinking consultancy.

FINAL COMMENTS

In case your project brief needs final comments, please add any information you think is relevant.