Appendices

JOIN OUR CO-CREATION SESSION: IMAGINE THE GALLEY OF THE FLYING-V

The TU-Delft in collaboration with the German Aerospace Center (DLR) and KLM are looking for novel ways to design the cabins of the future, in this case for the Flying-V. And we need your input!

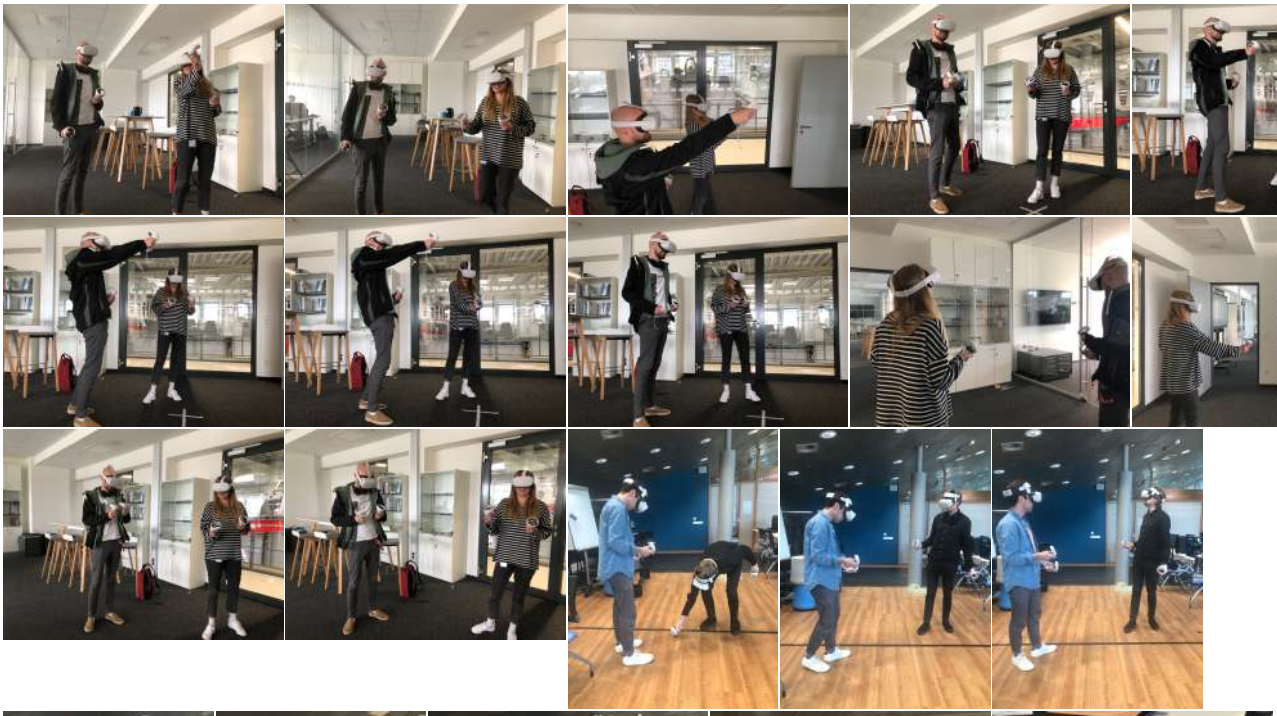
Designing the Future: Participate in a focused 3-hour hands on co-creation session where you will contribute directly to designing a galley that you think reflects the future of air travel. Your imagination is the limit!

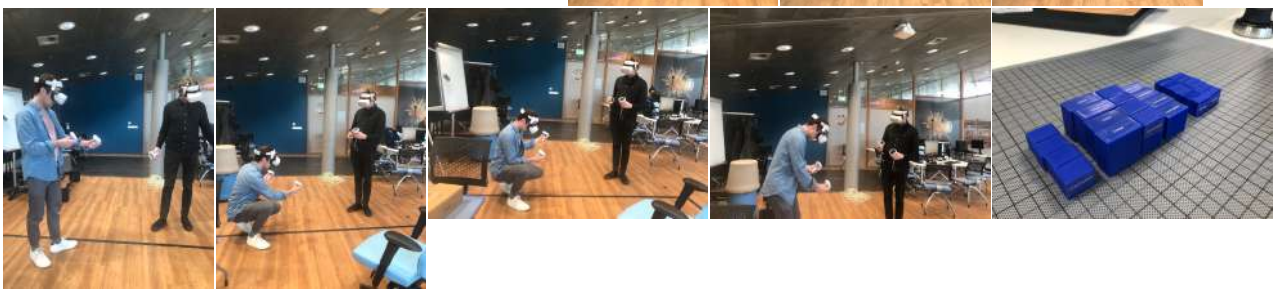
Collaborative Innovation: Alongside fellow flight attendants and a student designer, you will be part of shaping and imagining a cabin galley that truly meets your needs. The workshop also includes a component of extended reality (XR). Intrigued? Join us to find out more!

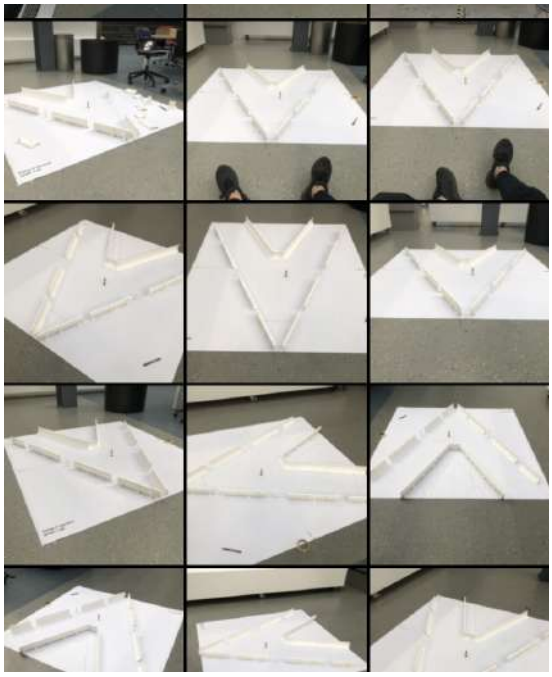
For more info:

TU Delft KLM DLR

Recruitment Flyer







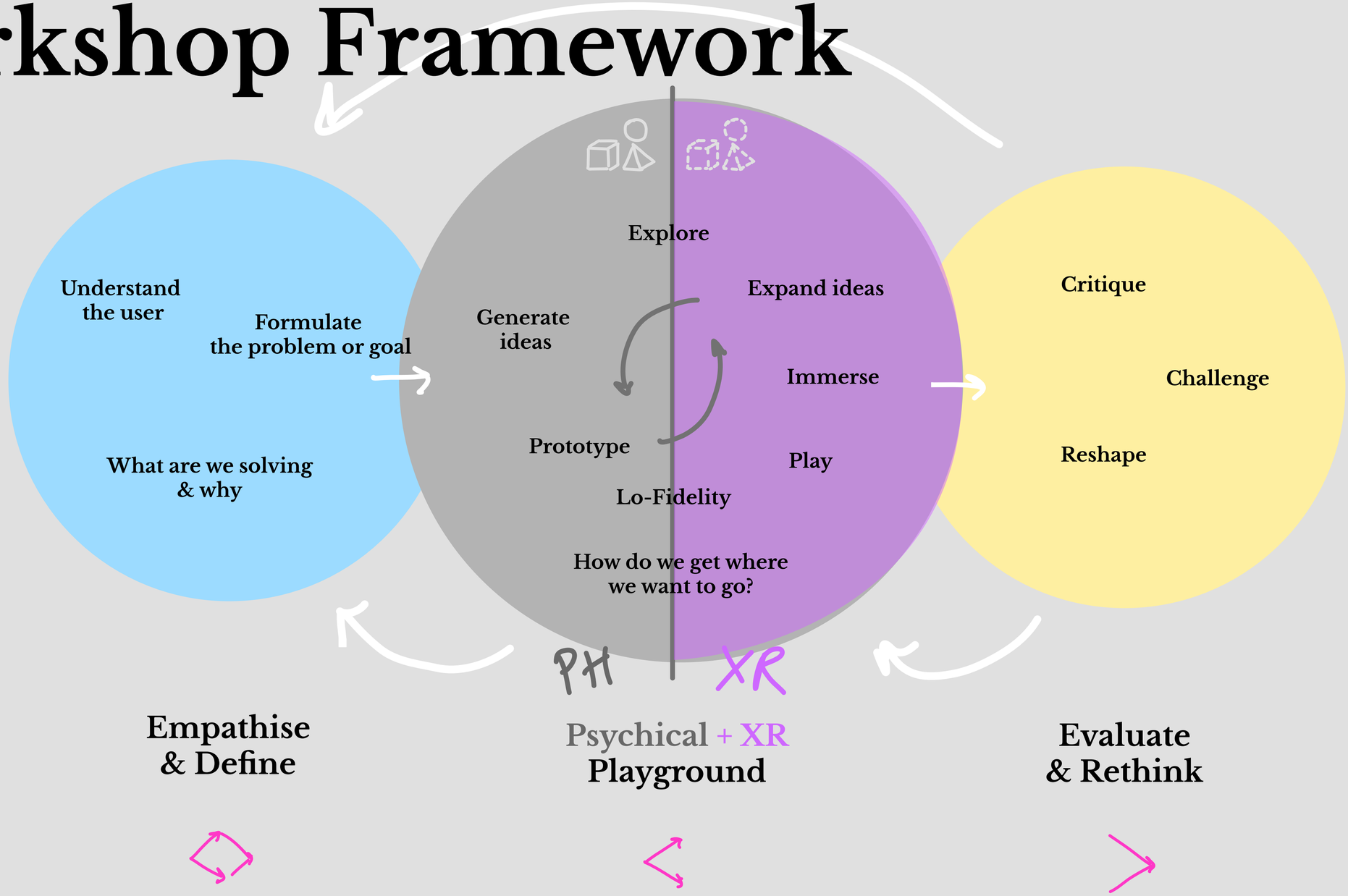
Various Photos

+XR
A co-creation guide for combining XR and the physical world

How to use this guide

This guide is intended to be of guidance for the fuzzy front end of design while co-creating.

Workshop Framework



Empathise & Define

Psychical + XR Playground

Evaluate & Rethink

Welcome!

In this workshop kit you will

What is design thinking?

The double diamond

The role of facilitator/designer

What will you be working on?

Workshop Checklist

Workshop Agenda

In this workshop kit you will

Empathise
Design Solutions
Verify and Iterate in XR

Understand the context

Identify the user

Recruit

Empathise

Define

Ideate

Prototype

Test

Finalize

Empathise

Define a challenge

Ideate possibilities

Prototype your design

Test your design

Present your work

Welcome to +XR

+XR is a method that is based on Design Thinking (DT) principles and the Double Diamond (DD) design process. It combines these principles together with co-creation techniques to come to a unique method that facilitates creative thinking in new and efficient ways.

This guideline is intended for designers but the DT and DD principles can be applied by everyone.

This guideline will give you the tools you need to benefit from XR within your co-creation projects. It will take you from understanding the problem to prototyping and testing first ideas to further iterate on.

Remember to have fun and let’s get started!

Before you continue...

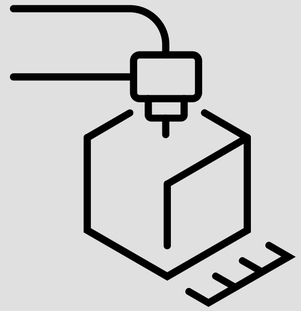
This guide is made for designers and is intended to be used by or in collaboration with designers. To make optimal use of this guide please sure you and/or your facilitation team are familiar with the following techniques:

- gravity sketch

Or other XR sketch program

- 

Or other CAD program

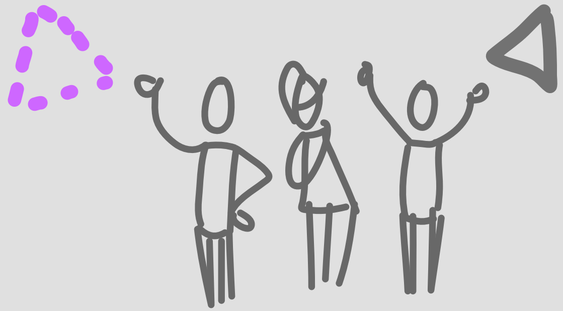
- 

Rapid Prototyping

What will you do ?

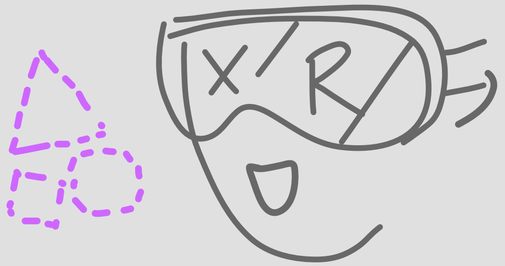
Follow a DT & DD route

Follow a diverging and converging path of design exploration that can be applied to a wide variety of design problems.



Co-create

Empathise with your end-user and create exciting new solutions with and for the end-users of your product by using physical and virtual tools.

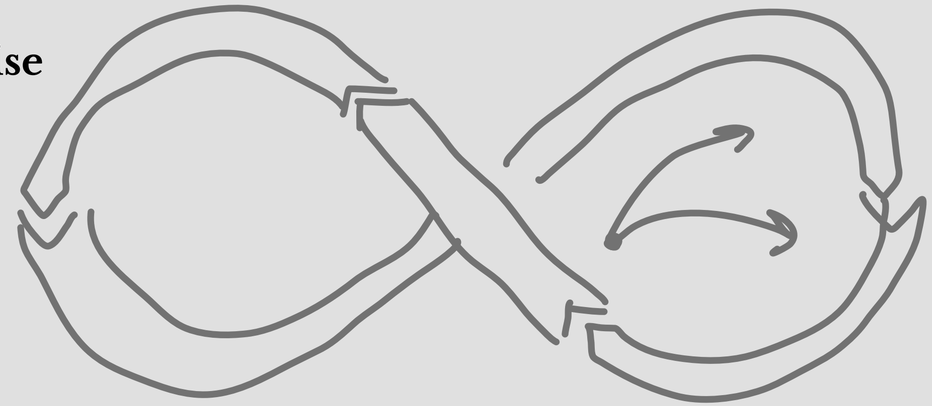


Design, verify & iterate in physical and XR

Take your ideas and designs to the next level by exploring them in XR and letting end users interact with these concepts

Design Thinking

1. Empathise



3 Ideate

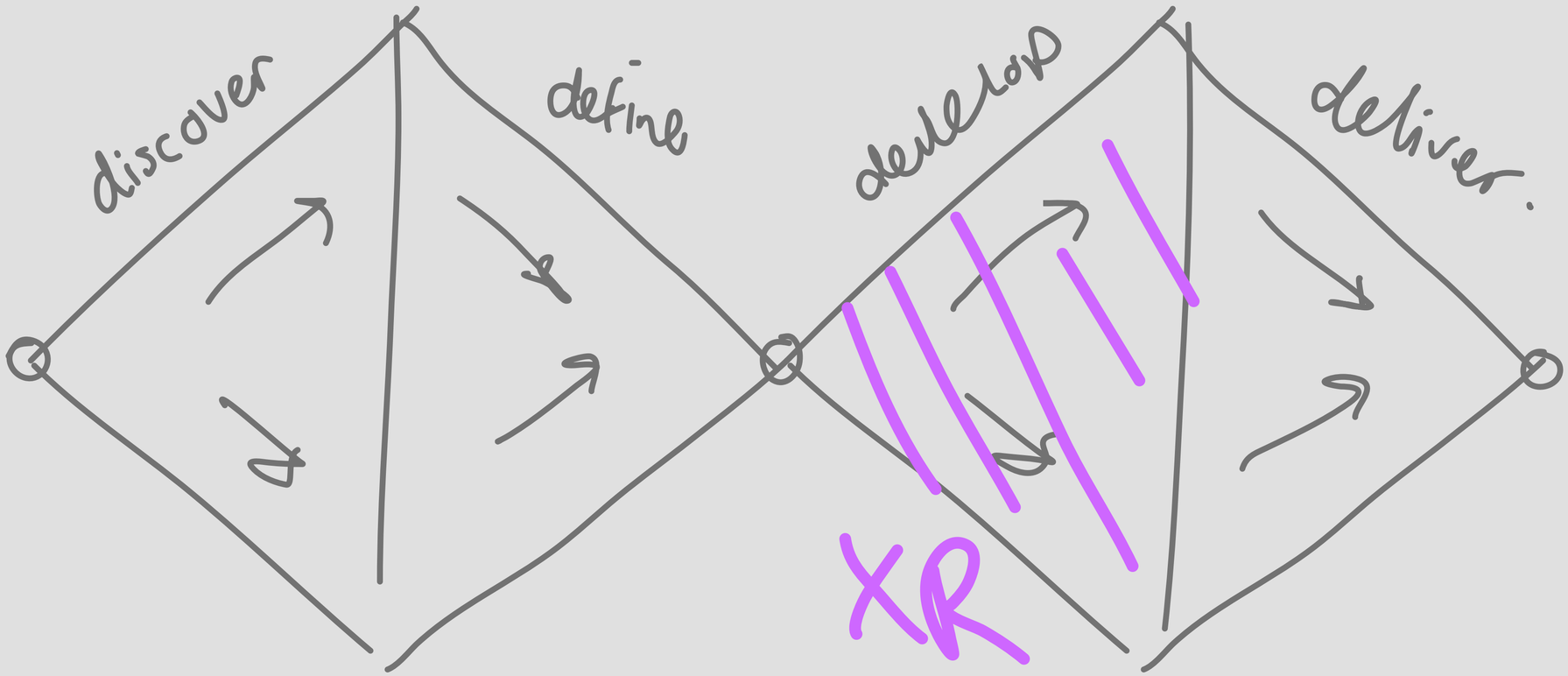
2 Define

5 Test

4 Prototype

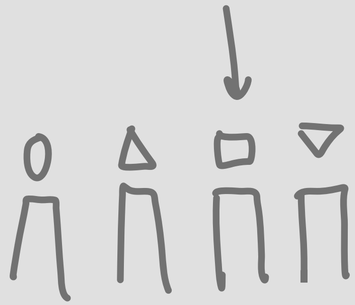
Double Diamond (Or SDF?)

“The Double Diamond diagram from the Design Council helps to visualize the divergent and convergent stages of the design thinking process, and highlights the different modes of thinking that designers use.”



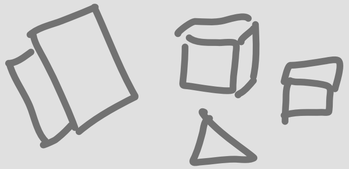
Pre-Workshop

- Understand the context



- Identify the (end) user and stakeholders

- Recruit!



- Prepare workshop materials

- Prepare workshop agenda

You as facilitator/designer

The facilitator is responsible for preparing and leading the session and keeping the general flow of the workshop going.

- Engage in Early Planning
- Select your users/participants
- Plan logistics and location
- Designs workshop materials
- Facilitates the session - welcome and intro
  - explaining the exercises
- Wraps up

Workshop

1. Discovery

Understand the challenge
Prepare research
Gather inspiration

2 Interpretation

Tell stories
Search for meaning
Frame opportunites

3 Ideation XR

Generate ideas
Refine ideas

4 Experimentation XR

Make prototypes
Get feedback

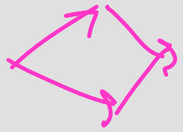
5 Evolution

Track learnings
Move forward

Workshop

1. Empathise & Define

Understand the user
Understand the problem
What are we solving and why?



2 Playground

How do we get where we want to go?

-Ideate	-Ideate
-Generate	-Generate
-Prototype	-Prototype
-Play	-Play

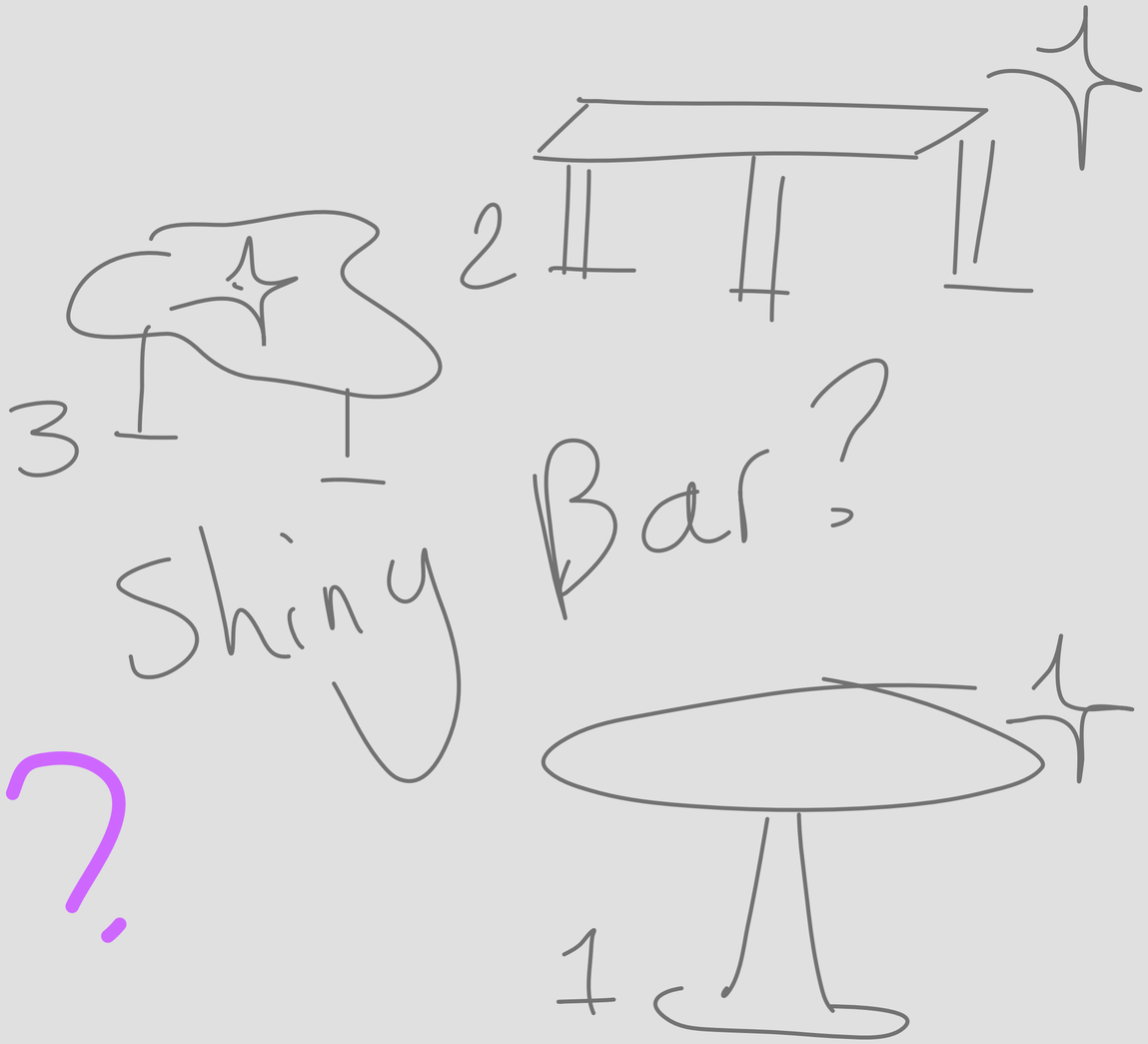
3 Evaluate & Rethink

Generate ideas
Refine ideas

Post-Workshop

1. **Reflect**

2. **Finalize & Deliver**



- **Checklist: Final design consolidated, validation from stakeholders, final presentation delivered.**

Design Thinking

1. **Empathise**

Understand the people you are designing for to know their needs

2 **Define**

Who are you designing for and what are you helping them with

3 **Ideate** XR

Come up with ideas in a hands-on way to solve the problem!

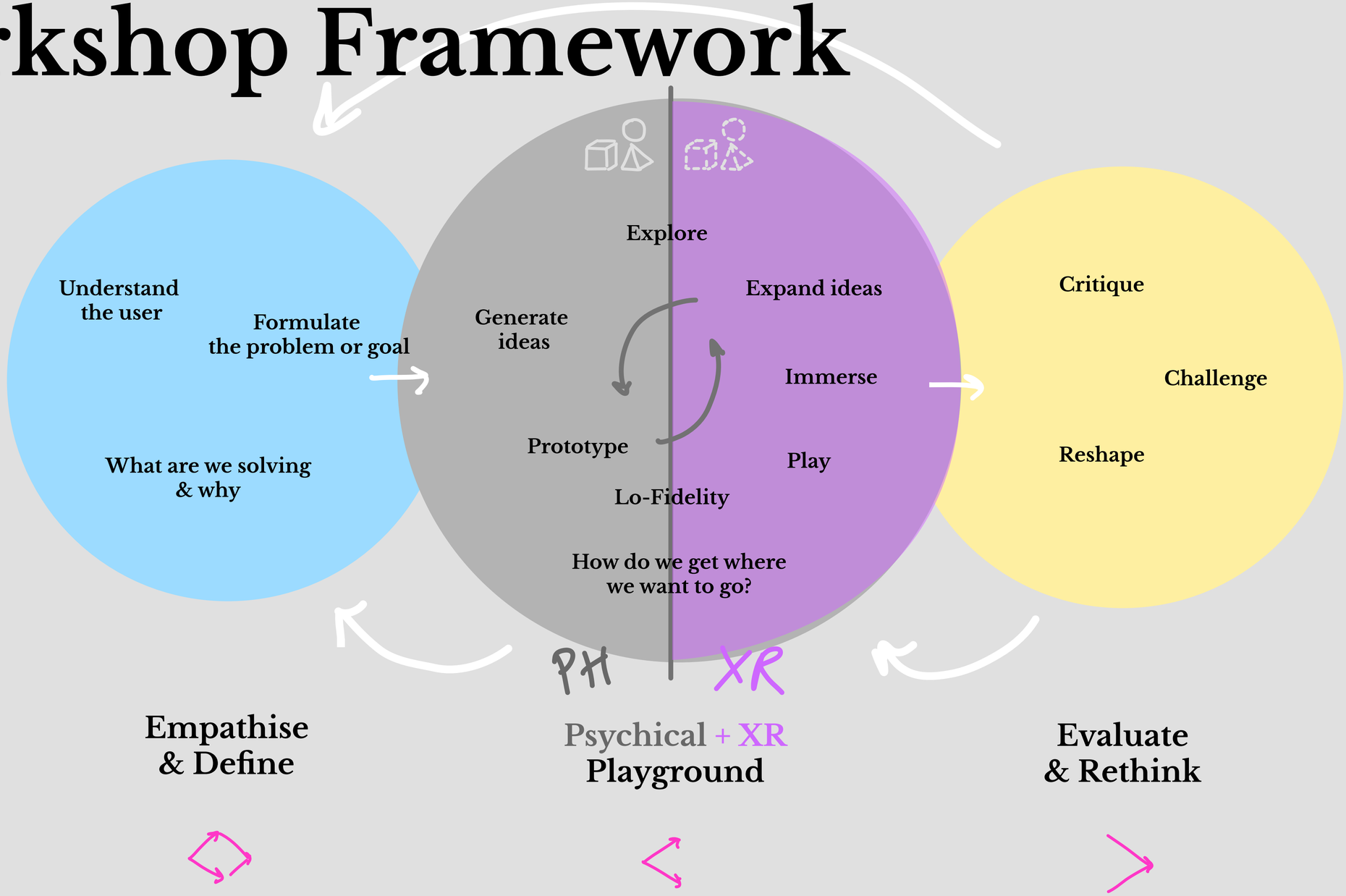
4 **Prototype** XR

Ties into the last step

5 **Test** XR

Verifying and test your idea in XR

Workshop Framework



Empathise & Define

Psychical + XR Playground

Evaluate & Rethink

Understand the context

Understand the context

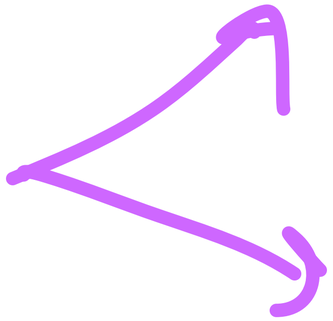
For who are we designing?
What are we designing?

Case example:
We are designing for the Flying-V. Specifically the interior of the Flying-V. More specifically the galley
or something fulfilling a similar function in the Flying-V

Engage in early planning

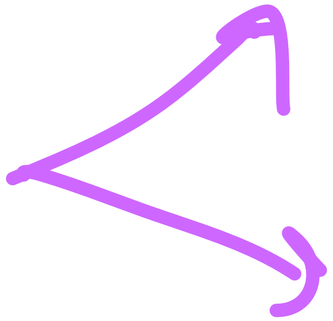
1 Discovery

Understand the challenge
Prepare research
Gather inspiration



- **Checklist: Stakeholder perspectives considered, context and environment understood, briefing session conducted.**

1 Empathise & Define



- **Checklist: Stakeholder perspectives considered, context and environment understood, briefing session conducted.**

Design Thinking

1. **Discovery**

Understand the challenge
Prepare research
Gather inspiration

2 **Interpretation**

Tell stories
Search for meaning
Frame opportunites

3 **Ideation** XR

Generate ideas
Refine ideas

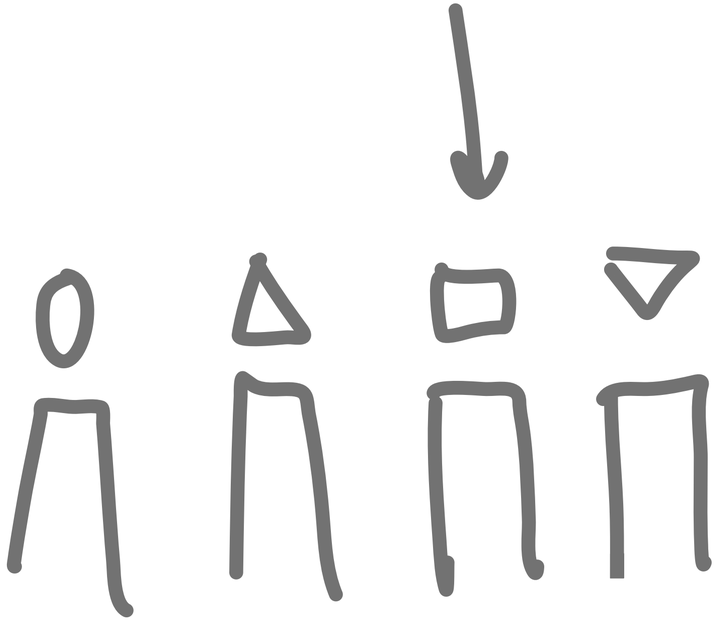
4 **Experimentation** XR

Make prototypes
Get feedback

5 **Evolution**

Track learnings
Move forward

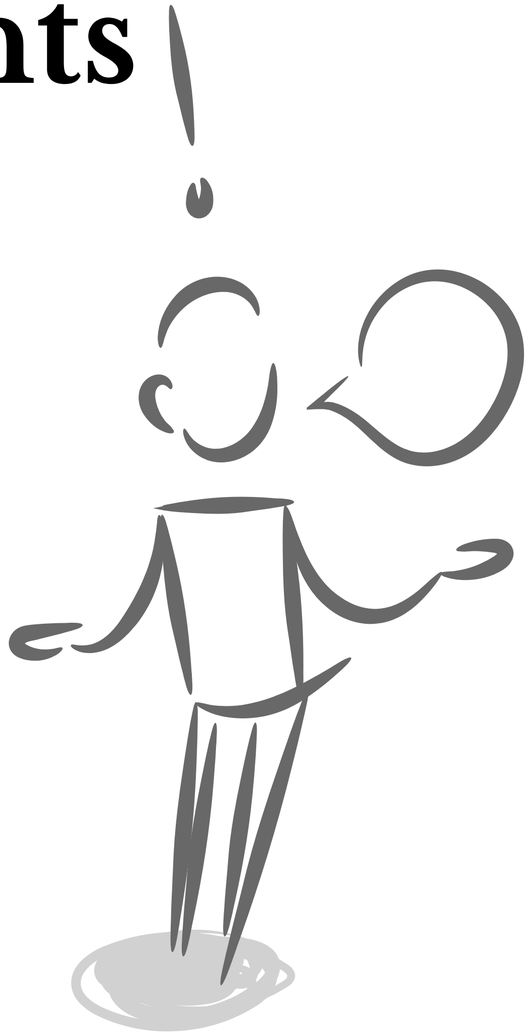
Identify the (end) user and stakeholders



Case example:
Who will be working in the galley of the Flying-V?
Flight attendants!

- **Checklist: Clearly defined problem statement, comprehensible to all, invites innovation, acknowledges the context.**

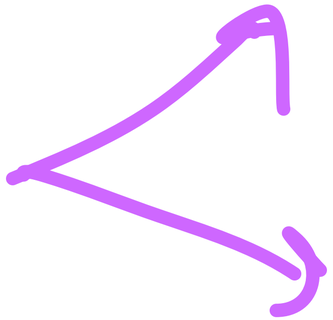
Select your users/participants



2 Interpretation

Tell stories
Search for meaning
Frame opportunites

Playground



- **Checklist: Stakeholder perspectives considered, context and environment understood, briefing session conducted.**

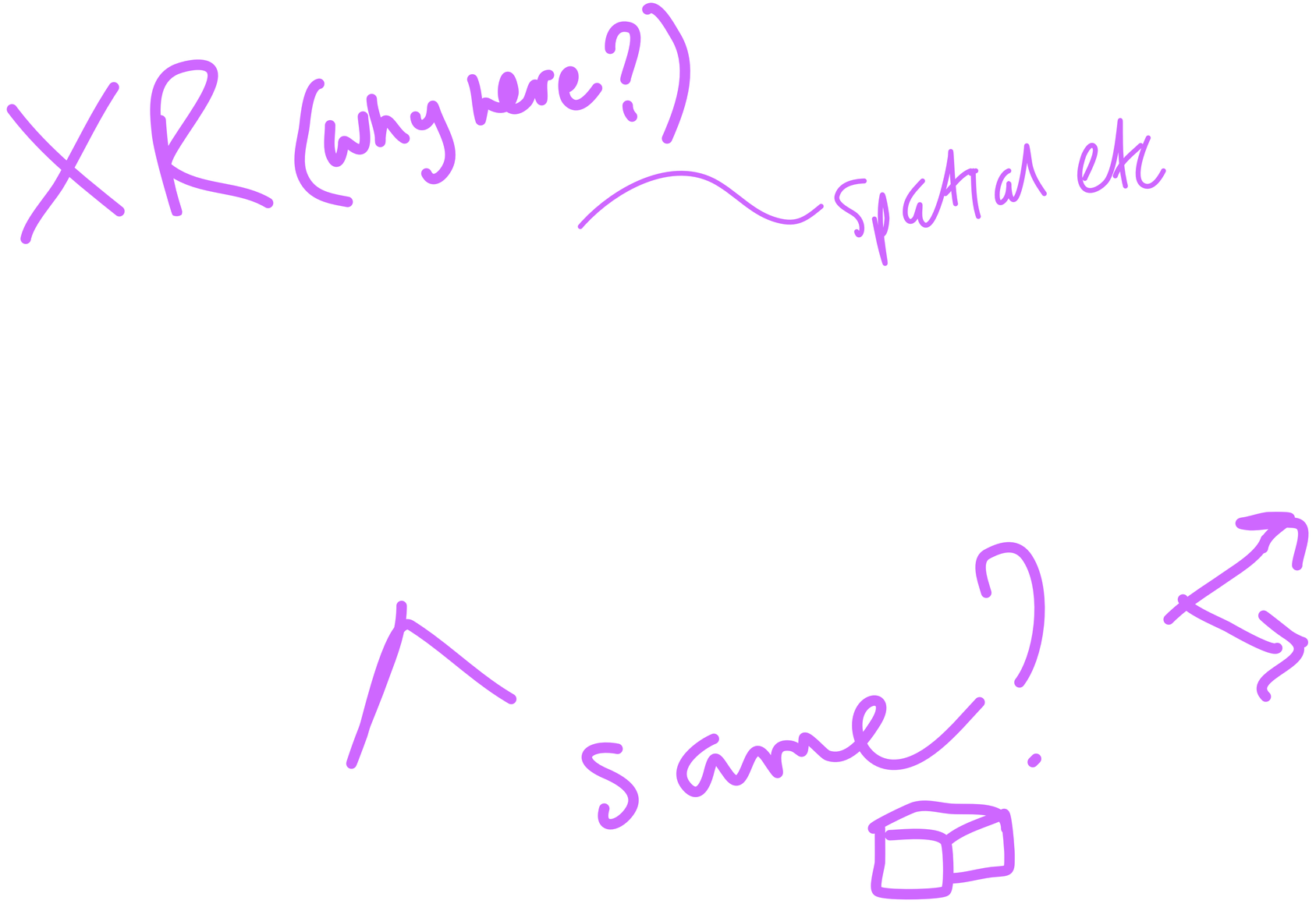
Recruit!

Case example:
Use your connections!
Social media

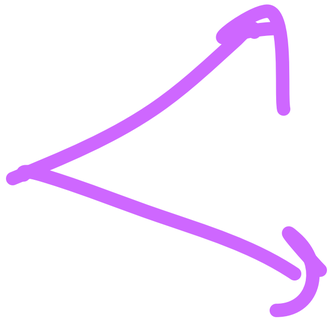
Plan logistics and location

3 Ideation
Ideate

Generate ideas
Refine ideas

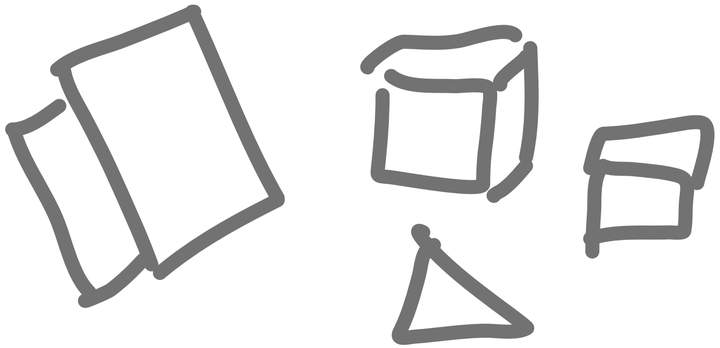


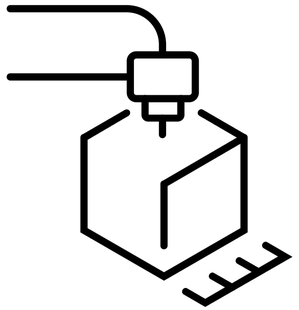
3 Evaluate & Rethink



- **Checklist: Stakeholder perspectives considered, context and environment understood, briefing session conducted.**

Prepare Workshop materials





Case example:
Dollhouse kit
Ambiguous materials

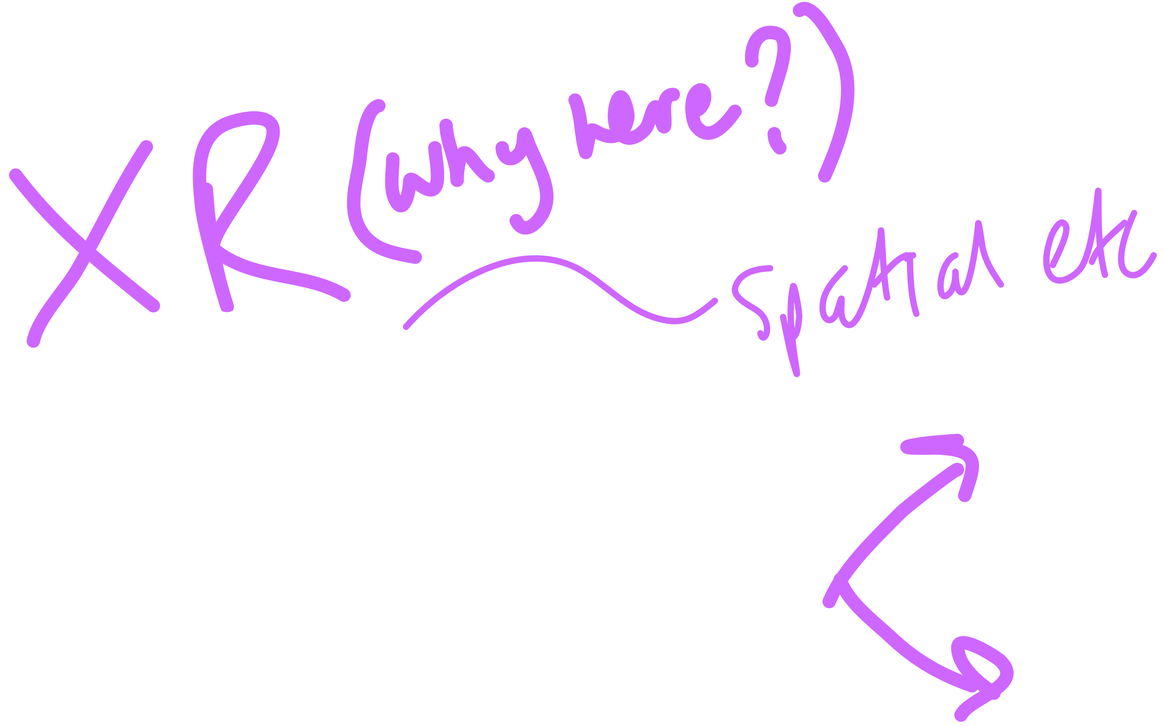
Design workshop materials

= xR

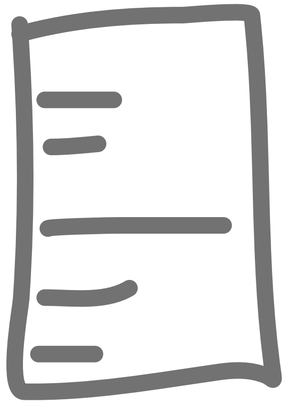
Case example:
Galley parts Flying-V

Experimentation Prototype

Make prototypes
Get feedback



Prepare Workshop agenda

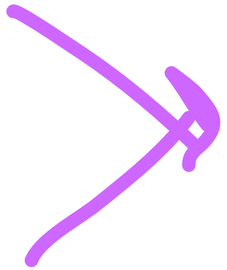


Facilitate the session

xR readtool

Evolution Test

Track learnings
Move forward



Wrap up

Shiny Bar

+XR
A co-creation guide for combining XR and the physical world

What is it

+XR is a guideline on how to use Extended Reality in co-creation. It combines co-creation techniques with XR and hence facilitates creative thinking in new and efficient ways.

How can she involve people in XR. Provide with steps

How does it work / Roadmap

Before:

Internal get people to join

Step 1 :
ROLE
Experiences

Step 2

Step 3

Suggested steps

with participants

preparation before after

as designer

Design the cabin... in Plain

How.
_With people who have experience in working there.
_Use 1:1 because of ... (literature..) ...

Why make them experts of their own experience.

Challenge: Different tech heavy.

How:

Who is involved

What

How

Why

Who is involved

What

How

Why

Goal of this method

Why am I using it like this?

Questionnaire results

To come up with innovative cabin (galley) designs

To spark more innovative co-created galley in which end users are happy

Collaboration

1 Brief
What to design : Galley
And for whom : Flight attendants (involve them and why?)

talk to ..

2 Context: Designers Understand the spatial context & user environment by ...
Spatial Restrictions / Operating Room
Galley
Share Flying V:
Service on an airplane / basic level : Have some interviews beforeat

talk to ..

3. User: Designer Understands the Participants Perspective by Interviewing 1-2 people

talk to ..

3 main questions
What does the job entail? what do you encounter Immerse in existing context
Dislike
Why

4. Prepare: Designer Prepares workshop materials

Collaboration

Floorplan top help understand the space XR
3D print stuff (doll house)

XR world spatial (emphasize in 1:1, because of paper x)

(for step x)
for the XR world

(for step x)

talk to XR peeps

Workshop Start

5. Empathise in workshop

What does the job entail?
Dislike
Why

Immerse in the current

talk to cabin crew..

6. Start designing in physical

Give instructions about today's goal (design your ideal galley)
Give them blocks
Let them build with physical blocks

Create the new context

7. Immerse in XR

Model the physical blocks in XR
Explore the design with them in XR
Build ideas and talk out loud.

Immerse in the new with XR

8. Final designs???

Most interesting ideas. Write them out.

9. Making a Final design and ask for feedback

Making a final in XR. And see how it works.
Really want to give that to them
How would you move forward if you do have more time

talk to designers

Key points of what makes my method really nice

Goal

What are you designing and for whom

Why do you need to understand the context.
Need to understand galley
Shape of Flying-V
Service on an airplane (people tell you)
Elements galley
Need to understand your operation space/environment.
Design space

Over all Failitator Principles

Overall:

Step specific principles

Step 2 ... specific

Step 3 ... specific

How to move forward: Green light

1 Finalize the framework

Finalize with company: (SPD)

2. Present framework to company

3. Write down viability, feasibilty... with them together

4. Write down next steps on how they would like to use your outcome ...

...

Reflection on report:

like

dislike .. / I want to still .. because ...

Let’s start!

+XR
A co-creation guide for combining XR and the physical world

How does it work?

The Designer Understanding

Collab partners

1. Brief

- Identify what we are designing
- Identify for whom we are designing

talk to:
designers
colleagues

2. Context: The designer understands the design space

- What do you need to know about the environment you are designing for?
  Spatial - Theme specific - Operational - Personal - Technological

talk to:
engineers
designers

3. User: The designer understands the participants perspective

- What do you need to know about your participants
  Demographic & Prof. Bg - Phys&Psy - Pros/Cons - Operational Understanding

talk to:
end users

Designer Preparing

4. Prepare: The designer prepares the workshop materials

- Prepare a paper floor plan of your design for you users to understand the space.
- Prepare your MakeTools by using arts and crafts materials or 3D printing them.
- Prepare your XR world: Using Gravity Sketch or Blender create the virtual elements that represent your physical MakeTools.

talk to:
3D printing
and/or XR
experts

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talk to:
3D printing
and/or XR
experts

Workshop Start (explain structure to participants)

Designer Facilitating

5. Empathise in workshop

- Do a brain dump of all the things that come to mind when participants think of the subject.
- Ask questions about their experiences
- Ask questions about challenges
- Ask questions about improvements

6. Design in physical space

- Give instructions about the goal of today's workshop. ideal galley FV
- Give them physical blocks to play and build with. Explain the concrete and ambiguous nature of the blocks.
- Let them build with physical blocks

7. Immerse in XR

- See what your participant have created. Model this design of the physical blocks in XR using Gravity Sketch
- Explore the design with them in XR
- Build ideas and talk out loud.

XR world spatial (emphasize in 1:1, because of paper x)

8. Final design

- Select your most interesting designs from the workshop
- Explore why they are most relevant

9. Final design feedback

- Making a final in XR. And see how it works.
- Iterate on your final design and make it final

Workshop Start (explain structure to participants)

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Moving forward from GL:

- Finalise the Framework

- Present the framework to DLR

- Go over Viability, Feasibility and Desirability with DLR

- Finalise the Framework with DLR

- Write down next steps on how DLR would like to use this outcome

Agenda

1 Recap / Set Up 30 sec.

2 Research Question

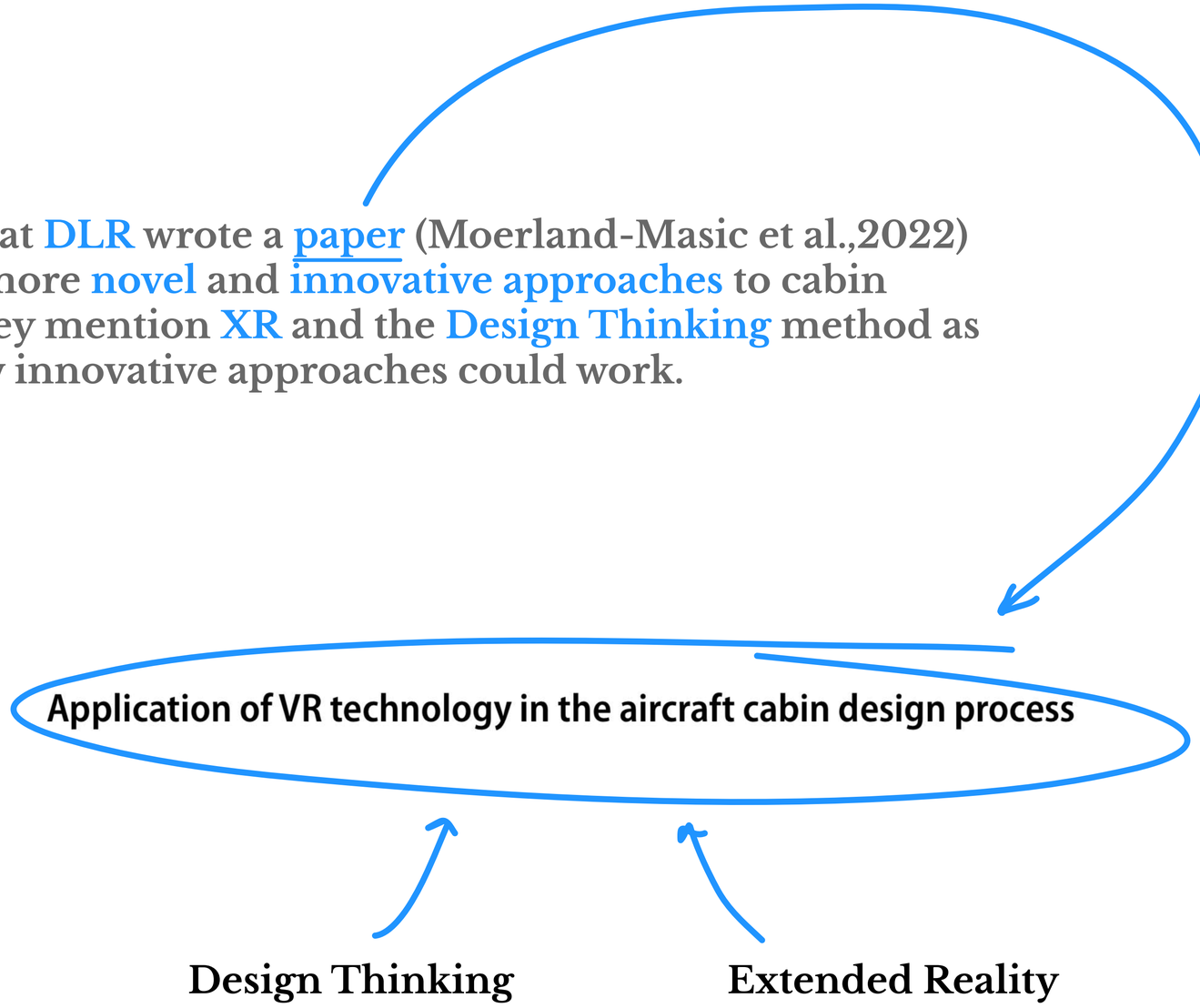
3 Co Creation + XR

3

4

Recap

The cabin design team at DLR wrote a paper (Moerland-Masic et al.,2022) last year on exploring more novel and innovative approaches to cabin design. In this paper they mention XR and the Design Thinking method as a first try out to see how innovative approaches could work.



What is it?

XR+ is a design facilitation method designed for product designers, engineers and user representatives like flight attendants aiming to co-create innovative design solutions using a mix of physical elements and extended reality (XR). These come together in a design workshop.

By exploring and prototyping design concepts in a tangible and immersive environment, it allows for richer ideas and collaboration among a diverse group of stakeholders. It allows participants to visualise and manipulate design concepts, understand implications from different perspectives and explore innovative possibilities without constraints typically imposed by traditional design tools.

The interplay between physical elements and XR fosters a creative synergy that encourages participants to venture beyond conventional boundaries.

Goal of this method

To initiate a collaborative environment that sparks innovative co-created (galley) designs in which end users are crucial for shaping the final design.

Questionnaire results Why am I using it like this?

Overall facilitator principles

- Engage in Early Planning
- Select your users/participants
- Plan logistics and location
- Designs workshop materials
- Facilitates the session - welcome and intro
  - explaining the exercises
- Wraps up
- Have an open approachable attitude
- Reserve judgement

Step specific:

Step 5: make people comfortable to speak their mind.

Step 6: help participants on their way if they are struggling.

Recap

DLR has a connection with the TU Delft and the TU is currently working on the development of the Flying-V. Since this aircraft is still very much in development this proved to be a good test case to explore novel and innovative cabin design processes DLR is interested in.

I would argue (end)user involvement is very important in the design process. This is becoming more so in recent years due to the shift from traditional designers roles to more co-creation and facilitation roles.

During the midterm it became clear that the question of the design brief shifted to the following:
“How and where can we make use of XR (extended reality) in the co-creation process whilst involving end-users?”

Immerse in current context

PRE-WORKSHOP

The Designer Understanding

1. Brief

To Do:

- **Identify what we are designing?:**

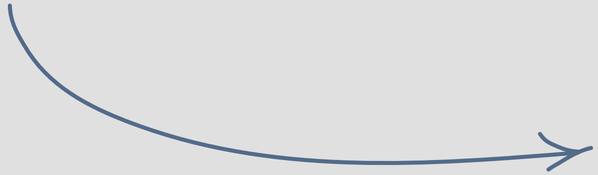
  The galley (or something of similar function) in the Flying-V

Done by:

Facilitator/Designer & Client

- **Identify for whom are we designing?:**

  Cabin crew



Why do we involve them?

Research has shown that involving end-users in a co-creative process leads to better design results.

Collaboration partner:

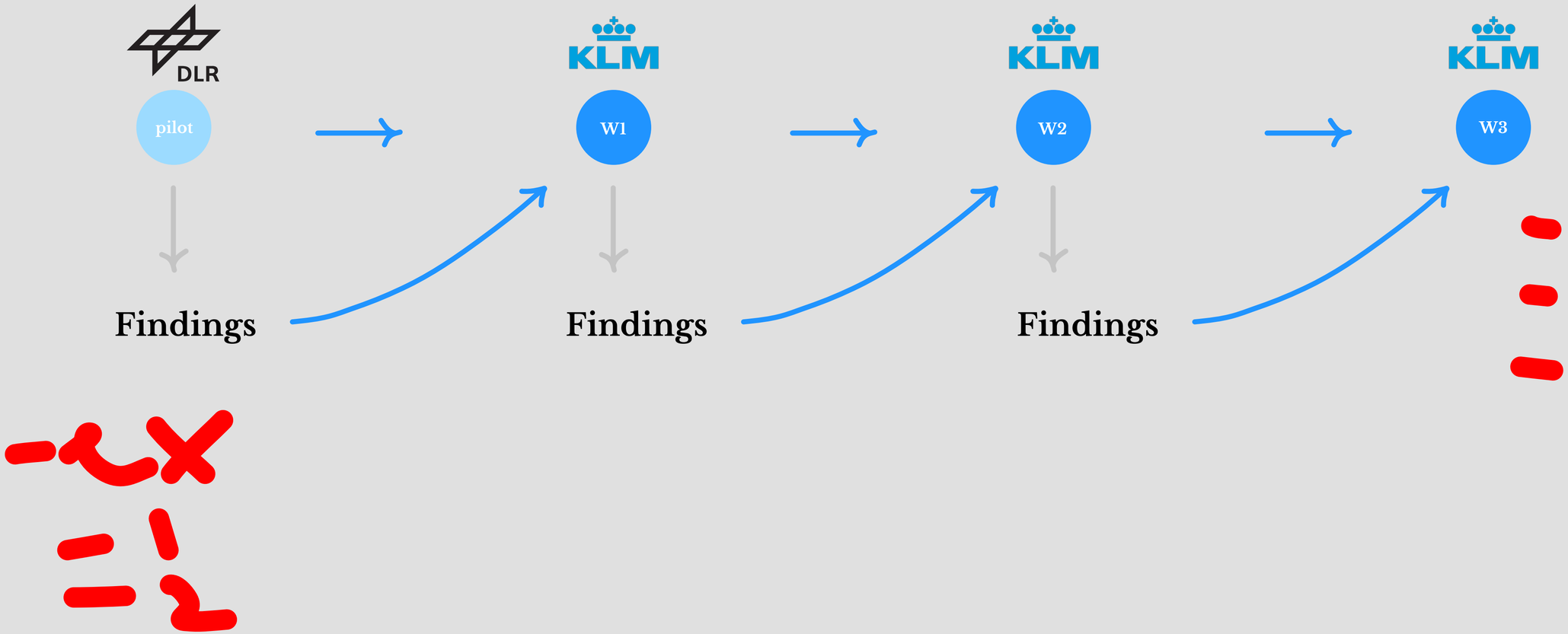
Talk to client & fellow designers/colleauges

Research Question

During the midterm it became clear that the question of the design brief shifted to the following:

“How and where can we make use of XR (extended reality) in the co-creation process whilst involving end-users?”

How it came to be



Immerse in current context

PRE-WORKSHOP

The Designer Understanding

2. Context: Understand your design space

Done by:

Facilitator/Designer

Find out: ○ What do you need to know about the environment you are designing for?

Spatial
- What does the layout of the Flying-V look like?

Theme specific
- What is a galley?
- What does a galley consist of?

Operational
- How do FA's work in a galley?
- What does service look like?

Personal
- Conduct interviews with users
- Understand needs and challenges of the users. Likes and Dislikes

Technological
- Basic knowledge of technological systems and their limitations and capabilities can aid in creating new concepts.

Collaboration partner:

Talk to engineers fellow designers

How to collaboratively integrate participants in the design of a flying V using XR

Workshop Start
(explain structure to participants)

The Designer Understanding

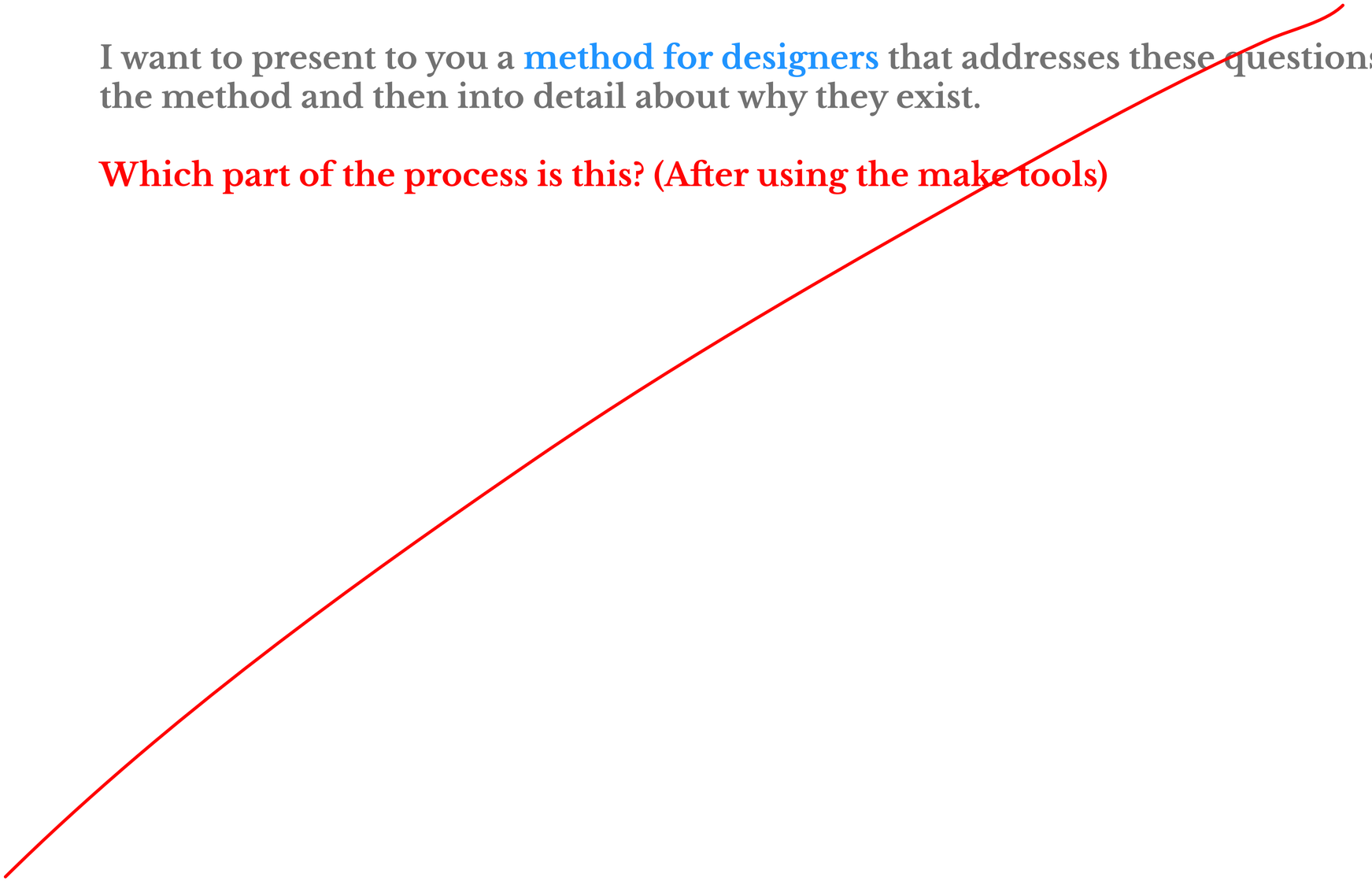
Designer Preparing

Designer Facilitating

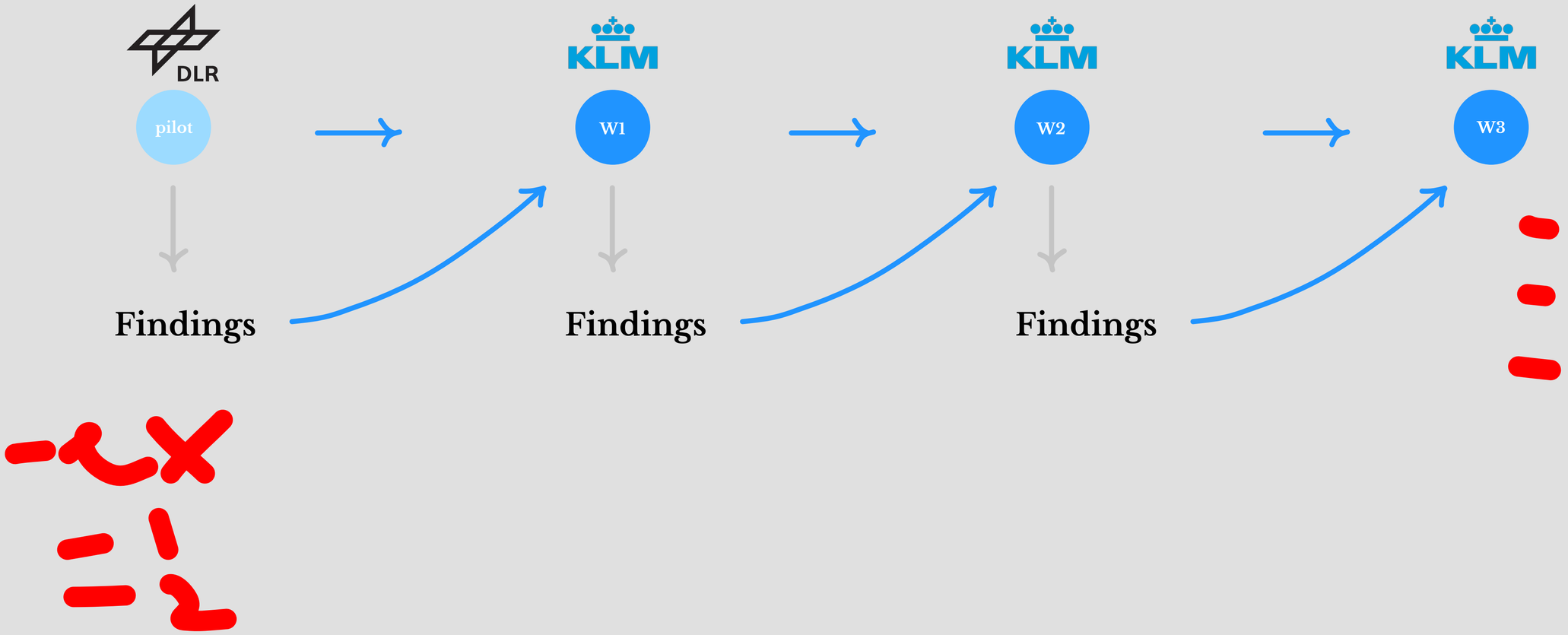
How?

I want to present to you a method for designers that addresses these questions. I will first go over the method and then into detail about why they exist.

Which part of the process is this? (After using the make tools)



Main Findings for final method



Immerse in current context

PRE-WORKSHOP

The Designer Understanding

3. User: Understand your participants/end user

Done by:

Facilitator/Designer

Find out:

- **What do you need to know about your participants?**

Demographic & Professional BG

- Who are you designing for? What are their specific needs?
- What kind of experience do they have?

Physical & Psychological

- What physical challenges need to be taken into account?
- Stressors & Motivations

Their Pro's & Cons

- What do they like and dislike about the current context.

Operational Understanding

- How do they manage their current work.
- What would like changed? Think of service, safety, placement etc.

Collaboration partner:

Talk to your end users: Flight Attendants

Do:
Do interviews with your end user. Gather research.

Note:

Add Agenda: (Challenges for XR?) - > Interesting

How it came to be ? - > Most interesting

Findings e.g.

Why this method why do you make it useful for them ?

Design Goal

To encourage DLR to collaboratively design (the galley for the Flying-V) with end users, by facilitating co-creative processes that combine the physical world and the XR world to spark innovative new concepts.

4. Designer: Prepares workshop materials

To Do:

- **Prepare a paper floorplan of your design for you users to understand the space.**

  A 1:20 scale floorplan was plotted to be used in the workshop in Step 6

- **Prepare your MakeTools by using arts and crafts materials or 3D printing them.**

  Existing and ambiguous (scaled) galley elements where printed to be used on the floorplan of the Flying-V in Step 6

- **Prepare your XR world: Using Gravity Sketch or Blender create the virtual elements that represent your physical MakeTools.**

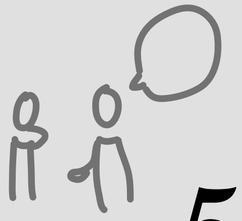
  3D print files and Flying-V 3D models where made and or modified to be imported into Gravity Sketch and used in the workshop in Step 7

Done by:

Facilitator/Designer

Collaboration partner:

Talk to 3D printing and/ or XR experts



WORKSHOP

The Designer Facilitates

5. Empathise in the workshop

To Do:

- **Do a brain dump of all the things that come to mind when participants think of the subject.**

  In the Flying-V galley workshop FA's were asked to write on Post-It's tall the things they liked about a galley. Then think of all the things they disliked about the galley. These thoughts lead to opening up conversations about experiences, challenges and improvements. The post-it's lead to clusters that could be referenced in Step 6 and Step 7

- **Ask questions about their experiences**
- **Ask questions about challenges**
- **Ask questions about improvements**

Done by:

Facilitator/Designer & Participants

Collaboration partner:

Talk to flight attendants

5. Empathise in the workshop

Create the new context

WORKSHOP

The Designer Facilitates

6. Design in physical space

Done by:

Facilitator/Designer

Facilitator/Designer

Participants

Collaboration partner:

Talk to flight attendants

To Do:

- **Give instructions about the goal of today's workshop.**

  In the case of the Flying-V the flight attendants were instructed to design their ideal galley if they could have it their way.

- **Give them physical blocks to play and build with. Explain the concrete and ambiguous nature of the blocks.**

  Flight attendants were given physical 3D printed blocks to build and explore their ideal galley with. This proved to be a quick and iterative medium to design with.

- **Let them build with physical blocks**

  Flight attendants designed their ideal galleys and could reason about their choices with the physical blocks.

Why this step?:

In the workshop it became clear this is the fastest most easy way to mock up a 3d design. Also Sanders (2006) mentions using 3D tools

7. Immerse in XR

Immerse in the new context

WORKSHOP

The Designer Facilitates

Done by:

Facilitator/Designer

Facilitator/Designer & Participants

Facilitator/Designer & Participants

Collaboration partner:

Talk to flight attendants

To Do:

- **See what your participant have created. Model this design of the physical blocks in XR using Gravity Sketch**

  In the Flying-V example participants had modelled and placed their ideal galleys in the physical world. The facilitator could reference this real world design and with pass through mode on the XR headset model it in XR.

- **Explore the design with them in XR**

  For the Flying-V FA's were guided by the facilitator through their design on a 1:1 scale and to see how they experienced their designs

- **Build ideas and talk out loud.**

  Elaborating ideas popped up and through talking out loud more ideas and discussions came to mind

Why this step?:
Sanders (2006) mentions, the more full scale and 3D it gets, the better. Although not mentioned in 2006 by Sanders,XR is an immersive technology that can simulate this.

Also:
The physical model stays present in the room and acts as a talking piece

Immerse in the new context

WORKSHOP

The Designer Facilitates

8. Final Designs

To Do:

- **Select your most interesting designs from the workshop**

  In discussing with the participants, a design or feature was chosen in the workshop to further elaborate on. This was based on full scale immersion in XR and comparing to the physical model.

- **Explore why they are most relevant**

  Discuss why this idea has potential and why it is desirable

Done by:

Facilitator/Designer & Participants

Facilitator/Designer & Participants

Collaboration partner:

Talk to flight attendants

Verify the new context

POST-WORKSHOP

The Designer Reflects

9. Final Design Feedback

To Do:

- **Iterate on your final design and make it final**

  Make the final design in XR and see if the design works in the intended way? What would you change? What not? Do the participants agree with this design?

- **Next steps.....**

Done by:

Designers (could be with participants)

Collaboration partner:

Talk to designers

Agenda

Let’s start!

+XR
A co-creation guide for combining XR and the physical world

Design Goal

To encourage DLR to collaboratively design (the galley for the Flying-V) with end users, by facilitating co-creative processes that combine the physical world and the XR world to spark innovative new concepts.

How does it work?

Moving forward from GL:

- Finalise the Framework

- Finalise the Framework with DLR

- Present the framework to DLR

- Go over Viability, Feasibility and Desirability with DLR

- Write down next steps on how DLR would like to use this outcome

Agenda

1 Recap / Set Up

2 Research Question

3 Co Creation + XR

4 Findings Midterm and Process

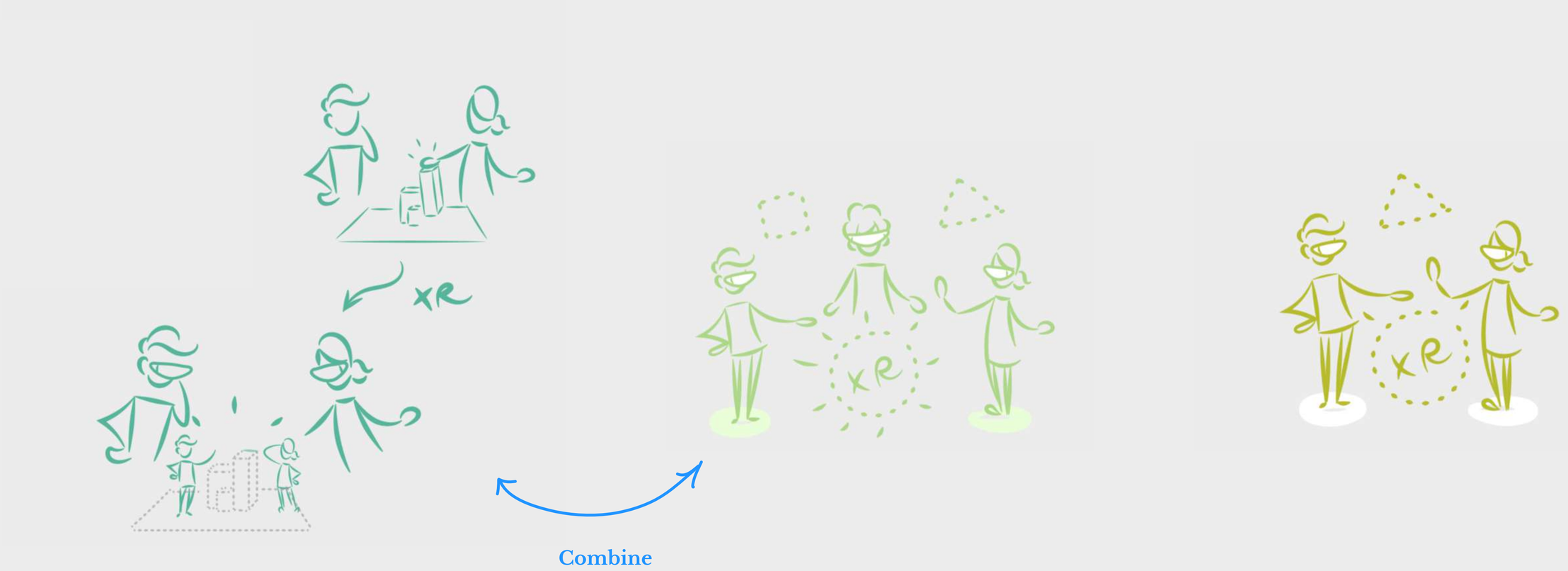
5 Design Goal

6 How does it work?

7 Moving forward from GL

Recap

Findings Mid-Term



The Design is for DLR - Designers,

because ....

- Infrastructure is there
- They already implemented what I have been doing
- The designers have the know-how and skills for using XR and physical mock ups.

How to collaboratively integrate participants in the design of a Flying-V galley using XR?

Workshop Start
(explain structure to participants)

The Designer Understanding

Designer Preparing

Designer Facilitating

Report Reflection

- **Things that went well:**

  Structure
  Iterations in workshops

- **Things that could be improved:**

  Avoid writing in ‘we’ form
  Make sure all the English is academic
  Make sure references are coherent
  Present findings and workshops in a more appealing way

- **What I still want to include:**

  The whole method as up until this point start to finish
  More visuals to for supporting the text
  One more workshop perhaps

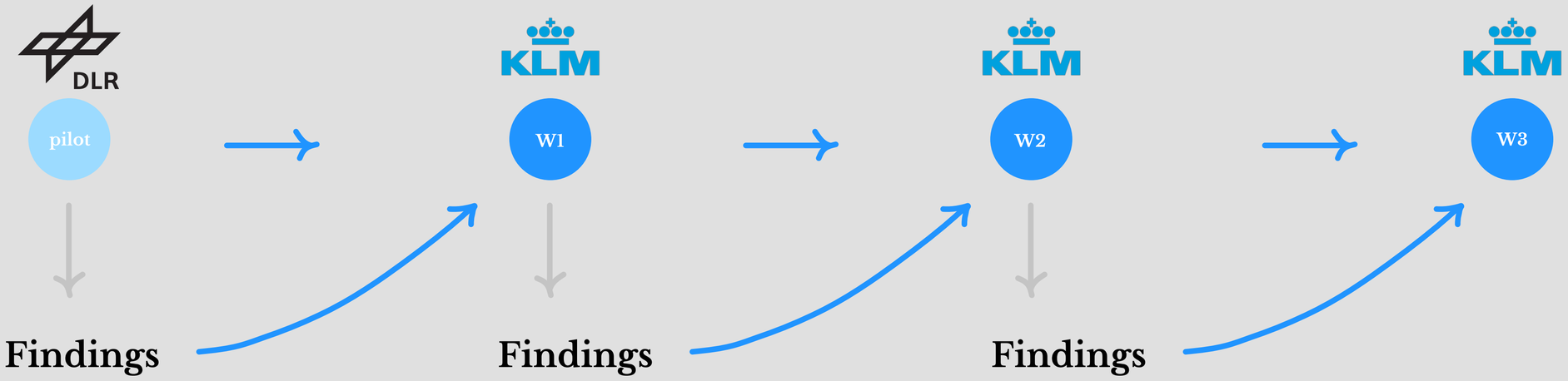
Research Question

During the midterm it became clear that the question of the design brief shifted to the following:

“How and where can we make use of XR (extended reality) in the co-creation process whilst involving end-users?”

Understanding the context

Iterative Process to find the best method to integrate XR



Three main direction

Provide more scaffolds workshop items

XR adds to physical ideas

XR adds to physical ideas

The Designer Understanding

Designer Preparing

Collab partners

1. Brief
- Identify what we are designing
- Identify for whom we are designing

talk to:
designers
colleagues

2. Context: The designer understands the design space
- What do you need to know about the environment you are designing for?
  Spatial - Theme specific - Operational - Personal - Technological

talk to:
engineers
designers

3. User: The designer understands the participants perspective
- What do you need to know about your participants
  Demographic & Prof. Bg - Phys&Psy - Pros/Cons - Operational Understanding

talk to:
end users

4. Prepare: The designer prepares the workshop materials
- Prepare a paper floor plan of your design for you users to understand the space.
- Prepare your MakeTools by using arts and crafts materials or 3D printing them.
- Prepare your XR world: Using Gravity Sketch or Blender create the virtual elements that represent your physical MakeTools.

talk to:
3D printing
and/or XR
experts

The Designer Understanding

Collab partners

1. Brief

- Identify what we are designing
- Identify for whom we are designing

talk to:
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Designer Preparing

4. Prepare: The designer prepares the workshop materials

- Prepare a paper floor plan of your design for you users to understand the space.
- Prepare your 3D physical tools by using arts and crafts materials or 3D printing them.
- Prepare your XR world: Using Gravity Sketch or Blender create the virtual elements that represent your physical MakeTools.

talk to:
3D printing
and/or XR
experts

Workshop Start (explain structure to participants)

Designer Facilitating

5. Empathise in workshop

- Do a brain dump of all the things that come to mind when participants think of the subject.
- Ask questions about their experiences
- Ask questions about challenges
- Ask questions about improvements

6. Design in physical space

- Give instructions about the goal of today's workshop. ideal galley FV
- Give them physical blocks to play and build with. Explain the concrete and ambiguous nature of the blocks.
- Let them build with physical blocks

7. Immerse in XR

- See what your participant have created. Model this design of the physical blocks in XR using Gravity Sketch
- Explore the design with them in XR
- Build ideas and talk out loud.

XR world spatial (emphasize in 1:1, because of paper x)

8. Final design

- Select your most interesting designs from the workshop
- Explore why they are most relevant

9. Final design feedback

- Making a final in XR. And see how it works.
- Iterate on your final design and make it final

Workshop Start (explain structure to participants)

Designer Facilitating

5. Empathise in workshop

- Do a brain dump of all the things that come to mind when participants think of the subject.
- Ask questions about their experiences
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- Explore the design with them in XR
- Build ideas and talk out loud.

XR world spatial (emphasize in 1:1, because of paper x)

8. Proposed concept

- Select your most interesting designs from the workshop
- Explore why they are most relevant

9. Final design feedback

- Making a final in XR. And see how it works.
- Iterate on your final design and make it final
  Feed it back into the next workshop

Final Presentation

Date : 1st of August

PH

XR

1

PRESENT

2

1

2

SWITCH

1

2

BUILD

XR

PH

2

1&2

1:20

1:1

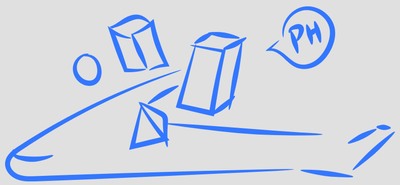
EVALUATE

DISCUSS


PH
1


XR
2

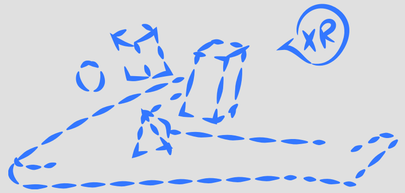
Key points of what makes this method nice



Hands on physical blocks are intuitive

Participants found it easer than using XR

Stays as a talking object



Immersion shows practical issues faster

Ideas are built upon the existing concepts

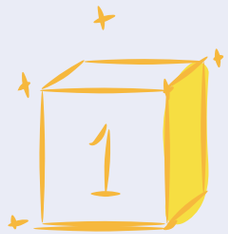
Overall facilitator principles

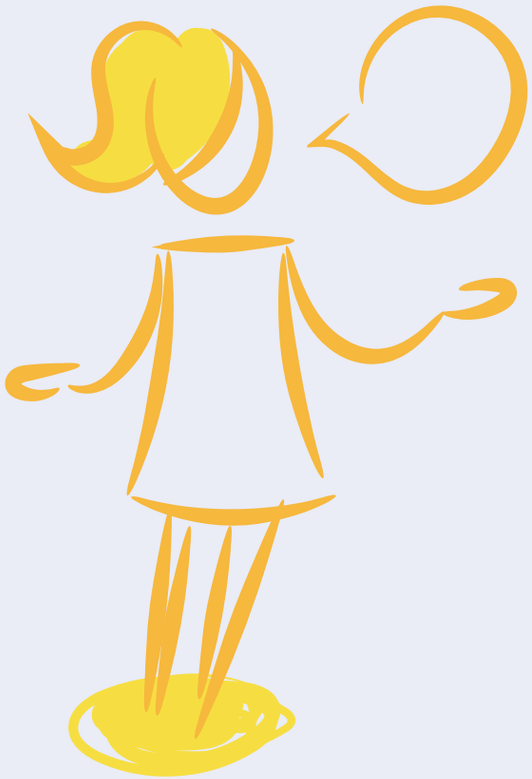
- Engage in Early Planning
- Select your users/participants
- Plan logistics and location
- Designs workshop materials
- Facilitates the session - welcome and intro
  - explaining the exercises
- Wraps up
- Have an open approachable attitude
- Reserve judgement

Step specific:

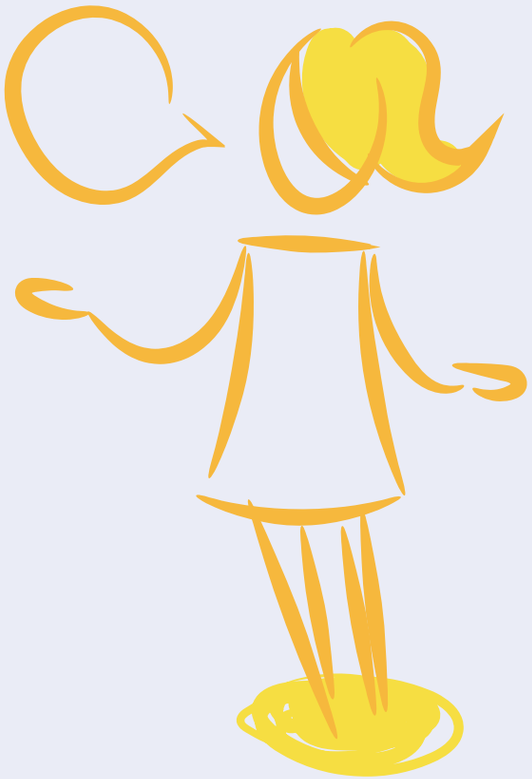
Step 5: make people comfortable to speak their mind.

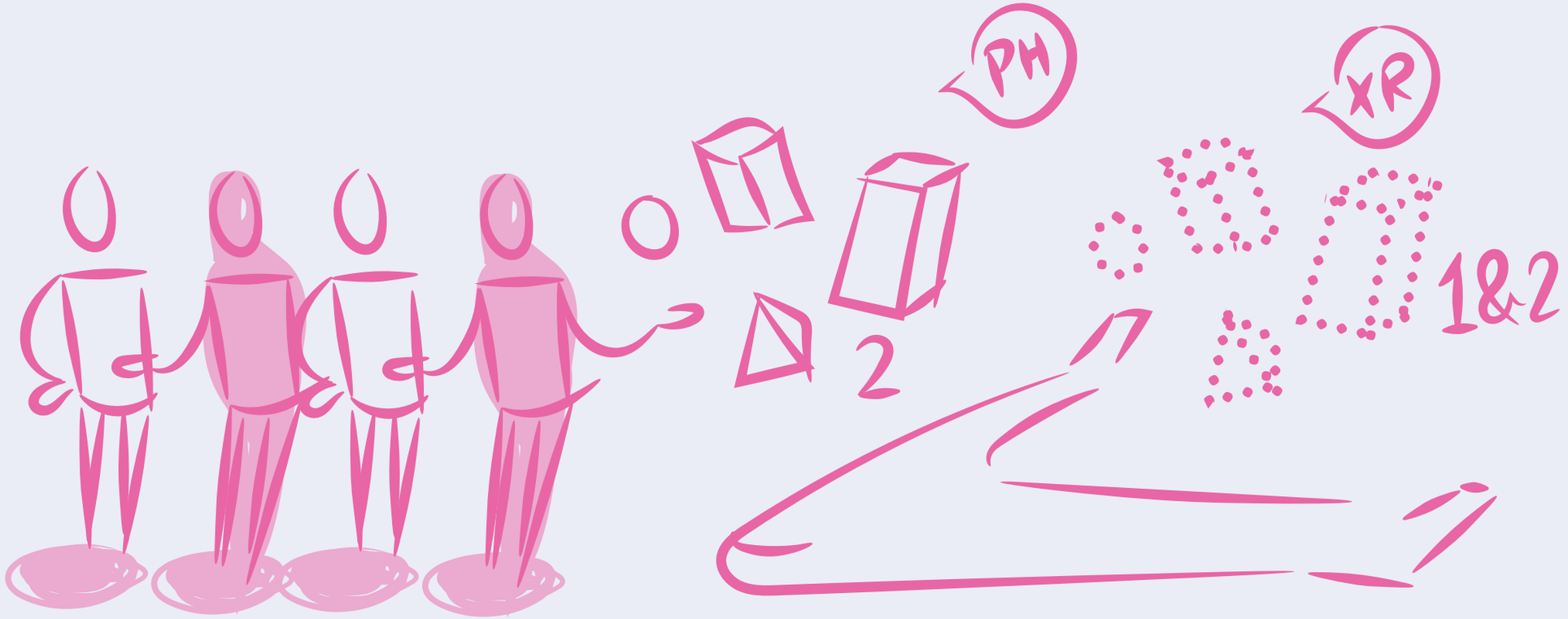
Step 6: help participants on their way if they are struggling.



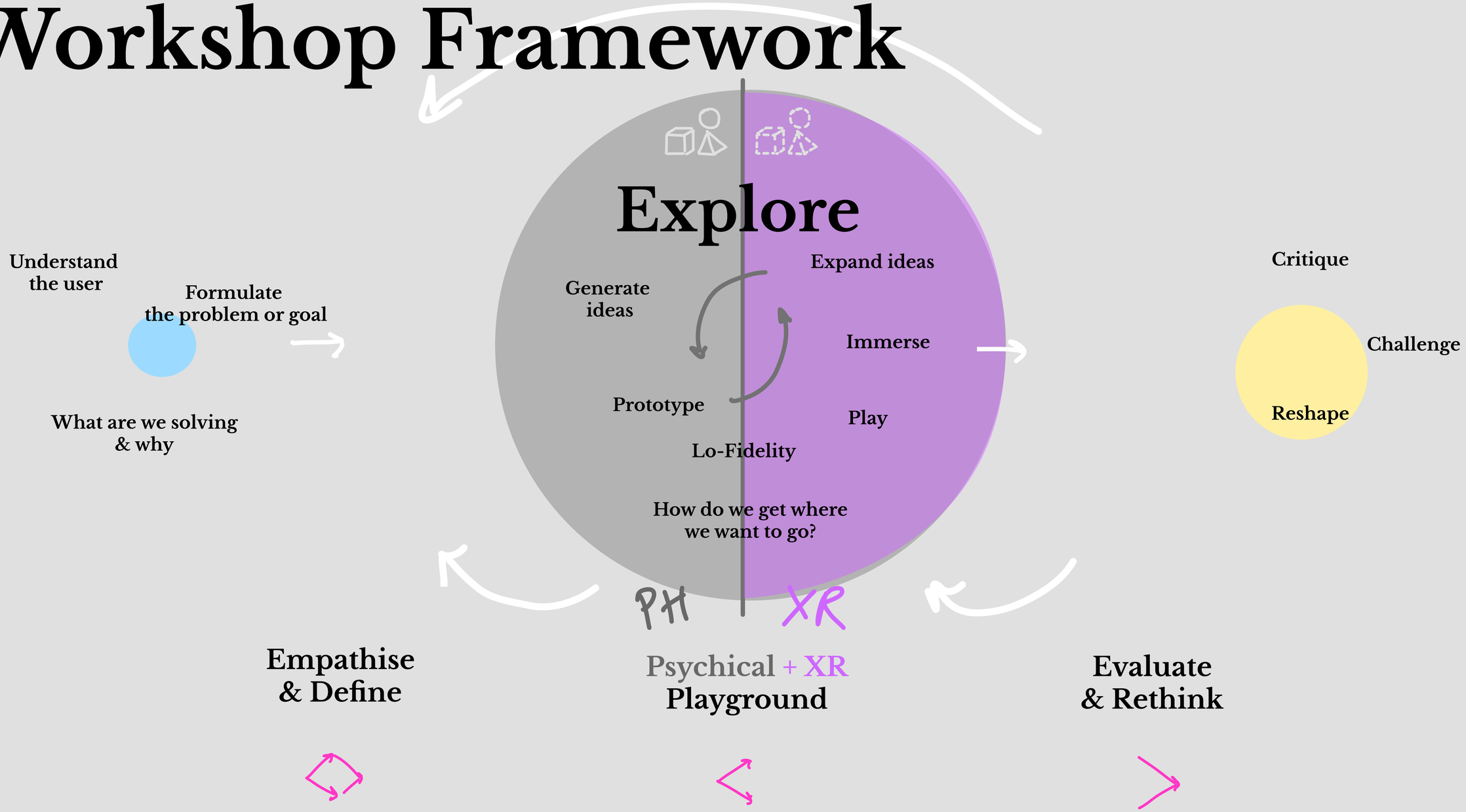


PRESENT

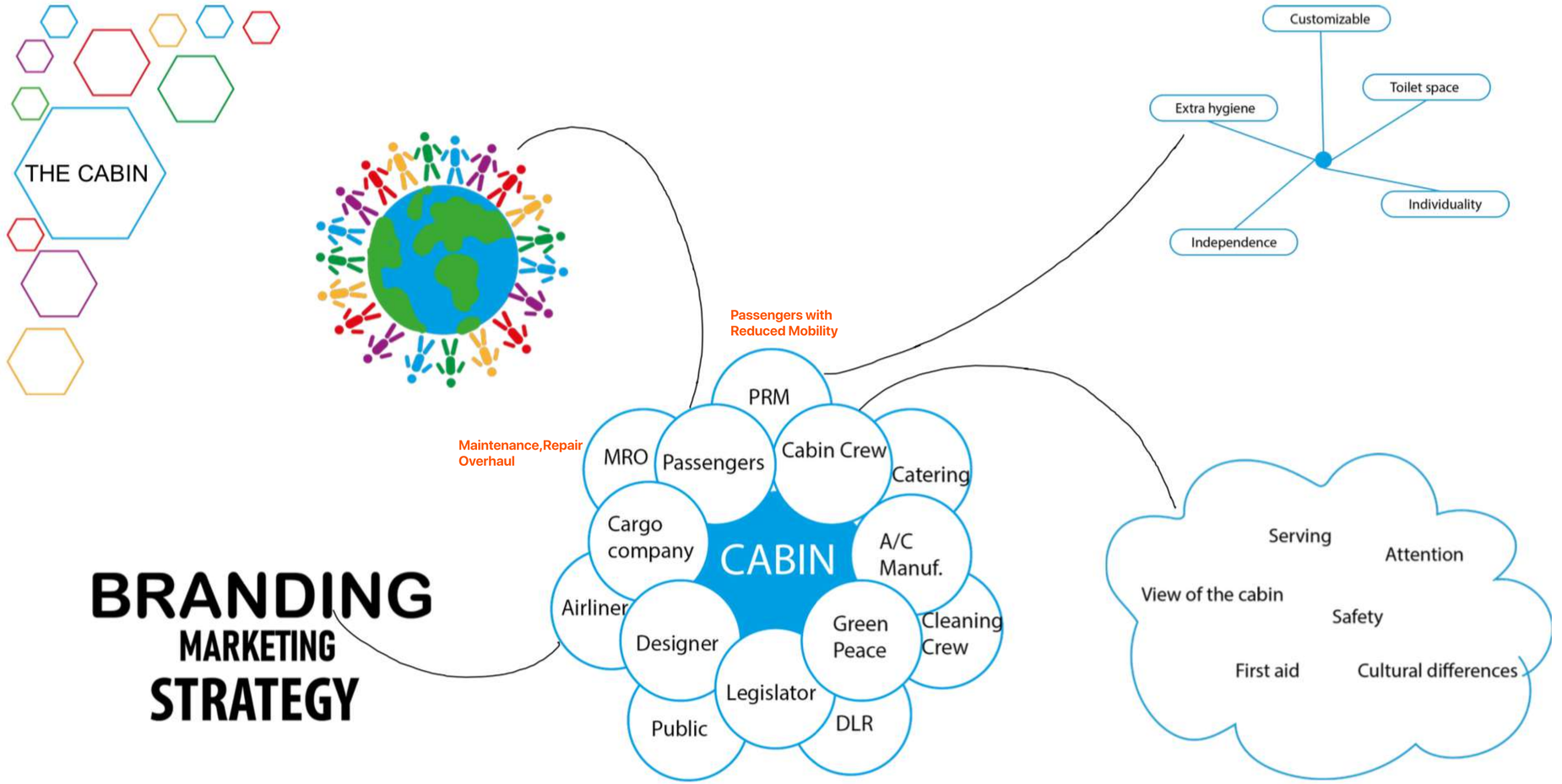



PH
XR
2
1&2

Workshop Framework



A Lot of Stakeholders Involved



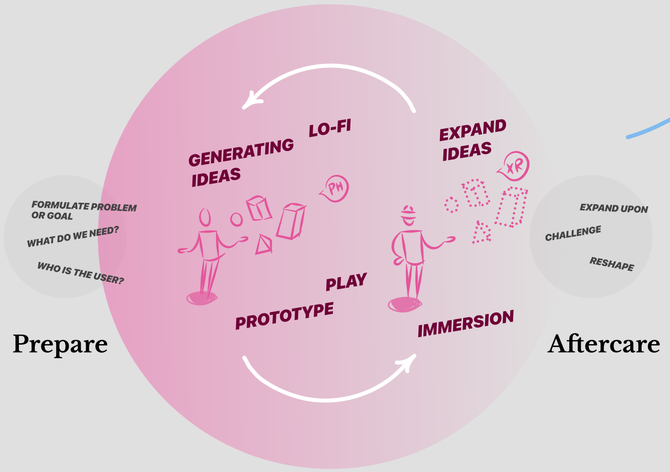
DESIGN PROCESS

Process step

Process step

Process step

Process step



FORMULATE PROBLEM OR GOAL
WHAT DO WE NEED?
WHO IS THE USER?

Prepare

EXPAND UPON
CHALLENGE
RESHAPE

Aftercare

Psychical + XR
Playground


PH
2

Design Team + Customer = Same Company

Unfulfilled need, shortcoming is identified.

Design Team Designs a concept which fulfills the corresponding need

Iterations take place within the same company

Safety Certification (actively and passively)

Multiple scaled mockups

Ten meetings for requirements

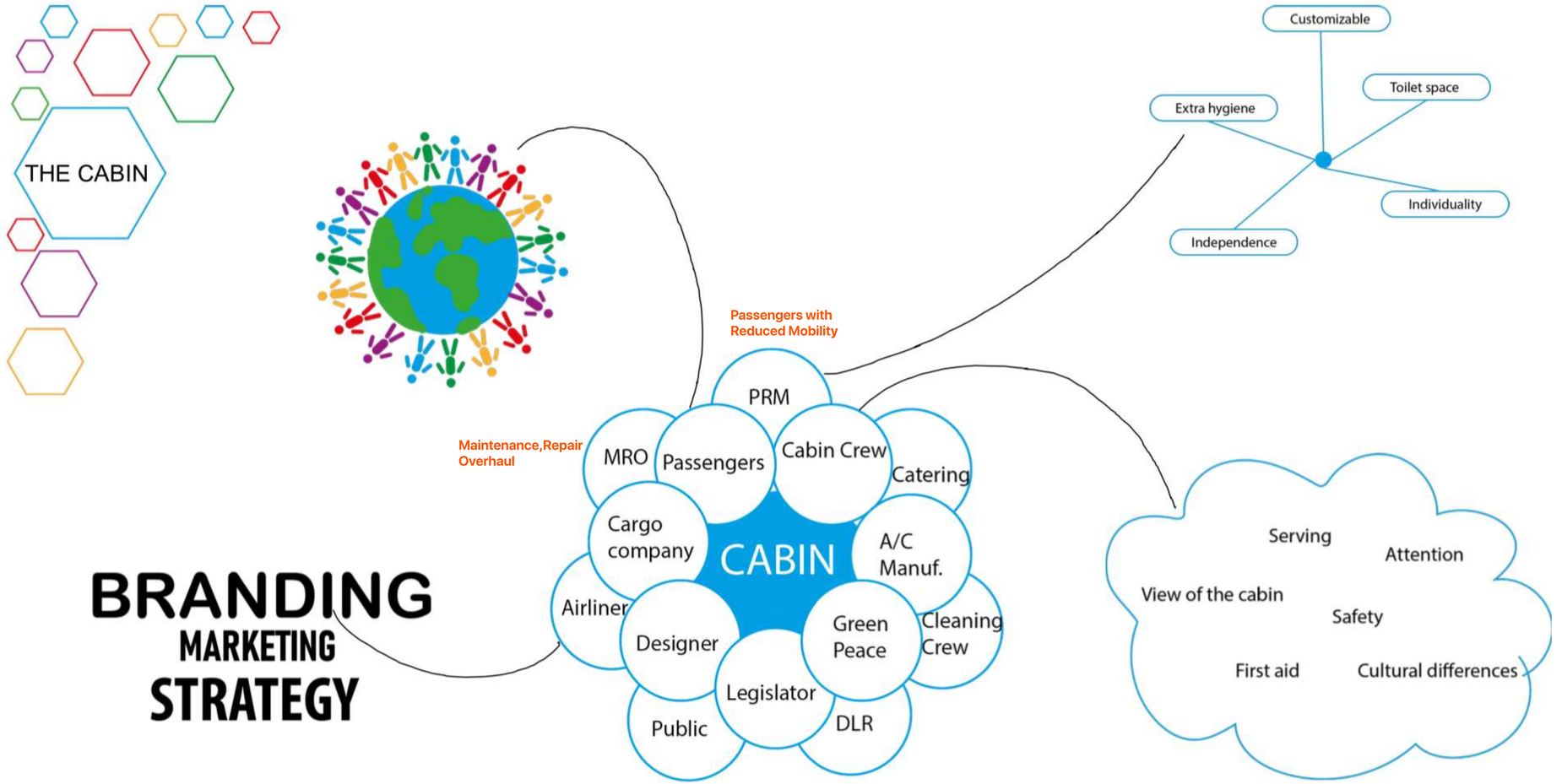
Takes 2 years to design

Shot in the dark

Why VR?

- Shortening the initial cabin design process
- Including end-user ideas and wishes in ideation phase
- Communicating important aspects of the design
- Getting a sence of feeling of de designed space 1:1 scale

A Lot of Stakeholders Involved



Example: Air Taxi

A user centric Cabin Design using the Design Thinking approach

Why VR?

- Shortening the initial cabin design process
- Including end-user ideas and wishes in ideation phase
- Communicating important aspects of the design
- Getting a sense of feeling of de designed space 1:1 scale

Application of co-design

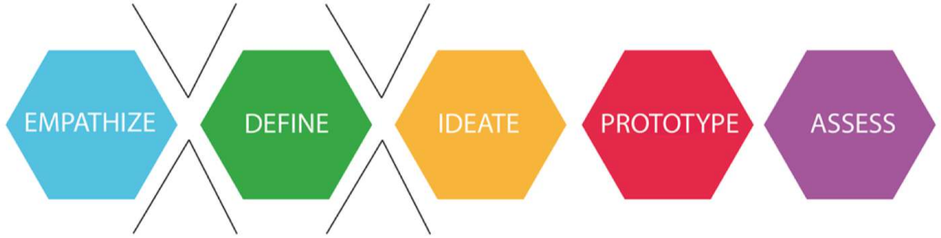
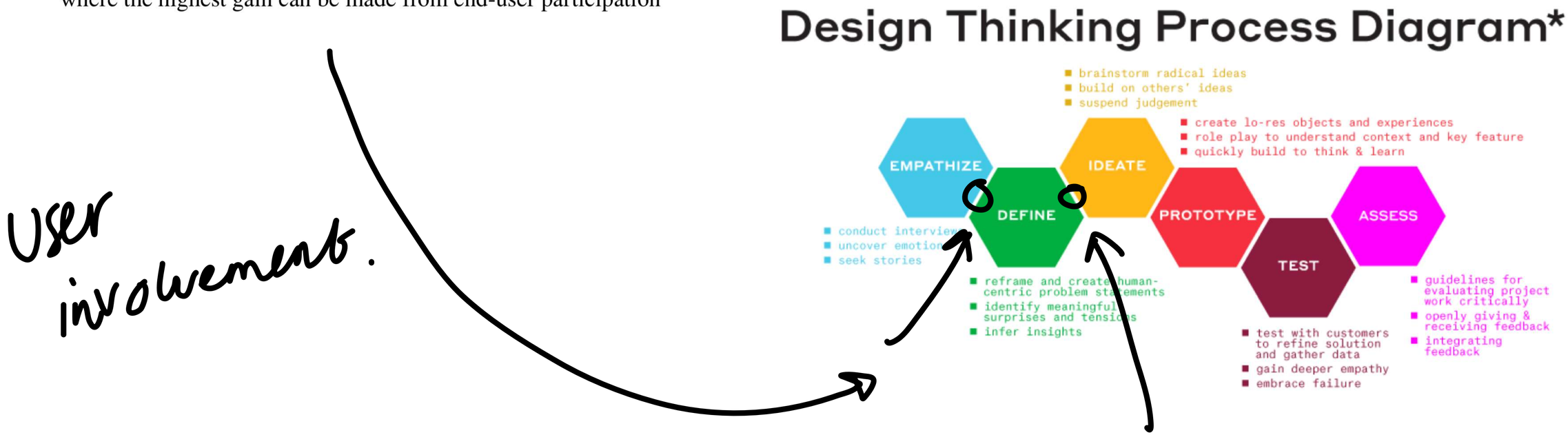


Fig. 4 Involvement within the stages Empathize, Define and Ideate is where the highest gain can be made from end-user participation

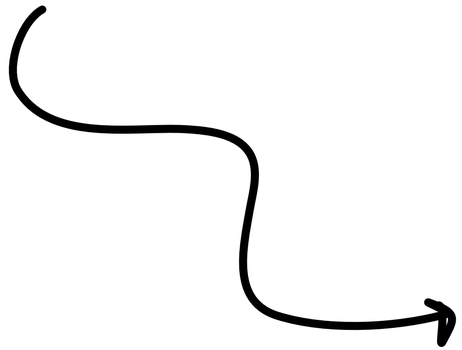
The ones affected most by the design should be given a chance to change and adapt the design to their true needs



Communication channel is needed to understand the users on one hand and communicate the interpretation of that understanding back tot the users on the other.

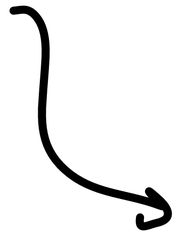
Ability to let the users immerse in the concept they are helping to be created. See conequences of their requests.

Very beginning of the design process could make a difference in the time span of the cabin concept design



Is the answer RealityWorks? Gravity Sketch?
Harmonize agenda's of designers, engineers and regulators

InDiCaD (Innovative Digital Cabin Design)
Follow the complete design process until the prototyping phase.
Testcase applying VR in cabin design process.
Different possibilities innovative aircraft



Tested with members of the design team (not actual users)

2D → 3D → VR

Walk thru the model and communicate desires directly to designer
Combine AR with VR

Pros

Communicating designs with the customers
Moves bottlenecks to the early concept design stages
Quick sketches

Cons

Special equipment is needed
Distraction when not used to VR
Motion sickness when using the headset
Awareness of being seen can influence the experience of the design.

Cabin Crew Tasks at a glance (long haul)

Pre-Flight

- Briefing
- Security Checks
- Boarding
- Cleaning

During-Flight

- Prepare Trolley for drinks
- Distribution of drinks
- Heat meals
- Collect Empty glasses
- Prepare trolley for meals
- Distribution of meals
- Collect dishes
- On-board sales
- Break (Sleeping)
- Guarding shift
- Distributing towels (saunas)
- Collect towels (saunas)
- Breakfast distribution
- Collect dishes

Post-Flight

- Check Cabin

Cabin Crew Tasks

Pre-Flight

- Attending a pre-flight briefing, during which air cabin crew are assigned their working positions for the upcoming flight (crew are also informed of flight details, the schedule and if there are passengers with any special requirements, such as diabetic passengers, passengers in wheelchairs or the number of infants on board);
- Carrying out pre-flight duties, including checking the safety equipment, ensuring the aircraft is clean and tidy, ensuring that information in the seat pockets is up to date and that all meals and stock are on board;
- Welcoming passengers on board and directing them to their seats;
- Informing passengers of the aircraft safety procedures and ensuring that all hand luggage is securely stored away;
- Checking all passenger seat belts and galleys are secure prior to rake-off;

During-Flight

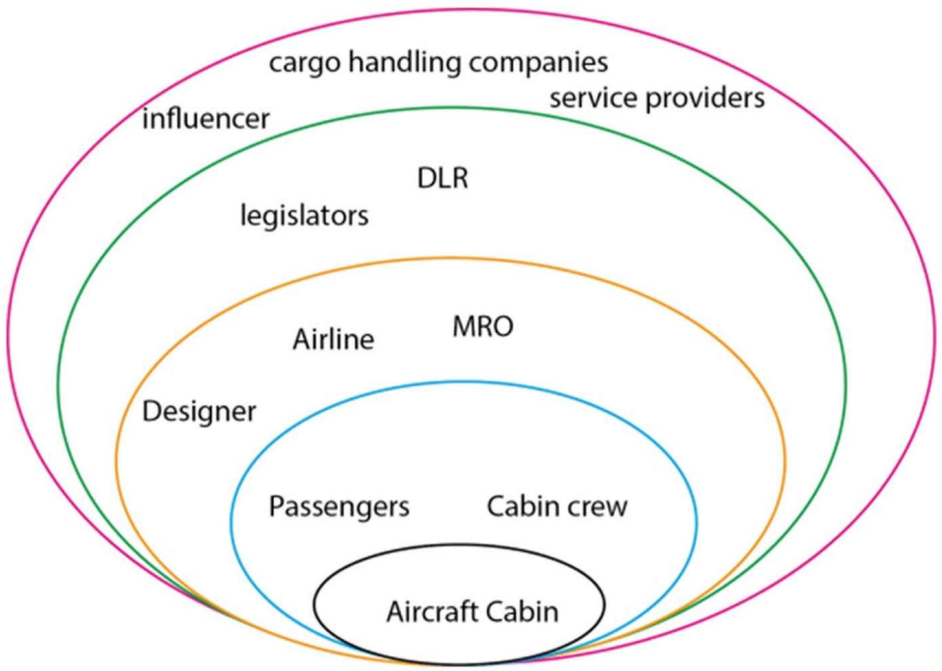
- Making announcements on behalf of the pilot and answering passenger questions during the flight;
- Serving meals and refreshments to passengers;
- Selling duty-free goods and advising passengers of any allowance restrictions in force at their destination;
- Reassuring passengers and ensuring that they follow safety procedures correctly in emergency situations;
- Giving first aid to passengers where necessary;

Post-Flight

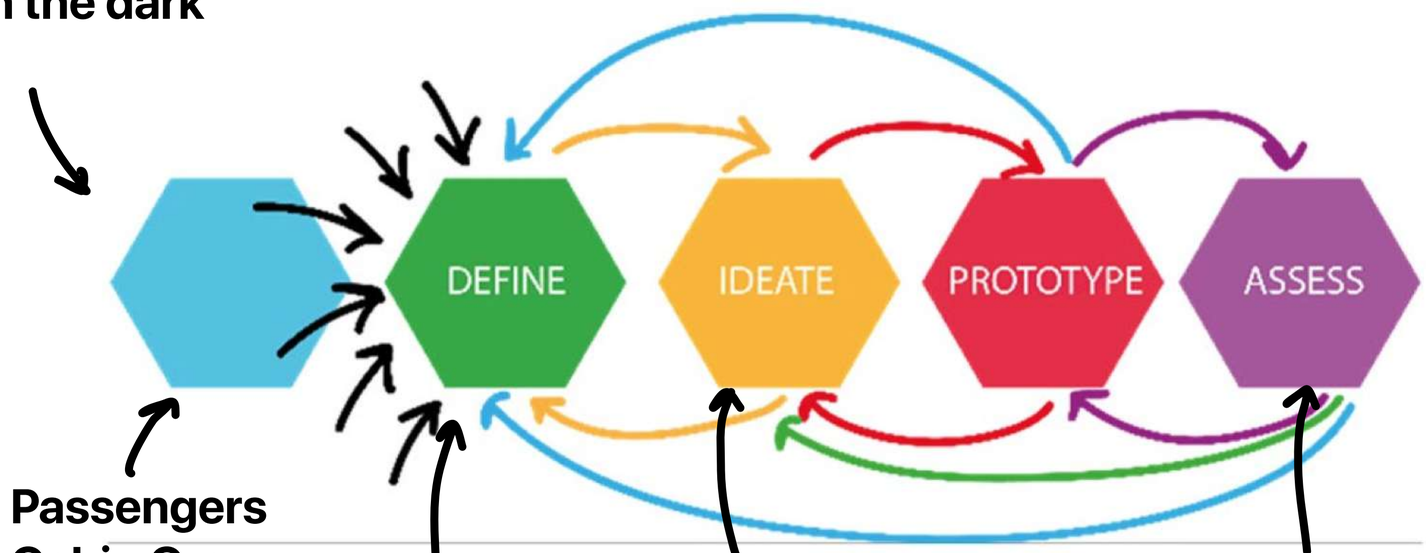
- Ensuring passengers disembark safely at the end of a flight and checking that there is no luggage left in the overhead lockers;
- Completing paperwork, including writing a flight report.

Saftey & Emergency Procedures

- Aircraft Evacuation
- Ditching (landing on water)
- Decompression
- Fire Fighting
- Passenger Management
- Security Related Issues
- Extraordinary Situations
- First Aid
- Survival



Shot in the dark



Once the concept design is frozen it is handed over to a team to work out the details.

Passengers
Cabin Crew

DLR
Legislators

Designer
Airline
Maintenance, Repair, Overhaul

Influencer
Cargo Handling Companies
Service Providers

How is it done now?

- VR is used for enriching the design process in later stages of the design e.g. or showing the ‘frozen concept’.

In the future?

- Immerse potential users in the ‘cabin construction site’.
- Widen the design space
- Understand the user better (needs/wishes/complaints)
- Designing early in the process?
-

Design Team + Customer = Same Company

Unfulfilled need, shortcoming is identified.

Design Team Designs a concept which fulfills the corresponding need

Iterations take place within the same company

Safety Certification (actively and passively)

Multiple scaled mockups

Ten meetings for requirements

Takes 2 years to design

Start: Shot in the dark, design team tries to interpret wishes of customers (interviews/experience)

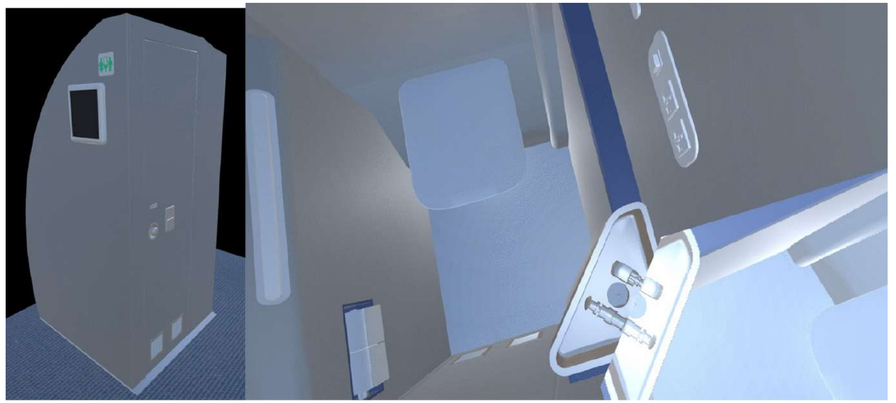
DESIGN THINKING

How is it done now?

- VR is used for enriching the design process in later stages of the design e.g. or showing the ‘frozen concept’. (Cabin Definition Center Hamburg)

In the future?

- Immerse potential users in the ‘cabin construction site’.
- Widen the design space
- Understand the user better (needs/wishes/complaints)
- Designing early in the process?



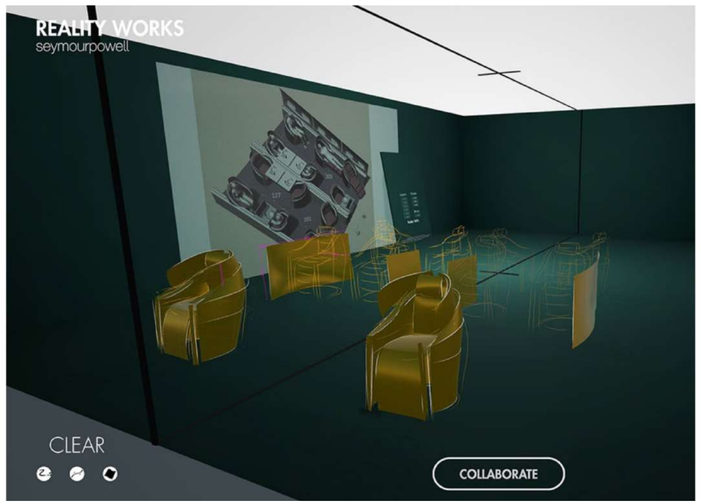


Fig. 7 Three different stages of detail possible in RealityWorks (courtesy of SeymourPowell)

Steep learning curve (for the design team)

Ideate and Prototype phase

Let project team take an active part in designing (taking the controller)

Validation also done here

XR/VR Sketching

Pros (Astles, 2022)

The ability to draw out anthropometric skeleton sketches

Human Centered Design in mind-set

Make HCD more efficient and accesible for non-designers to be involved in the workflow

Share concepts remotely

More usuable for non-designers

More accesibility to use the design and provide feedback early

Virtual reality creates a realistic world

It enables user to explore places.

Through Virtual Reality user can experiment with an artificial environment.

Cons

Easily disrupted compared to 2D methods

Internal factors: Cybersickness

External factors: Sketching environment, temp etc

Publishing accesible VR content is a hurdle, AR works better

Time and tools to publish the sketches to be viewable

It consists of complex technology.

CASTLE project (VR use)

Get the intended user closer to the product
Validate the design approach and strategy
Experience aspects
Ambient Lightning
Spaciousness
1-on-1 perception of the design

Current tools either expensive and time consuming

Last Minute VR: Cabin Definition Center (CDC) - check design for the last time, choose coloring/pattern.

Point in the design process where such change is possible without fundamental change in the planning.
VR Potential

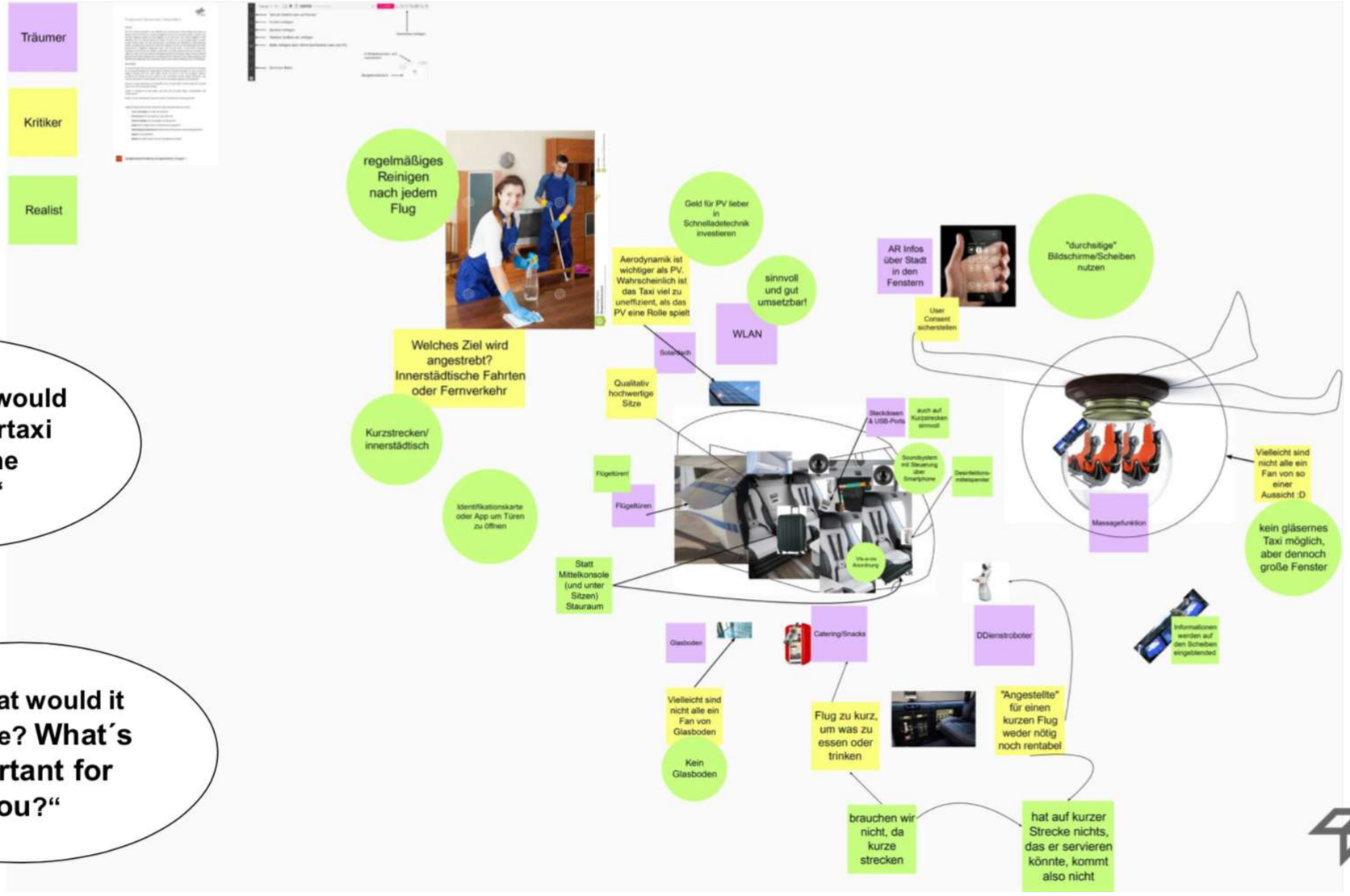
Empathize

“Disney Method”

Träumer

Kritiker

Realist



„Imagine you would design the Airtaxi Cabin of the Future…“

„…What would it look like? What´s important for you?“

DLR

CASTLE project (VR use)

CAbin Systems design Toward passenger welLbEing

Get the intended user closer to the product
Validate the design approach and strategy
Experience aspects
Ambient Lightning
Spaciousness
1-on-1 perception of the design

Last Minute VR: Cabin Definition Center (CDC) - check design for the last time, choose coloring/pattern.

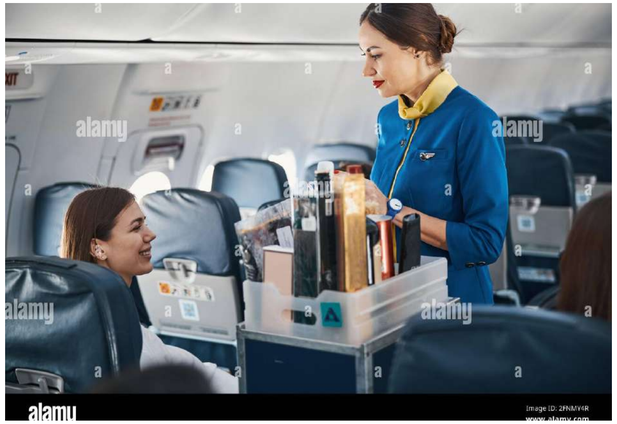
Point in the design process where such change is possible without fundamental change in the planning.
VR Potential

Current tools either expensive and time consuming

Examples of opportunities Flying-V

Galley

Crew Rest/Wellbeing



Trolley/Walkways

Safety/Medical

etc...

Application of VR

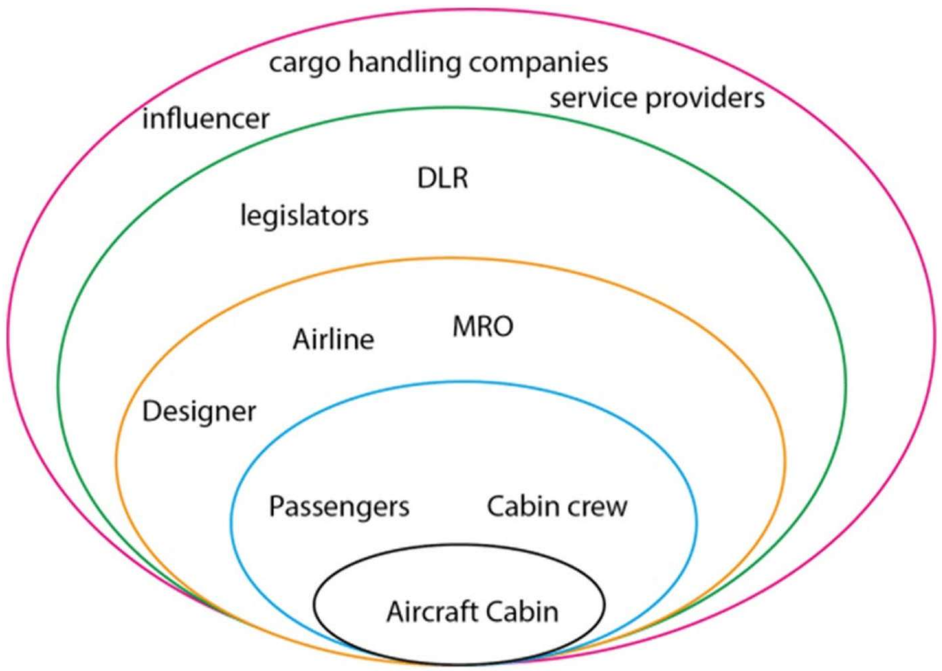
Main users involved in the design process.
End-user point of view crucial to succes of innovative cabin

Different placement markets are an extra dimension
End users are barely or not at all involved int he process
Group seeks involvement in the design process of a new cabin

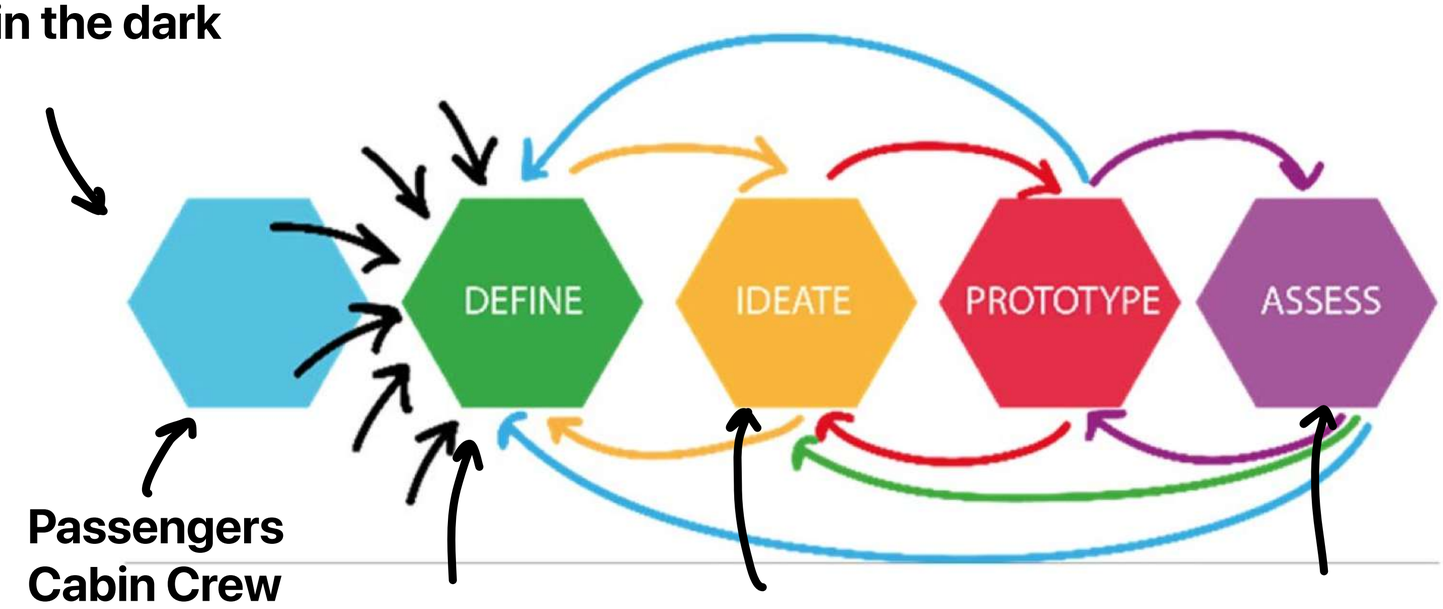
Pain points
Lack of clear overview?
Lack of wheelchair space

Make end-users pseudo members of the design team

Current Process



Shot in the dark



Once the concept design is frozen it is handed over to a team to work out the details.

Passengers
Cabin Crew

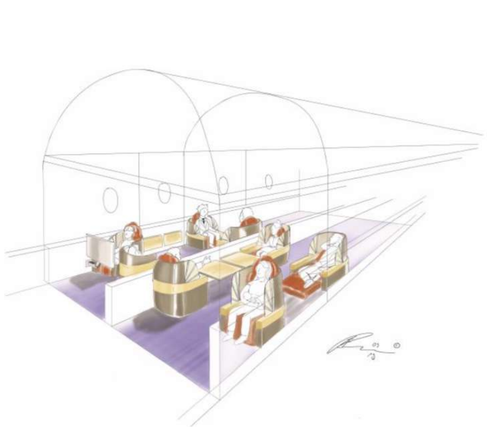
DLR
Legislators

Designer
Airline
Maintenance,
Repair, Overhaul

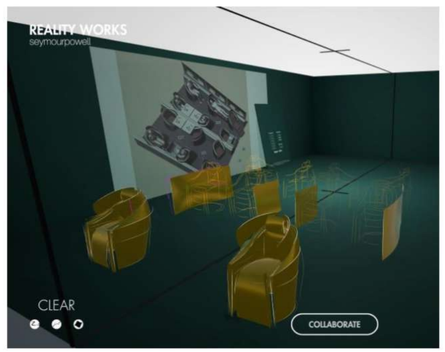
Influencer
Cargo Handling Companies
Service Providers

A SOLUTION

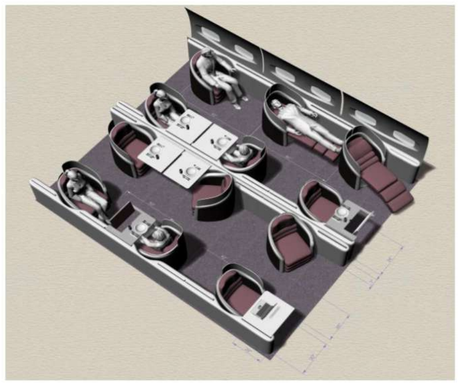
USE CASE: Business lounge (Project InDiCaD)



2D Photoshop sketch
Effort: 2h
No depth



VR Sketch
Effort: 20 min
Immersive



3D Rhino model
Effort: 3+ weeks
Very detailed

Switch to :

A user centric Cabin Design using the Design Thinking approach

Application of VR

Main users involved in the design process.
End-user point of view crucial to succes of innovative cabin

Different placement markets are an extra dimension
End users are barely or not at all involved in the process
Group seeks involvement in the design process of a new cabin

Early incorporate pain points
Lack of clear overview
Lack of wheelchair space

Make end-users pseudo members of the design team

Making the design process more efficient by means of enriching the communication between different stakeholders thru XR

Experiencing the design full scale without notable time and cost investment.

Involving stakeholders in the inspiration & Ideation phase (early phases)

Shortening the design process, making choices earlier in the design process. Less costly

DLR + TU Delft How can we use XR in co-designing an aircraft cabin?

Who of you has flown in past ?

Imagine the aircraft of the future....

Air Taxi = codesign test
VR = test with only design team

Future AC: Climate Friendly and quiet as possible
How do people want to travel in the future? What impact does this have on the design of an aircraft
New concepts and involving users (before: marketing team identifying gap)

1 How can we involve the user in co-designing this future vision?

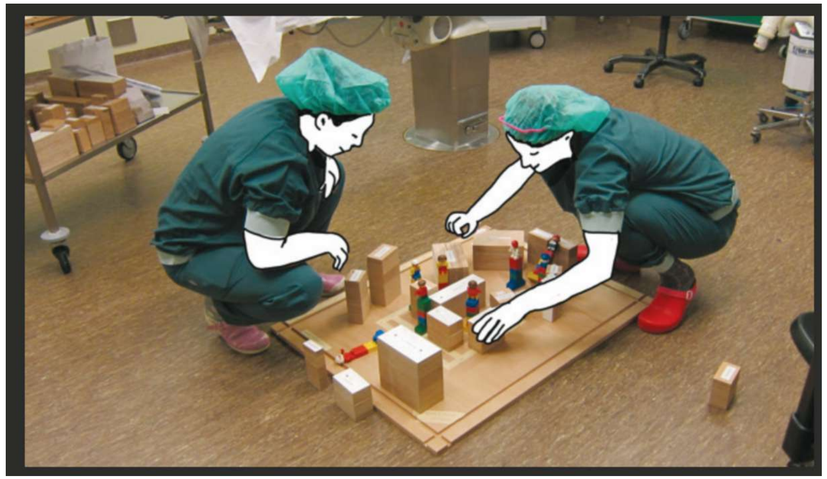
Apart from traditional methods (sketch render) A tool that can adapt to constant changes is needed.
XR is flexible in nature

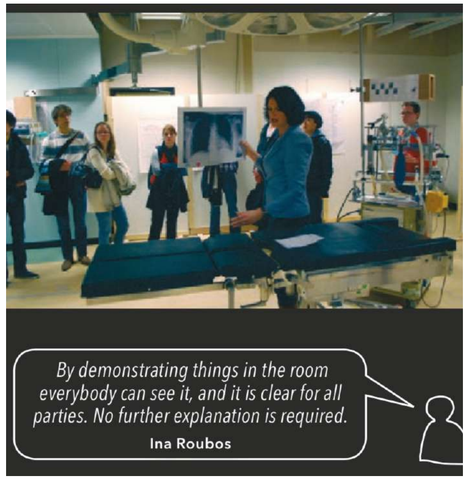
Exploring ways to integrate XR in the process.

2 XR is quite novel, how do you effectively incorporate XR into design workflow. Where would this be beneficial?

3 Bringing the world of co-design/participatory design and XR together.

Examples of possibilties (codesign)





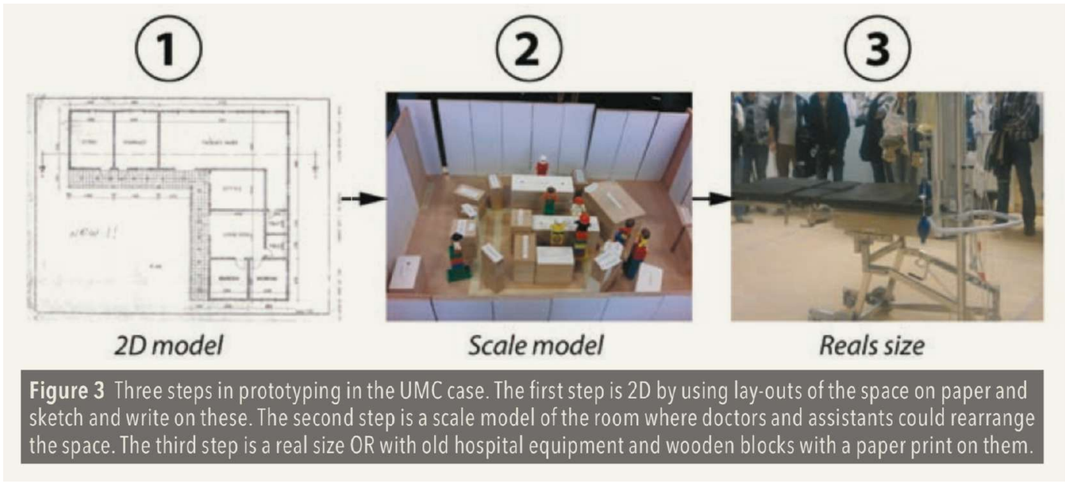


Figure 3 Three steps in prototyping in the UMC case. The first step is 2D by using lay-outs of the space on paper and sketch and write on these. The second step is a scale model of the room where doctors and assistants could rearrange the space. The third step is a real size OR with old hospital equipment and wooden blocks with a paper print on them.

Potentially in VR?

Application of co-design

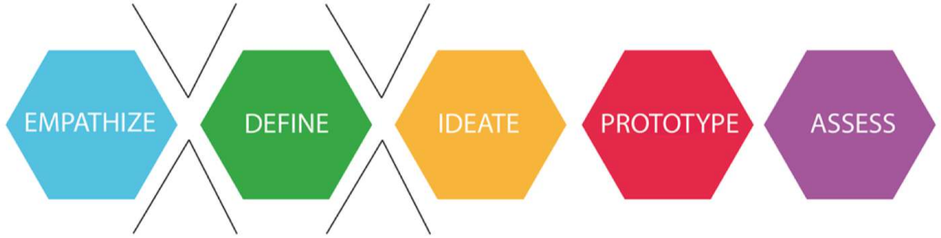
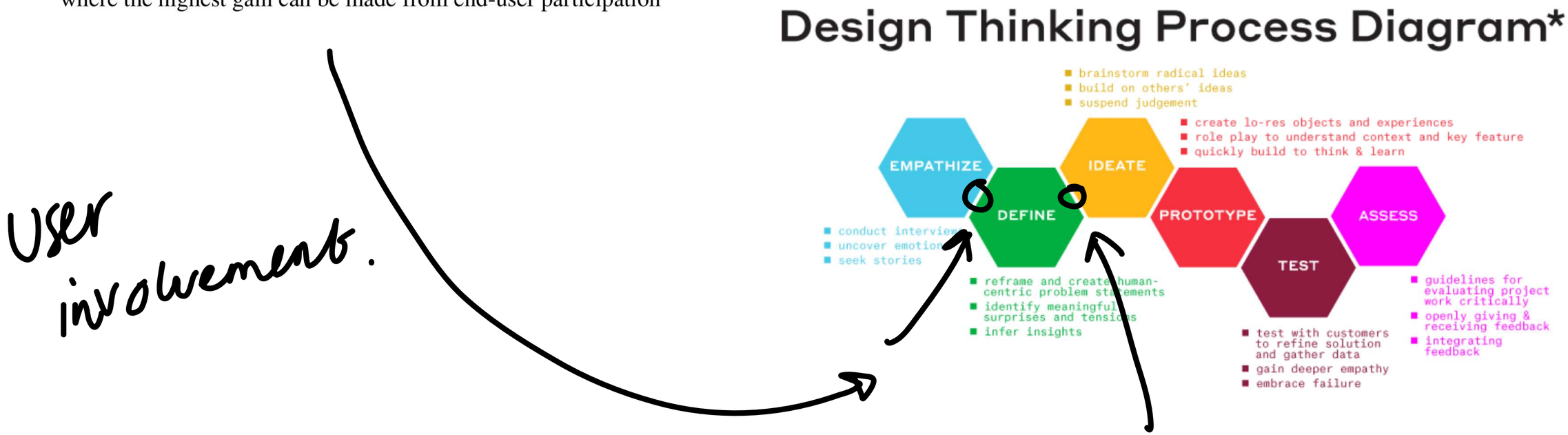


Fig. 4 Involvement within the stages Empathize, Define and Ideate is where the highest gain can be made from end-user participation

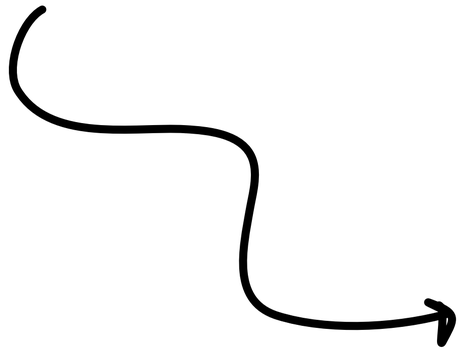
The ones affected most by the design should be given a chance to change and adapt the design to their true needs



Communication channel is needed to understand the users on one hand and communicate the interpretation of that understanding back tot the users on the other.

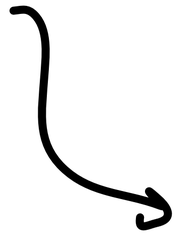
Ability to let the users immerse in the concept they are helping to be created. See conequences of their requests.

Very beginning of the design process could make a difference in the time span of the cabin concept design

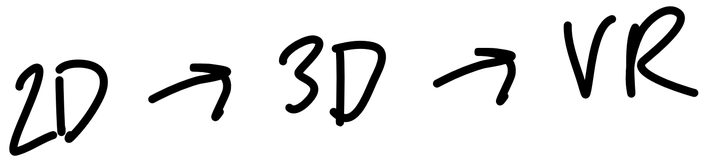


Is the answer RealityWorks?
Harmonize agenda's of designers, engineers and regulators

InDiCaD
Follow the complete design process until the prototyping phase.
Testcase applying VR in cabin design process.
Different possibilities innovatie aircraft



Tested with members of the design team (not actual users)



Walk thru the model and communicate desires directly to designer
Combine AR with VR

Switch to :

APPLICATION_OF_VR_TECHNOLOGY_IN_THE_AIRCRAFT_CABIN.pdf


TU Delft


DLR


AIRBUS
?
KLM

Understanding Stakeholders DLR

- Where to include actual co-design at DLR?
- Is the Future Vision used to consult other parties?
- How does the material need to be designed to be used ?
- Should it better be a design training to understand the material?

Potential Research Methods

Literature Research

Co-designing

User Involvement

Futuring Research - For example: What could be the future of Flying?

Speculative Design Approaches

Steep learning curve (for the design team)

Ideate and Prototype phase

Let project team take an active part in designing (taking the controller)

Validation also done here

Is the Design Thinking Method the way to go?

What does a typical co-creation process look like, how can we translate the Design Thinking Method to this?

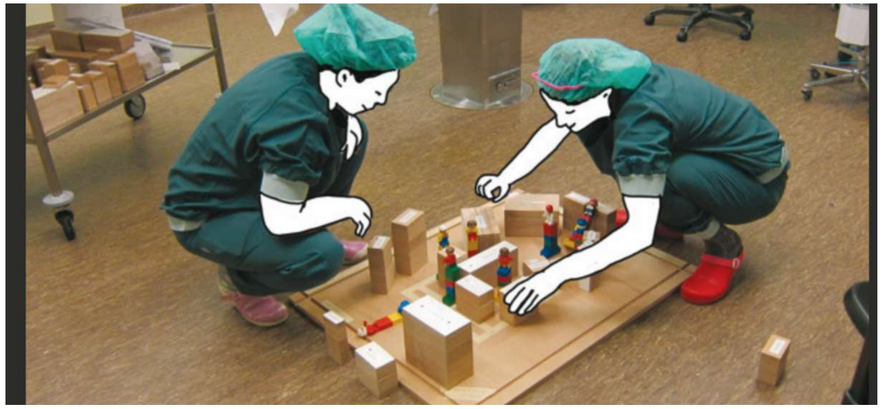
From Validation to Designing

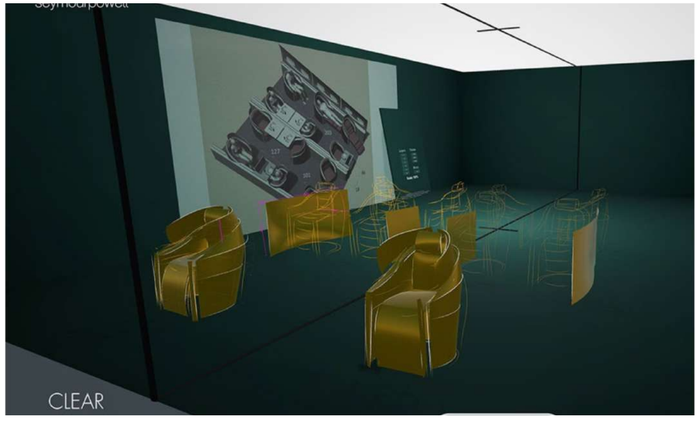
Co-creation can be challenging due to diverse participants, designers or non-designers

Key elements in co-creation: Collaboration, Interaction and Experience

How and where to collaborate, how to interact and what will be the experience?

Co-creation brings together users and designers to work towards a shared goal




CLEAR


CLEAR
COLLABORATE

Designing your own workspace improves health, happiness and productivity

Date: September 8, 2010

Source: University of Exeter

Summary: Employees who have control over the design and layout of their workspace are not only happier and healthier -- they're also up to 32 percent more productive, according to new research.

INDUSTRY THOUGHTS

Is It Time To Allow Employees to Design Their Own Workspaces?

By wizu | 25 May 2020

Communicating designs with the customers
Moves bottlenecks to the early concept design stages
Quick sketches

Special equipment is needed
Distraction when not used to VR
Motion sickness when using the headset
Awareness of being seen can influence the experience of the design.

Making the design process more efficient by means of enriching the communication between different stakeholders

Experiencing the design full scale without notable time and cost investment.

Involving stakeholders in the inspiration & Ideation phase

Current Direction

- Galley Design of Flying-V
- Using XR/VR
- Co-Design with Cabin Crew

Galley Design

Designing in VR, where applicable in the design process?

When in the design process do Virtual Prototypes add more value than physical?

Testing Co-Design with XR (Flying-V galley as use case.)

How can XR add value, when integrating users in the design process?

Deel 1

Is half uur lang een goede introductie. Ik leg goed de sessie uit. De mensen hebben tijd om hun ervaringen gebaseerd op het sensitizing boekje te vertellen and that's it. Immersen in hun eigen context en wat zij belangrijk vinden en wat in hun hoofd zit wegschrijven op de muren. (check hoe dit moet)

Deel 2

Brainstormsessie het middelste deel. Leuk om ze wat beelden te laten zien van de galley. Niet in XR, wat beelden en wat voor ontwikkelingen. Iets van VR even wat space. En dan laat je hun de ideale kitchen galley ontwerpen voor over 10 jaar dit en dit en dit (laat je ze het scenario uitontwerpen). Niet alleen een 3d model maar ook iets van een verhaaltje. Iets van een scenario, iemand een FA gebruikt dat 3D ding. Dat het niet alleen het product op zichzelf staat.

KL641 eerste deel. Als input, ik heb hier nog wat visuals. Voor dit ding gaan we ontwerpen? Casus, maar je gaat hen een scenario laten ontwerpen. Dit is de casus. Leuke input, dan geef je ze een template om het ideale ding te ontwerpen. Dan kan je koppeltjes maken.

Deel 1 - Wat betekent het serveren eigenlijk en wat gaan we vandaag doen? (30 min) Sensitizing. Doel uitleggen: Ik heb jullie gevraagd zijn allemaal ontwerpers/ingenieurs. Jullie hebben nu, moeten nadenken over eten wat geserveerd wordt (in je persoonlijke leven, moet je benadrukken) dat klinkt misschien een beetje gek maar jullie zijn expert in jullie ervaring daarom wil ik dat jullie daar over nagedacht hebben. Jullie zijn experts als ontwerpers. In die beide expertises betrek ik jullie vandaag in de sessie. Leg je misschien van tevoren uit, let je bij de sensitizer uit. Goed uit te leggen aan het begin van de dag.
Waarom zijn we hier eigenlijk?

Deel 2 - Cocreatie sessie, scenario moeten maken en een 3D model. (60 min) discussie over de gemaakte ontwerpen.

Deel 3 - Discussie, hey maar ik ben hier natuurlijk met VR bezig. Dan stop je ze in VR. Zou de tijd van Deel 1 naar Deel 3 gooien

Midterm

Vragen wat er voor de midterm mogelijk is. Een hoofdstuk zou nice zijn. De analyse of table of contents hoe je je verslag voor je ziet. Ook Peter vragen wat hij het fijnst vind.

Moet van tevoren leesbaar zijn dus check wanneer je de eerste versie moet inleveren.

GOAL

Where and how does VR fit into a co-design session?

What will the galley of the future look like?

What is it like to be a flight attendant on a long haul flight from Amsterdam to NYC and what practicalities, concerns, feelings and attitudes come into play?

Immerse in eigen context en wat zij belangrijk vinden.

Immerse in context.

Brainstorm
Beelden
VR
Ontwikkelen
Galley
ideale kitchen galley

Design your ideal galley

XR?

Immerse into own design

Reflection on the brainstorm

Immerse in VR.

*Make sure there are snacks and drinks available on site

Time	Action	Checklist
5 min	Welcome	Walk in and welcome
		Why are we here? Explain the goal of today: All sit down and the facilitator introduces the topic for today.
10 min	Introduction	Welcome one and all. You are either designers or engineers and you have had to think about food being served in your personal or private life. You are all experts in your own personal experience and this is why I wanted you to have thought about this. Since you are also experts in engineering or design, I today want to combine your two expertises in this session. Hence the fact why I have brought you here. Make them understand why they are joining this session.
		We will be creating something together today. All input is appreciated."You are the designer and the user of the specific product today". Explain they are welcome to share any experiences that come to mind do not hesitate to ask, shout or share things they want to at any time in the session.
15-25 min	Getting Acquainted	Have each person present one or two pages from their sensitizing booklet to the group. They have time to share their experiences based on the sensitizing booklet with all of the other participants. Ask them why they particularly wanted to present this page/these pages.
		Allow them to get their thoughts on the whiteboards. What do you think of when you think of these things? (specific assignment?)
5 min	Inspiration	Ease Out -- > You have just shared all these things. I've got some visuals from an existing flight. KL641. This is the case we are going to design for. You are going to come up with a scenario for the ideal situation in the future. They are going to tell about the scenario. You make a template for the ideal galley to design on. (make video KL641)
15-20 min	Break	Break
5 min		Intro to the brainstorm. Show them an inspiring video and or pictures of current galleys. Show some developments along with some cutting edge VR/XR technology to probe and inspire them a bit. Trigger their imagination. (make video)
10 min	Explain the 3D-modeling exercise.	Design the ideal galley for in 10 years time. Next to designing the galley please also come up with how it will be used. So a scenario, so that the product does not exist on its own. So for instance how an FA would use this newly 3D created galley. Someone walks in/walks out etc.
		You will now be tasked to come up with the ideal kitchen (galley) for an aircraft flying from AMS-JFK. On this flight you will be serving the Premium Comfort Class passengers. Explain what meal service looks like for this class and what kind of service you will be providing throughout the flight. What are the requirements: list these. Make a small design brief.
20 min	Making the ideal galley with foam/ wood/etc	Using different materials such as cardboard, foam, wood, plastics etc participants are invited to make their own version of the ideal galley and to play around with them like lego. Participants will be coupled in pairs to stimulate interaction and cooperation. If possible non-designers will be teamed up with designers. This exercise uses physical artifacts. (provide physical artifacts & template).
10 min	Presenting and discussing the ideal galley	Group members will present their 3d designs to the rest of the group and explain why they made particular choices. Remind yourself to ask open ended question about why they made particular choices and how they came to these conclusions. What underlying values motivate these choices.
20 min	Break	During the break the facilitator prepares the 3D models in VR and makes them on a scale 1:1. This will be a lo-fi prototype
		Of course I'm using VR so then I'll have to put them in VR.
30 min	You are the user	Group members are asked to immerse themselves into the role of flight attendant. This is encouraged by transporting them into a VR world. In an ideal setting all participants would be able to access the VR world simultaneously by all wearing a headset. Discussing their findings on a 1:1 scale and making adjustments with the designer also immersed in the virtual world. (ideally multiple headsets). Add the opportunity to add notes to the design for finetuning.
10-20 min	Discussion	Group members are invited to share their experiences of where the VR was used in this case. Did it make sense to use VR in these places in the process? Why/Why not? Where would they have liked to have more visual feedback? Where would they like to share more info on the design on a 1:1 scale? Did VR make it easier/harder? Did it make sense at all?
5 min	Closing comments	Thank everyone for coming and keep them in the loop on results.

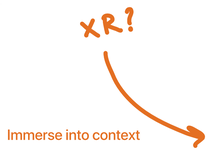
*Make sure there are snacks and drinks available on site

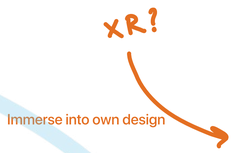
GOAL

Where and how does VR fit into a co-design session?

What will the galley of the future look like?

What is it like to be a flight attendant on a long haul flight from Amsterdam to NYC and what practicalities, concerns, feelings and attitudes come into play?





Reflection on the brainstorm

Time	Action	Checklist
5 min	Introduction	All sit down and the facilitator introduces the topic for today. We will be creating something together today. All input is appreciated. "You are the designer and the user of specific product today". Explain they are welcome to share any experiences that come to mind do not hesitate to ask, shout or share things they want to at any time in the session.
5-10 min	Getting Acquainted	"Whodunit" Have each person write a couple of statements down on multiple cards, the sillier the better. Throw the cards in a a hat and have each person draw a card which they read out loud. The reader must try to guess 'whodunit' and why they think this.
5 min	Explain the collage-making	Use the sheet of paper to make a collage for your 'ideal' kitchen. Use images and words to describe your ultimate kitchen. What would you like to include? What does it look like? Is it futuristic or traditional? What words thoughts, feelings come to mind? Cut out words and pictures, stick them with glue. Write or make your own. Use any other materials to convey your message.
20 min	Make the collage	"The ideal kitchen". Use the instructions provided in the introduction to the collage-making. Visualise your kitchen by drawings, words, pictures etc. Ask them to be as free as possible. Nothing related to aircraft etc or other boundaries.
20 min	Presenting the collage + discussion	Group members present their collages to the rest and explain why they made particular choices. Remind yourself to ask open ended question about why they made particular choices and how they came to these conclusions. What underlying values motivate these choices.
15-20 min	Break	Let the video settle a bit in their mind while they grab a bite & coffee and get out of the room.
5 min	Show video of airline food (XR video?)	Of course on an airplane things are done totally different than in the ideal kitchen. Show a video of how meals are served on board an aircraft. (Show flight attendant struggles? Or leave them out for now?)
5 min	Explain the 3D-modeling exercise.	You will now be tasked to come up with the ideal kitchen (galley) for an aircraft flying from AMS-JFK. On this flight you will be serving the Premium Comfort Class passengers. (Or should they serve themselves?) Explain what meal service looks like for this class and what kind of service you will be providing throughout the flight. What are the requirements: list these. Make a small design brief.
20 min	Making the ideal galley with foam/ wood/etc	Using different materials such as cardboard, foam, wood, plastics etc participants are invited to make their own version of the ideal galley and to play around with them like lego. Participants will be coupled in pairs to stimulate interaction and cooperation. If possible non-designers will be teamed up with designers. This exercise uses physical artifacts.
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10-20 min	Closing discussion	Group members are invited to share their experiences of where the VR was used in this case. Did it make sense to use VR in these places in the process? Why/Why not? Where would they have liked to have more visual feedback? Where would they like to share more info on the design on a 1:1 scale? Did VR make it easier/harder? Did it make sense at all?
5 min	Closing comments	Thank everyone for coming and keep them in the loop on results.

Time	Action	Checklist
5 min	Introduction	All sit down and the facilitator (me) asks them if they all filled in their sensitizing booklet and their quick thoughts about it. Then I'll tell them the topic for today which involves designing their ideal kitchen. "You are the designer and the user of specific product today". Explain they are welcome to share any experiences that come to mind during the session do not hesitate to ask, shout or share things they want to at any time.

Time	Action	Checklist
5-10 min	Getting Acquainted	“Whodunit” Have each person write a couple of statements down on multiple cards, the sillier the better. Throw the cards in a a hat and have each person draw a card which they read out loud. The reader must try to guess ‘whodunit’ and why they think this.

Time	Action	Checklist

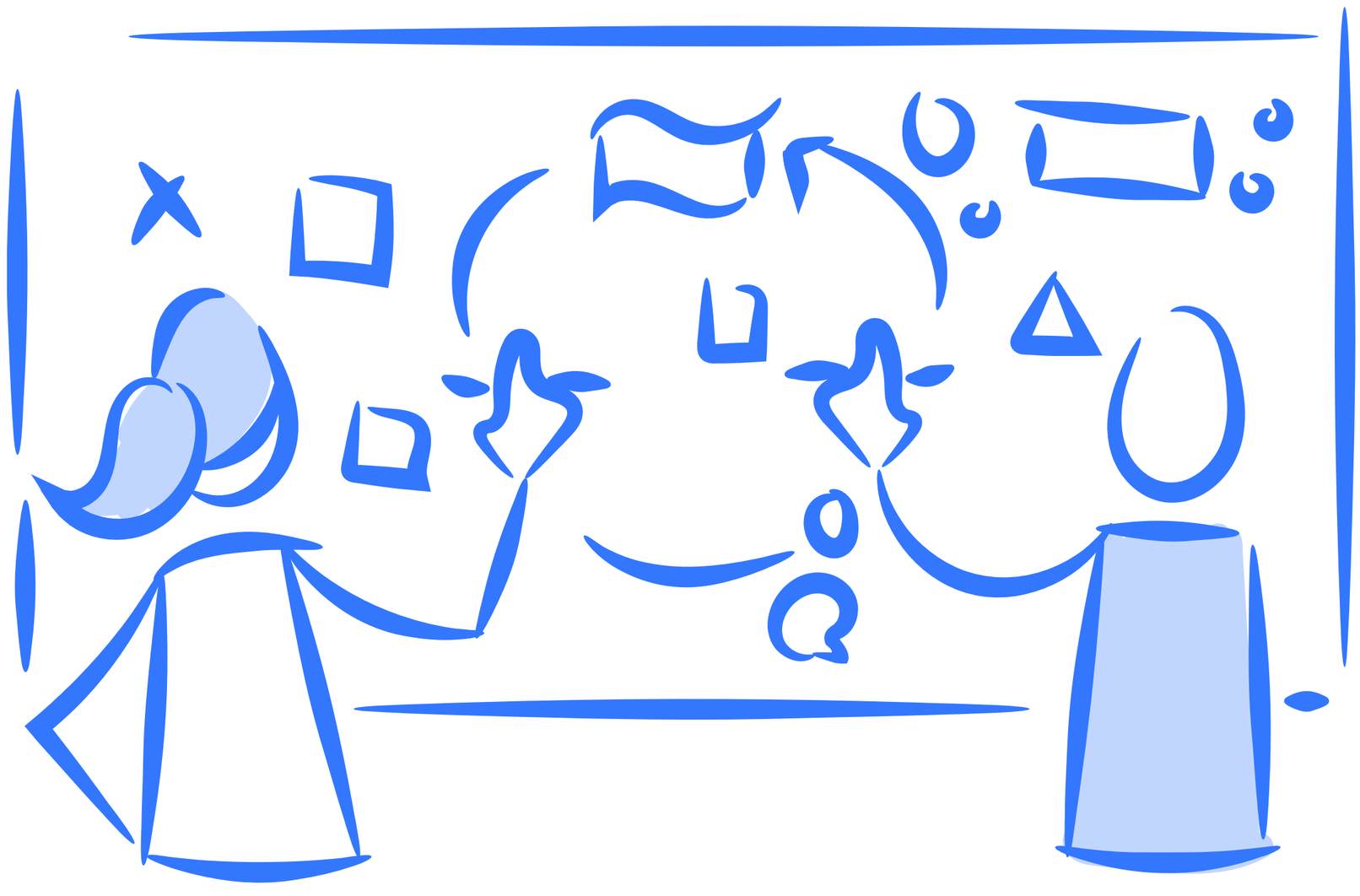
Time	Action	Checklist
20 min	Make the collage	”The ideal kitchen”. Use the instructions provided in the introduction to the collage-making. Visualise your kitchen by drawing, words, pictures etc. Ask them to be as free as possible. Nothing related to aircraft etc or other boundaries.

Time	Action	Checklist
10 mins/day	Fill in the Sensitizer	Participants are handed out a booklet and asked to fill in the sensitizing booklet before coming to the workshop.

Time	Action	Checklist
5 min	Introduction	Introductions and welcome make sure everyone is seated correctly and supplied with a drink or a snack.

Time	Action	Checklist
5 min	Introduction	The facilitator, me, explains the goal of today. Welcome one and all. You are either designers or engineers and you have had to think about food being served in your personal or private life. You are all experts in your own personal experience and this is why I wanted you to have thought about this. Since you are also experts in engineering or design, I today want to combine your two expertises in this session. Hence the fact why I have brought you here. Make them understand why they are joining this session. We will be creating something together today. All input is appreciated.”You are the designer and the user of the specific product today”. Explain they are welcome to share any experiences that come to mind do not hesitate to ask, shout or share things they want to at any time in the session.

Time	Action	Checklist
10 min	Energizer	Have each person present one or two pages from their sensitizing booklet to the group. They have time to share their experiences based on the sensitizing booklet with all of the other participants. Ask them why they particularly wanted to present this page/these pages.



Time	Action	Checklist
10 min	Brain Dump	Allow them to get their thoughts on the whiteboards. What do you think of when you think of these things? (specific assignment?)

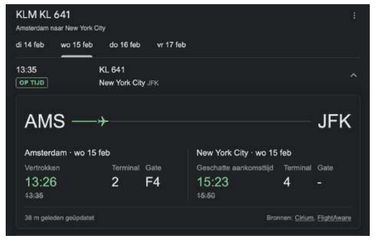
Time	Action	Checklist
5-10 min	Concluding Moment	Discuss what we have just written out on the boards. See if there is any overlap of if we can make clusters that people already find important. Give them stickers that indicate wether or not this is important for them.

Break

Time	Action	Checklist
5 min	Inspiration Round	Intro to the brainstorm. Show them an inspiring video and or pictures of current galleys. Show some developments along with some cutting edge VR/XR technology to probe and inspire them a bit. Trigger their imagination. (make video)

Time	Action	Checklist
5 min	Introduce the exercise	Design the ideal galley for in 10 years time. Next to designing the galley please also come up with how it will be used. So a scenario, so that the product does not exist on its own. So for instance how an FA would use this newly 3D created galley. Someone walks in/walks out etc.

Time	Action	Checklist
5 min	Further explanation	You will now be tasked to come up with the ideal kitchen (galley) for an aircraft flying from AMS-JFK. On this flight you will be serving the Premium Comfort Class passengers. Explain what meal service looks like for this class and what kind of service you will be providing throughout the flight. What are the requirements: list these. Make a small design brief.



Local Time:
13:55

FLIGHT KL641

Local Time:
15:50

AMS
Amsterdam, The Netherlands

Duration 8H

JFK
New York, NY

CASUS

You are a flight attendant on this afternoon flight from Amsterdam to New York. During this flight you will specifically be concerned with the food of the Premium Comfort Class passengers. In the timeline below you will see an overview of what is offered to the passengers on this 8h+- flight. This scenario is based on the first flight (KL645) of the 787-10 Dreamliner that included the new Premium Comfort Class in the cabin.

Premium Comfort Class?

"The intermediate class, as KLM itself calls it, has spacious and very comfortable seats. There is a good recline and the seating comfort is excellent. With the 13.3" screen you can also enjoy and relax with a movie or some music during the flight. Following the flight is also possible with the built-in flight tracking system.KLM has chosen to definitely pay attention to the meal service as well. During this flight to New York, there are two meal rounds. On the first round, there is always a choice between meat, fish or vegetarian. One of these dishes is always cold. The meals are of good quality and very tasty. The details have been thought of: metal cutlery, a design reflected in the trays, tray and menu, and glassware for your drinks. Unfortunately, drinks are also served in cardboard and plastic cups. Hopefully KLM will follow up on this."

Timeline of Meal Service on the Plane

AMS

Local Time AMS:
13:55

Local Time AMS:
14:55

Local Time AMS:
around 20:00

JFK

Water & Towel

Choice of drink
& some nuts

1,5 hour before
landing light meal

5 ovens
Each housing 8 trays
Each tray 4 warm meals

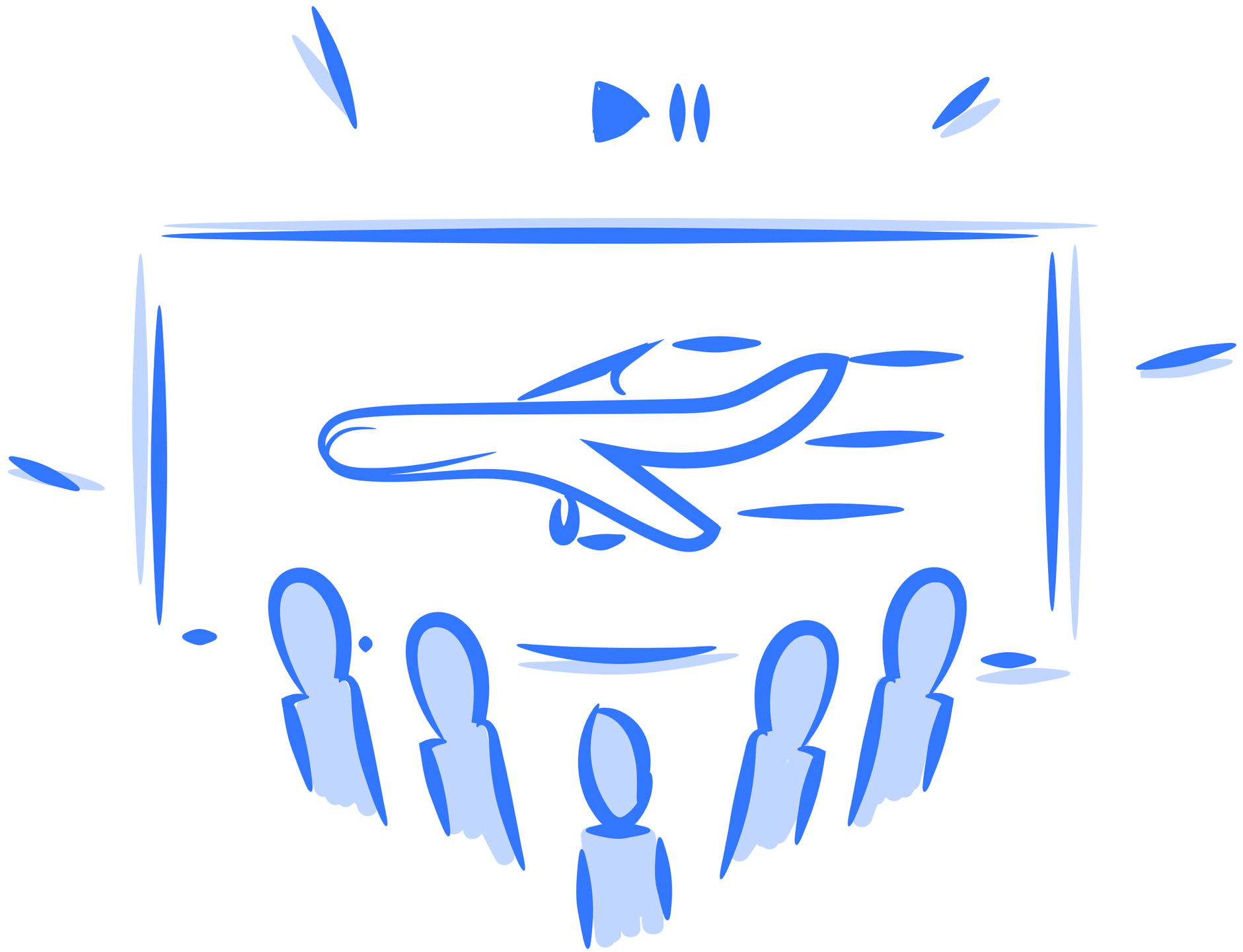
First meal served after
an hour

Appetizer
Main
Side
Bread

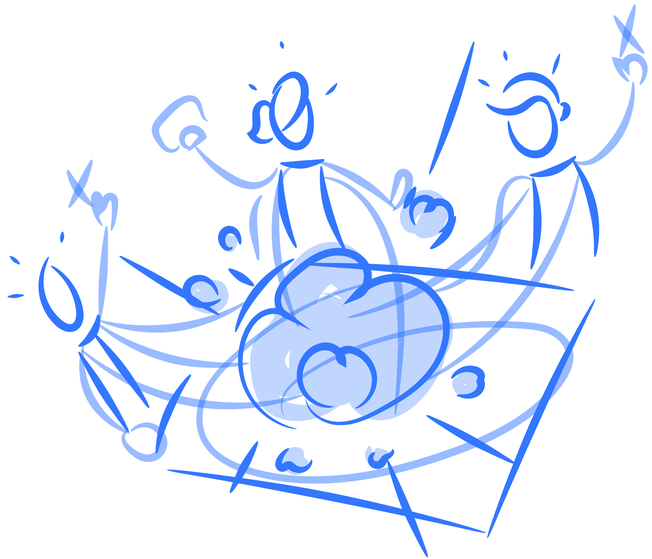
Baileys Coffee
Stroopwafel Ice cream

Ice cream after lunch

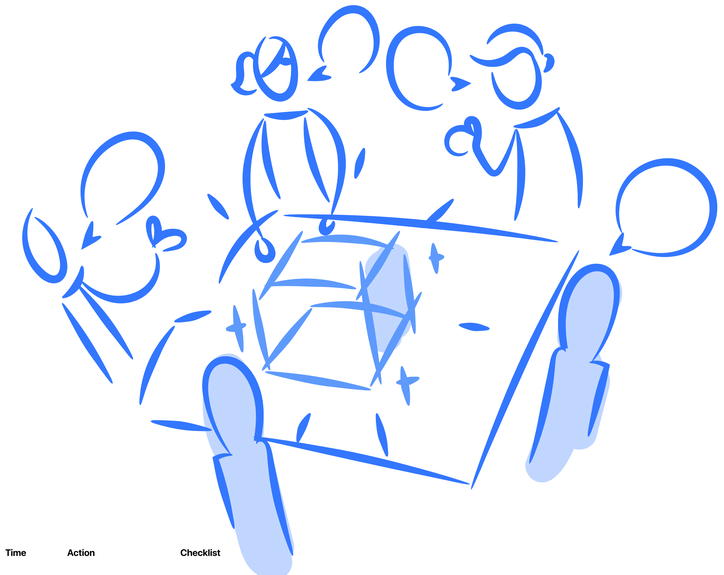
Welcome after
boarding
with amenity kit &
headphones



Time	Action	Checklist
5 min	Watch Video	Ease Out -- > You have just shared all these things. I've got some visuals from an existing flight. KL641. This is the case we are going to design for. You are going to come up with a scenario for the ideal situation in the future. They are going to tell about the scenario. You make a template for the ideal galley to design on. (make video KL641)



Time	Action	Checklist
20-30 min	Make the galley	Using different materials such as cardboard, foam, wood, plastics etc participants are invited to make their own version of the ideal galley and to play around with them like lego. Participants will be coupled in pairs to stimulate interaction and cooperation. If possible non-designers will be teamed up with designers. This exercise uses physical artifacts. (provide physical artifacts & template).

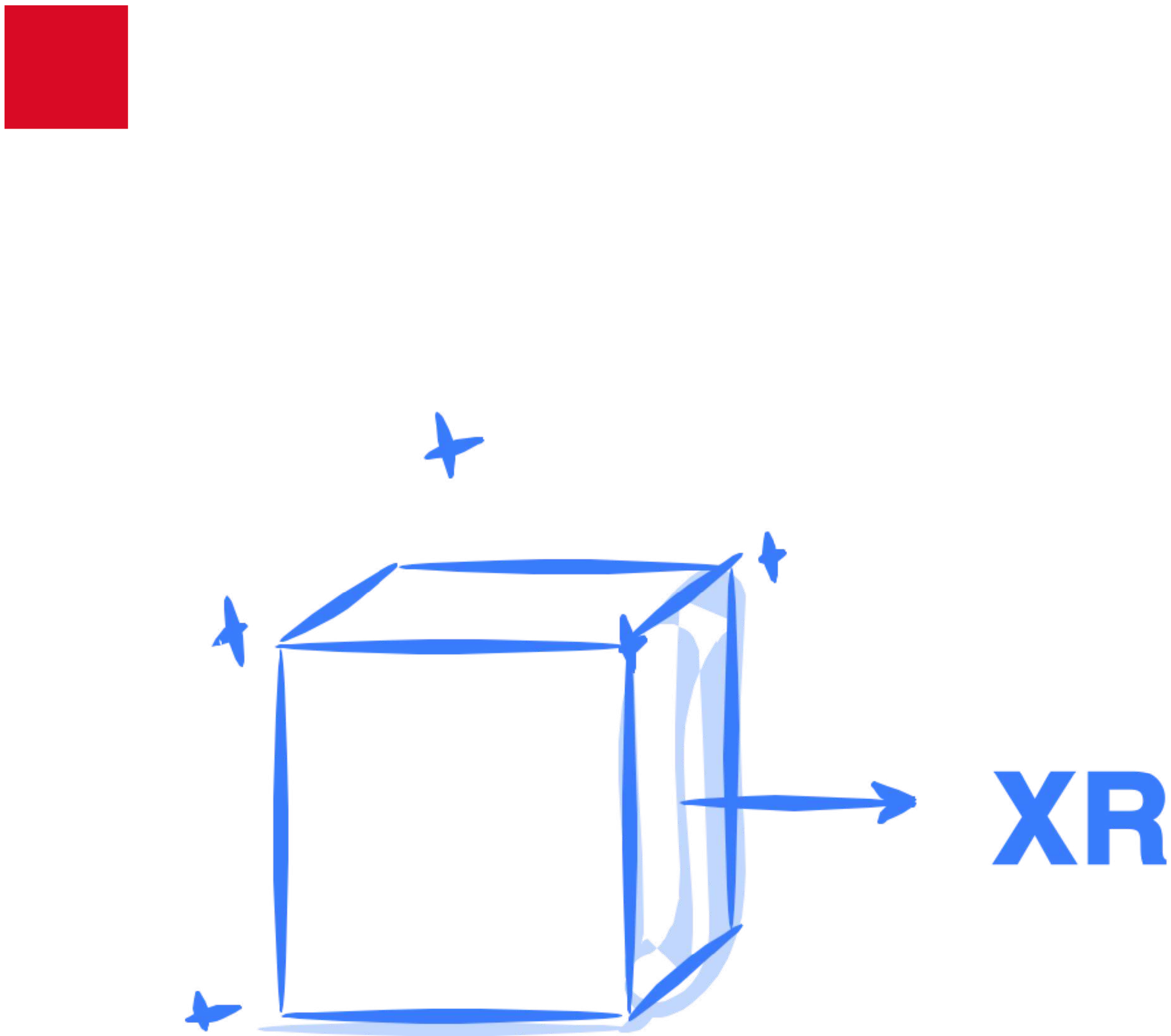


Time	Action	Checklist
10 min	Present the designs	Group members will present their 3d designs to the rest of the group and explain why they made particular choices. Remind yourself to ask open ended question about why they made particular choices and how they came to these conclusions. What underlying values motivate these choices.

Break

During the break the facilitator prepares the 3D models in VR and makes them on a scale 1:1. This will be a lo-fi prototype

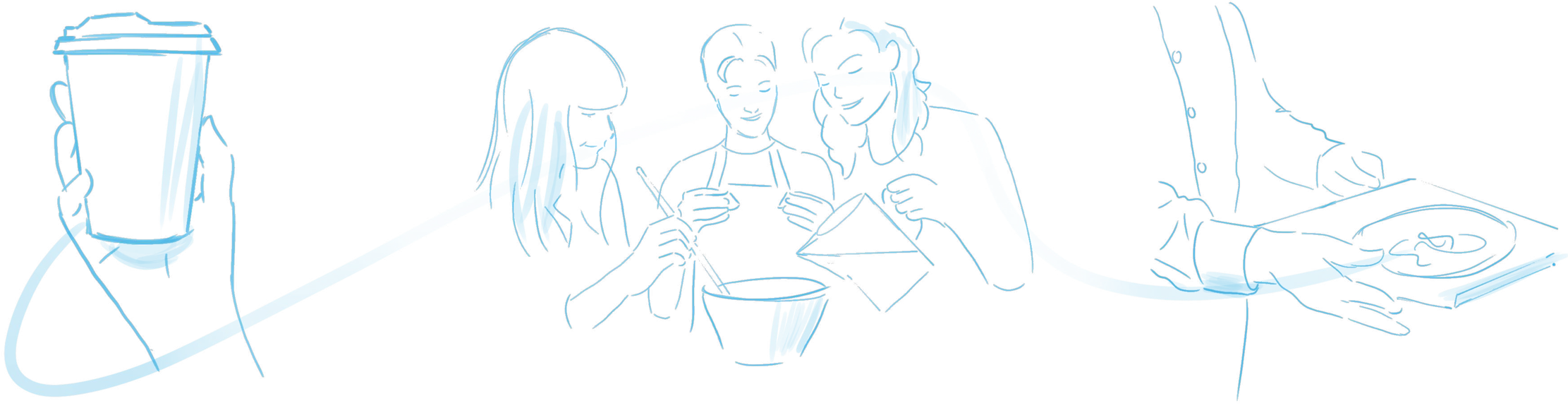
Time	Action	Checklist
5 min	Introduction	Of course I am researching XR and you have just made all your designs in a physical world. You have explained and evaluated why you have made your choices and I now want you to feel what it would be like if you can all enter your own design in XR.



New Design

Me and my food

Workbook



This booklet belongs to.....

Hi there

Thank you for participating in this research project!

This booklet is about your attitudes towards food and cooking either at home or while travelling. Food is first and foremost an essential part of our lives serving as a necessity to sustain ourselves and survive. However food is connected to more aspects ranging from social, cultural, emotional and pleasurable, to name a few. Food can express our cultural identity, help us connect to others and provide us comfort and enjoyment. There are many ways that food can play a role in our lives, be it through rituals and traditions, tastes and textures, comfort and well-being...the list goes on.

This booklet will among other things help you explore what experiences you have with food, cooking and travelling. There are four sections in this booklet each corresponding to a day. Please fill in the first section on day 1, the second on day 2 etc. Each section will take roughly 5-10 mins to complete. Please don't complete the book in one go. There are no right and wrong answers and there is a small example for some tasks to get you on your way. Please feel free to use as many materials as you want and don't forget to have fun!

If you have any questions please don't hesitate to contact me.

Good luck!

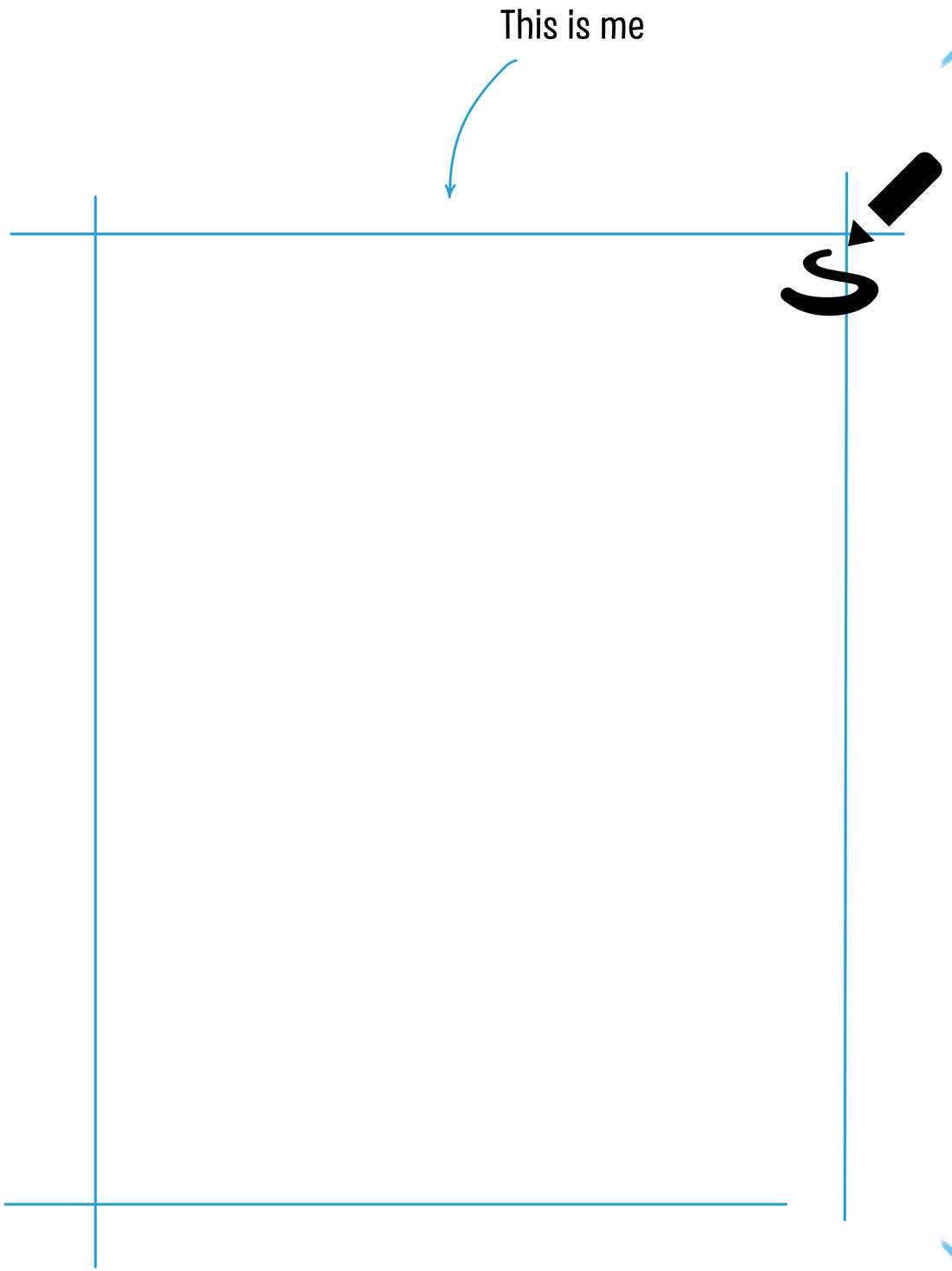
About me:

Name: .....

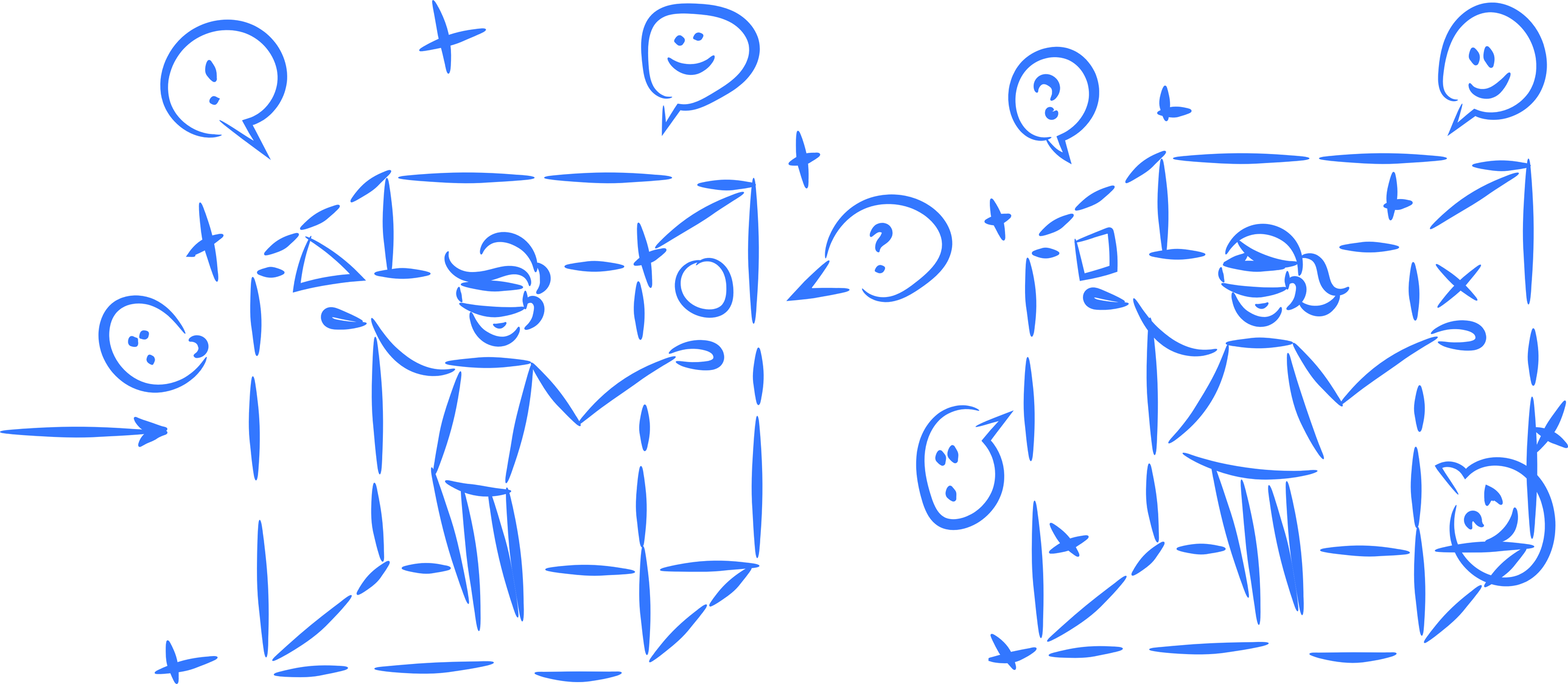
Age: .....

Gender: .....

Job: .....

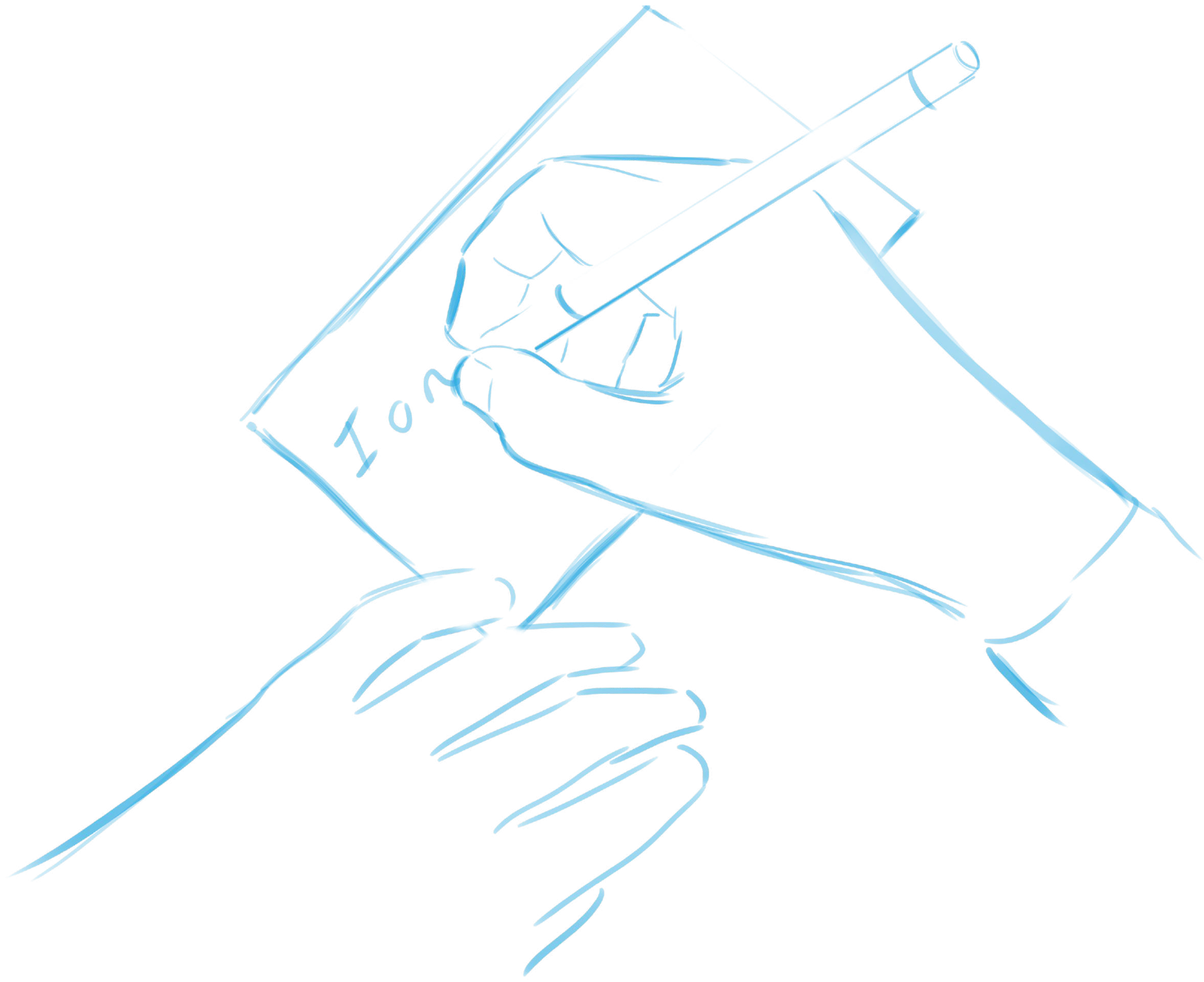


Time	Action	Checklist
15 min	Immerse in VR	Group members are asked to immerse themselves into the role of flight attendant. This is encouraged by transporting them into a VR world. In an ideal setting all participants would be able to access the VR world simultaneously by all wearing a headset. Discussing their findings on a 1:1 scale and making adjustments with the designer also immersed in the virtual world. (ideally multiple headsets). Add the opportunity to add notes to the design for finetuning and/or the talking aloud method.



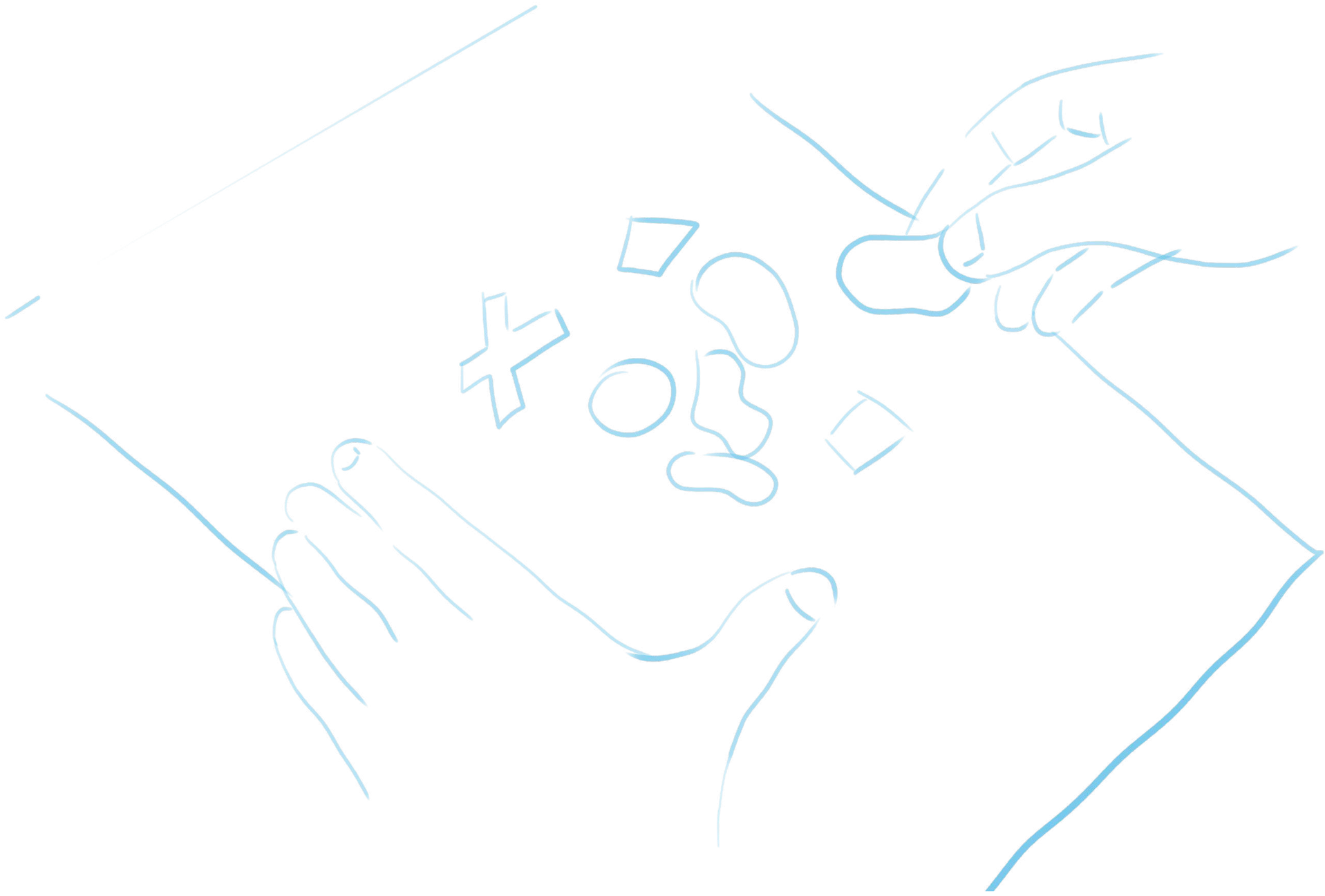
Time	Action	Checklist
5 min	Introduction	All sit down and the facilitator (me) asks them if they all filled in their sensitizing booklet and their quick thoughts about it. Then I'll tell them the topic for today which involves designing their ideal kitchen. "You are the designer and the user of specific product today". Explain they are welcome to share any experiences that come to mind during the session do not hesitate to ask, shout or share things they want to at any time.

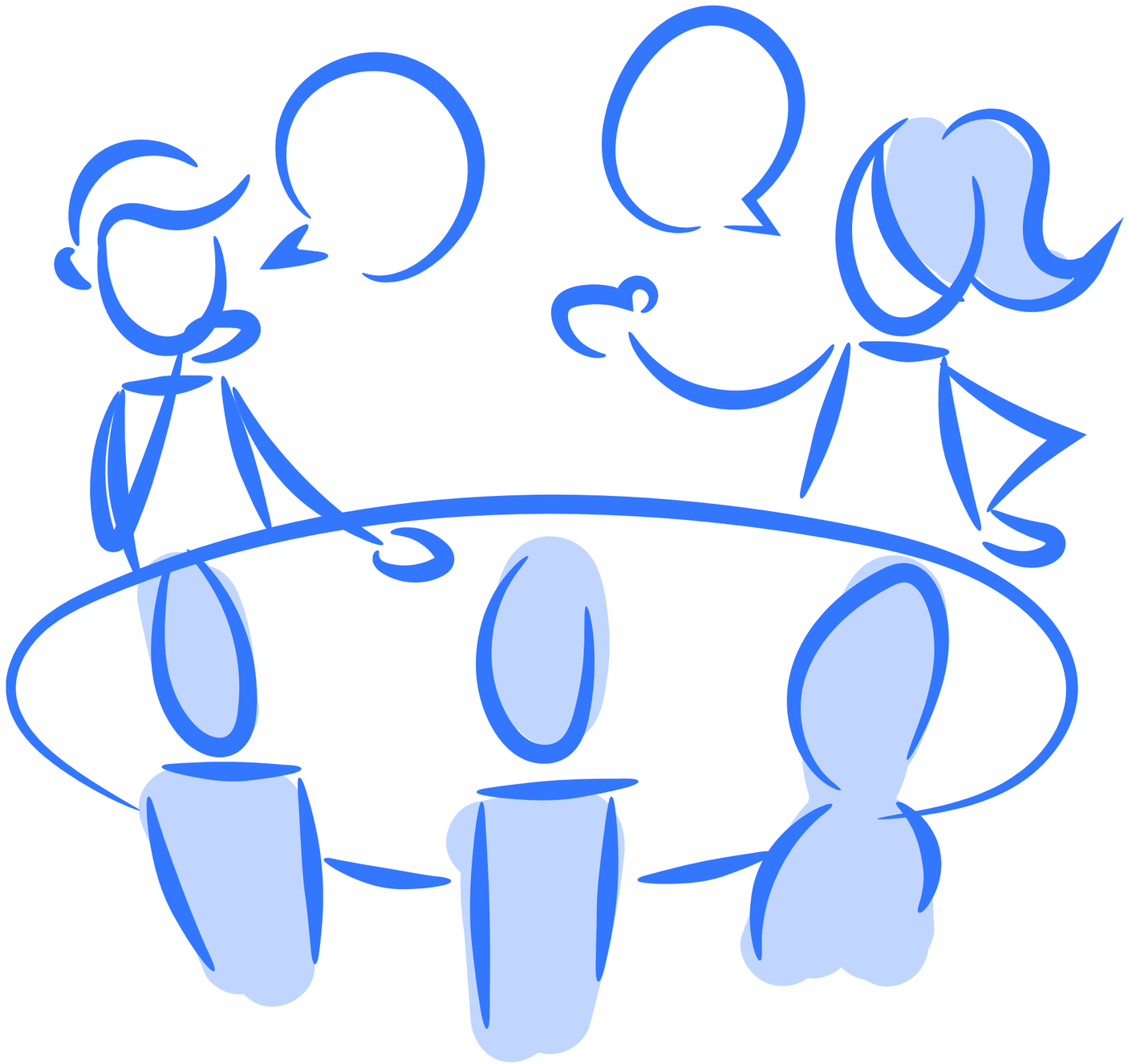
Time	Action	Checklist
5-10 min	Getting Acquainted	“Whodunit” Have each person write a couple of statements down on multiple cards, the sillier the better. Throw the cards in a a hat and have each person draw a card which they read out loud. The reader must try to guess ‘whodunit’ and why they think this.



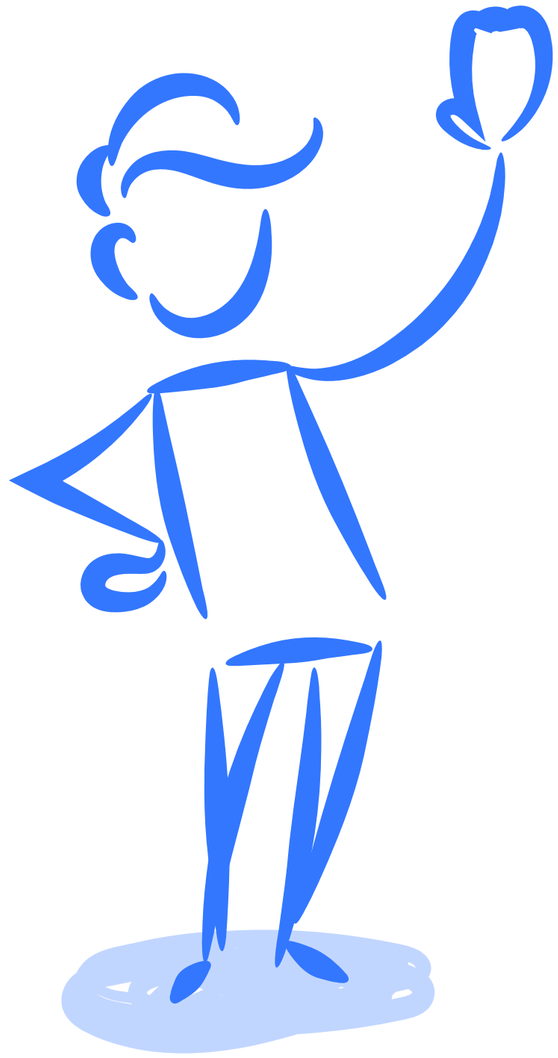
Time	Action	Checklist

Time	Action	Checklist
20 min	Make the collage	”The ideal kitchen”. Use the instructions provided in the introduction to the collage-making. Visualise your kitchen by drawing, words, pictures etc. Ask them to be as free as possible. Nothing related to aircraft etc or other boundaries.





Time	Action	Checklist
20 min	Discussion	Group members are invited to share their experiences of where the VR was used in this case. Did it make sense to use VR in these places in the process? Why/Why not? Where would they have liked to have more visual feedback? Where would they like to share more info on the design on a 1:1 scale? Did VR make it easier/ harder? Did it make sense at all?



Time	Action	Checklist
5 min	Thanks & Bye	Thank everyone for coming and keep them in the loop on results.

Concerns

Discussion in the break and modeling in the break?
Conflict?

Record the break and model yourself
Join the break and let someone else model?

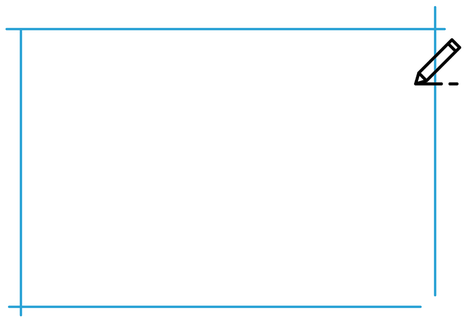
Podium
Equipment failure

My own designed galley in VR that I pitch that and then let them experience that in VR

Intro

My favourite dish

name of your favourite dish.....



Draw a picture of your dish in the circle

The last time I ate it was.....

Did you ever try to make it yourself? How did it turn out?

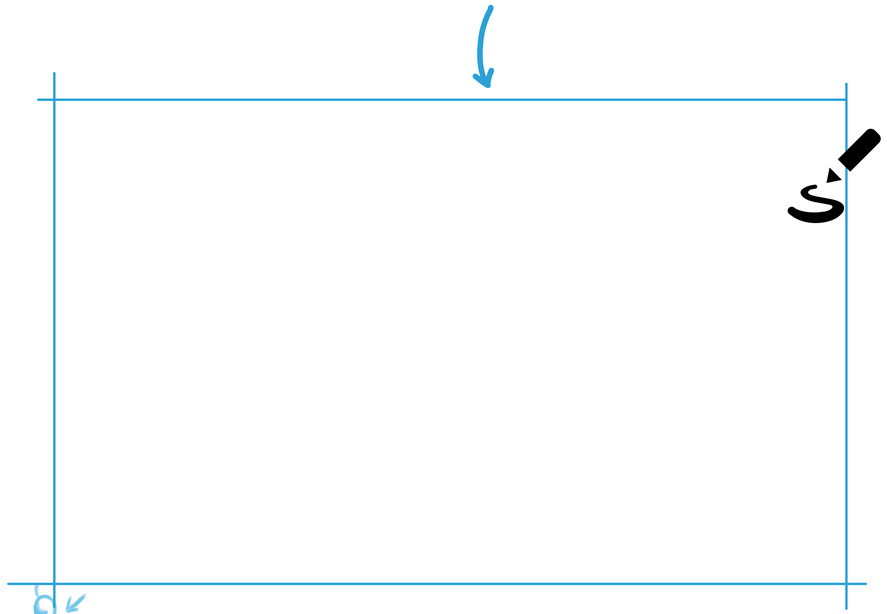
What is your personal history with this dish?

THEN

NOW

day1

My kitchen

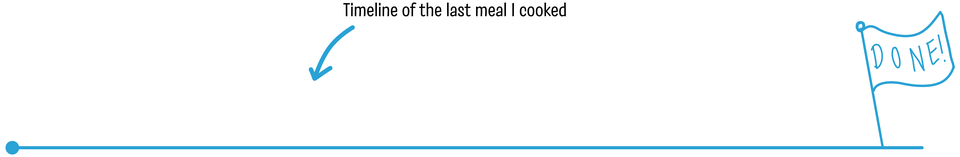


circle

1 2 3 4 5 6 7

<10 10-20 20-30 30-40 40-60 60-90 90+ min/day

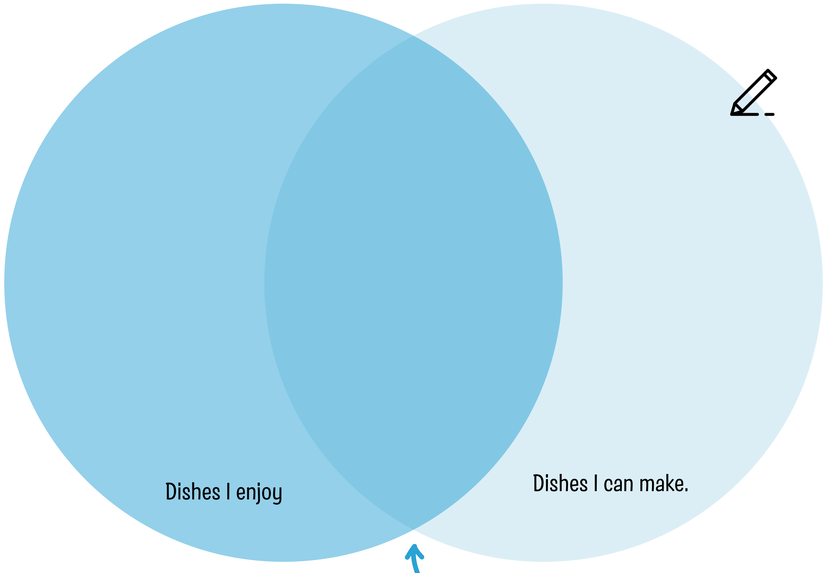
Timeline of the last meal I cooked



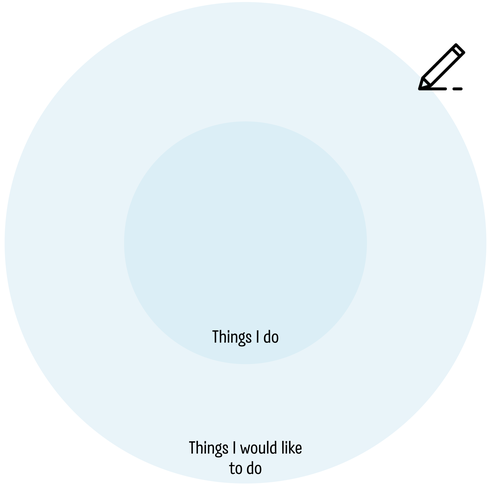
Things I like about my kitchen:

Things I would want for my kitchen:

Please write down what comes to mind in the correct circles :)



The 'lucky you' part



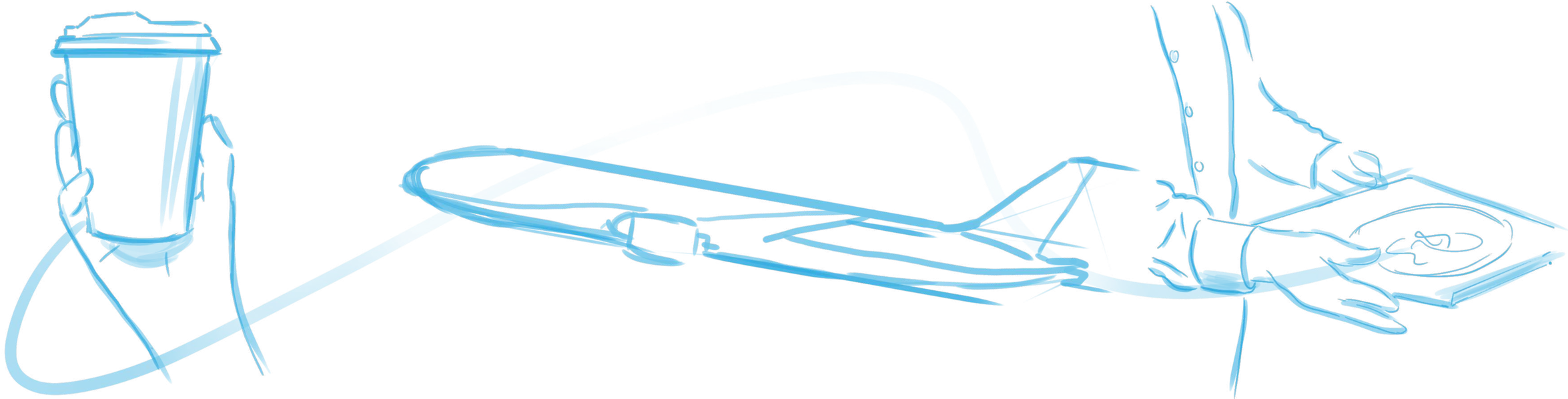
What things apart from cooking do you do in your kitchen?

How do you organize and optimize space in your kitchen?

My ideal kitchen would look like....

Culinary Cruising

Workbook



This booklet belongs to.....

Mini Design Brief

Overview

The Flying-V is a new type of plane that reimagines what a conventional airplane should look like. With this new design comes the need for redesigning the whole aircraft interior from scratch not being bound to conventional aircraft limitations. This creates the freedom for new and innovative solutions and you are invited to think in these terms for this upcoming assignment.

Goal & Objective

You have now immersed yourself in being served on an aircraft, and serving food yourself. With this knowledge I would like you to imagine what this would look like in the future. More specifically: If you were a flight attendant in the future working in the Flying-V and you were not bound to standardisations and regulations, what would your ideal galley of the future look like?

Design your ideal future galley for the Flying-V and come up with a scenario of how this galley could be used.

Feel free to use all the materials supplied to form and create the galley

Target audience

In this case you as a future flight attendant! You decide what you like and don't like/want and don't want!

Deliverable

1. Create a physical model/represenation with the materials supplied of your ideal future galley.
2. Create a storyline or scenario of how this galley would be used.

Tips

Tips for creating your model:

- Draw inspiration from the visuals
- Use the provided templates for reference
- Don't spend to much time on detailing.
- Make use of volumes to represent objects
- Invite open communication with your partner(s) while building

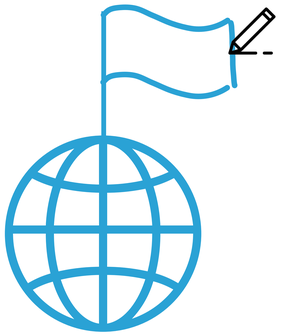
Tips for creating your scenario:

- What story do you want to tell with your scenario?
- Think of common things flight attendants do in an aircraft but don't let it limit you!
- Imagine an ideal working environment and guide us through it.

day2

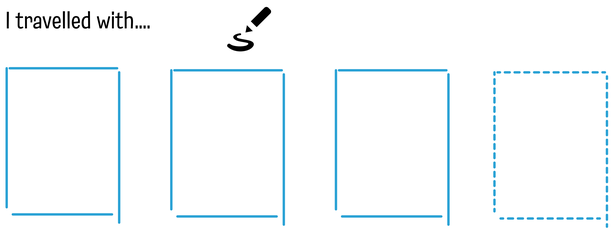
Food on the Go

The last place I travelled to abroad was:...



I travelled by....

I travelled with....



Draw your travel companions

How do you choose where and what to eat while on the go?

My favourite type of food to eat when I'm on the go... why?

I would bring my own food on the go when: .....

because: .....

Hi there!

Thank you for participating in this research project!

This booklet is about your attitudes and experiences towards inflight food and serving food away from home. Food is first and foremost an essential part of our lives serving as a necessity to sustain ourselves and survive. However food is connected to more aspects ranging from social, cultural, emotional and pleasurable, to name a few. Food can express our cultural identity, help us connect to others and provide us comfort and enjoyment. There are many ways that food can play a role in our lives, be it through rituals and traditions, tastes and textures, comfort and well-being...the list goes on.

This booklet will help you explore what experiences you have with inflight food and food serving. There are no right or wrong answers, you are the expert of your own experience! There are 2 sections in this booklet each corresponding to a day. Please fill in the first section on day 1 and thee second on day 2. Each section will take roughly 5-10 mins to complete. Please don't complete the book all in one day. There will be small examples for some tasks to get you on your way. Please feel free to use as many materials as you want and don't forget to have fun! There are some symbols and pictures for you to cut out and stick in the booklet to add flavour to your answers too. If you think of something later and what to go back to a day feel free to do so.

If you have any questions please don't hesitate to contact me.

Good luck!

About me:

Name: .....

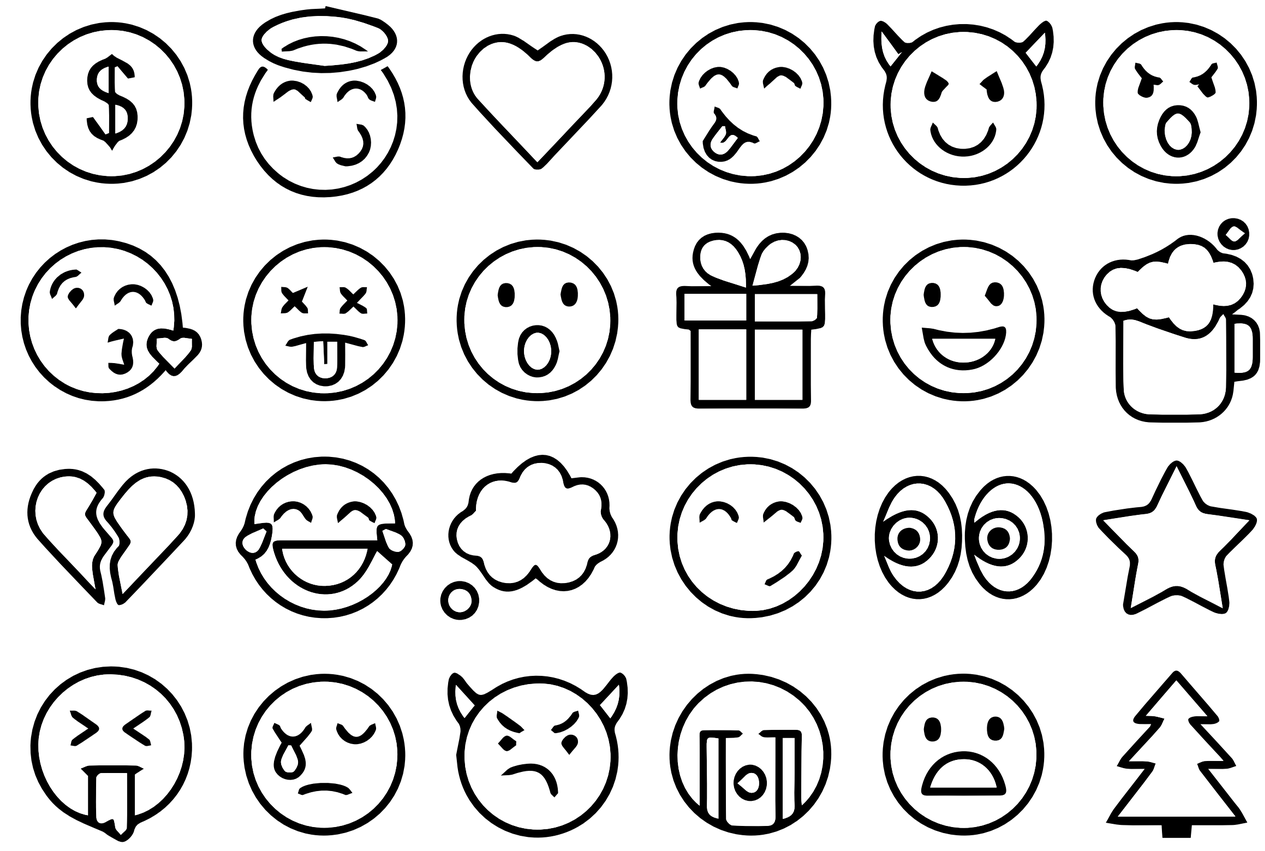
Age: .....

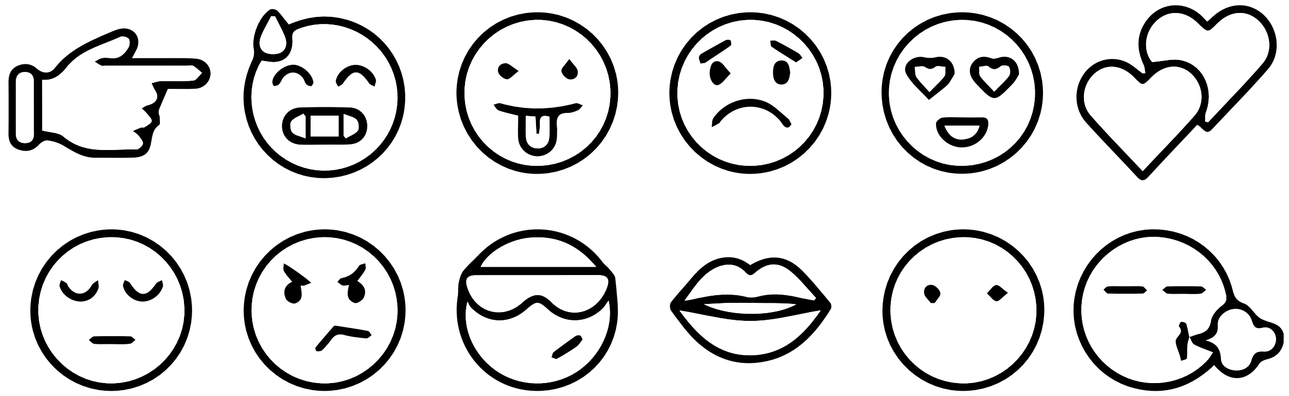
Gender: .....

Job: .....

This is me
(you can draw/use words/stickers/
pictures etc)

Cut out & stick





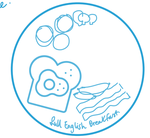
Cut out & stick

Intro

My favourite dish

What is the name of your favourite dish.....

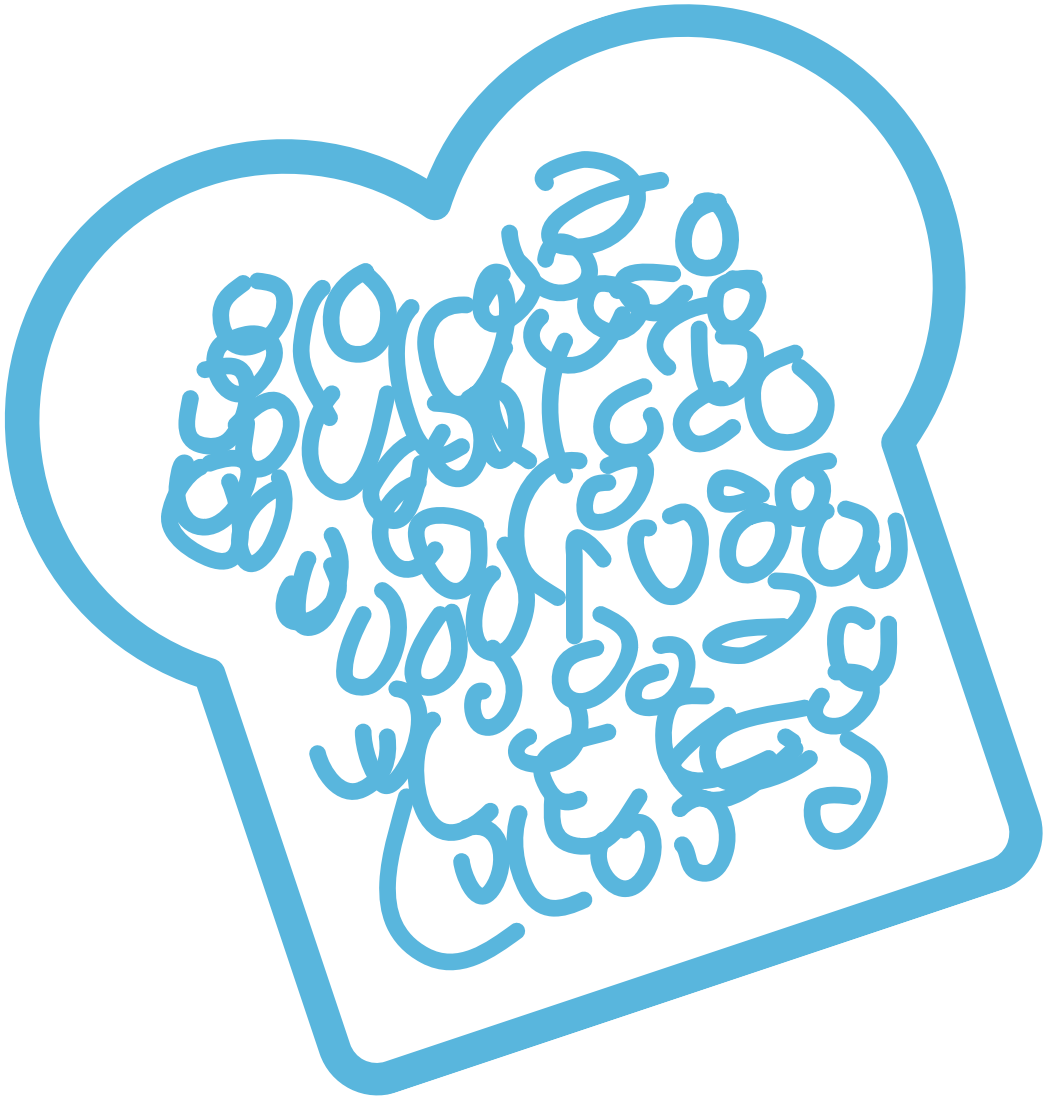
example:



Draw a picture of your dish in the circle

The last time I ate it was.....

Did you ever try to make it yourself? How did it turn out?



strongly disagree — strongly agree

I feel that food plays an important role in my travel experience.

please elaborate

strongly disagree — strongly agree

I am willing to spend more money on higher quality food options when I'm travelling or on the go

please elaborate

strongly disagree — strongly agree

I prioritise convenience over taste and quality when selecting food on the go

please elaborate

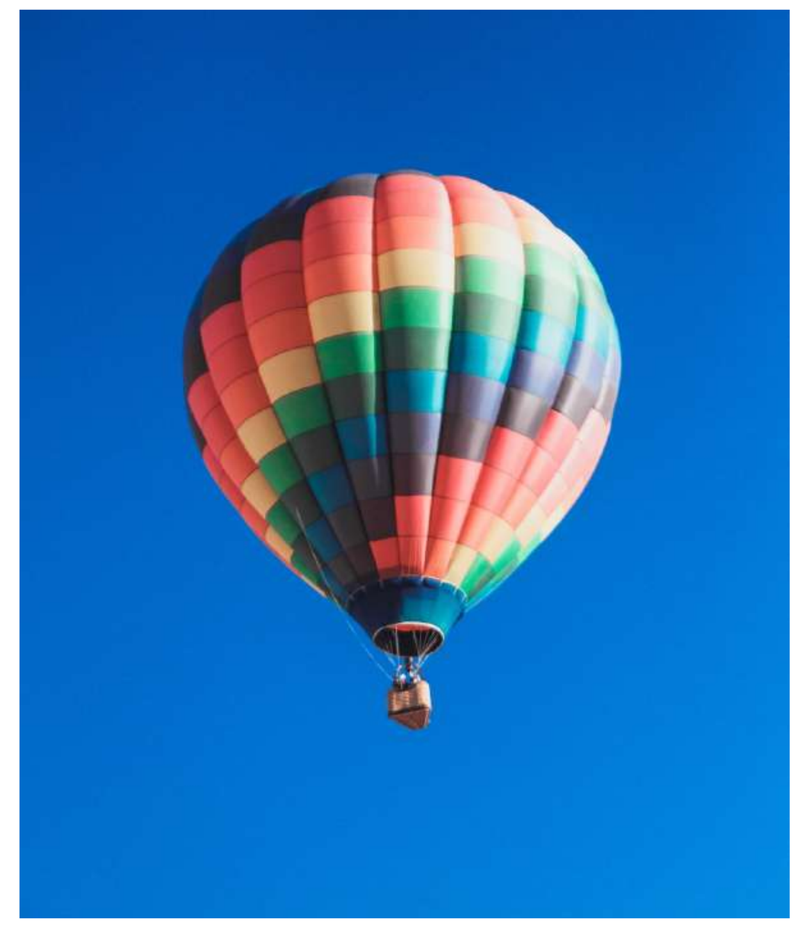
What role does food play in my travel experience?

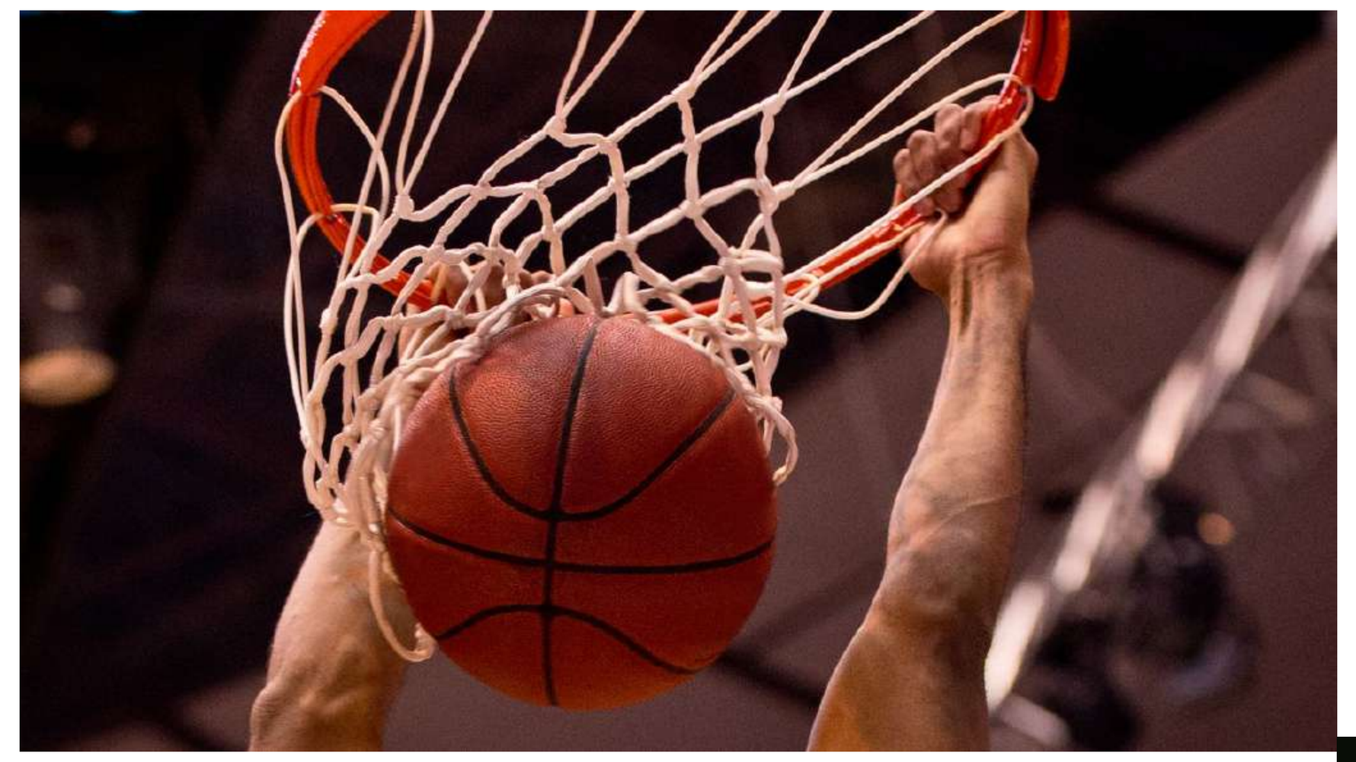
Cut out & stick

















Cooking and food in a different setting

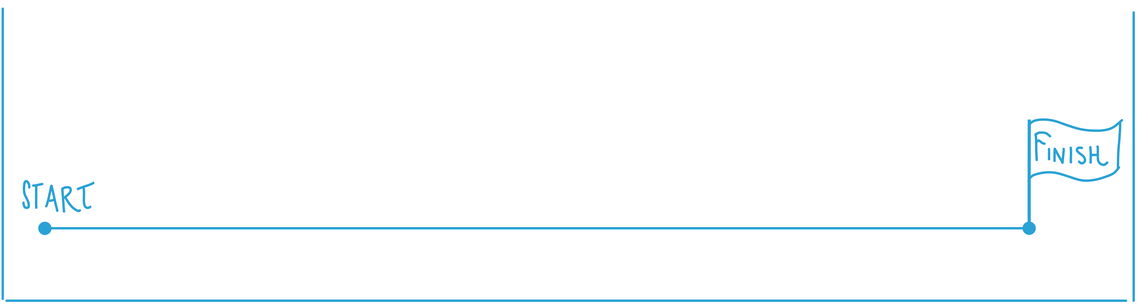
day3

Think of the last time you cooked in a kitchen that wasn't your own. Was this at a friend's place? Family? On holiday? Somewhere else? The last time I cooked in a kitchen that wasn't my own was when....

What was the reason for this?

I adapt to cooking in a different kitchen than my own by.....

If you cooked with someone else, who was it? With how many were you? Run us through the workflow of cooking together..



Biggest challenges I had when cooking in a kitchen that wasn't my own...

day1

Inflight Meals/Being a passenger

The last flight I took was....

BOARDING PASS

Last Destination

Purpose of trip

Travel companions

BOARDING PASS

Airline

Class

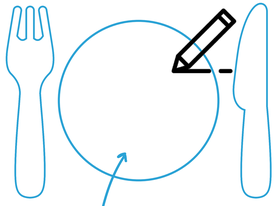
Flight duration

Business/ Leisure

Who did you travel with?

Economy/Business/First?

Think of the last flight you took....



I had (insert number of meals)on my flight.

I had (insert number of snacks) on my flight.

I had (insert number of drinks) on my flight.

YES NO

I asked for a special (dietary/religious) meal?

If so could you elaborate?

MARK A CIRCLE

Things that surprised me!

Things that I would like in my kitchen!

Things I disliked....

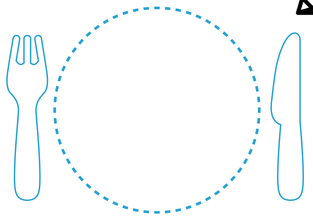
Things that I noticed when cooking in a different kitchen

My most memorable experience cooking together (in my own or a different kitchen) was...

because....

Other stories you would like to share.

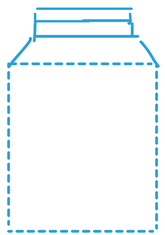
What kind of....



...meals...

Please write in the white space

...snacks...

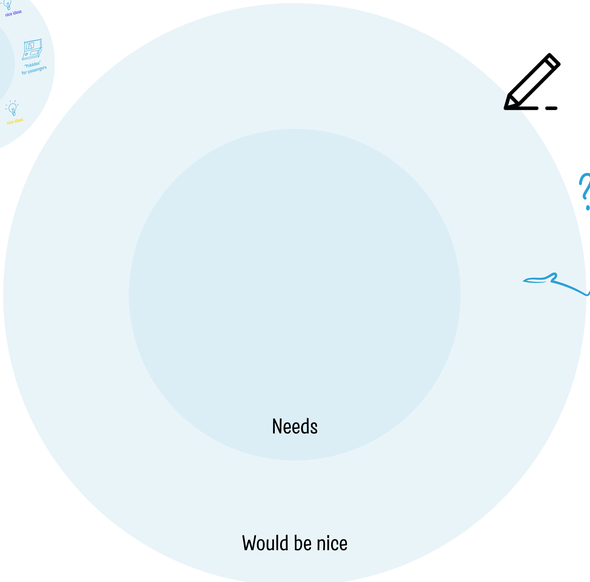


... and drinks did you have?

What struck you about the flight attendants while meals were being served? This can be in general not just your last flight. Did you find something nice? annoying? sad? cool?... You can use stickers words/pictures etc!

How does an inflight meal compare to dining in a restaurant, going to a snackbar or cafeteria?

What was your last very best inflight meal experience?



What kind of support and resources do you think flight attendants need to provide the best food and beverage service to passengers?

day 4

Inflight Meals/Being a passenger

The last flight I took was....

BOARDING PASS

Last Destination

Purpose of trip

Travel companions

BOARDING PASS

Airline

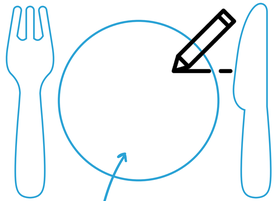
Class

Flight duration

Business/ Leisure

Economy/Business/First?

Who did you travel with?



I had (insert number of meals)on my flight.

I had (insert number of snacks) on my flight.

I had (insert number of drinks) on my flight.

YES NO

If so could you elaborate?

I asked for a special (dietary/religious) meal?

day2

Serving food in a different setting

Think of the last time you served food in a place that wasn't your own. This could be for instance cutting a birthday cake at your friends place or the office. Dishing out food on a holiday? Helping out at a wedding? Somewhere else? The last time I served food in a setting that wasn't mine was...

What I liked and disliked about the situation....

Had you been in this setting before?

YES NO

Did it help being there/not being there before?

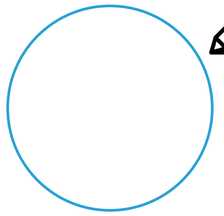
If you served with someone else, who was it? With how many were you? Run us through the workflow of serving together..

Start

Finish

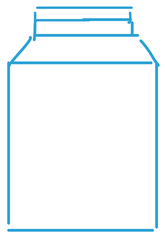
Biggest challenges I had when serving food in a setting that wasn't my own...

What kind of....



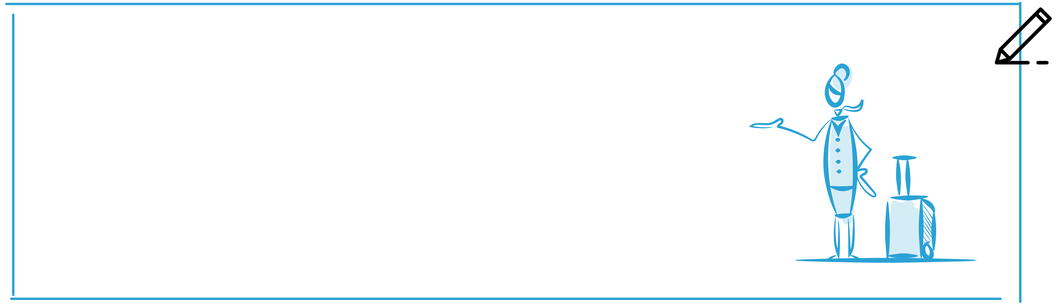
...meals...

...snacks...



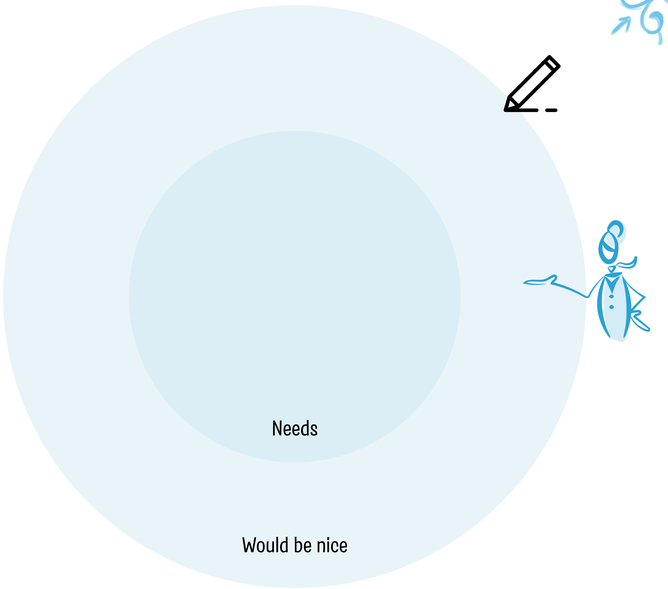
... and drinks did you have?

Please write in the white space



What struck you about the flight attendants while meals were being served? This can be in general not just your last flight. Did you find something nice? annoying? sad? cool?...

How does an inflight meal compare to dining in a restaurant, going to a snackbar or cafeteria?



What kind of support and resources do you think flight attendants need to provide the best food and beverage service to passengers?

Things that I noticed when serving food in a setting that wasn't my own....

Things that surprised me!

Things that I would like for next time

Things I disliked....

My most memorable experience serving food in a setting that wasn't my own.

because....

Thank you for your time

Thank you for your time

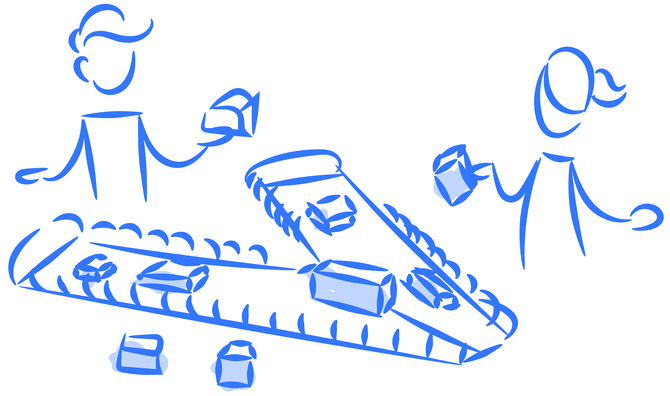
5. **Design Research with Cabin Crew**
    - **Engagement process: Explain how you will involve cabin crew in the participatory design process and how their input will be incorporated into the design**
    - **Data collection: Describe the techniques used to collect data from cabin crew (e.vg., interviews, surveys, focus groups) and how the data will be analyzed**
    - **Findings: Present the findings from the design research, focusing on the impact of XR on the cabin crew's input and design outcomes**
    - **Challenges and solutions: Discuss any challenges encountered during the design research and how they were addressed**

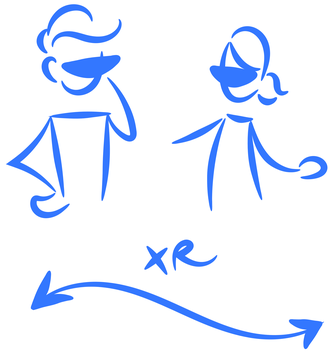
6. **Discussion and Implications**
    - **Synthesis of findings: Draw connections between the literature review, workshop results, and design research with cabin crew to provide a comprehensive understanding of the role of XR in participatory design for aircraft galley design**
    - **Practical implications: Highlight the practical implications of your findings for aircraft galley design, participatory design processes, and the use of XR in collaborative design efforts**
    - **Limitations and future research: Address any limitations of your research and suggest potential avenues for future research in the**

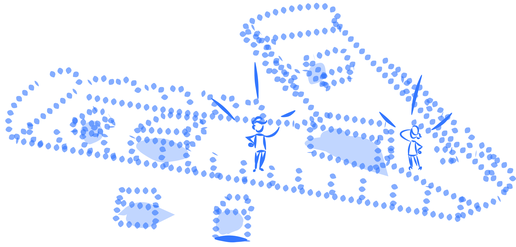
Iteration & Refinement.

Final Guideline or product.


XR




XR




XR
1

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.

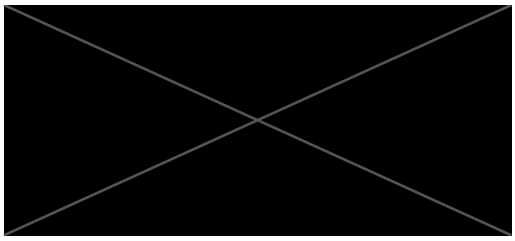
USE ADOBE ACROBAT READER TO OPEN, EDIT AND SAVE THIS DOCUMENT

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
initials given name
student number
street & no.
zipcode & city
country
phone
email



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

IDE master(s): IPD Dfl SPD

2nd non-IDE master:

individual programme: - - (give date of approval)

honours programme:

specialisation / annotation:

SUPERVISORY TEAM **

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

** chair dept. / section:

** mentor dept. / section:

2nd mentor

organisation:

city: country:

comments (optional)

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.

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

APPROVAL PROJECT BRIEF

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

chair _____ date ____-____-____ signature _____

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 _____ Student number _____

Title of Project _____

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 - - 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, ...).

space available for images / figures on next page

Initials & Name Student number

Title of Project

introduction (continued): space for images

image / figure 1:

image / figure 2:

Initials & Name _____ Student number _____

Title of Project _____

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.

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.

Initials & Name _____ Student number _____

Title of Project _____

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 ____ - ____ - _____ ____ - ____ - _____ end date

Initials & Name _____ Student number _____

Title of Project _____

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.

FINAL COMMENTS

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

Initials & Name _____ Student number _____

Title of Project _____