Sustainable Smart Textiles

Purpose-Driven Innovation Project

Splash
By Xuetong R. & Chloé B.

October - March 2021

Sustainable Smart Textiles for VW & Comlogo

Master of Strategic Design
Third Semester

SRH Berlin University of Applied Sciences
Berlin School of Design and Communication

Abstract

Idea Concept

Splash - Sustainable Virtual Trip

For millennials who desire long-distance travel and do not really care about the environment, a sustainable virtual trip is an immersive experience featured with smart clothing that fulfills the desire for long-distance travel and encourages sustainable mobility behaviors. Unlike other smart clothing for commuting, such as Jacquard by google, our smart clothing provides an immersive experience that encourages sustainable mobility behaviors and reconnects people to our planet during the pandemic.

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Proejct Phase
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Research

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Introduction

In order to obtain different points of view, six different research approaches were applied, both quantitative and qualitative. The goal of research is to define the real problems and hidden needs of the user, and gain a deeper understanding of smart wearables and its sustainability. To be more specific, Team Splash focused on the field of sustainability and durability on smart wearables, mobility behavior, safety, diversity, game, and immersive experience.

1. Desk Research

Research topic:

- Project partner:Volkswagen & Comlogo
- Smart clothing for mobility
- General samrt clothing
- Smart clothing regarding sustainability
- Target group and sales
- Manufactures/competitors

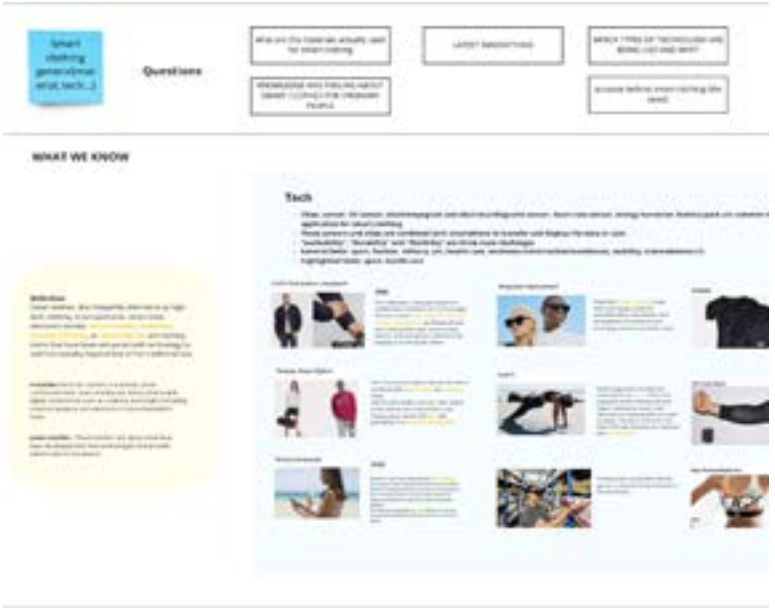


Fig. Sharing desk research findings on Miro

Key findings

- Chips, sensor, UV sensor, electromyogram and electrocardiograms sensor, heart rate sensor, energy harvester, battery pack are common tech application for smart clothing.

- High budget - 15% of users claims smart garments are too expensive.

- Washability, durability, and flexibility are the three main challenges of smart wearables' production and application.

- Main problems in recycling smart clothing: integration with the fabric, variety of material And electronic components.

Key Insights

- High cost associated with the smart weara bles followed by lack of awareness is expected to hinder the market growth over the forecast timespan.

- The sustainability of smart textiles requires a systems-thinking approach and depends on the sustainability of its constituent components as well as the lifespan of the clothes/ wearables to which the technology is converted over time.

- It is crucial to consider the washability, durability, and flexibility of smart clothes in the design phase to overcome those three main challenges.

2. User Interview

Overview:

To gain a deeper understanding of users' daily behavior towards smart wearables, sustainability, mobility, diversity, gaming, and immersive experience. Several interviews with users were conducted. In order to make the interview process more smooth and comfortable, other tools were applied as well, such as card sorting.

Minh, Student

“I wish smart clothing can motivate me to achieve my goal instead of only refining postures or tracking my body data.”

Enya, primary school teacher

“Too much technology and tracking, it puts a sort of pressure on me to be perfect all the time.”

Matti, Tech entrepreneur

“Sustainability for me is not just how things are sourced but also how long it can survive in my wardrobe.”

Pragya, Design student

“Video games make me feel lethargic and if I spend too much time on them, I always have a guilt trip”

Martina, Experience designer

“Smart clothing for gaming are not mainstream but have a lot of potential !”

Insights

- Staying motivated is important as improving performance when it comes to functional

- Intuitive design can shorten distance between users and technological solutions.

- Balance the relationship between people and smart clothing (technological solution) is crucial

- Deep immersive experience makes people be addicted to game. But it might help people be “addicted” to taking sustainable actions towards

- Consumers have the understanding of sustainability. Durability is perceived way more important than sustainable materials which only last for few years.

3. Expert Interview

Overview:

To get in-depth findings and insights of smart wearables, sustainable fashion, and smart wearables' potential in the gaming industry from a professional perspective. It was crucial to conduct expert interviews.

Nassim, E-sportive

"I think video-games will be much more prominent than before, and that the general public will discover a real professional face that is still unknown today."

Tingting, Fashion designer

"Today, we often talk and discuss recycle, reduce and reuse, once it comes to sustainable fashion. But the research data told us the recycled material made sneakers is not sustainable at all, because its second used material even is more difficult on its disposal."

Insights

- Video games industry is in a big growth and smart wearable has its potential in this market.

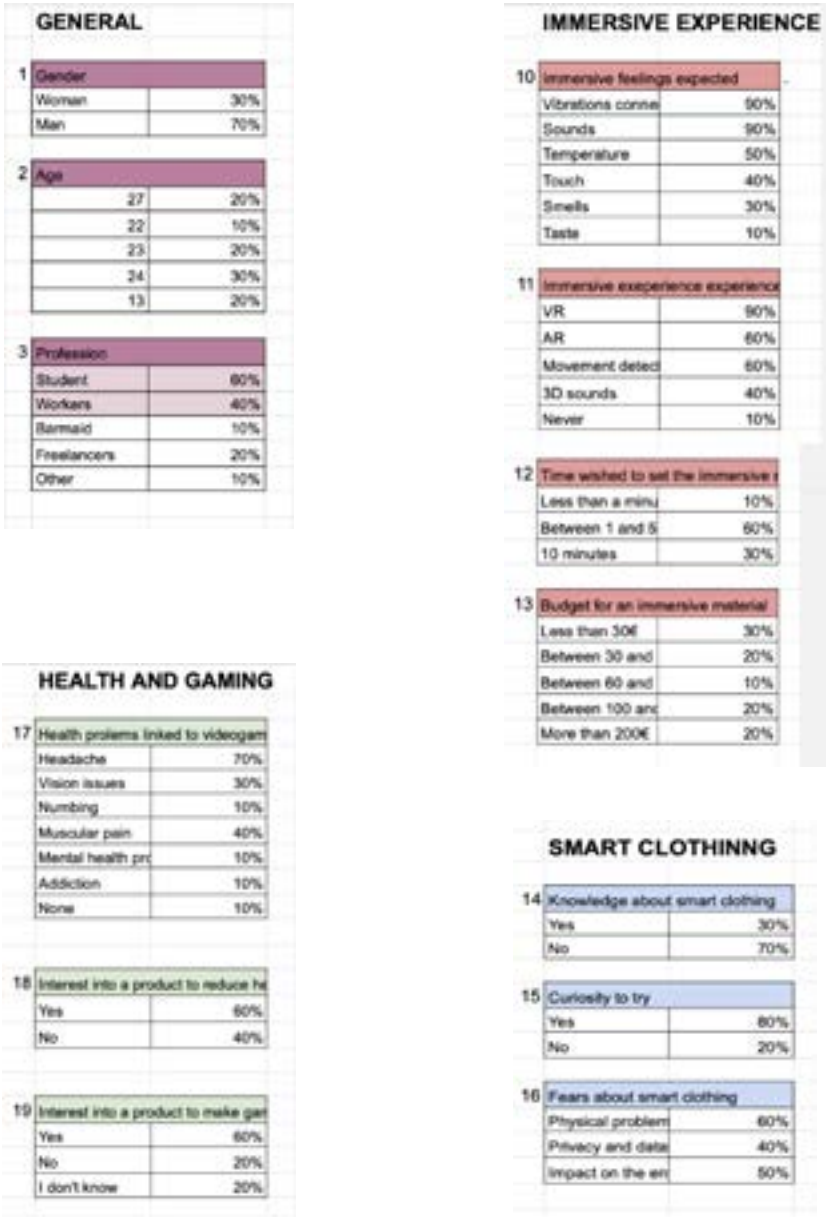
- Rethink the concept of sustainability is vital, to investigate what is truly sustainable smart wearable. It cannot only easily pick recycled material, which negatively impacts the environment at the end of the life cycle.

4. Quatitative Survey

Overview:

For quantitative research, an online survey was created on the google forms platform and shared explicitly with 10 participants who play video games and show interest in other technological game innovations. The survey consists of four sections: general participants information, health and gaming, immersive experience, and smart clothing.

Fig. survey results



GENERAL

1	Gender	
	Woman	30%
	Man	70%
2	Age	
	27	20%
	22	10%
	23	20%
	24	30%
	13	20%
3	Professioo	
	Student	60%
	Workers	40%
	Barmaid	10%
	Freelancers	20%
	Other	10%

HEALTH AND GAMING

17	Health prolems linked to videogam	
	Headache	70%
	Vision issues	30%
	Numbing	10%
	Muscular pain	40%
	Mental health pr	10%
	Addiction	10%
	None	10%
18	Interest into a product to reduce he	
	Yes	60%
	No	40%
19	Interest into a product to make gar	
	Yes	60%
	No	20%
	I don't know	20%

IMMERSIVE EXPERIENCE

10	Immersive feelings expected	
	Vibrations conne	90%
	Sounds	90%
	Temperature	50%
	Touch	40%
	Smells	30%
	Taste	10%
11	Immersive experience experience	
	VR	90%
	AR	60%
	Movement detect	60%
	3D sounds	40%
	Never	10%
12	Time wished to set the immersive	
	Less than a minu	10%
	Between 1 and 5	60%
	10 minutes	30%
13	Budget for an immersive material	
	Less than 30€	30%
	Between 30 and	20%
	Between 60 and	10%
	Between 100 anc	20%
	More than 200€	20%

SMART CLOTHINNG

14	Knowledge about smart clothing	
	Yes	30%
	No	70%
15	Curiosity to try	
	Yes	80%
	No	20%
16	Fears about smart clothing	
	Physical problem	60%
	Privacy and data	40%
	Impact on the en	50%

Fig. organized data in Excel

Key Insights

- 70% of player have headache while playing video game. it might caused by headset

- 60% people have fear of technical problems linked to smart clothing, but most of them don’t know about smart clothing (70%).

- 90% of people expected immersive experience through Vibrations and sounds. VR is one of main factors leads to their expectations.

- Use of head set increases lenght of gaming sessions through immersive experience.

Fig. 4 Infographic

5. Cultural Probes

Overview:

Cultural probes is a technique used to inspire ideas in a design process. It serves as a means of gathering inspirational data about people's lives, values, and thoughts. In the research, cultural probes helped to gain an in-depth understanding of users' perceptions and behaviors on smart wearables, mobility, and sustainability.

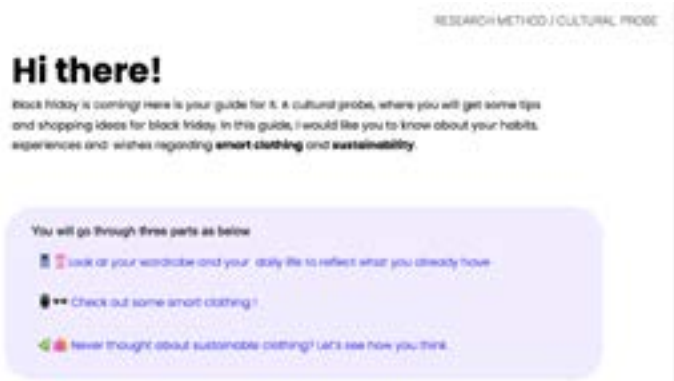
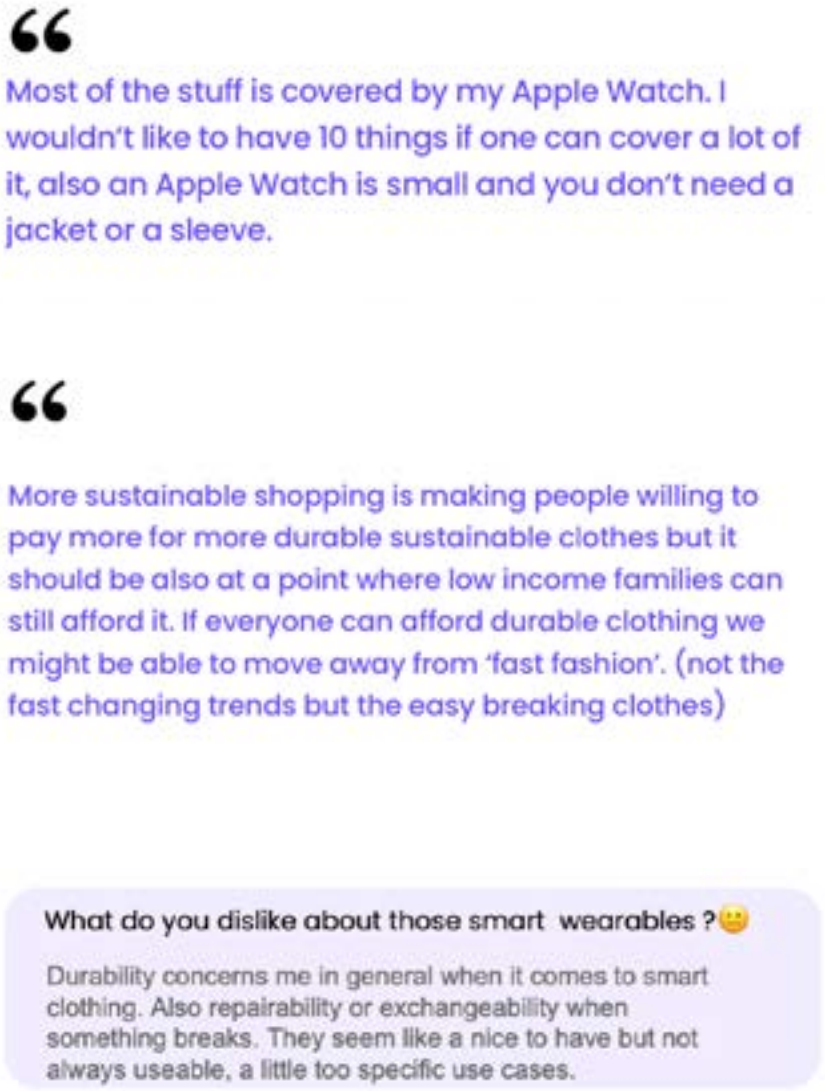


Fig. Cultural probe introduction



Key Insights

- Durability over sustainability, not only one participant mentioned that they'd instead buy high-quality clothes that they can wear for years than buying sustainable materials made clothes which might be broken in a short time.

- Apple watch is quite common among consumers, so that they would not buy smart clothing with the features already included in the apple watch.

- Most participants are positive about technology. Still, some of them were concerned about they are under pressure from technology, especially by the tracking system and too much data.

One participant mentioned that he hoped smart clothing could motivate him to do sport instead of refining his postures or tracking his body data during sports.

6. Stakeholder Mapping

Fig. Stakeholder map

Overview:

With the stakeholder map, we were able to visualize the relations, dynamics, and information between partners, primary stakeholders, and secondary stakeholders. Smart wearables have potentials in various fields such as the health sector, gaming, and sport.

Splash

Synthesis

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Introduction

Synthesis enables an entire set of information seen at once, which assists in uncovering implicit and hidden insight. We focused on making sense of our design research. We assembled the information gathered during the research phase and define the core opportunity fields necessary for our hypothesis.

1. Define Opportunity Fields

1.1 Analysis of Research

We narrowed down our research topics into smaller fragments for improved understanding. It was essential for us to share stories from all research fields to know our users and their desires better. In order to make all information more clear and informative, We listed key findings as well as relevent quotes from interview, desk research data, and insightful cultural probes answers from participants.

Fig. Research key findings

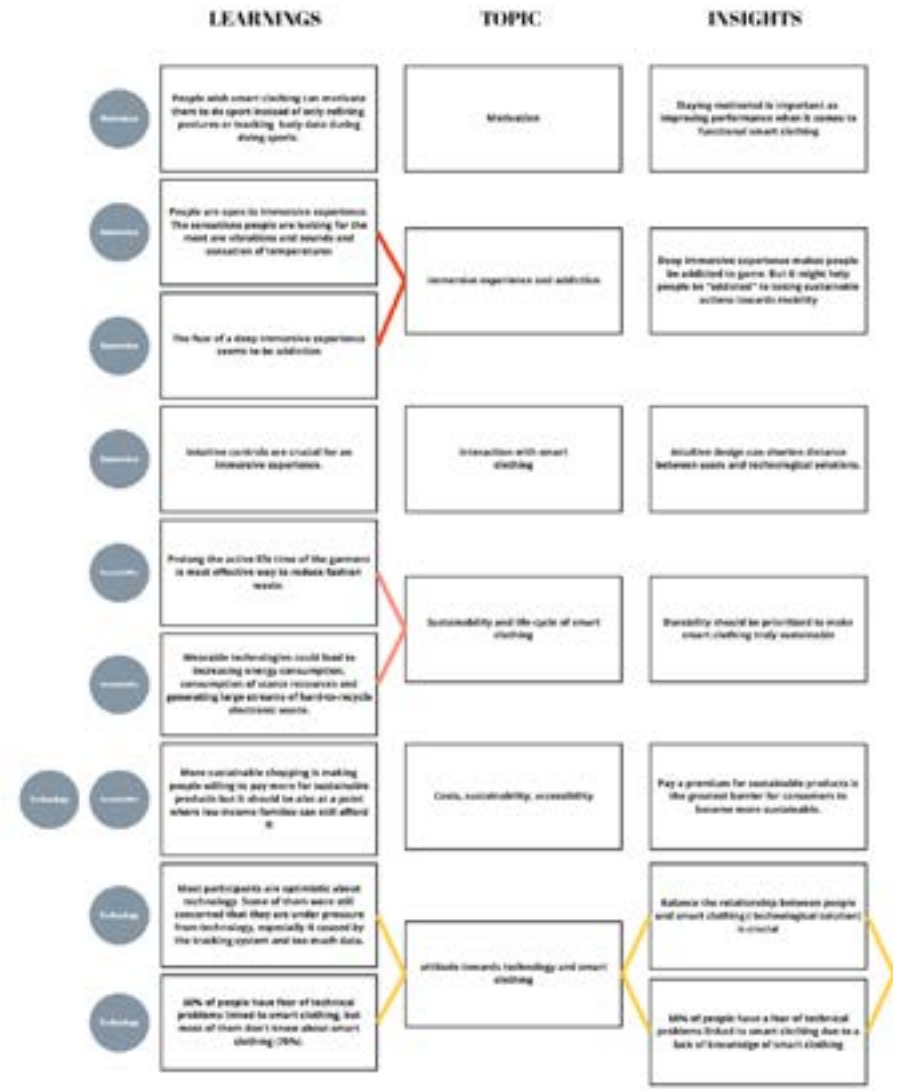
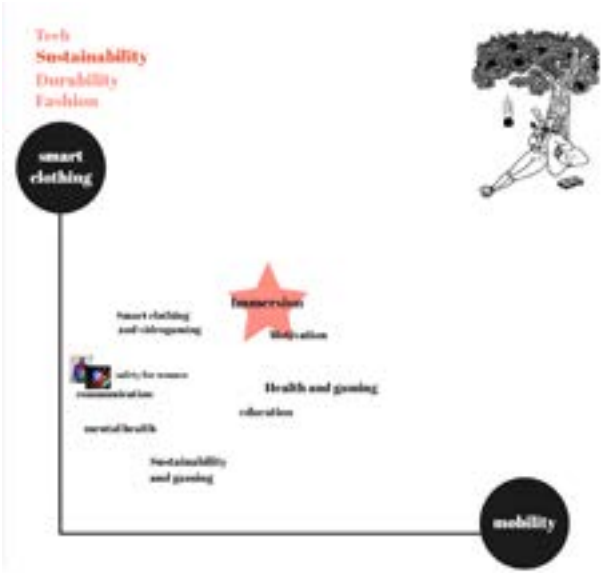


Fig. Clustered key insights and learnings



1.2 Clustering Insights

We clustered the most important insights that surprised us, made us curious and falsified our earlier assumptions. Since our research materials cross multiple topics and fields, it is crucial to select potential themes by evaluating grouped learnings in order to identify opportunity fields. The criteria for selecting potential themes are based on the project challenge provided by our project partner.

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1.3 Opportunity Fields

After organizing all the data gathered in the research phase, related raw research materials are grouped into themes. Motivation, immersive experience, sustainability, and technology are identified as opportunity fields. Those four fields were analyzed with strategic design frameworks to gain an in-depth understanding, uncovered needs, and patterns.

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2. Frame Works

2.1 Motivation
Tool: System Map

One insightful finding we discovered in the research phase is that some participants we interviewed wish smart clothing can motivate them to do sport instead of only refining postures or tracking body data while doing sports. It indicates that staying motivated is essential as improving performance when it comes to functional smart clothing. How might we motivate people to act sustainably towards mobility through smart clothing? To understand the motivation tightly connected to increasing more sustainable mobility behaviors, we found four leverage points by mapping out the system map: Encourage staying and shopping in the neighborhood, increase the amount of entertainment, improve the perception of weather conditions, and improve energy level or practicality.

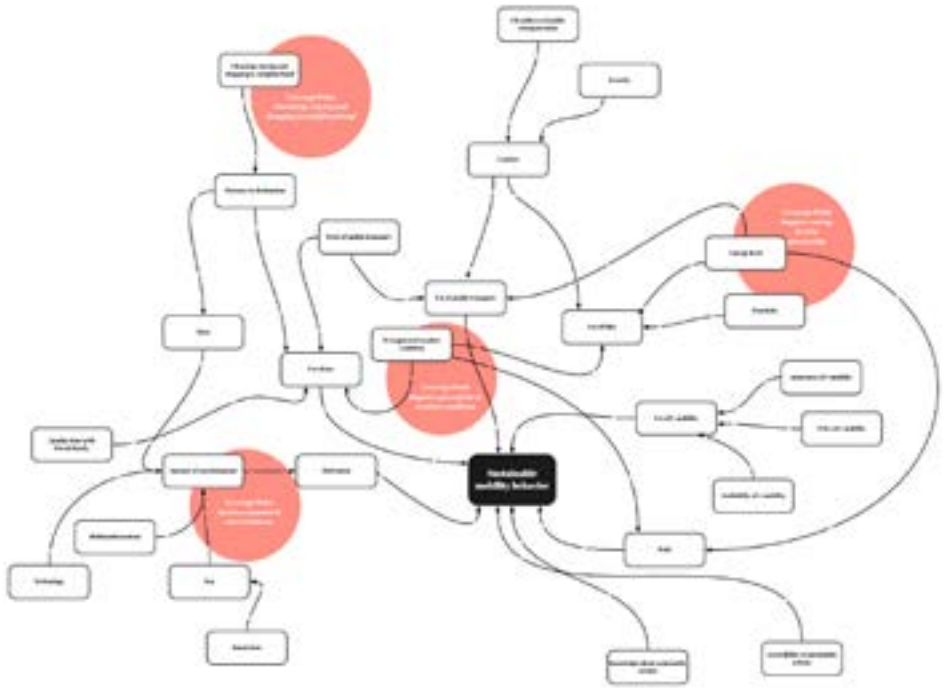

Fig. System map

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2.2 Immersive Experience Tool: Process Map

In user research, we found that fear of immersive experience seems to be addictive. The immersive experience mechanism includes three main elements:

- High engagement
- Instant gratification
- A high amount of dopamine

We make appropriate use of this mechanism, and it can become our potential opportunity. Think of people being “addicted” to behave sustainably towards mobility. The HMW question we framed in this opportunity field is, “How might we encourage sustainable actions towards mobility through immersive experiences with smart clothing?”

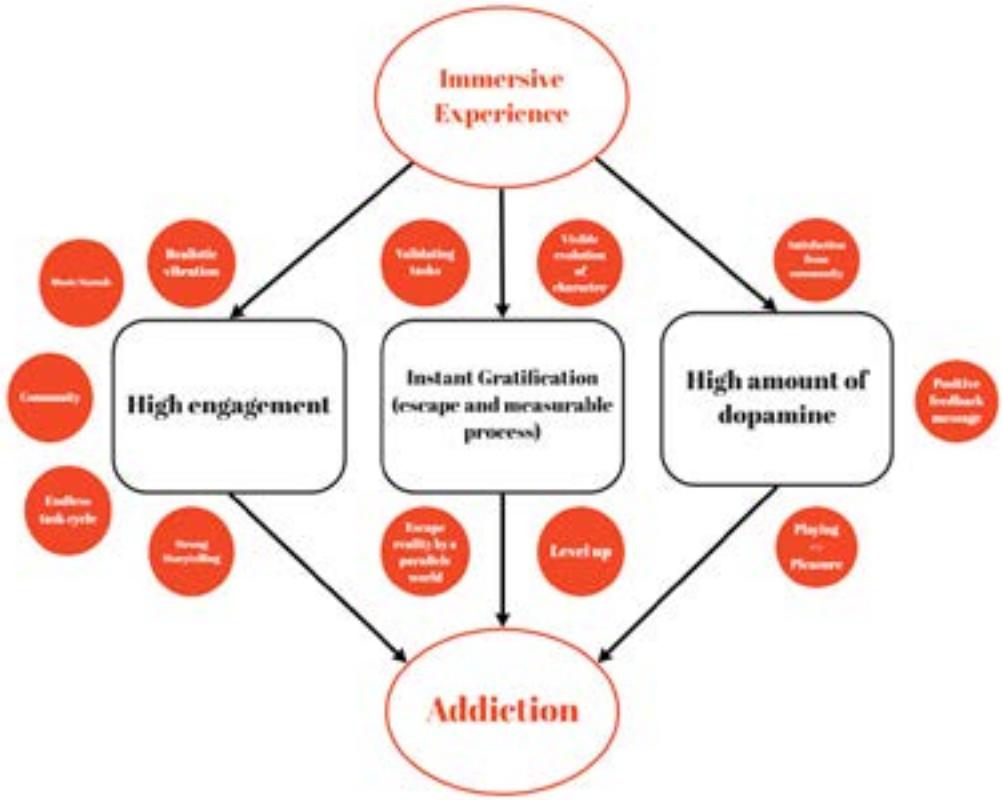

Fig. Process map

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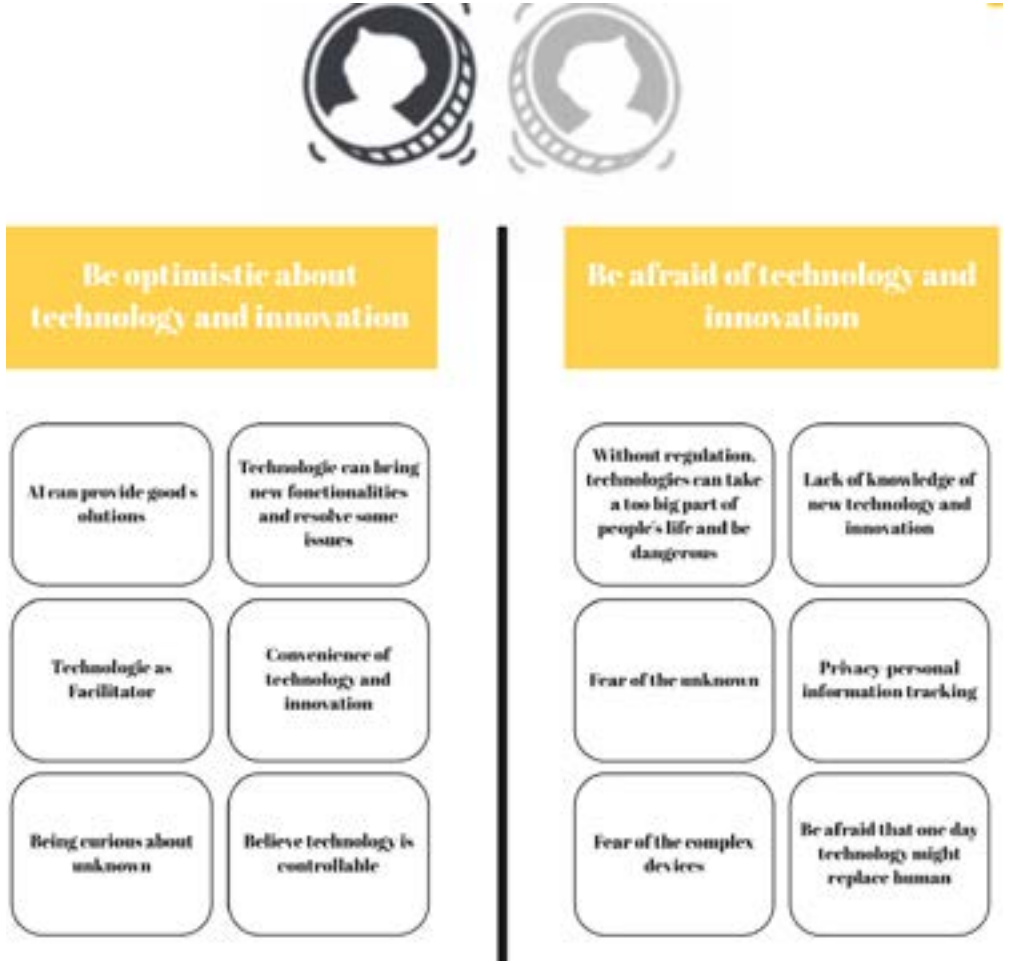
2.3 Technology Tool: Two Sides of a Medal

Besides researching current smart wearable technology in the market, our participants' attitude towards technology is a big concern. Some of them are optimistic about new technology and innovation. However, under the pressure of technology seems to become a large issue mainly caused by the fear of the unknown, fear of the complex devices, and lack of privacy and transparency. To help people establish a transparent and healthy relationship with technology is not only our potential opportunity but also our responsibility in the environment of the rapid development of scientific and technological innovation.



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2.4 Sustainability

There are two dimensions of sustainability: the sustainability of smart clothing and sustainable mobility behavior. Through the expert interview, we realized that the durability of textile and electronic components should be prioritized to make smart clothing truly sustainable in order to reduce its energy consumption and waste. Secondly, the main obstacles to increasing sustainable mobility behavior are the convenience of the car, weather conditions, and distance to destination. Besides focusing on providing sustainable products and services, education and increasing awareness of sustainability are essential.

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3. Problem Statement

3.1 Persona & Point of View

After applying frameworks for opportunity fields, we identified specific problems and facts in different fields. To define a meaningful and actionable problems statement, we created a Point of View to capture our design vision by defining the right challenge to address in the ideation sessions. There are three elements to articulate a POV - User, Need, and Insight. We also created a persona that helps us to understand our target group.

Fig.1 Persona
Fig.2 POV

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3.1 Infographic

To organize all the information effectively, we created an infographic that helped us to map out all the grouped insights to clarify all the information and an overview for all opportunity fields.

Fig. Infographic

Splash

Ideation

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Introduction

The ideation phase stimulates creativity and allows people to share their individual opinions and ideas, by developing solutions to the discovered insights from the research and synthesis phase. During this stage,
it is essential to be as creative as possible - to spark up new ideas and innovative solutions without setting boundaries. It is always easier to reduce the expected goals of a crazy idea, rather than to try to expand an idea that is not extraordinary.

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1. Hell & Heaven

Proejct Phase
Ideation

We applied Hell & Heaven method with the question “HMW encourage sustainable actions towards mobility through immersive experience with smart clothing?” We started brainstorming from “HELL” to explore the opposite of the question. Then we took the opposite ideas as inspirations to explore the “HEAVEN”. After individual brainstorming, we clustered and reviewed all ideas in the team.

Fig. Hell & Heaven from team 1

Fig. Hell & Heaven from team 2

Inspiring ideas:

- Customised immersive experience that fits people's needs in order to encourage them.

- Achieving some kind of rewards when being more sustainable.

- Provide trendy challenge to motivate people (like tiktok challenges)

- Connect people around us (usually we are only looking to phones)

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2. Learning From Other Companies & Celebrities

It aims to learn from different companies/ celebrities to inspire ourselves from different perspectives. One team applied learning from companies, and another one used learning from celebrities. We wrote down the associations around Disneyland and Madonna. Then we brainstormed solutions to the same HMW question “HMW encourage sustainable actions towards mobility through an immersive experience with smart clothing?”

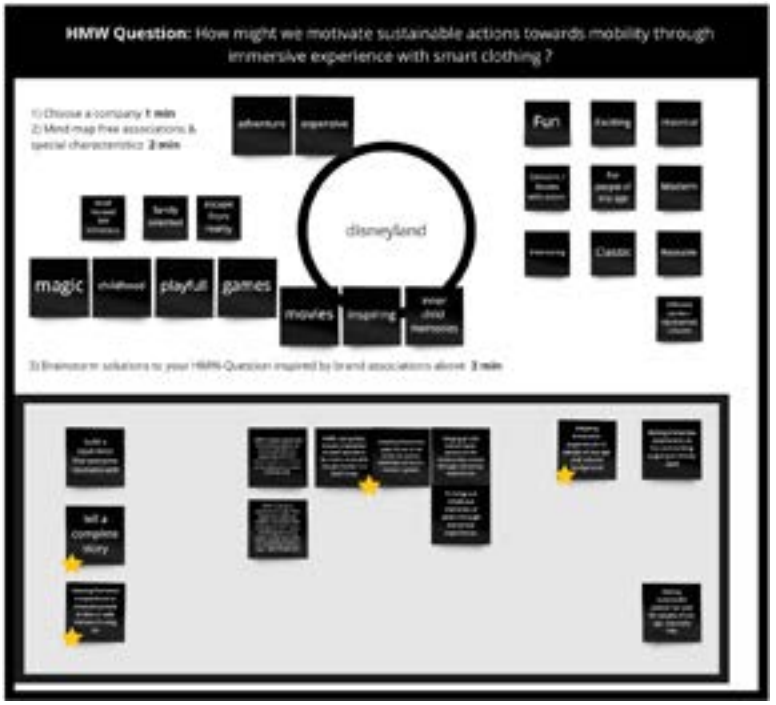

Fig. Learning from other companies

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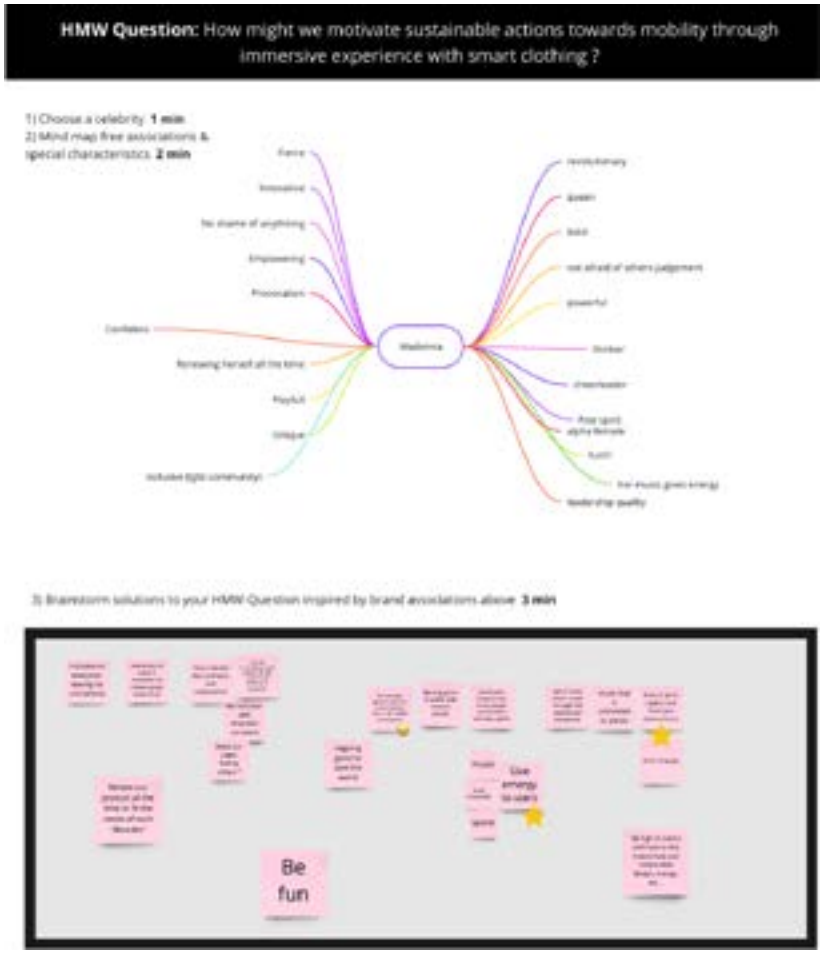

Fig. Learning from other celebrities

Inspiring ideas:

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3. Brain Writing

To stick to our ideation rule - go for quantity. We used Brain Writing for the last round of ideation session, and it was applied to the question, " HMW build a sustainable, transparent, and healthy relationship between people and smart clothing?" Brain Writing is a technique for generating new ideas, and it involves driving inspiration from other members in a cyclical way.

Fig. Brain writing from team 1

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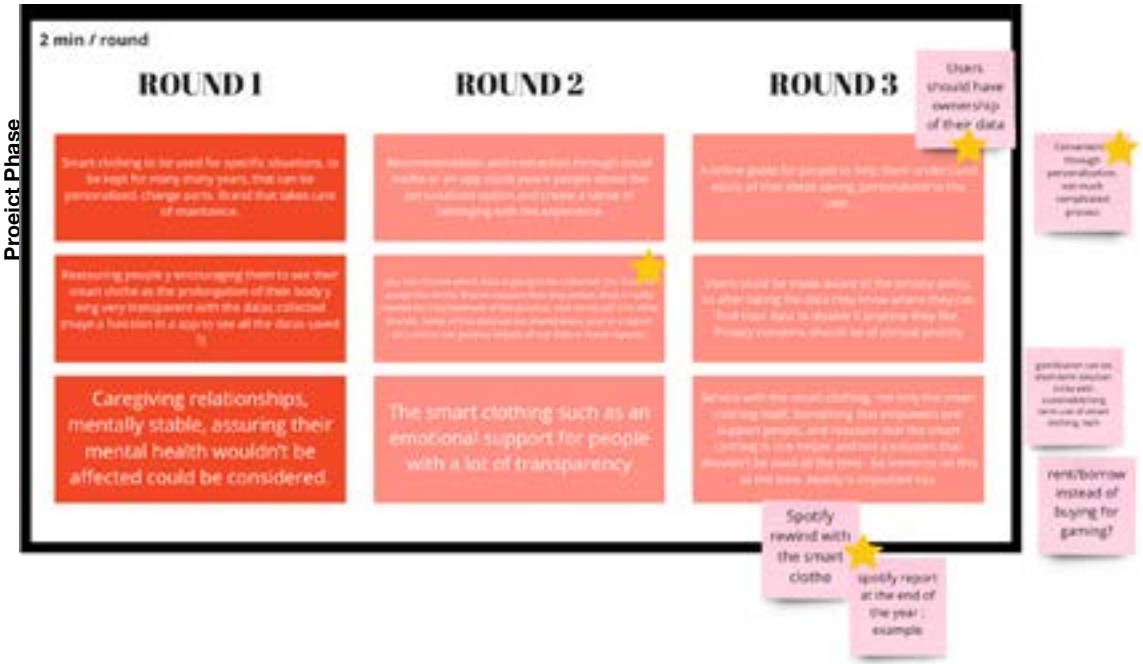

Fig. Brain writing from team 2

Inspiring ideas:

- Allow users to define and always can change the characteristics of the smart clothing (male/female, tone of voice, attitude, jokes, motherly figure, etc.) so that the person will be happy to hear or see them regularly, without provoking negative feelings towards the smart clothing giving life advice

- To make users be a part in the process of making smart clothing also for sustainability concern. For example, to share their used clothes and make them be a part of smart clothing.

- Users should have ownership of their data.

- Convenience through personalization, not a much-complicated process.

- Show the users' sustainable mobility behaviors on a report, like a Spotify report at the end of the year.

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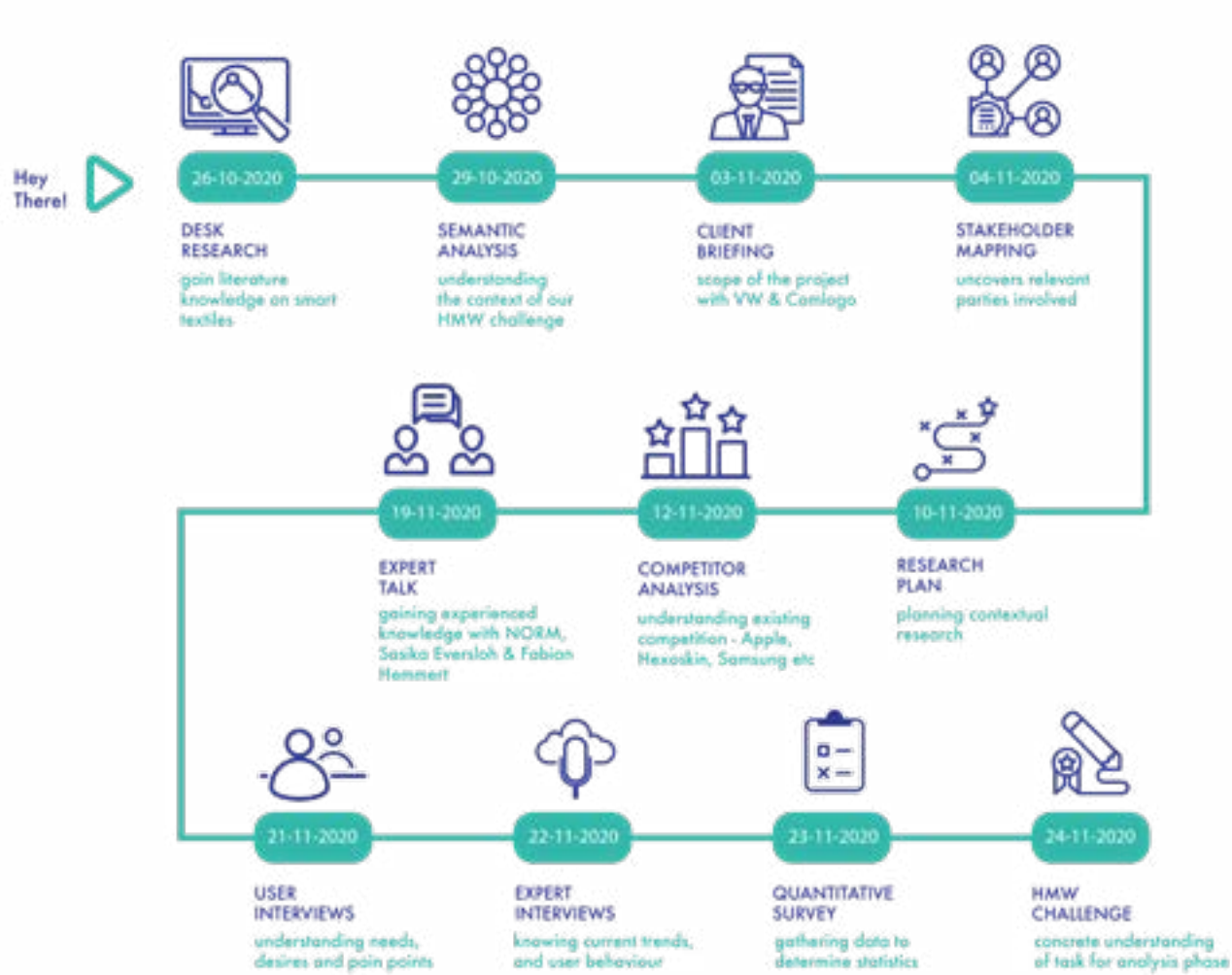

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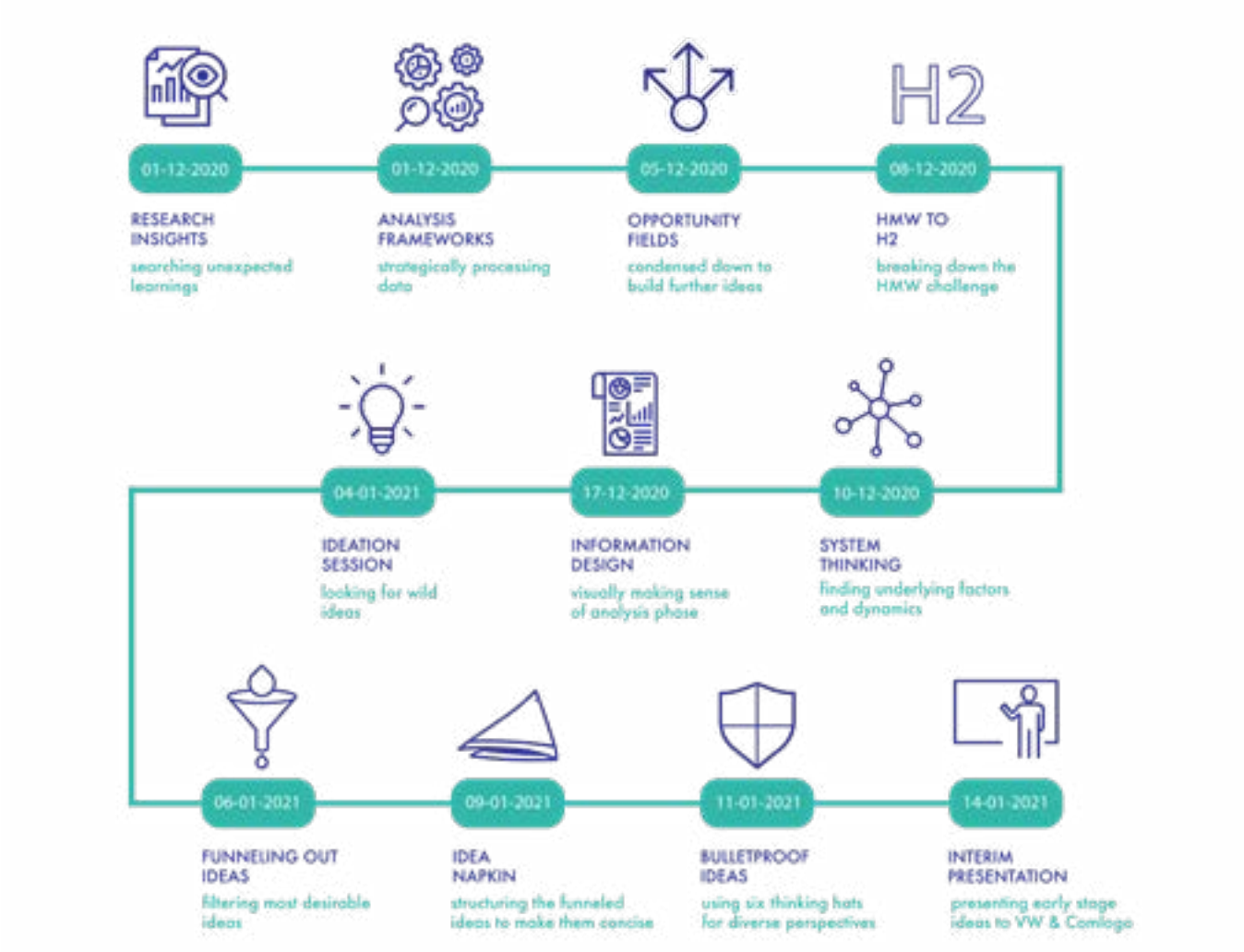

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Proejct Phase
Introduction

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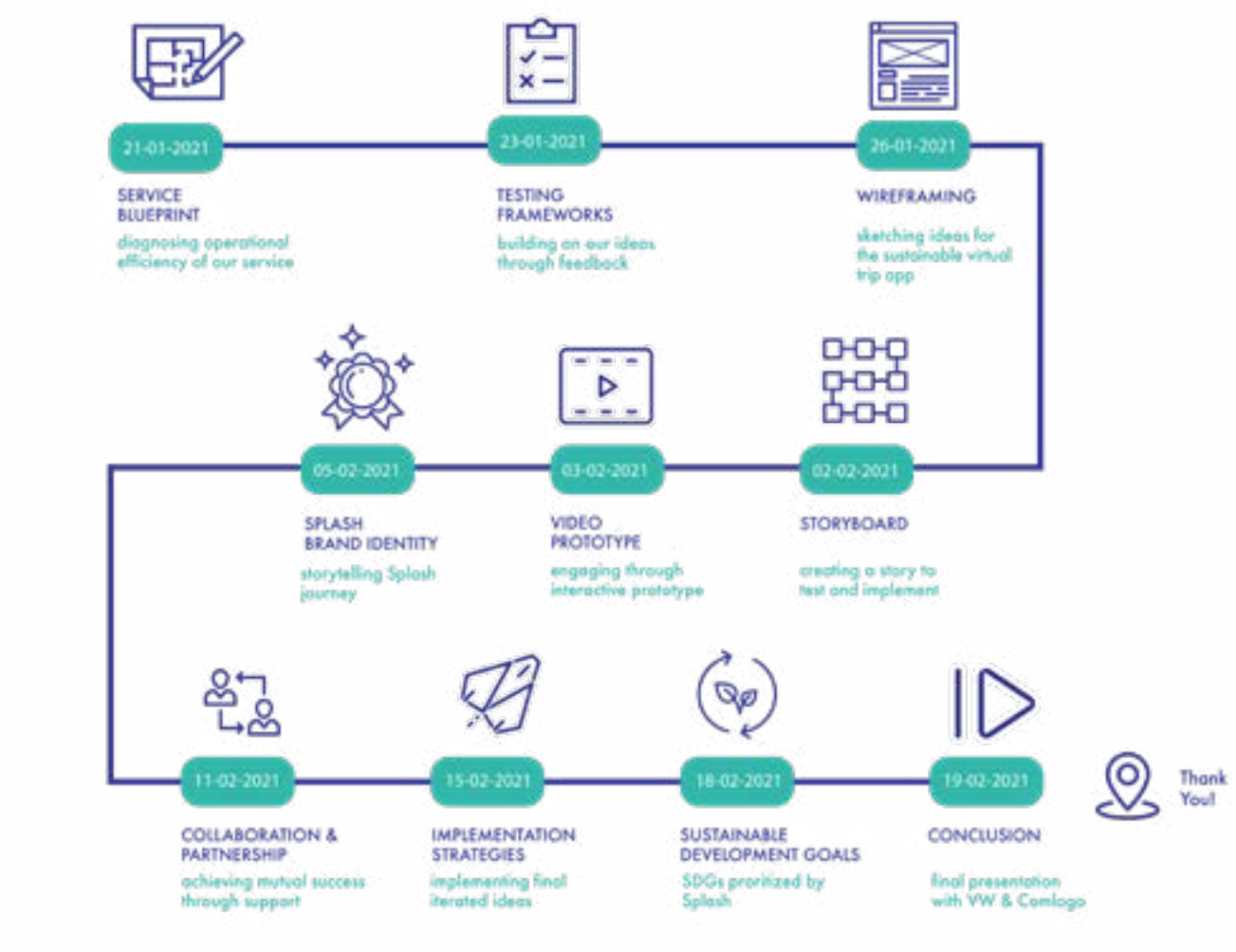

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Proejct Phase
Implementation

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PHASE 1
2022

**Acquire first customer (B2C)
to build community**

Customer	Product	Marketing	Operation	Finance
First target group : technology early adopter and Volkswagen's customers	Launch MVP : Standardised smart vest App features 3 basic maps	Social media marketing Offline pop up store	Set up supply chain Build maintenance team	Generate revenue from direct sale of the smart vest

PHASE 2
2024

Being established in key European markets (B2C+B2B)

Customer

B2B: Companies that encourage their employees commute sustainably
B2C customers

Product

Customisable smart vest
Premium story-based and city-based maps
(Star Wars, Game of thrones...)

Marketing

Collaboration with influencers
Launch pop up stores in key european markets

Operation

Optimise supply chain and maintenance team

Finance

Direct sale of smart vest
Monthly subscription of premium maps

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PHASE 3
2026

Become a sustainable tech-based brand providing smart mobility solutions

Customer

B2B: Companies that encourage their employees commute sustainably
B2C customers in massive market

Product

Integrate VR and smart glasses technological solutions to improve visual feature for smart mobility experience

Marketing

Collaboration with influencers
Launch pop up stores in key european markets

Operation

Move toward more sustainable supply chain and maintenance service

Finance

Direct sale of smart vest
Monthly subscription of premium maps

Learning & Reflection

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Proejct Phase
Research

After several months of work and iterative development on our splash idea, we obtained an in-depth understanding of Smart Clothing and its sustainable applications in a mobile society by sticking to the strategic design thinking process. Besides developing an innovative and feasible idea for our challenge, we apprehend that holistic and systemical thinking is essential for a purpose-driven innovation project, which means thinking of the environmental and societal aspects in the whole system and empathizing with target users and customers as well. It required us to invest more time in the research phase to investigate textiles and technological solutions for Smart Clothing, bringing positive and beneficial impacts to users and our environment. Considering the impacts of Covid-19 on people's livelihood, health, society, and economic dynamics is crucial since the Splash idea was developed during the pandemic. This perspective contributed to bringing us to the sustainable virtual trip idea, which aims to increase sustainable mobility behaviors and reconnect people to our planet. Throughout the whole project, there were various challenges that we needed to confront. Smart clothing is still an early-stage concept that brings us technical limitations, the uncertainty of an immature competitive market, and the difficulty of identifying the target group. However, Strategic Design aims to solve problems innovatively and collaboratively. All the methods and tools we applied effectively helped our team to face those challenges. We hope that the Splash idea will be developed further in the future and empower more people to travel sustainably and reconnect them to the world in an entertaining and eco-friendly way.

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