

Trabajo Fin de Grado

Diseño y desarrollo de un producto/servicio
para la mejora de la experiencia de usuario en
el entorno del esquí

Design and product/service development for the
improvement of user experience in the skiing
environment

Autor/es

Andrea Sánchez Díez

Director/es

Markus Kretschmer / César García Hernández

EINA / Escuela de Ingeniería y Arquitectura
University of Applied Sciences Upper Austria / School of Engineering
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Design and product / service development for the improvement of user experience in the skiing environment

Project Work
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Author: Andrea Sánchez Díez

Supervisor: Prof. Markus Kretschmer
Co-supervisor: Prof. César García
Hernández

University of Applied Sciences
Upper Austria



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Interviews PART I

I. User experience in skiing

The peak of performance is reached when three fundamental elements converge: competence, passion and need. If you think back of the last time you worked on an area where you could exploit your best skills, you were passionate about it and you had the feeling that you were contributing to the improvement in the results of something or somebody's life you will understand this powerful "sweet spot".

For the past four years I have been studying in the fields of design and engineering, but this competence starts much longer back in my past. I have always had an interest for creating and exploring new fields, combining both an artistic and technical side to it.

When thinking on possible topics for the writing of this Project Work, different issues came to mind. What I knew was that my final decision would have to meet my interests in order to undertake the project with passion and involvement. Skiing had been a sport in my life since I was very young. Even though Spain is known for its beaches and sunny weather, I am lucky to live close to the Pyrenees, located in the north, borderline with France. This was an activity that me and my family used to do together and, later on, I practised on my own with my friends. The advantage of skiing is that despite maintaining its traditional roots, it allows innovation as the technologies of our time evolve. Benefiting from my opportunity of studying this semester abroad in Austria, I decided to explore skiing in the mountains of this winterland.

Lastly, spending time on something you put your effort in and your passion shouldn't be merely academic, but have the goal of contributing to improve society. User Experience creates products that provide meaningful and relevant experiences to users. Keeping the user in the center of the project is one of the main objectives. This means we are concerned with the entire process, including design, usability and function. It is a story that begins before the design is even in contact with the user.

II. Methodology

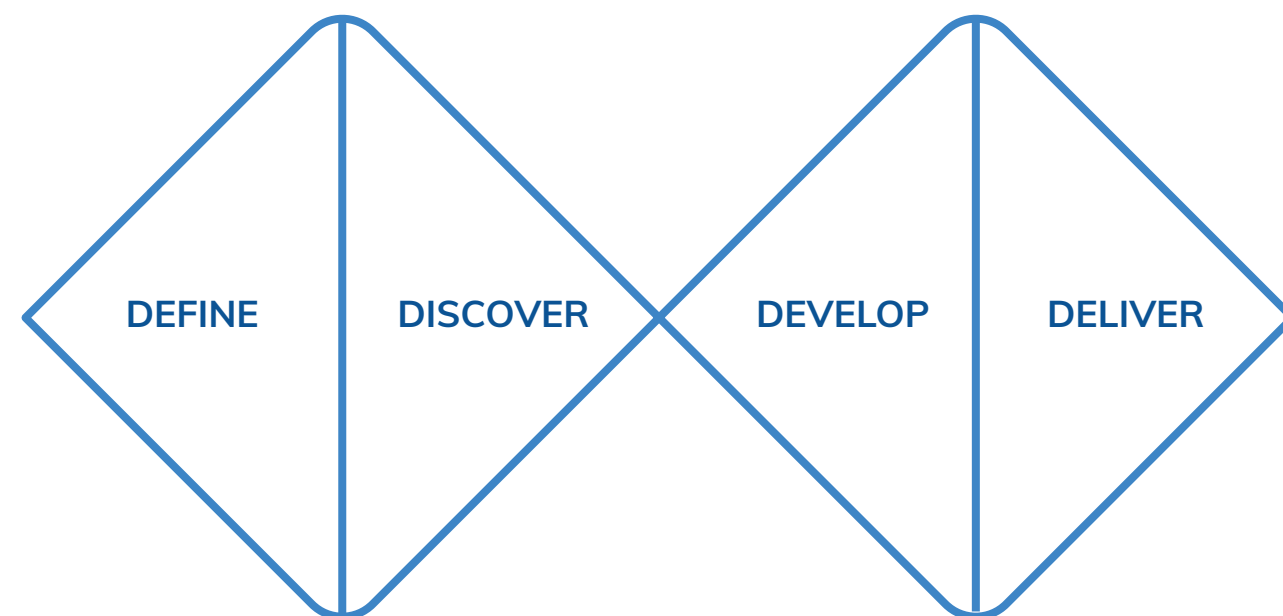
"Design is what links creativity and innovation. It shapes ideas to become practical and attractive propositions for users or customers. Design may be described as creativity deployed to a specific end."

— The Cox Review

Design has many different definitions, but at its heart it is about the process of translating ideas into reality, making abstract thoughts tangible and concrete. Whether it's for a new service, a piece of graphics or an innovative product, a number of key attributes support every design-led project.

DESIGN PROCESS

There are a wide range of approaches that a designer can choose from when working on a project. The model that I considered the most appropriate to illustrate the process of this project is the 'Double Diamond'. Divided into four distinct phases: Discover, Define, Develop and Deliver, it maps how the design process passes from points where thinking and possibilities are as broad as possible to situations where they are deliberately narrowed down and focused on distinct objectives.



Discover

The start of a project is a period of discovery, gathering inspiration and insights, identifying user needs and developing initial ideas. The beginning of every design project is marked by an exploratory phase where insights and inspiration are gathered. This exploration uses both qualitative and quantitative research methods and can involve both directly engaging with end users and analysis of wider social trends.

Define

The second quarter represents the definition phase, in which we try to make sense of all the possibilities identified in the Discover phase. Which matters most? Which should we act on first?

The mass of ideas and findings are analysed and structured into a reduced set of problem statements. These are aligned with the needs and objectives to identify which to take forward. The Define phase results in a clear definition of the fundamental challenge or problem to be addressed through a design-led product or service. In this case, we have selected three problems to develop in an early stage.

Develop

The Develop phase takes the initial design brief and through an iterative process of developing and testing, refines the product or service concepts. We have developed the three problems to the same level until we decide on the finale one to develop to the fullest and, finally, implement in the next phase.

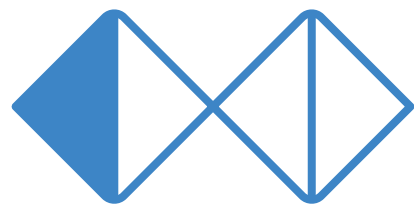
Deliver

In the Deliver phase, using design and creative techniques, we develop the individual service components in detail and ensure these link together to form a holistic experience. The product or service is launched and begins to address the needs identified in the Discover phase. The final concept is taken through final testing, finalised and signed off. It is important to ensure systems are in place to capture user feedback, especially for services. The Deliver phase is also the point to feed back lessons.

In this project only the first part of this phase: prototyping, will be undertaken, leaving out of the scope the second part: user testing.

II. Methodology

DISCOVER



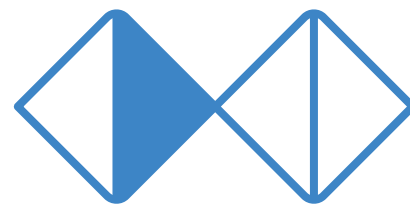
Objectives

- Identify the problem, opportunity or needs to be addressed through design
- Define the solution space
- Build a rich knowledge resource with inspiration and insights.

Tools

- User Journey
- Research
- Interviews
- Survey

DEFINE



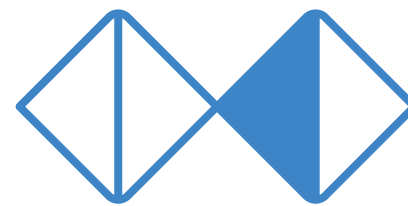
Objectives

- Analyse the outputs of the Discover phase
- Synthesise the findings into a reduced number of opportunities.
- Define a clear brief for every opportunity.

Tools

- Brainstorming
- Design Brief

DEVELOP



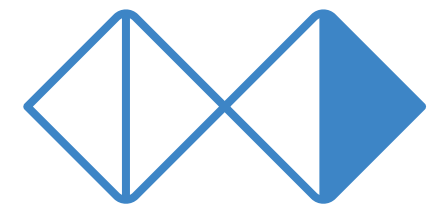
Objectives

- Ideate alternatives for the different design briefs.
- Select the final solution.

Tools

- Brainstorming
- Ideation
- Experience prototyping

DELIVER



Objectives

- Implementation of the concept.
- Ensure customer feedback mechanisms are in place.
- Share lessons from development process.

Tools:

- Prototyping
- Testing
- Evaluation and feedback



Phase I

Discover





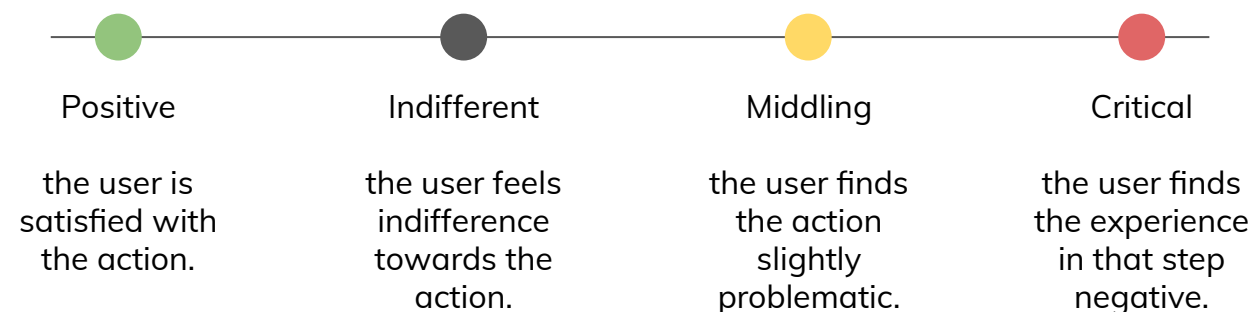
I. User Journey

A user journey describes the sequential steps that a user goes through with a company, product or service, in our case the steps a skier takes when going skiing to a ski resort, getting an understanding of the **users motivations, needs and pain points**. Ultimately, understand **how the user feels in every moment of the process**.

The user journey is divided into 5 stages, starting from the preparation of the trip selecting the ski resort and getting the equipment and ski passes ready, next arriving to the ski resort and the necessary actions before the following step, skiing. During the skiing there are different scenarios: using the lifts, descending the slopes and the resting periods, at the slope or at the service areas. The end of the day skiing would end the same way as it has started but backwards: returning the equipment, in case of rental, or collecting it in the car or other transport used to leave the ski resort.



Each of these stages is made out of different actions that the user undertakes. To represent the users satisfaction at each action, they are rated based on an **'emotional graph'** that goes from positive to critical with two other intermediate positions, indifferent and middling.



For each step **pain points** (problems that the users are experiencing) are spotted but also **positive aspects** that could be taken advantage of for the future design.

In order to understand the user journey it is important to put ourselves in the skiers shoes. For this reason, firstly, based on my own experience a user journey is drafted, and the personal emotional journey is drawn out. A second trace is drawn with a contrasted emotional journey provided by respondents and observation.

Throughout the understanding of the emotions of the customer in each phase of the process, we can find out the needs and expectations of the users.



I. User Journey

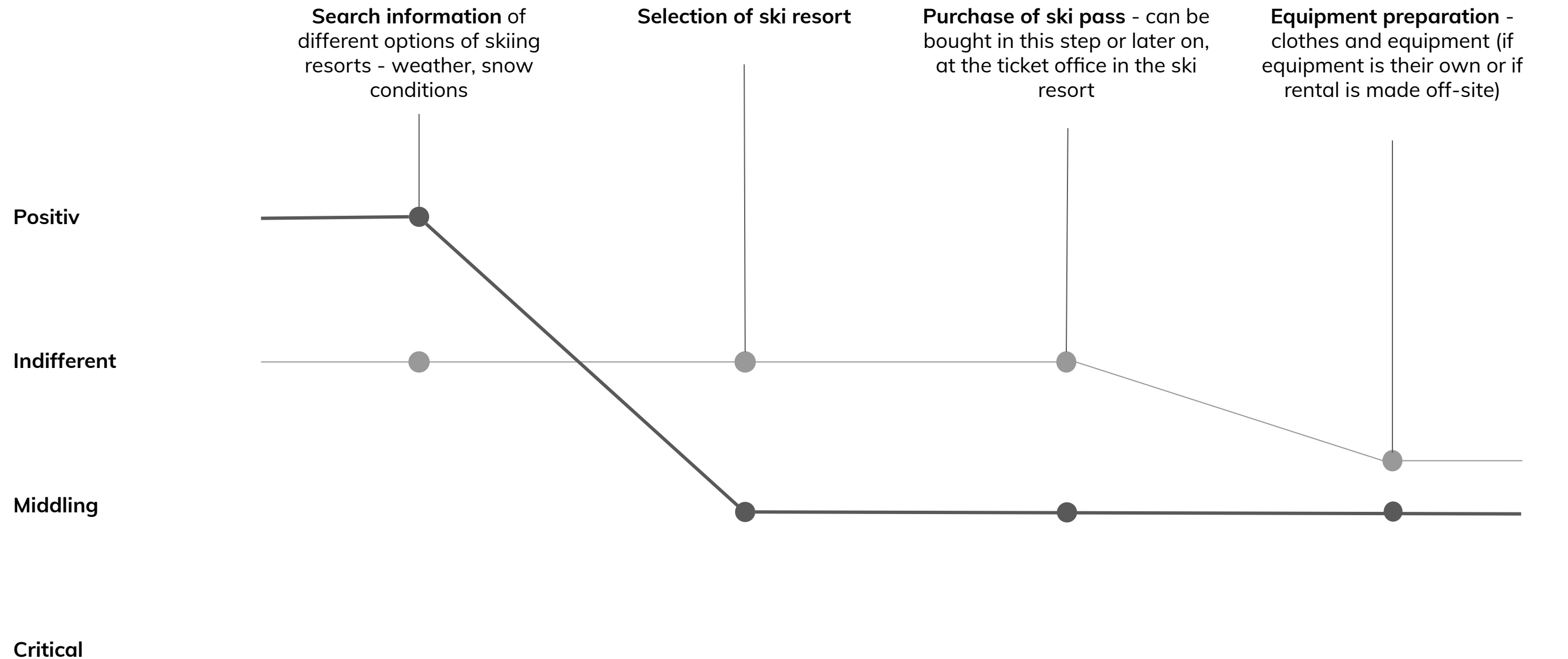
PREPARATION





I. User Journey

PREPARATION



- You can find a lot of information, inspiration online.

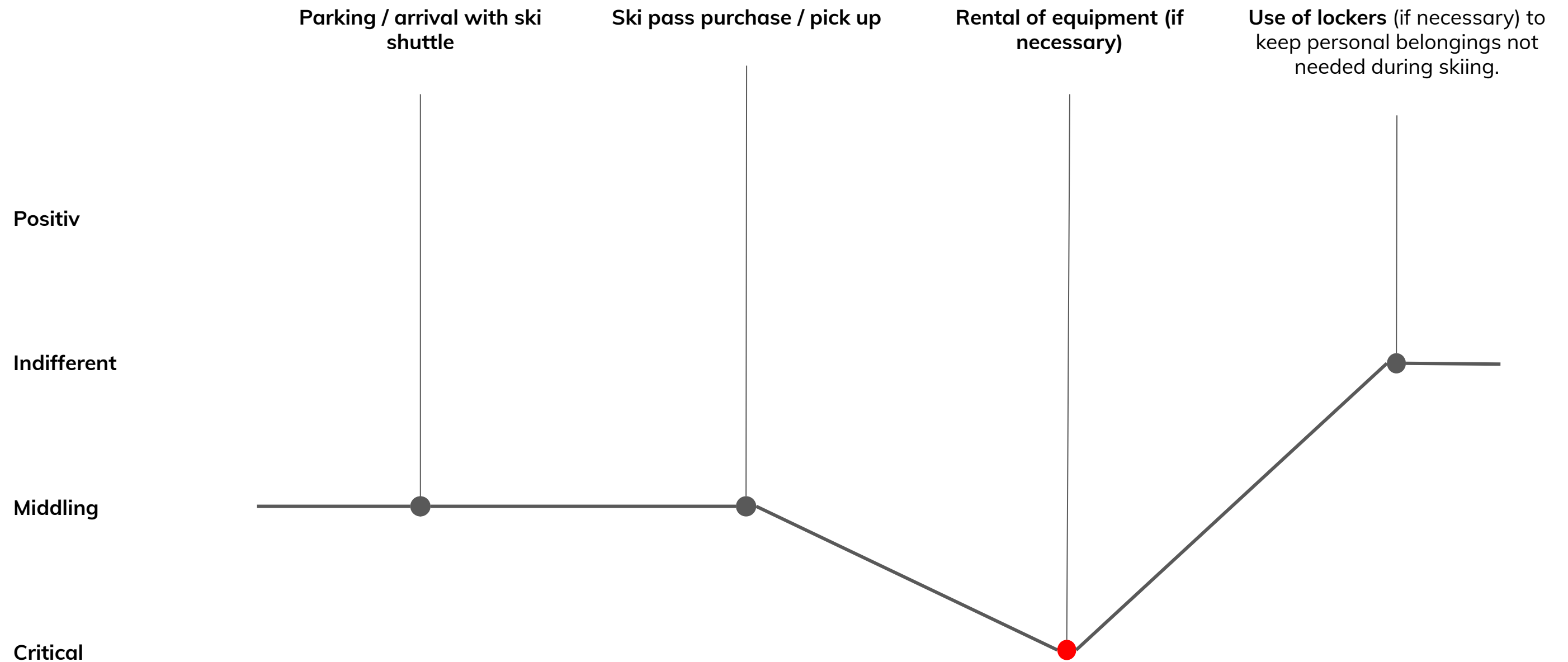
- It can be too much information to make a decision on where to go.

- Carrying all the equipment is an uncomfortable task as it is a lot of things and heavy.



I. User Journey

ARRIVAL



- Carrying all the equipment is an uncomfortable task as it is a lot of things and heavy.
- Finding parking space (if going by car)

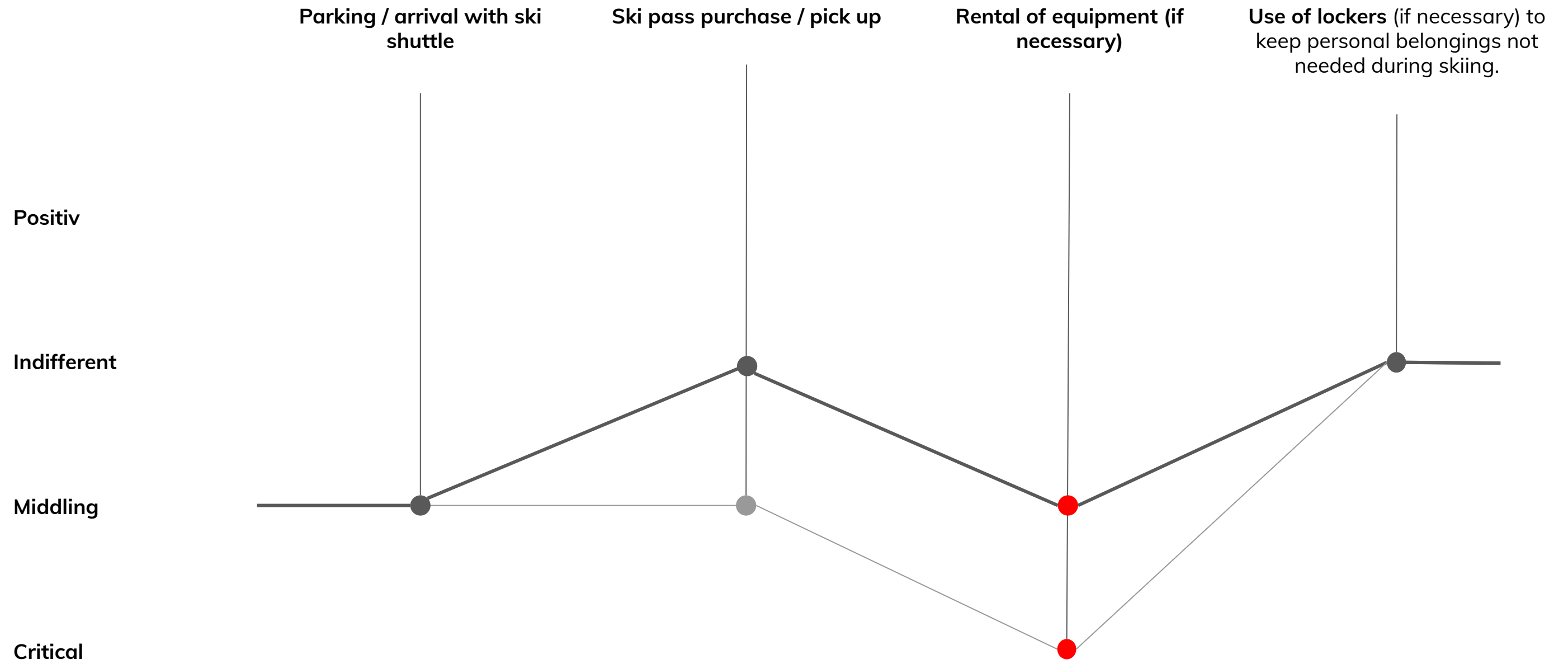
- It's an easy thing to lose
- Ski pass contains all your information - needed to get the lifts

- It takes a lot of time: a lot of information of the user is needed for the size of skis and boots.
- Boots have been used by other people.



I. User Journey

ARRIVAL

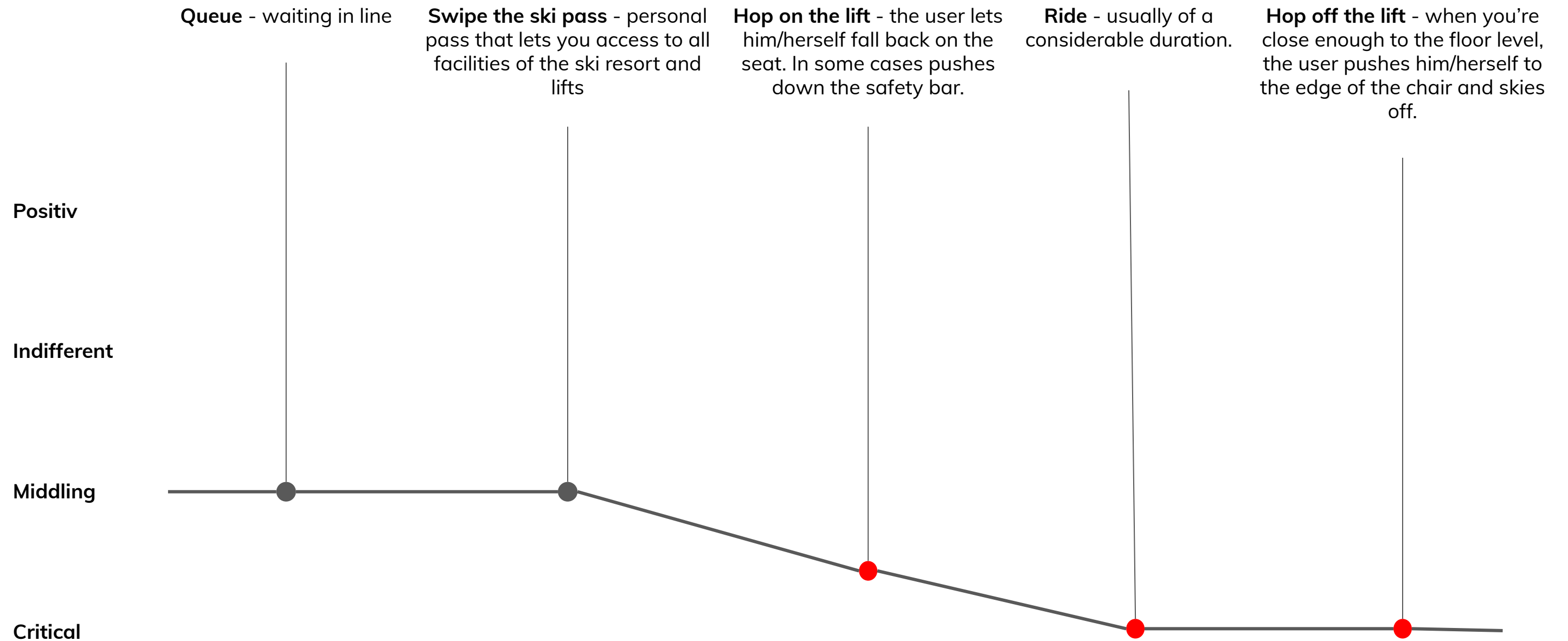


- You have to wait in a queue which is sometimes very time consuming.
- Considered 3rd-4th worst aspect out of 7 of skiing.
- Time consuming.



I. User Journey

LIFTS

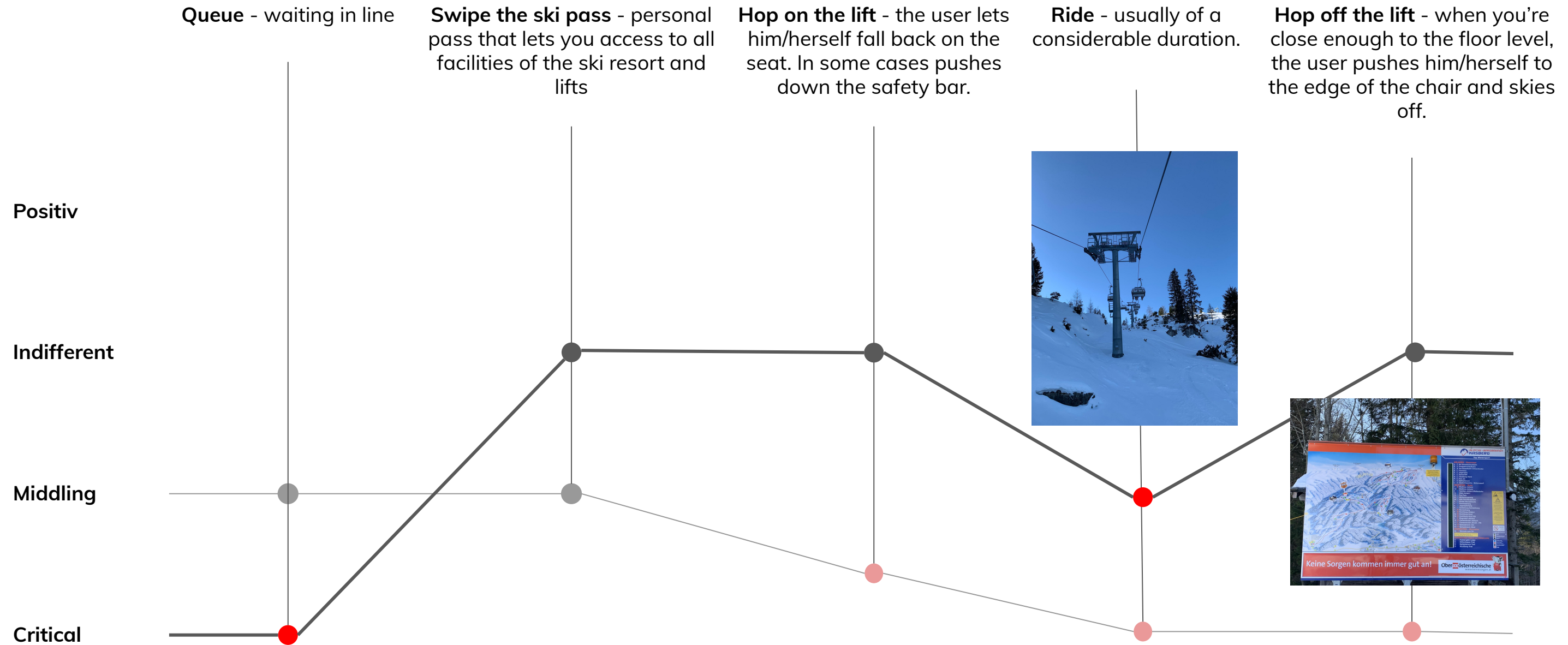


- During the high season, queues can be a big time-consuming source
- The card reader might not detect the pass if it's located in a far place.
- It's not comfortable to go through the turnstile with the big skiing clothes and equipment.
- There are lifts of different capacities (2-6 people), these are not efficiently exploited as sometimes seats are left empty.
- The time spent on the lift is wasted.
- It is cold, as the user has been active and suddenly stops for a period of time at a high altitude.
- The lift doesn't stop at the end of the ride for which the user has to be aware of the descent.
- Get out of the way quickly not to disrupt transit.



I. User Journey

LIFTS

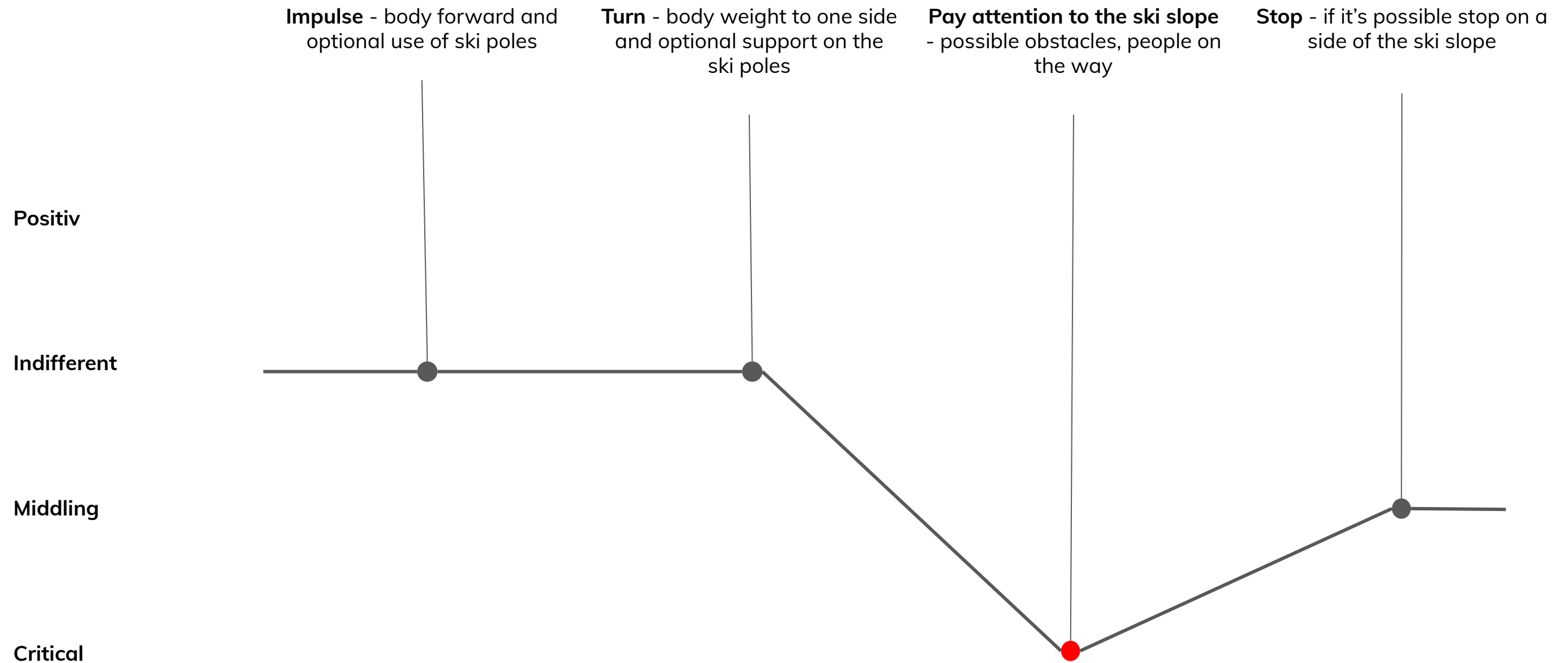


- During the high season, queues can be a big time-consuming source
 - Not organized queues.
 - Stepping on others skis.
- Capacity not fully exploited.
- Well signaled were to stand
 - Speed of lift not too fast to hop on.
- Period of time with nothing to do.
 - Some ski lifts have heat and a rain/wind protector.
- Crowding of people around the hop off area.



I. User Journey

DESCENT

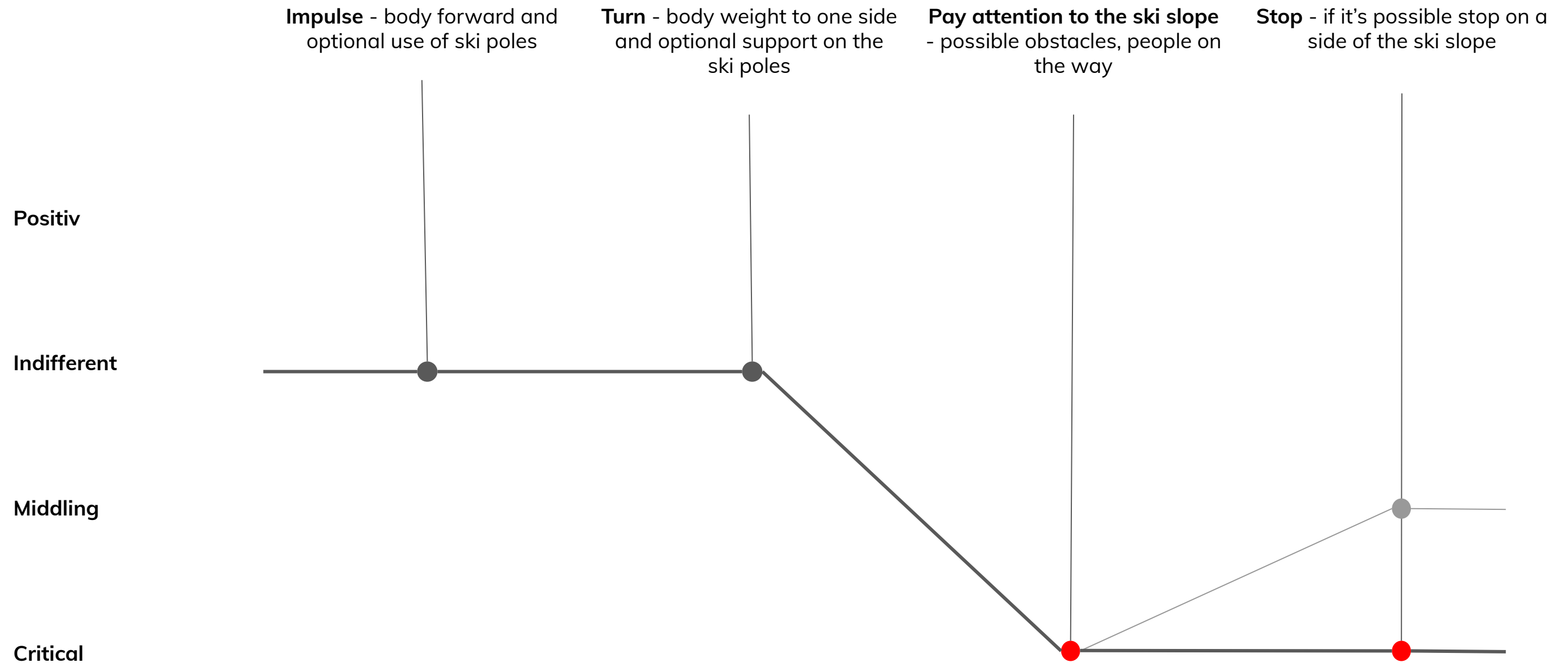


- Stopping or falling of others along your path
- Overtaking without warning
- Different speeds
- Watch out for the limitation of the slope
- Stopping to consult the map in intersections of different slopes



I. User Journey

DESCENT

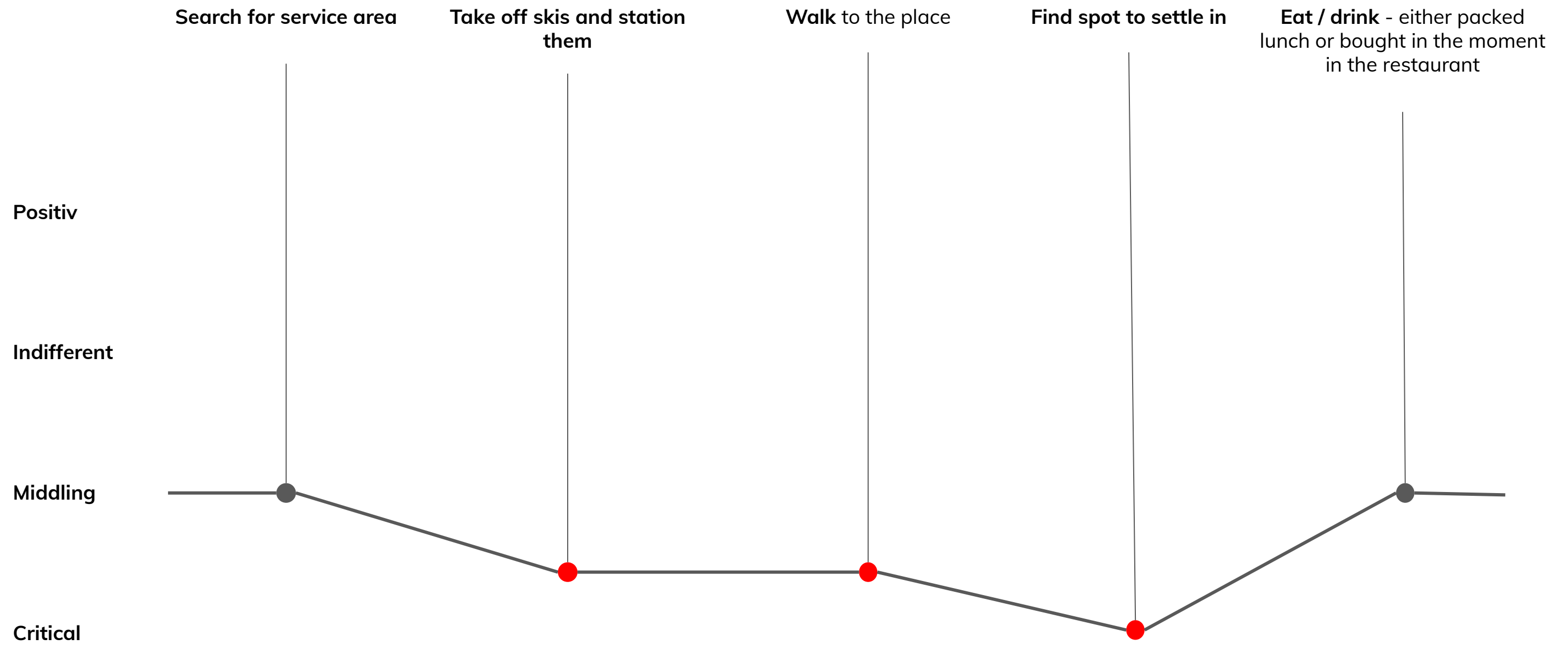


- Very different profiles of skiers share the slopes: different speeds, different levels.
- Stopping to consult the map.
- Making stops to wait for people, if you're skiing accompanied.



I. User Journey

RESTING



- Take out the map and find the closest service area to your location.
- If you are joining other people there at a certain time, calculate aprox. the time it will take you.
- If they are rental skis you might not differentiate later which are yours.
- Walking with the skiing boots is uncomfortable.
- Temperature contrast: sweat when in motion / cold when stopped.
- Ice and snow from boots melt when entering indoor spaces because of heat



I. User Journey

RESTING



- Calculation of time if you're meeting other people for lunch is not always appropriate.
- Skis are left outside the restaurants in an unorganized way, in the entrance area.
- Presence of water on the floor - use of carpet.
- Queue for food/drinks.
- Payment of meal.



I. User Journey

CONCLUSIONS

The main factors that concern the pain points are: **time, space management and obstacles.**

Time is a valuable factor for the users, they will want to make the most out of skiing, so **losing time is not something they are looking for.** This time consumption starts even before reaching the ski resort. The phase of preparation requires research about aspects relevant for the trip like the snow conditions, weather, ski resort facilities, characteristics of the slopes, reviews... Sometimes the excess of information and variety of sources makes the decision making hard.

The steps in which most time is spent once at the ski resort are:

1. Equipment rental, as the workers ask for a lot of user data.
2. Queues, in the office for the purchase or pick up of the ski pass, in restaurants and cafeterias to order food, and, specially, for lifts, as it is a slow process, because of both having to swipe the skiing pass and safety (the lift can't exceed a certain speed for hopping on and off).
3. Lifts, where users have to spend time, as it is what takes you to the start of the slope, but it is a non exploited time window. The user can't do anything apart from using the phone, for which he needs the sense of touch which he doesn't have with the gloves on, and looking at the map of the ski resort.

On the other hand, users of winter sports like spending time resting and socializing. For which there are restaurants, cafeterias and service areas. These are distributed throughout the ski resort but located at the start or end of slopes, as they usually use up a lot of space.

The **space management is not the most optimal** either. First of all, the areas of hop on and hop off the lifts are usually crowded with people due to the fact that it is a strategic point to meet up with your companions if you have gone separate ways on the last slope, a place to fix the boots or snowboard, or a spot to take a look at the map. Another place that can be chaotic is the entrance of restaurants, where skis are left outside in an unorganized way. All these locations are usually not too big making mobility hard.

We can find limited space also throughout the pistes. If the user gets hurt or wants to rest half way on a slope the only option is to step a side, and sit on the snow. Another reason for which the user would want to stop is to contact a friend he has gone with on the trip or to look for indications on the map of the ski resort.





I. User Journey

CONCLUSIONS

Lastly, the slopes are a place that **a lot of people transit at the same time. The skiers/snowboarders don't all have the same level of ability** but still go down the same slopes. For this reason, users have to pay attention on the slopes. People descend in different speeds, overtake, can fall or stop in the middle of the slope. But there is no signalization that warns the rest of the skiers/snowboarders.

On the other side, there are also some **positive aspects** that are already part of the user experience and can be exploited.

1. Skiing is a popular sport from which you can find a lot of information online, both factual and user based. The more data the better, as long as it's managed correctly, meaning an easy access for the user, easy comparison and reliability of content and discarding irrelevant information.
2. Every person that makes use of the ski resort has to have with him a ski pass, which is a card that allows the use of lifts, and thus the entrance to the slopes. It contains the relevant information of the user.
3. The signalization of the delimitation of the queue at the nearest point of chair lift helps the organization of the queue. But this is not applicable from the beginning of the queue.
4. The chair lift ride is a period of time in which the skier can relax from all the exercise he is practising and regain strength. The conditions of the environment favours this state: the surrounding of nature and silence, heat on the seats and rain and wind protection (in some cases).



II. User analysis

Next, an analysis of the user profiles in the field of ski sports is presented. For this purpose, users can be categorized according to different factors. These factors are the following:



1. Age: Depending on the age the users will have different needs and interests.

- Some kids start skiing from a really early age. This gives them several advantages; they have a great ease to learn as their body is not fully developed and so it can adapt better to the postures and they still preserve their innocence so are not afraid of trying these sports. Their characteristics can also lead them to difficulties:
 - Their short height complicates the interaction with cable lifts and rope lifts.
 - They are fast and short which may make it complicated for other skiers to distinguish them when descending the slope.

This group of users are always accompanied by an adult, it can be a family member or friend or a ski instructor. They are too young to be left alone in case they don't find their way down.

- Youngsters belong to the age group of 14 to 25 years old. The users of this category can be beginners or already have experience if they have started from a younger age. It's a sport they practice as leisure activity with friends or family or as a competitive sport. In the first case they are looking for enjoyment, in the second case it consists on training, but it still has a basis of entertainment. These users are generally more agile than adults. And enjoy the après ski activities.
- Adults are the oldest age group. This is still an age when people can start learning skiing or snowboarding. It may be tiring for people who are aged or with physical problems as it is a sport that requires a lot of movement and effort: a lot of equipment, most of it heavy, has to be carried, every time you take off or put on the skis you have to bend down. They also enjoy the restaurants, bars etc for resting, as well as the après ski.

2. Level: Users can be divided into four groups according to their level.

- Beginner: these users experience skiing for the first time, either by themselves or together with an instructor. So their knowledge is non or very low. It's a new environment for this user which means they will be looking for an intuitive signalling and every possible ease. This user level normally uses the green and blue slopes, which are adequate for their level. Even though these slopes are for beginner users, users of higher levels may also ski in these slopes. As he is a new user, he also isn't familiar with the ski resort, so will need indications to discover the slopes and the service areas. Doesn't know how to use lifts. In general terms, the main needs of this group of users are ease, safety and learning.
- Intermediate: the users of this level enjoy the experience a bit more than the previous group as they have more experience. Their confidence level is higher and skiers may explore skiing at higher speeds on slightly steeper slopes. This group of users look for improvement in their skills. Goes down blue/red slopes and still isn't ready to go down black slopes.
- Advanced: This group of users can ski down any level (green, blue, red and black and orange). Despite this, these skiers will be wanting to spend more time in challenging terrain to increase mileage and confidence. Their goal is to push their emotional and physical thresholds as well as developing technique.
- Professional: This group consists of users that practice these sports as a competitive sport. They have specific needs. For this project it is decided not to take this group into consideration, for which no further description will be made.





II. User analysis

3. Activity: Depending on the activity that the user undertakes in the ski resort we can talk about different groups. Each of these perceive the sport differently.

1. Skier/ snowboarder

Skiing is a way of practicing sport, it is a leisure activity or a competitive sport.

2. Instructor

Skiing is a job for this user. He is responsible for one or more people, for which he is in charge of their safety, satisfaction and guidance.



- Not only has to pay attention not to collide with obstacles (including people) or to surpass the limitation of the piste, but to also make sure that every person under his responsibility is not in any danger. At the same time, he has to make sure that the group he is in charge of stays together and that no one gets lost.
- Teach their clients but at the same time entertain them. Make skiing a fun activity, an experience that they want to have again. Aswell, even if the instructor is teaching a group of more than one person he has to have an individual monitoring, which can be difficult if it is an outnumbered group.
- The route is defined and guided by the instructor.

The perfect student is the one that's wanting to learn, an enthusiast and open to new things. One of the problems of this user is that they spend a lot of hours exposed to the cold and exercising.

3. Lift operator



They are the people in charge of the functioning of the machinery of the slopes, like chairlifts and rope lifts. If the machinery is working adequately, the operators are standing, still, controlling outside in the cold or inside a shed.

They also are in charge of removing the excess of snow from the hopping on and off area. Another of their roles is to help those who have problems for hopping on or off the lifts.

4. Rescue personnel



The Rescue Team on site is responsible for the safety of the consumers of the services in the ski resort. Some of these users requirements are the following:

- Advanced skiing knowledge; they might have to reach the skiers/snowboarders on slopes skiing. At the same time they have to carry the necessary equipment for the rescue.
- Carry the patient or practice the necessary medical procedure with limited mobility as they are wearing the bulky skiing clothes, and in an unusual environment.

5. Services Staff

This group consists of the people that work at the restaurants, cafeterias, offices, rental of equipment and any other service area of the ski resort. Their needs will depend on whether they work indoors or outdoors.



II. User analysis

4. Number of people: When going skiing people can go alone or accompanied. Each of these groups of users will have different goals and different needs in the skiing experience.

- Skiing alone: This user looks for a relaxing day, on his own, with no other distractions. Skiing alone gives the user a lot more freedom and independence as they don't have to worry about any other person. The skier can ski on its own pace, chose the routes he wants and manage his time as he wishes. On the other hand, this can also be seen as a disadvantage in terms of safety. The skier can't count on a trusted person in case something happens and was in need of help. It can also end up being boring or lonely as it is a very monotonous and repetitive activity.
- Skiing accompanied by someone: Skiing accompanied is more common than skiing alone, as skiing is more of a social sport. The different members of the group might have different skiing levels, what generates a division inside the group for the descent of the slopes or one of the sides give in (skiing under or over one's capability) to keep the group together. If the group splits up there will be breaks to wait for the slower part of the group and a communication is needed, for example to meet up in a restaurant or to set a time to be at a certain place. Sometimes phone service on the slopes is not so good.

A lot of different levels of difficulty and typologies of users coexist in the same environment, the ski resort.

5. Duration of the stay:

- Daytrippers: Only spend a day skiing, reach the ski resort by bus or private car. The key factor for this group is getting into the ski resort as quickly as possible as they want to make the most of their day. Most probably the users of this group will be arriving and leaving at similar times of the day. The critic points were a high flow could accumulate would be: the valley road, the parking lot, the ticket office, the rental shop (both for pick-up and drop-off).
- Longer stay visitors: Weekend trippers or people that go skiing for a longer holiday share some necessities with the daytrippers but also have some specific ones. For the ones that rent the equipment, they're going to need a fast and accessible service to collect and put away every day of their stay.

III. Research

HEALTH

Skiers are not aware of all the dangers that skiing implies in terms of health, they don't give them the importance it should have. Some of these topics are sun protection, stretching and warming up, eating, hydration and alcohol consumption. We will be focusing on three of these health aspects: Sun protection, hydration and alcohol consumption.

SUN PROTECTION

The following statements are some indispensable recommendations according to studies in solar protection:

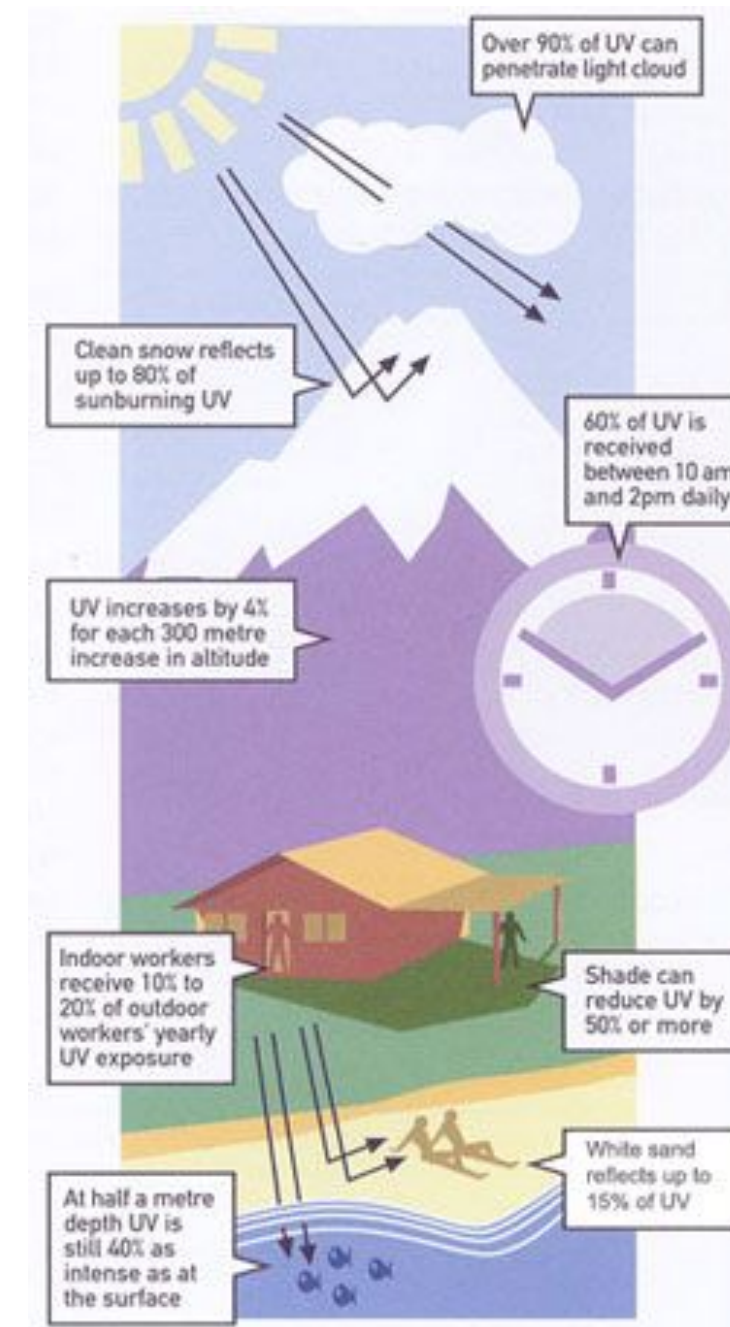
- You should apply ski sun cream and lip balm with SPF every two hours, regardless of the level of protection.
- You still need to use protection on cloudy days. Clouds can only reduce sunlight by 20%.
- The strength of UV radiation depends on the altitude, surface reflection and geographical location. It has been proven that for every 300 metres above sea level, the sun's rays become 4% stronger. This means that if we go into the mountains up to an altitude of 1500 m, they are 20% stronger than by the sea.
- Cover your body with a thick layer of clothing, through which the rays cannot penetrate. This doesn't mean you can underestimate protection of the face, lips and eyes.

Results from the survey show that a **15% of skiers don't apply sunscreen** and **over a 50% only apply it once in the whole day of skiing**, a not sufficient quantity according to studies.

"People inaccurately associate two meteorological phenomena with UV, temperature and cloud cover. This results in more burning on cooler days because people are less likely to take precautions. Similarly, people engage in fewer sun safety practices on cloudy days. Dense clouds can impede UV by up to 50%, but clouds do not block all UV, a problem during months when solar UV is moderate to high and can penetrate clouds." cited in the study 'Environmental Cues to Ultraviolet Radiation and Personal Sun Protection In Outdoor Winter Recreation'.

<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3364536/>

Environmental factors that influence the UV level





III. Research

HEALTH

Biarritz, located in the south west of France, is a coast city with a couple of beaches. It's a very common place to practice surf. At the promenade of the beach you can find stands for solar awareness. A cosmetics brand sponsored these signs, placing free sun cream for the bathers and surfers and related information for a responsible protection.

Eye protection is another factor. Polarized lenses reflect harmful ultraviolet rays away from your glasses. All light, whether it's natural sunlight or artificial indoor light, is composed of violet, blue, green, yellow, orange and red light with varying wavelengths. Glasses with colored lenses help filter out certain colors to enhance vision.

Orange or yellow lenses are ideal for hazy, overcast days and filter out blue light in shadows. Copper, brown and gray lenses work well on sunny days and help to improve contrast and visual acuity under blue skies. When it's partly cloudy, try wearing amber, rose or red lenses.

ALCOHOL

Alcohol also has a harmful effect, it contributes to dehydration. This will cause a decrease of concentration and the capacity of the muscles. This is an important topic, especially in Austria, as having a couple of beers at the top of the mountain in the middle of the day is part of the experience of skiing. According to the Road Safety Centre of Austria, 29% of the skiers who had an accident on the slopes in 2014 had a blood alcohol rate higher or equivalent to the legal limit for driving. A survey to 600 people was conducted in several ski resorts testing alcohol consumption. The result were that one in every five people ski having consumed alcohol.

"People skiing under the influence of alcohol pose an increased risk to themselves and to other people on the slopes," said Alexandra Kuehnelt-Leddihn from the Austrian Road Safety Board (KFV).

INJURIES IN SKIING

Skiing is not a dangerous sport, as long as you follow the security rules and through a good physical training.

The main reasons of accidents that occur when skiing are three: lack of physical training and skills, skiing in a fatigue state and the breach of rules in the slopes.

The most common injuries on the slopes are the thumb, the knee and the shoulder. The skiers thumb is the term given to the injury when the skier falls to the ground, rests the hand on the snow and so the hand is crushed possibly having a UCL tear.

According to studies, the knee gets injured a 43% of the times, the shoulder a 12% and 8% for the thumb. Thus, knee and shoulder are the most frequent spots for an injury regardless of the level of skills of the skier.





III. Research

HEALTH

HYDRATION

The body is 70 percent water. It is essential to health to maintain that level of water to regulate metabolism and stay healthy. The importance of staying hydrated is reflected in the following aspects:

- **Optimal function:** the body needs water to carry nutrients and oxygen to all the cells as well as for a good performance of the organs.
- **Mood:** dehydration can involve changes in mood, like feeling tired or bad-tempered.
- **Productivity:** water enhances brain function, and, in consequence, cognitive skills
- **Enjoyment:** It can also affect people's enjoyment of the sport.

In addition, skiing has several features that increase the necessity of drinking water:

- **Intense exercise:** skiing is an activity that requires a lot of energy and effort, for which, no doubt, sweating will be involved. Sweat means we lose water and so we need to regain it.
- **Performance:** water is needed to transfer oxygen and nutrients to the muscles and joints. Hydration will provide an effective performance, as muscles and joints will not be weak.
- **Safety:** water is essential for our senses to work properly; hearing, seeing, tasting and smelling, they all need fluids in order to happen. At the same time, lack of water can cause dizziness as oxygen isn't supplied adequately to the brain. An unstable mind can be dangerous when skiing down a slope.

Interviews demonstrate that drinking is not an aspect in the minds of skiers. Even though some of them carry a backpack with a bottle of water they don't take the time to stop to drink. Hydration is not an aspect they consider in their resting periods of time. The breaks they take are for coffee, beers or a quick lunch. This is due to, besides physiological reasons, the behaviour of users during skiing.

- Skiers want to make the most of their day skiing, for which, the less time they spend on breaks the better.
- Most skiers carry a water bottle in their backpack which is not too accessible due to the reduced mobility of the user in cold temperature.

One of the ways we lose water, besides from breathing, is through sweat. Skiing is an activity that requires a lot of energy and motion, for which the body gets warmed up, and hence sweats. Wearing a lot of layers boosts this even more.

According to the website of the Human Performance Resource Center, a Department of Defense initiative: The combination of heavy clothing and high-intensity exercise can lead to increased sweating and the possibility of dehydration.

Most users fail to replenish fluids while skiing. This is due to various reasons:

- **Altitude:** The lungs have to work much harder at the top of a mount than at sea level to achieve the same levels of blood oxygenation. To make this happen, ventilation increases. Because our breath is saturated with water, the increased breathing rate results in increased water loss, encouraging dehydration.
- **Cold weather:** your body chemistry impairs your brain's ability to tell you when to hydrate, which means the body thirst sensation decreases. On the other hand, sweat evaporates more quickly in the cold, dry air, which makes us believe we are not losing fluids as rapidly as on a hot day, as the sweat is not as perceptible.

The colder the temperature and the more intense the exercise, the more vapor you lose when you breathe. We often think we aren't sweating in cold, dry weather, because it tends to evaporate so quickly.

Cold weather tends to move blood and other body fluids from your arms and legs to your core, increasing your urine output. Cold weather also decreases your body's thirst sensation, which is normally an early sign of mild dehydration.

The sensation of cold extremities while being on the lift has a relationship with this topic.



Camelbak



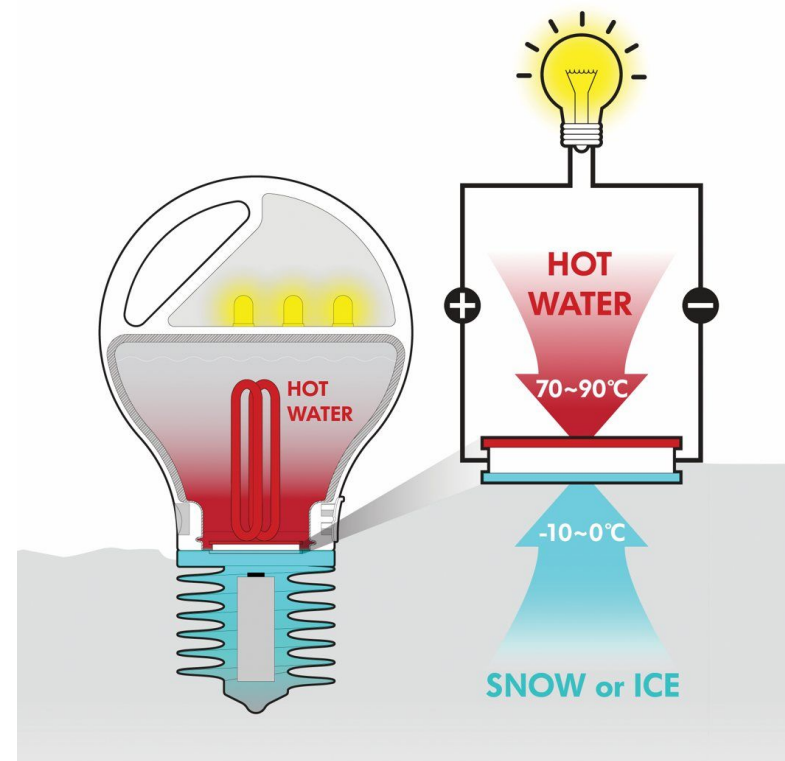
III. Research

HEALTH

Ways of producing water out of snow or ice

Ice produces far more water than snow because snow is full of air.

1. Body heat:
 - it takes time and the time during skiing is used for other things as it's precious.
2. Solar power:
 - you need the sun. It's not always sunny, and you can't control the weather.





III. Research

RENTAL SERVICE

In the following section I will analyze the differences between different rental services experiences for skiing equipment.

Intersport online booking

- Access the website
- Select the place where you want to rent it, which will be the pick up point (closest store to the ski resort)
- Select the dates you want to rent it for
- Choose the preferred equipment (there are different categories/classifications: basic, economy, premium)
- Go to the basket to proceed to payment
- Fill in the check out information and pay
- Receive a confirmation email
- Fill in the personal information (weight, height, level of skiing)

Rental at ski resort

- Arrive at the store
- Get to the machine
- Introduce personal data
- Fill in necessary data for selecting the appropriate equipment for you
- Receive a ticket from the machine
- Ask for your boot size to the shop assistant
- Try it on
- Repeat this step until you find the fitting boot
- A different person is responsible for the skis.
- Wait in line
- Give the ticket to the man
- He asks about knowledge in skiing
- He fixes the skis.
- Gives you the sticks.
- Wait for the rest of the group members if you're going with a group





IV. Interviews

A set of interviews have been conducted in order to expand the user research. As the project evolved and the research and analysis were done in parallel, different groups of interviews were arranged to different groups of users and with different scopes.

1. Interviews to skiers on the slopes: complementary to the surveys the interviews add more detailed information about the topics of interest.
2. Interviews to professionals in the field of skiing: this group of users gives us a more technical and inside vision of skiing. In order to obtain a more professional knowledge, not just personal experience from skiers, but from people whose job is related with skiing.
3. Interviews to professionals of sports of similar characteristics to ski: to broaden our boundaries in the topic of health measures we wanted to analyze how users of other sports deal with this important issue.

The document of the first group of interviews can be found at the end of this document under the name *Interviews to skiers*.



IV. Interviews

PART II - Ski instructor

Phone interview made on the 28th of December to Jaime San José, a 24 year old ski instructor in Panticosa, ski resort in the Pyrenees.

METHODOLOGY

I structured the interview in two parts. In first place I asked the interviewee about his job and some of my points of interest in relationship with his job. Afterwards, I wanted to know about his own personal experience skiing as for this person skiing is both work and leisure. For this part a shorter version of the previous interview was made.

Part 1: Skiing as a job

What ski resort do you work in?

What company do you work for? The ski resort organization or a private school?

Do you teach private or group classes? How long are the lessons?

What age range do you teach? (Kids, adults, both) And what levels of skiing?

Do your clients use their own equipment or rent it?

Do you warm up and stretch with your students?

How aware are your students of hydration and solar protection?

How many breaks do you make per day?

Part 2: Skiing as a lifestyle

Do you carry a backpack while skiing? If so, what do you carry in it?

How often do you make breaks?

Do you use any special object (for example, gopro, sports watch)?

What are the reasons that make you ski? What does skiing mean for you?

Any suggestions for improvements in skiing?



IV. Interviews

PART II - Ski instructor

Name: Jaime San José
Age: 24

Part 1: Skiing as a job

Jaime is a ski instructor of a private school in the ski resort of Panticosa. Panticosa is located in the Tena valley in the Pyrenees, and is considered the greatest skiing destination in Spain.

* By law, in Spain a person can only practice as a ski instructor if part of a ski school, not as a freelance.

User group: Jaime teaches any age group, from little kids to adults, but most commonly receives kids, for private classes, or in organized groups, for example school groups.

Duration: The duration of the classes he teaches depends on the client. It can vary starting from 1 hour of private classes, for example, to courses of 5 hours per day.

Breaks: It all depends on the client/s, but most commonly if it's a class of under 2 hours he doesn't stop. If it's a longer course and, specially, if the group is made out of kids he makes a long break of 20 - 30 minutes to drink and eat something. Of course, if at any time the students ask him to stop, the group takes a small break. When it's a kids group, Jaime is the decision maker and they also have to stop more often as they get tired more easily. On the other hand, adults and more advanced groups have the confidence and maturity or knowledge to know when to ask for a break.

Awareness of health aspects: When asking about some health factors in skiing (hydration, eating, sun cream, warming up) and the importance he as a teacher transmits to his students as well as the own awareness of the skiers, I didn't receive a very positive answer.

- Hydration: Jaime is aware he himself doesn't drink the necessary water every hour and admits he only **reminds** the kids. Once in a while he makes the group stop to drink a bit of water. He also explains as a pain point for the ski instructors that they are not allowed to carry a backpack or any other object that is not part of the schools mandatory uniform. This means, in order to drink water, they have to reach the schools locker area where the instructors keep their personal belongings, a bathroom with drinkable water or a cafeteria. One of the only ways ski instructors would be able to take water with them while skiing is carrying a camelbak, and it does not have enough capacity for all the hours of work.

The last weeks there has been really warm weather, which makes even more dangerous not drinking sufficient amount of water. Jaime has witnessed a couple of people fainting.

- Similar with sun cream, Jaime warns his younger students of the use of sun cream but leaves it under their individual responsibility for the adults. When he notices that a students face is burnt he alerts them to put on sun cream. Measures should be taken before the consequences are shown.
- Warm-up: For more advanced students that are going to start at maximum effort from the start he does some exercises to warm up before starting. Instead, if it's a more beginners group he doesn't warm up at standstill as the speed and intensity of effort grows gradually. Nevertheless, the first descent is done slowly warming up the knees, arms, hips.

Part 2: Skiing as a lifestyle

Jaime has been skiing since he was 4 years old. For him skiing is a lifestyle more than just a sport or hobby. It's an experience not only for enjoyment but for improvement. He explains that you have to keep growing in your technic, venture to try new things, like other winter sports: snowboard, telemark; search for new sensations.

When skiing in his free time there are two possibilities:

1. He goes to the ski resort alone to ski only for a couple of hours. In this case he would not take anything with him: no backpack, no water, no food. He makes no breaks and only skis for the whole time he is there.
2. He goes with friends to spend there the whole day. Then he carries a backpack which contains: water, camera, small snacks like energy bars, bread... Him and his group stop once in the day for lunch and a beer (20-30 min.)



IV. Interviews

PART II - Maintenance manager

Phone interview made on the 5th of January to Rafa Mayordomo, former person in charge of maintenance and operation of ski lifts in Baqueira Beret for 2 years.

METHODOLOGY

This interview was divided in three parts. First of all, I asked him about his roles and responsibilities in the ski resort. Next, we went deeper in the topic of queues and pain points of ski lifts. To end up, I suggested the problematic of dehydration on pistes and other health problems and asked for his professional opinion.



IV. Interviews

PART II - Maintenance manager

Name: Rafa Mayordomo

Skiing as a job

Rafa worked for 2 years at the ski resort of Baqueira Beret, Andorra, as the responsible of operation and maintenance of the ski lifts, in charge of the organization of the workers and the arrangement of malfunction.

There are 3 possible areas to work in:

1. technician: make sure that everything works okay and the operation and maintenance of snow-cat machines.
2. people in charge of the slopes: groom ski slopes, rescues...
3. development of new ski slopes

Time is very important in their job as the time people have to wait stopped seated on the lifts depends on how much they take to fix the problem.

People in the sheds at the top and bottom of chair lifts have two roles:

- help people to hop on and off the chair lift
- emergency stops

Queues:

Two factors, long waiting periods of time and unorganized lines.

The average time a person waits in line can be calculated. The skier will feel at ease if:

- other people don't skip the line
- other people don't step on their skis
- the entrance of the chair lift is uphill or downhill

Knowing how much time you have left in line will not diminish the queue but it will give the skier more comfort. Most of the times skiers are also not distributed equally throughout the different pistes, making the queues for lifts even more busy. Why some slopes are less used should be studied. Also people prefer commercial slopes rather than harder and more professional slopes.

Ski lift capacity / slope capacity has to be balanced. If there's a long line in the lift it means not many people are skiing down the slope, which is satisfying for the people skiing but not for the people in line. On the other side, if there's more lift capacity, because there are more seats per lift, the process is faster, there are more people on piste and more uncomfortable.

Requirements of a ski lift:

- sun or shade: people like to ski also to get some sun.
- queues have to be made on a straight line or with a very subtle curve.
- indicate organized queues from the start, to avoid funnel effect.

Ski lifts are tailored to the fixed area, so specific requirements can be fulfilled. Another relevant point is that everything in the area of the ski lifts has to be removable for the snow-cat machines to maintain the snow.

Health aspects:

The only place you can drink right now in a ski resort is in cafeterias or if you bring your own water bottle. Both of them have some negative points:

- Everyone goes to the cafeteria around the same time, which makes it a very busy place having a hard time to find a place to seat or taking a long time to order your drink/food.
- In general, if you bring your own water bottle you need to take a backpack. This isn't comfortable when skiing. The water can also tip over inside the backpack.

This awareness of health aspects could be included in the sequence of the ski lift as it's a period of time in which you don't do anything, you just sit on the lift until you reach your destination. As well, everyone that is in the ski resort carries a card which is the ski pass. This could be used to make use of any service related with getting water, for example.

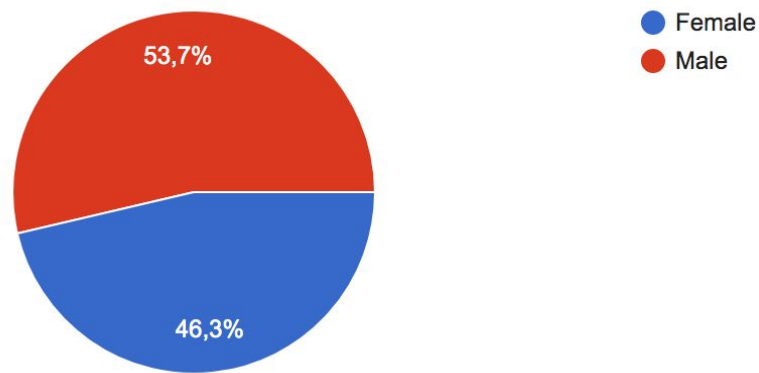
What refers to sun cream, people like to have individualized products, so in the case of having some kind of service that provides sun cream a collective product would not be a good option.



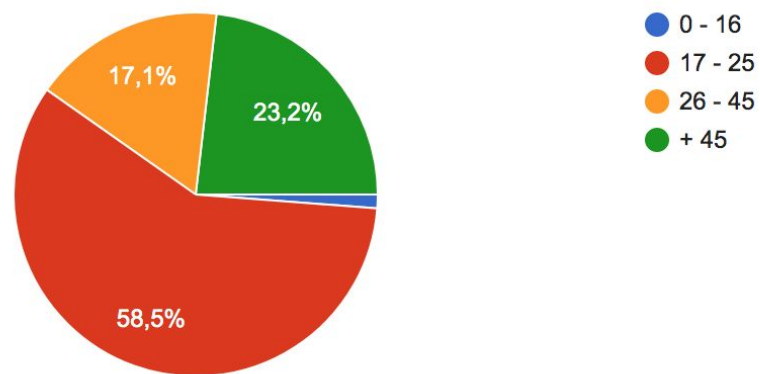
V. Survey

Survey conducted to a sample of 80 people during the week 6-12th of January.

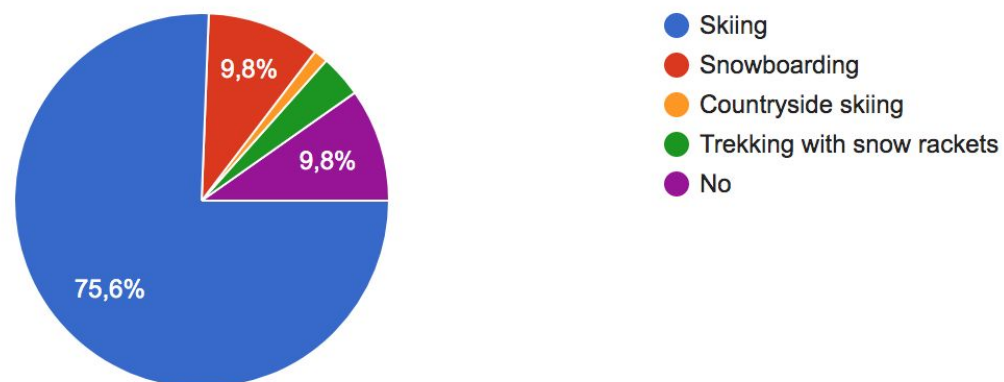
1. Gender



2. Age



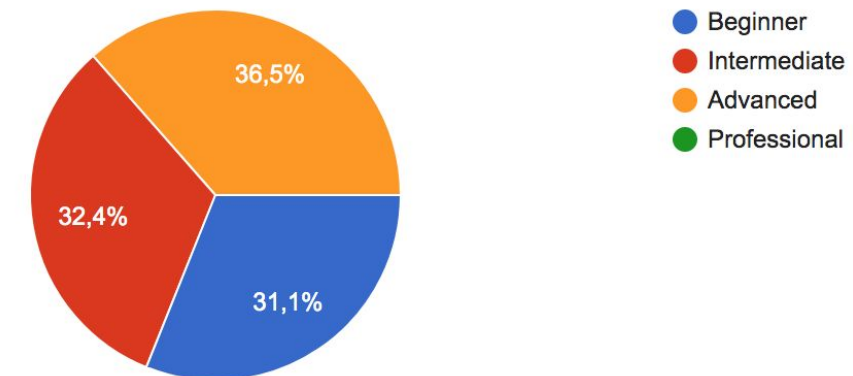
3. Have you ever practiced one of these winter sport?



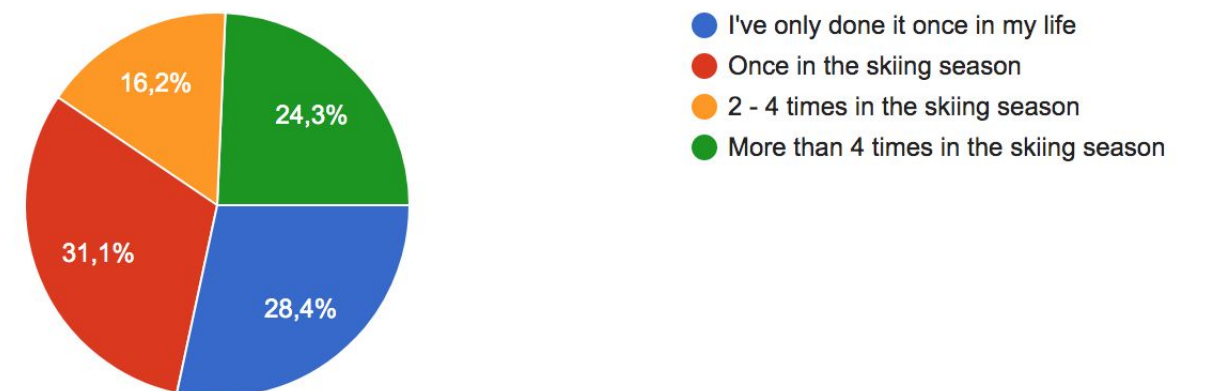
4. What is your regular location for practicing this/these sports? (multiple options allowed)

- 70% Pyrenees
- 12,5% Austrian Alps
- 7,5% Sierra Nevada, Spain
- 5,5% Italian Alps
- 5,5% French Alps
- 4% USA
- 1,5% Canada
- 1,5% Australia

5. If you have practiced skiing or snowboarding, what would you consider your level is?



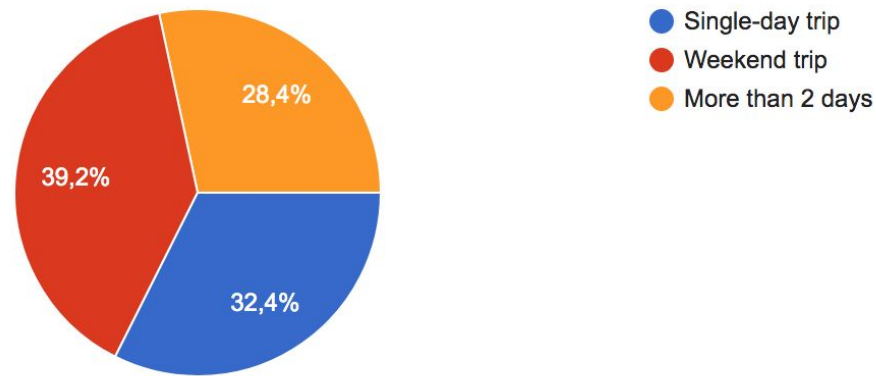
6. How often do you practice this sport?



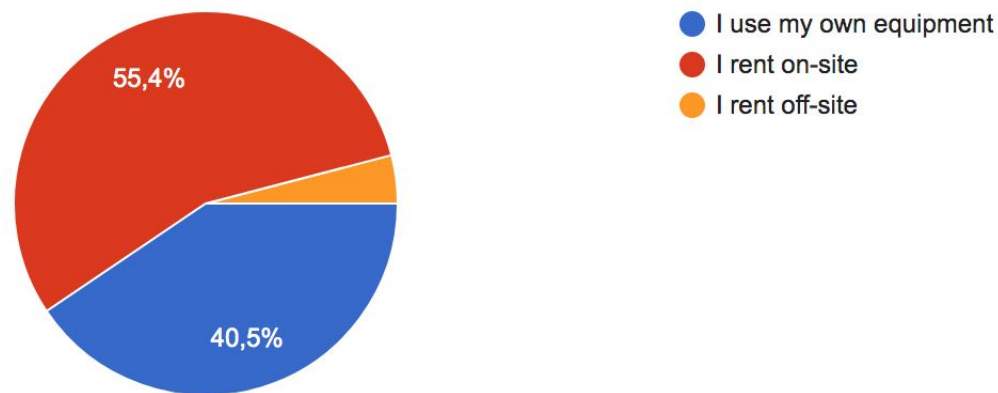


V. Survey

7. What kind of trip do you usually make?



8. What equipment do you use?



9. Order from 1 (most important) to 7 (least important) what factors you consider when choosing what skiing resort to ski in

Factors: Proximity to residence, skiable kilometres, quality of the ski slopes, variety of levels of the slopes, amount of crowding, Aprè ski, service areas and restaurants.

The factors considered as more important are proximity to residence, skiable kilometres and quality of the ski slopes, and the least important Aprè ski and service areas and restaurants.

10. What other factor not mentioned above would you consider?

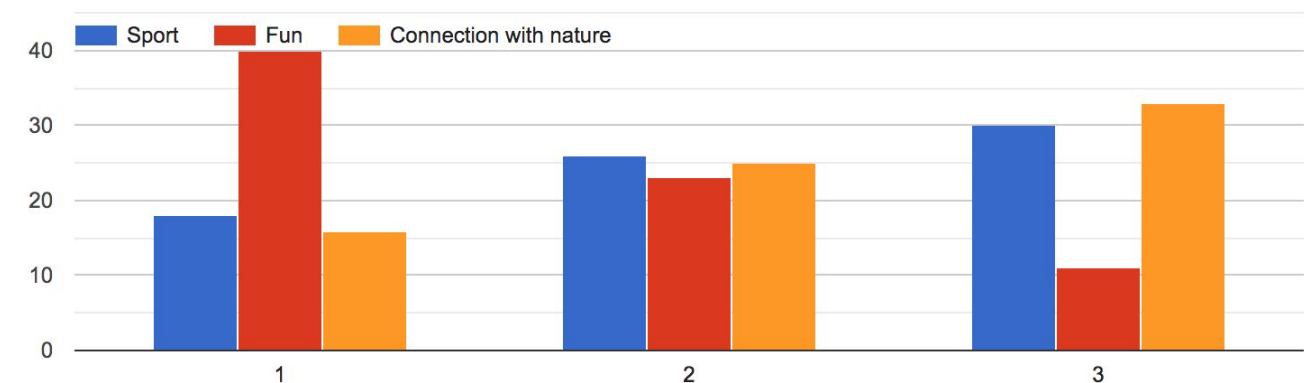
- price
- weather
- staff
- availability of friends
- parking
- snowparks
- amount of rental shops nearby
- accomodation
- transport links
- medical service

11. Order from 1 (worst aspect) to 7 what you consider the worst aspect of skiing

Aspects taken into account: Temperature contrasts, queues, poor phone service, equipment rental, signalization, lifts, carrying the equipment,

Queues, carrying the equipment and equipment rental are considered the worst aspects, while skiers don't pay too much attention to temperature contrasts and poor phone service.

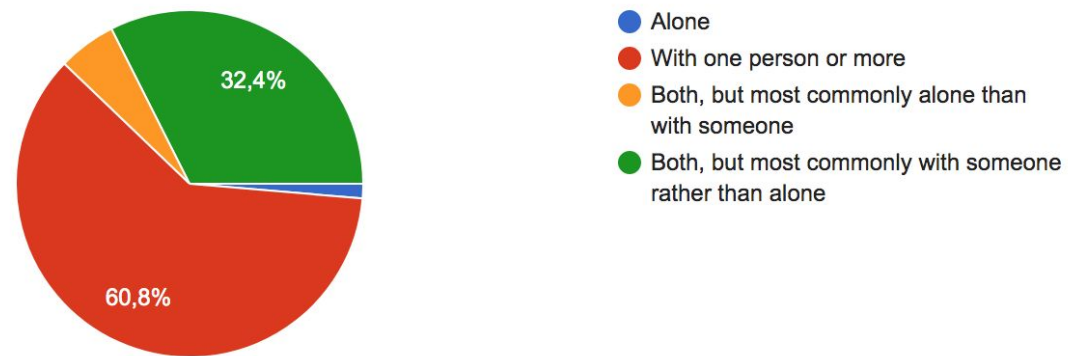
12. Order from 1 (most important) to 3 (least important) what the skiing experience means for you





V. Survey

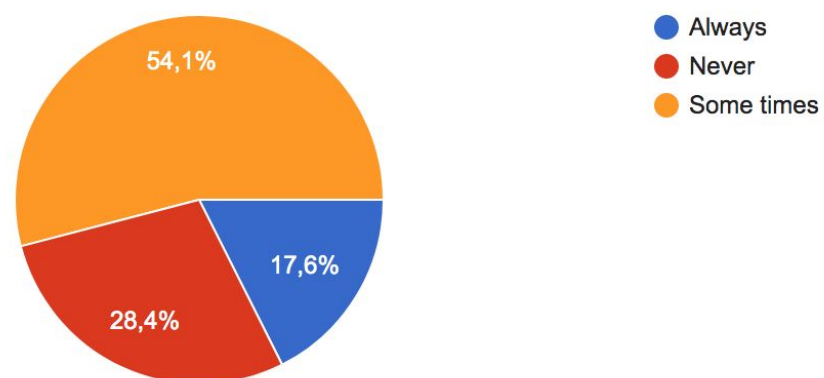
13. Ski/snowboard alone or accompanied by someone



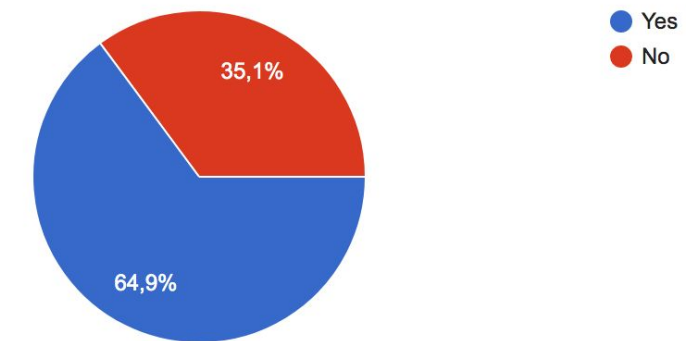
14. What aspect would you find interesting to monitor while skiing? (e.g.: speed, km, hours skiing...)

- km
- speed
- mapping of the route
- consumed calories
- height and steepness
- hours skiing
- location with 3D view
- hours without falling down

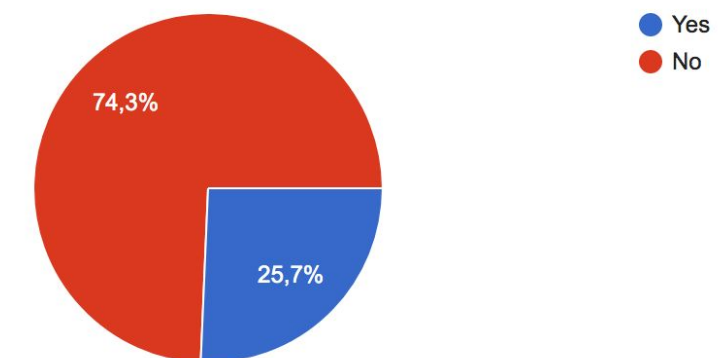
15. Do you use backpack?



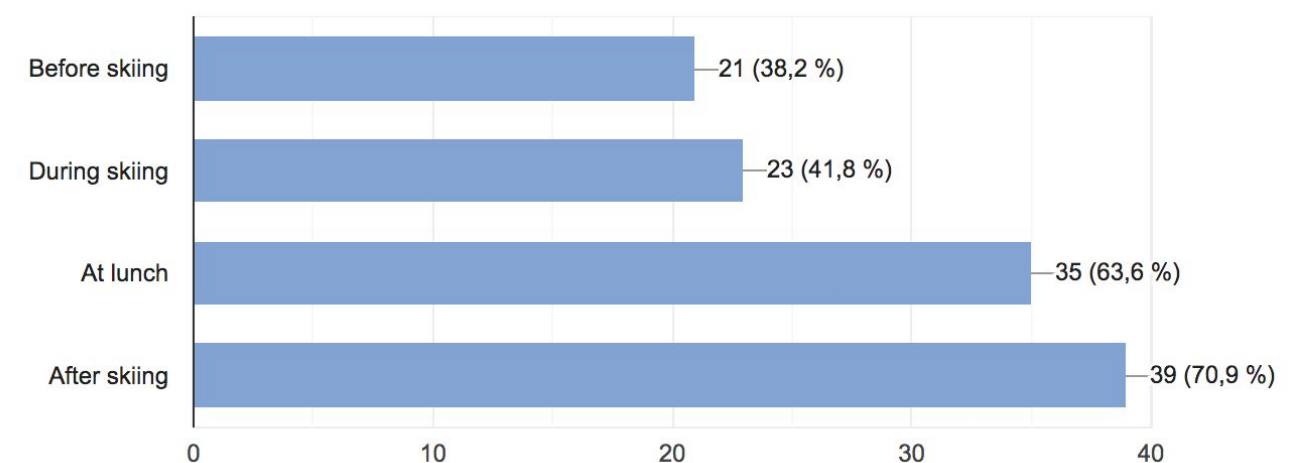
16. Do you carry water / energy drinks?



17. The recommended amount of water per hour is a minimum of 350 mL (1/3 L), do you drink it?



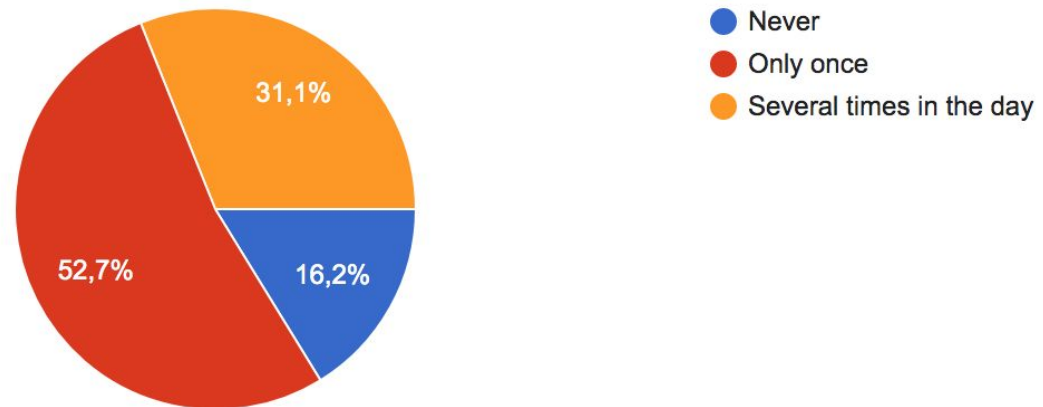
18. When do you drink? (multiple options allowed)



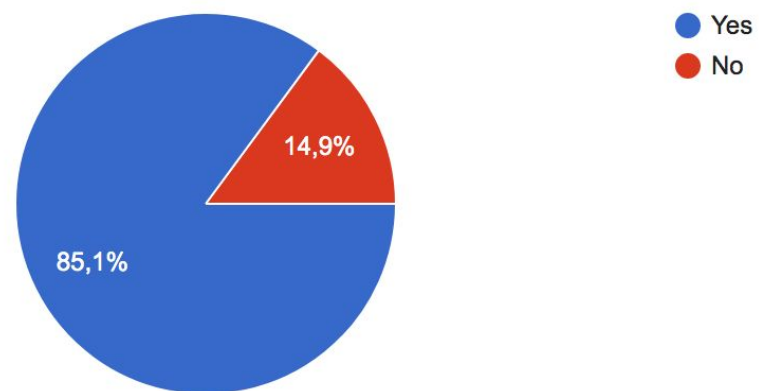


V. Survey

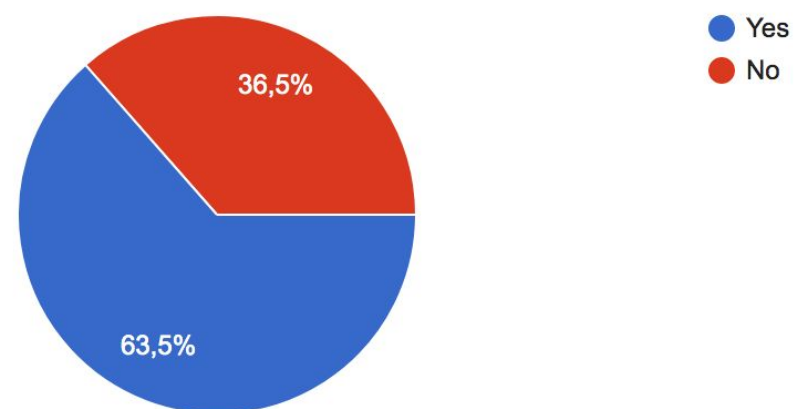
19. How often do you apply sun cream during a ski day?



20. Do you like to keep the memories of your skiing trips by taking pictures / videos?



21. Would you like that someone else / a service would do it for you?





V. Survey

CONCLUSIONS

- Balance between different levels of skiing, from beginners to advanced. **Slopes are shared by a great variety of types of skiers**, different speeds, different knowledge, ones fall down more often, ones try to make tricks... Skiers have to be careful with what is coming behind them and what they have in front of them.
- Highest percentage of times a person goes skiing in a season is once. But graphs also show that almost half of the respondents make a weekend trip, so they spend a couple of days a year in a ski resort. Not to far is the percentage of people that ski more than 4 times in the season. In conclusion, **nearly three quarters of the respondents revisit the ski resort in the same season.**
- **More than half of the respondents rent their equipment**, either on-site or off-site. This means they make use of the rental services.
- Users are **interested in data related to the ski resort** in terms of characteristics for skiing, not so much the social activities like apre-ski and restaurants.
- The **top three of worst aspects** in skiing considered by the respondents are:
 1. Queues
 2. Carrying the equipment
 3. Equipment rental
- The main reason for which users ski is for **fun**. After this, sport and connecting with nature are positioned almost at the same importance.
- It's a **"group activity"**, even though skiing is an individual sport, it's an activity that is liked to practice with the company of other people.
- Almost 1/3 of the respondents never wear a backpack while skiing, which means they don't carry essential products like water, snacks, sunscreen. Moreover, more than half only use it sometimes. 3/4 of the respondents never or occasionally use a backpack, which leaves a low percentage of skiers that do use it always. In snowboard, carrying a backpack ruins your balance, both in snowboarding and skiing it is uncomfortable. In the case of going in a group, it is common to take one bag for all and share it.
- 65% of respondents affirm to carry water or energy drinks while skiing but anyways don't drink the necessary water during a day of skiing. **Not even 25% of the people drink the recommended water per hour.** The moments of the day in which most people take the time to drink are during the lunch break or after skiing.
- During skiing not even half of the respondents hydrate: people who don't drink while skiing become so dehydrated that they can't even replenish themselves with water and food during a 90-minute lunch, so drinking water once a day is not a solution to dehydration.



VI. Interviews

PART III

After gathering data about some health aspects like hydration and solar protection throughout primary sources (the survey, observation and official documents) and secondary sources (online research), some further investigation was carried out to acquire a different vision of the topic. Until now research had only been carried out around the environment of skiing. In order to 'think outside the box' a reflexion was made: **What other sports are practiced under similar conditions to skiing?**

Conditions of skiing taken into account:

1. It has to be an outdoor sport as the weather is a very important factor in skiing. Weather conditions, like UV radiation or extreme temperatures, can be a risk.
2. It has to be an extreme sport. This is, long exposure to UV radiation and intense workout, which cause sweating and fatigue.
3. High altitude. These sports have to be practiced at high altitude like skiing as UV radiation increases proportionally with altitude.
4. No presence of shade. Following with the topic of solar radiation, skiing is an outdoor sport that needs a wide, open environment for which it is not possible to practice it under shade (unless it is natural shade from the mountains, but this will not last throughout the whole day as the sun moves).

After listing some requirements for skiing these conditions were looked for in other sports reaching these:

- Ironman triathlon
- Cycling
- Mountaineering
- Competition skiing
- Canoeing

Water sports like surfing that do attain some of the characteristics like long exposure under the sun and intense workout were not considered as they have other characteristics that distance from the ones of skiing: the presence of water and no altitude.

Next step was to find people in these fields to interview. In the following pages these interviews will be displayed.

METHODOLOGY

Explanation of the person's relationship with the sport

Trainings:

Where are the trainings undertaken?

How many hours a day do you train?

Breaks: How often do you take breaks? Do you drink water, do you apply sunscreen?

How do you protect yourself from the sun?

How do you stay hydrated? How do you carry de water? How often do you drink water?

Competitions:

What means do they use to inform the risks from UV radiation and dehydration?

Is there any kind of service that provides water, food or any other thing before, during or after the competition?





VI. Interviews

PART III - Professional skier

Phone interview made on February 7th to Carlota Carrera, 18 year old former slalom and giant slalom racer.

Started in a club in Astún, in the Pyrenees, not competition. At the age of 12 she changed club and joined the competition team of slalom and giant slalom.

Every weekend she drove to Astún for training, which were Saturday and Sunday from 9 am to 2 pm. The slopes are reserved and indicated with sticks so that other skiers don't use the slope. When there was a competition the team left at 6 in the morning from Jaca, where their base is placed, and drove to the ski resort where the competition took place.

BREAKS

They only had one big break of half an hour around 11:30-12:00. The time at which they took the break mostly depended on the weather and, therefore, the snow. Skiing is a sport that depends on the weather. One factor for the satisfaction of the user is the weather.

HYDRATION

As kids, drinking water was never very present during training, but they were insisted to drink and eat a small snack during the break. The trainer always carries water in a hydration bladder, from which the students can drink. At the age of 15 she started carrying a backpack to the top of the slope with a water bottle, a snack and sunscreen. When talking about both hydration and solar protection, we are more aware of the risk and consequences once we get older.

SOLAR PROTECTION

Sunscreen is essential when skiing for UV protection, no matter the weather. Both in a sunny or cloudy day it is important to apply sunscreen. Eye protection from the sun is another important aspect to take into consideration. There are different types of goggles with different lenses and also self regulating. It is not only the solar exposure of the eyes but the danger of falling and having an incident if not wearing appropriate glasses.

COMPETITION

Health awareness is promoted in competitions in different ways, depending of the relevance of the competition. In important competitions there are usually volunteers of the event host with different stops for food and drinks, depending on the available area at the finish line. In some occasions also discounts for the cafeteria at the slopes are offered.





VI. Interviews

PART III - Professional canoeist

Phone interview made on February 7th to Gloria Herrero, 22 year old former regional and national level canoeist.

Member of Centro Natación Helios in Zaragoza, Spain. She competed with the club in a regional and national level. The trainings were 6 days a week, 3 hours a day: 1 and a half hours of rowing and the rest running or working out at the gym. Now, she has stopped competing and has started as a support teacher the same club. She is in charge of giving corrections to the students, creating tracks, games and motivating.

The training is in the river or the water canals in Zaragoza. And competitions that she has participated in are held all over Spain: Sevilla, regionals of Aragón, Liga AESTE (Valencia and Catalunya), Marathon of Galicia...

BREAKS

The training is divided into water and gym. In between these two periods there is a break used to drink and eat something, but Gloria explains that this is not something her and her team usually did. During summer they do make use of this period of time and drink water with powder, which is an isotonic drink for recovery. During the water training they also carry water bottle in the canoe, which is drunk in between exercises, specially during summer. In terms of solar protection, it is only taken more seriously during summer again. Gloria applies sunscreen on her face, but not on her legs despite being exposed. She explains that her legs get progressively tan and so never get burnt. As she doesn't see signs of sun burnt she doesn't apply it. She also uses an eye shielder, not a cap.

SOLAR PROTECTION

Sunscreen is not a great friend for canoeist as it makes there hands slide off the paddle. In any case, Gloria applies sunscreen on her face and back, using as well sun glasses for both solar and water protection. In particular she wears an eye shielder which is not as common.

HYDRATION

In her team, she explains that the most common way of carrying water during training and competitions only in water is the cyclists water bottles that you can squeeze to drink water..

They are held behind the seat on the canoe, with no special way of holder. What she explains they use is their pair of slippers so that it doesn't move around the canoe. During summer they don't carry water as it is not warm she explains, a very wrong assumption. When competitions are approaching and training is increased to morning and afternoon training, they start drinking isotonic drinks.

In conclusion, they drink water when they have a sense of heat and noticing that they are sweating, meaning during warm weather. And also pay more attention to hydrating before and during competition season.

COMPETITION

The measures about health taken in competitions are very broad. In competitions in a national level for young talents speakers are placed and announce to drink water, wear an eye shielder. In warmer places like Sevilla these actions are also warned. But she mentions it is not a very precise information they give out, just some general indications.

Depending on the competition the services offered vary. In marathons there are stands of provisioning. In most of the competitions, after the race they provide you with a bag that contains a drink, some protein bars... In other types of competitions nothing is offered so it is the own team that takes their own food and drinks for after competing.

Camelbaks, or long tube to a hydration bag around the neck are used in some occasions.





VI. Interviews

PART III - Professional canoeist

In-person interview made on February 7th to Mason Wyck, practices nordic skiing, mountain cycling, mountain racing and marathons.

Mason comes from Alaska where he is used to going hiking on mountains of 1000-2000 m height. These hikes last an average of 2-5 hours, during which he is completely exposed to the sun, no shade.

HYDRATION

Depending on the distance of the hike, he explains, he tackles drinking water in a certain way. During winter he carries a water bottle, while in summer he uses a camelbak of 1,5L capacity. Another alternative he uses is a running vest of 750 mL capacity if he needs a very light weighted body mass. In the case of carrying his bike he takes along a couple of water bottles as the bike also has space for a bottle.

During the hike or the cycle he doesn't drink too much water, he explains it is only for the sensation of a dry mouth, not for hydration.

SOLAR PROTECTION

In terms of UV protection, he uses polarized sunglasses, a backwards cap, removing the function of the cap against the sun, and if it is really warm runs shirtless but using a UV jacket.

In his backpack he carries a tube of sunscreen but only applies before the activity. The tube is only used in case of feeling that his face is burning. Then he would reapply. In case of jumping in a lake or getting wet he does reapply sunscreen, but admits not to apply in other cases because of sweat or laziness.

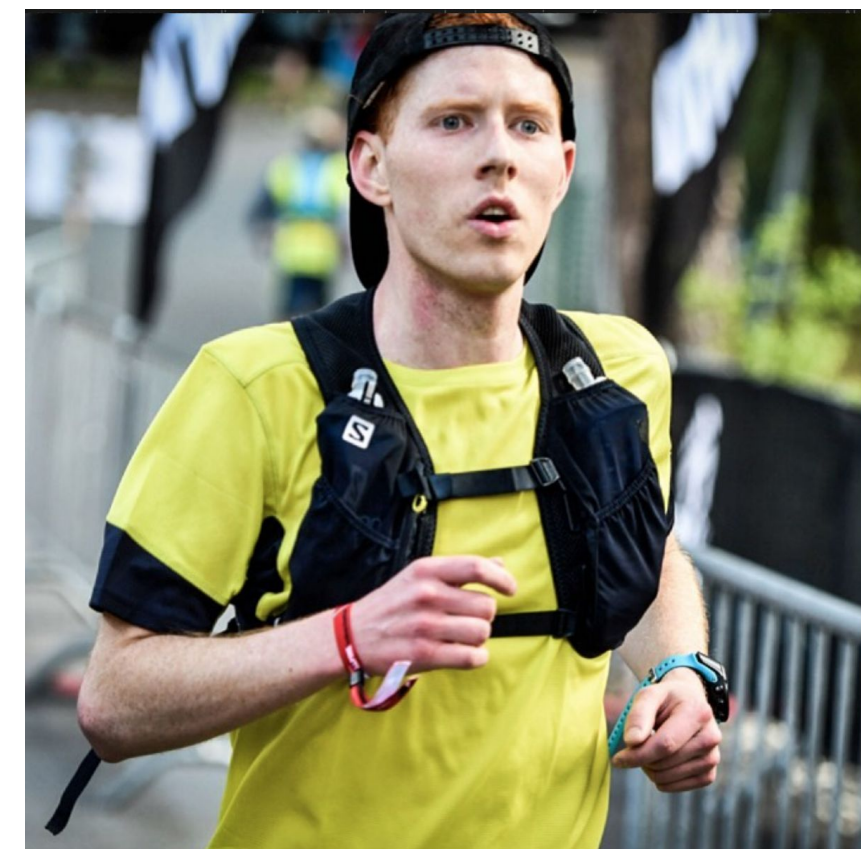
He is conscious of the risk of UV radiation even in a cloudy day, applying and carrying it in every kind of weather.

His personal experience has taught him the importance of sun protection as he has had some important sun burns and his family doesn't have a good skin against the sun.

COMPETITION

In mountain races he has participated in they warm about hydration, water stations are placed at half of the mountain. He also uses a belt with water or a vest.

A couple of years ago he ran the half marathon in Innsbruck, in which they required to carry several elements: water, blanket and jacket. They also had stations offering water, energy drinks and some snacks like nuts and bananas.





Phase II

Define





I. Define

In this second phase we will channel the identified challenges and problems in the Discover phase towards actionable tasks. We will structure them into a reduced set of problem statements.

Tools:

Brainstorming: Conclusions of the users journey mapping, interviews, research and surveys.

Design brief: Clear definition of the fundamental challenge to be addressed. A problem statement is the void between the problem, the current state, and the solution that meets the user needs of a process, product or service.

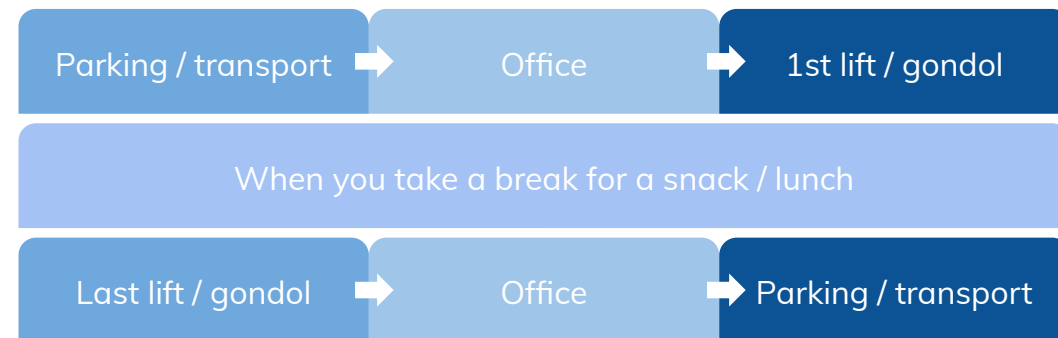
It is a human centred tool based on the insights gathered in the first phase that provides a description of the vision of the problem that wants to be solved, towards a feasible alternative.



II. Design brief I

EQUIPMENT HANDLING

One of the aspects that users pointed out as one of the top worst aspects in the skiing experience is carrying the equipment. There are different points in the user journey where the skier has to carry his equipment from one point to another.



The skis tend to separate between them and, consequently, dropping to the floor leading the user to figure out different alternatives of carrying them to solve this problem.

Along this path, one of these periods of times where skiers have to carry the equipment was analyzed in depth: snack / lunch break. This phase has another problem that affects user experience. The user carries the equipment to his destination where he leaves his gear in order to take a seat to eat or drink. The current measure is leaving the skis directly on the snow or placed on the racks that the ski resort offers. The problem is not everyone makes use of them for which the area surrounding the restaurant gets full with skis and snowboards “thrown” on the snow. A consequence of this is ski robbery. This derived in a new approach: space management of ski storage during breaks.

Problem statement:

The skiers find that the existing solution for the storage of equipment at the surroundings of the service areas is inefficient, affecting the access to these services and increasing the risk of robbery. The solution should deliver a safe and organized way of storing the equipment.



III. Design brief II

GROUP TRACKING

From the survey conducted to a sample of 80 people, a bit over 90% of the respondents don't go skiing alone rather accompanied. They like spending time with friends and creating memories. A series of questions and answers were posed regarding the communication between the members of a group.

Question: How can we know where our friend is if we lost him?

Answer: call or text

Question: How can we know without having to contact them directly?

Answer: tracking, without the need of a phone to remove these stopped periods of time.

Problem statement:

The skier prefers to undertake this sport accompanied by other people rather than skiing alone. This causes a waste of time to track down the rest of the members and regroup.



IV. Design brief III

HEALTH

In the phase of analysis and investigation it was observed that skiers don't pay the necessary attention to health and take precautions most of the time only after suffering the consequences (fainting, skin burns...). On the one hand, it was noticed that water is not very accessible in a ski resort. There are two options for getting water:

1. In cafeterias / restaurants: You can buy bottled water. The survey showed that 60% of the respondents drink during the lunch break.
2. Bring your own water: Skiers carry their own water either in a water bottle or water bladder. According to the survey, only less than 20% of the respondents always carry a backpack, 50% carry it sometimes. A bit over 60% of the respondents do carry water / energy drinks but don't drink the recommended amount of water per hour. Only 40 % of the respondents drink during skiing, which means skiers are not persistent in drinking water.

On the other hand, over half of the respondents of the survey apply sunscreen only once in a ski day. This is not enough. According to studies in solar protection, sunscreen has to be applied every 2 hours. The most dangerous consequence of exposure to UV is skin cancer. It is immensely important for people to use sunscreen and have the necessary information to know when UV is high. According to studies, UV radiation in the Alps increases at least 20% every thousand meters, meaning altitude is a factor that affects the risk. But this is not the only thing that makes the alpine environment dangerous, clear air and reflected UV from snow also contribute.

Problem statement:

The skier, throughout the day of skiing, doesn't give the sufficient relevance to the health risks (hydration, UV exposure and skiing under the influence of alcohol). Our solution should consider all the potential measures in the different stages in contact with these risks.



V. Design brief IV

RENTAL SERVICE

Renting the equipment is convenient for people that don't ski as often to make profitable purchased equipment. As the results of our survey show, renting is the best option for the majority of the respondents.

Ski resorts count with a balance between ski levels (beginner, intermediate, advanced).

Frequency with which they ski in a skiing season: the survey shows that over 50% of the participants ski just once in the skiing season or they've only skied once in their lives. For which it wouldn't be convenient for the to buy their own equipment.

A 60%, approximately, rents the equipment while a 40% purchases.

There are strengths in renting the equipment for all the different profiles of skiers, from beginners to more experienced users. The advantages are the following:

	Beginner	More experienced
Price	Not worth purchasing as he's not going to give it enough use to pay it off.	Purchasing equipment involves a high initial investment (expensive for students).
Possibility of choosing	Get to know what skis work better for you (get advice).	Possibility to try out new gear as if you purchase equipment lasts a lifetime so you don't update it (not everyone can afford to have several types of skis).
Convenience	Less time carrying gear if you rent it on-site. You don't have to carry it from home to the transport you're taking to get to the ski resort.	Less time carrying gear if you rent it on-site. You don't have to carry it from home to the transport you're taking to get to the ski resort.

On the other hand, the rental service, as we have already explored previously, presents disadvantages or weaknesses. In short, the stage of renting the equipment is very time consuming for the skier. Here are some problems that could be solved:

1. If there is **more than one option offered** for renting you can't know for sure which one is going to be better, in terms of quality of the equipment, quality/price ratio, customer service...
2. **Pick up and returning:** there is a waiting time before and after skiing as you have to wait to receive the equipment and to give it back. A shop assistant is needed for both these actions.
3. **Adjustments:** Some adjustments have to be made to the skis for the boot to fit to them, for this you have to take off one of the boots. On the other side, the boots might not fit you on the first try having to try a couple of boot sizes on until the right fitting is found.
4. **Assistance:** a shop assistant is needed for all the steps of the rental process, from receiving your data, handing you the equipment, to fixing the skis and collecting everything at the end of the renting service.
5. **Queue:** mostly people get to the renting shop at the same time for which queues are generated.

It was decided not to continue exploring this path as the improvements would not be to significant for the user experience in terms of time saving. In addition, there are technologies being studied by rental services at ski resorts towards the future of rental but are still far from reaching the present market.



VI. Boundaries

One of the important elements of the design brief is to identify potential risks and highlight how this will be mitigated and also sets the boundaries of the rest of the development process.

One of the questions of the interview conducted was **which stage of the skiing process do you spend the most time in?**

Interviewees agree that the most time consuming step in the skiing experience is the queue for the lifts. There is no alternative to lifts as to descend the slope you first have to get to the top.

The same result was obtained from the survey. Queues are considered the number 1 worst aspect of skiing of the given list.

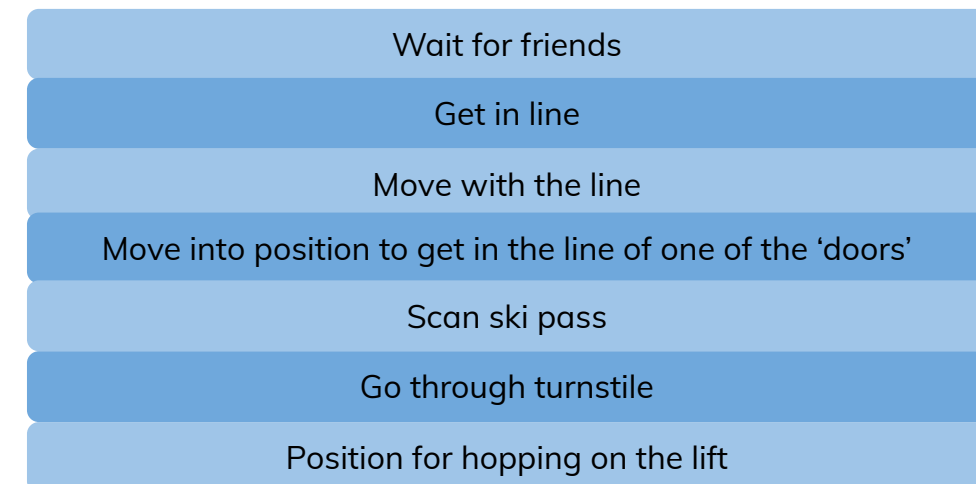
Users are looking for losing as little time as possible

In order to find out what aspects should be improved for a better user experience we listed the requirements for user satisfaction:

- organized lines from the start (avoid funnel effect)
- no skipping the line
- no sharp turns in the queue
- the queue shouldn't be formed uphill or downhill
- knowing how long the queue is going to take
- place the queue in a sunny area as users are static and don't want to get cold
- time to go by fast

This last idea goes along the same line that we've been talking about. To make this time go by faster for the skiers they must be entertained. The gap of time can be filled up with something for them to do while they reach the lift. As it's an irremovable step from the user's journey this time could be used for actions that the skier does in stops that are not irremovable. On the other hand, the time in the queue should not be increased by adding an activity to the sequence, as this would add up waiting time for the skiers.

Next we show the sequence of steps that a user takes in a queue for lifts:



The lift has the same characteristics as the queue of the lifts, it is a necessary step in the users journey and an unexploited period of time. It is a period of time in which you are isolated in a confined space. An element that is always present is at least another person, depending on the capacity of the chairlift. As the results of the survey show, the great majority of people go skiing accompanied. As we have mentioned before, it is an individual sport but, at the same time, social. The lift is the moment were you can interact with the people.

This has to be taken into account for the selected concept.



VII. Selected problem statements

The described problem statements are the following:

1. Equipment handling
2. Group tracking
3. Health
4. Rental service

Finally, it was decided to discard the fourth path as the improvements would not be to significant for the user experience in terms of time saving. In addition, there are technologies being studied by rental services at ski resorts towards the future of rental but are still far from reaching the present market.



Phase III

Develop





I. Develop

Out of the three final selected problem statements in the previous phase, the one that will be developed to the fullest is the related with health. In order to reach this decision, an initial concept has been defined for each of the three problem statements, starting from the design briefs. Only for the selected concept, through an iterative process of development, will be refined until it is ready for implementation.

An initial **brainstorming** was undertaken, generating ideas which, some of them, are used during this develop phase.

- People enjoy the experience and want to repeat it. It's a sport you can only practice in the winter season, so during a limited period of time (there are exceptions of places where you can ski the whole year): memory bank of your experience, something that makes you remember the time you've spent skiing.
- Skiing is a social sport, tracking your friends to know where they are in case you get lost as in the same group of people there is always different levels of skills and speeds.
- Awareness for health precaution: hydration, sun, alcohol consumption, warming up the muscles and eating.
- Make a better use of the unexploited time gap waiting at the queues for the ski lifts.
- Make the carrying of the equipment a more comfortable action.
- Improve renting service:
 - provision of data from home - elimination of contact with personnel at rental store to avoid losing so much time in the process. Equipment is ready as soon as you get to the rental place.
 - Database saves your information for following rents, so that process doesn't have to be repeated.
 - Fast and easy pick up and drop off of the equipment.
- Introduce sustainability in ski resorts:
 - Water filling service on site produced with the snow/ice.
 - Sustainable packaging for the served water.
- Inform of the distribution of masses throughout the ski resort to avoid oversaturation of people, reducing waiting lines, accumulation of people on slopes and crashes / injuries.



II. Equipment handling

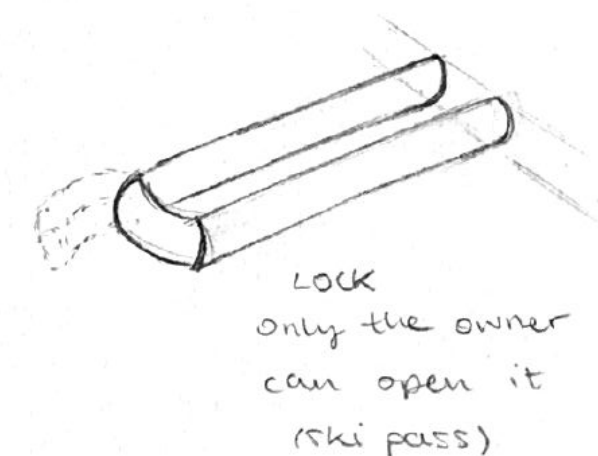
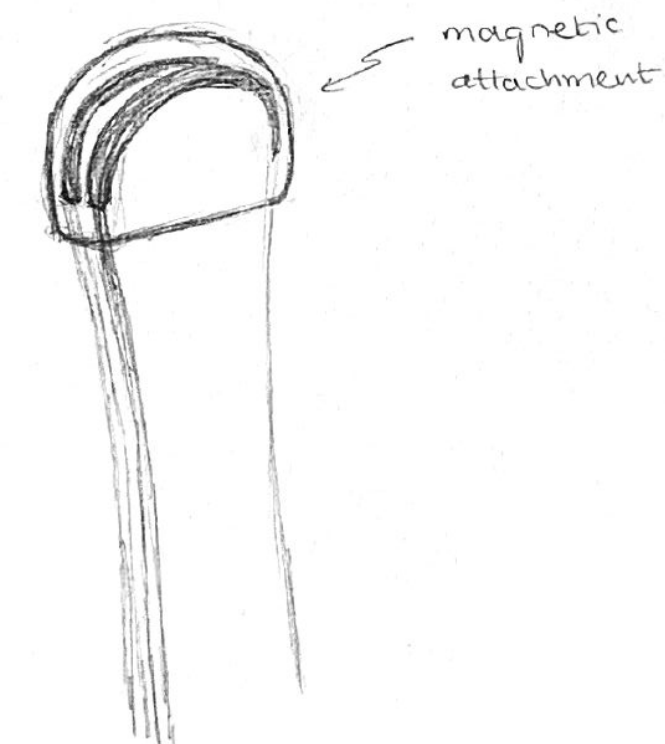
IDEA

A combination of these two problems was developed for the generation of this idea. On one side, the user would be able to carry the equipment from point A to B in a more comfortable and effortless way, and at the same time he could store his equipment in a safe way, keeping the area organized and accessible. The user would have available a service that starts at the beginning of the users journey, at the parking lot, and ends at the end of the skiing day at the same spot, when the skier returns the product. The service consists of an open space for the storage of equipment, being able to take part of this structure to carry the skis for the rest of the day, if needed. In other words, the product has a detachable part for the transport of gear inside the ski resort.

Different ways to carry the skis, and so keep the skis together were studied:

- magnetic attachment
- ropes
- clipping element

Finally, it was decided not to implement the second function of the service: A detachable part for the transportation of skis as it would require another element for the skier to carry while skiing, while it is not being used. Concept 2 shows the final result of this path.





II. Equipment handling

CONCEPT

Starting point

During the lunch break people leave their skis unsecured, out of their sight and in an unorganized way. Despite the presence of racks, this is not enough space for the amount of skis and most skiers don't make use of them. To confront possible thefts skiers take home measures like separating the skis or using a cable lock. These are not very safe methods. Also, this makes a very unorganized environment, obstructing the access to the restaurant, cafeteria.

What does it do?

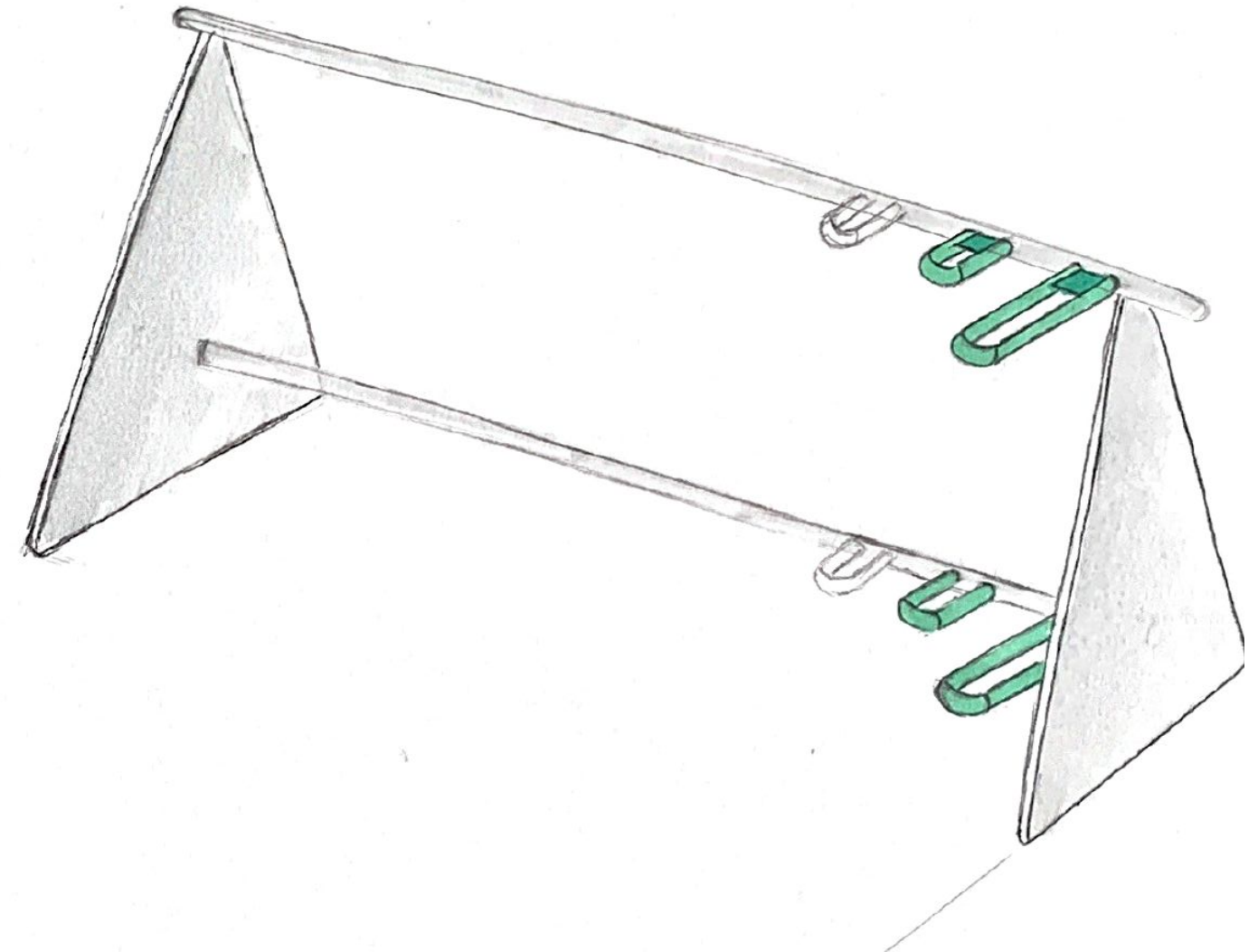
- Increases safety at ski resorts: reduces possibility of thefts of the equipment.
- Improves space management at service areas.
- Secured and individualized storage.
- Stores both snowboards and skis, as well as the sticks

How does it do it?

A structure placed at the service areas: restaurants, cafeterias, resting areas, stores skis and snowboards in an organized and individual way. Each individual compartment counts with an electronic lock RFID that is activated with a ski pass. This way, the access is exclusive and non-transferable.

The measurements of the structure are designed so that both snowboards and skis have access.

The layout of the different spaces is thought to optimize as much as possible the available area. Thus the service area is not obstructed by storage of equipment.

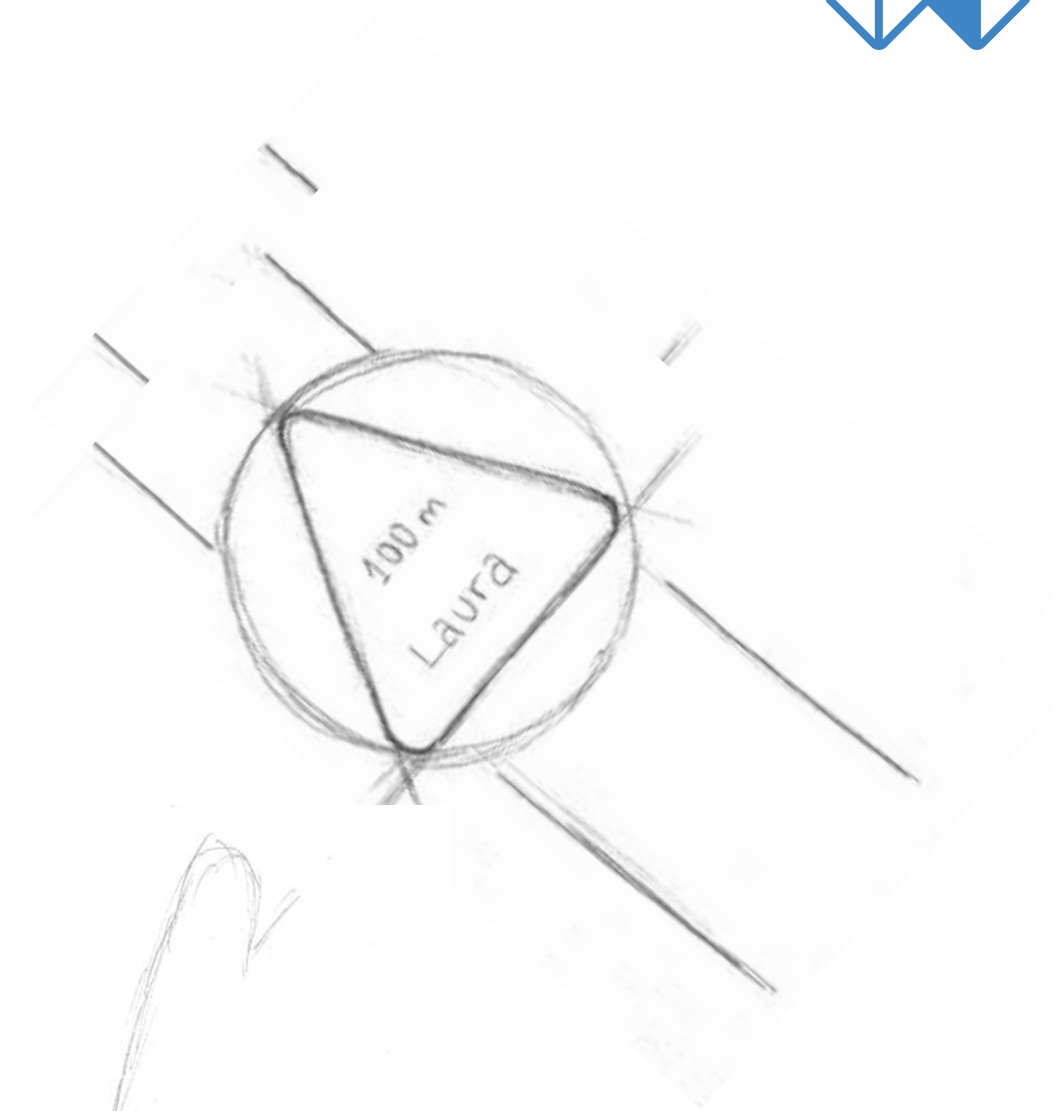
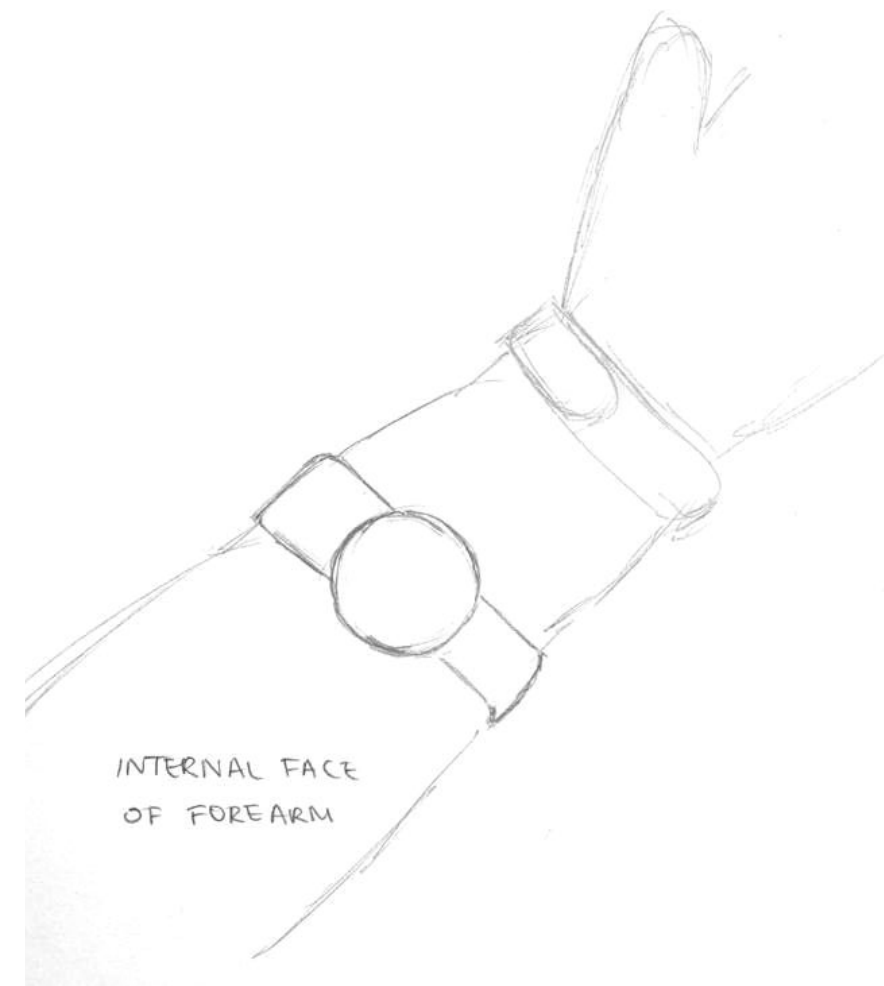
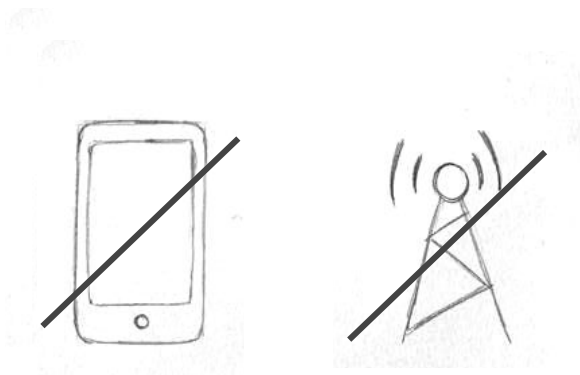




III. Group tracking

IDEA

This idea is the solution to establishing communication with your friends without the need of having to stop to use the phone. At the purchase of the ski pass, the skier has the option to buy a "group ski pass". This acts both as the ski pass and as a tracker for your friends. It incorporates a GPS that indicates the location of each of the members included in the group pass. The skier wears it as a bracelet, on top of the clothes, to have easy access and visibility of it. It counts with a LED screen and buttons, as a touch screen would not work because of the gloves.





III. Group tracking

CONCEPT

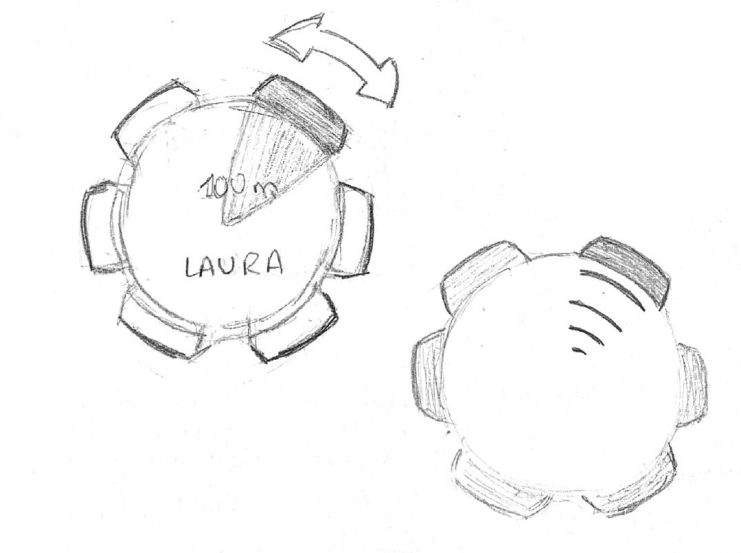
Starting point

Even though skiing is an individual sport, it is a very social one as well. People like going skiing accompanied by friends or family. Not necessarily all of the members of the group are going to have the same ability, speed or confidence skiing. As a consequence, the group is divided and the direct communication between them is broken.

The solution skiers turn to is the use of the phone. This brings several problems, sometimes the cellular service or internet are not available, the person you are trying to contact might not be able to answer the phone and, finally, it takes time of skiing as the person has to stop to contact the other.

What does it do?

- It intends to keep communication between the members of the group while skiing without the use of a mobile phone.
- Optimization of time as you communicate while being in motion
- Takes advantage of the characteristics of the ski pass
- Safety on the slopes is increased as your friends know your location at every time and you don't have to stop to check your phone and be a possible obstacle for other skiers
- Notifies when one of the group members has moved away over a set distance
- Gives freedom to the skier



How does it do it?

The device is made out of two parts, the functioning component and the part that holds this to the skier.

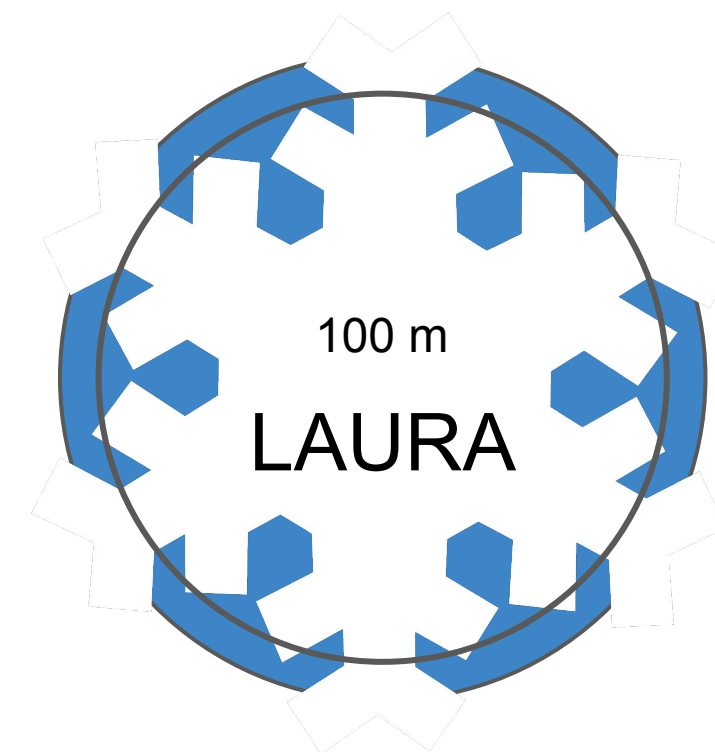
A LED screen displays the name, the distance between the two skiers and the direction of the location of each of the members of the group.

The device holds the ski pass for the use of the lifts at the ski resort.

In order to connect the devices without the use of cellular service or internet the option that is considered is long range, low power radio frequencies, like LPWAN, a type of wireless telecommunication network for the communication between devices.

In case of needing help, the skier can send a notification to the rest of the group members that are using the device by pressing the SOS button.

Different methods of notifying the skier when a member surpasses the set separation distance and when the SOS button is hit are being studied: vibrations, lights, sounds.





IV. Health

IDEA

With these results we posed a question: **What measures can we take to avoid the consequences caused by an irresponsible attitude of skiers towards health?**

We divided the measures into different groups depending on at what stage the skier encounters the solution.



1. Reduce cause. This is not possible, we can't change the weather or how the body works.
2. Promote awareness.
3. Reduce the impact. in other words, acat against the consequences.
4. Take measures after the impact. This is not what we are looking for as the harm is already done. This is what we are avoiding and it's the kind of measure that most skiers take right now.

Therefore, there are two areas that we can tackle: **awareness or action.**

The first step for skiers to act correctly is to learn how they have to perform against the health risks. For this we asked ourselves, **how can we make the information reach the users?** This would be in the field of awareness.

After this, the users have to follow the measures. We will first address the problem of dehydration. Two different ways were considered:

1. **Skiers carry the water with them.** How can they carry the necessary amount of water without the need of a backpack? This option would only make sense if the user could drink while skiing as we don't want to increase the inactive periods of time. On the other hand, the user would have to get notified when he has to drink as body thirst decreases under the conditions of skiing. It was decided not to continue this path given that it is already a very developed market.
2. **Skiers can get water at different locations of the ski resort.** This way the skier doesn't have to carry that big amount of water throughout the day.

Simultaneously, the problem statement has been kept in mind. The user goal is to spend as much time skiing, hence as little time possible stopped. The health measures should be integrated in the skiing sequence either in action or static. The unavoidable stops that a skier makes are:

- Office: ski pass purchase and return
- Queue of lifts
- Lifts

The office is only frequented twice, at the beginning of the day and at the end, instead skiers go through the lifts many times. As in this topic persistence is necessary the second case is more appropriate for the concept.

IV. Health

IDEA

At this point two options were being considered:

1. A product / service that provides the skiers with water and sunscreen at the queue of the lifts.
2. Raise awareness of the importance of health aspects in the skiing environment in an entertaining and participative way.

For the first option different ways of getting water were studied. As skiing is done in an environment full of snow, this same snow could be used for obtaining water. There are two more sustainable ways of achieving this.

- Body heat: it would take too much time
- Solar power

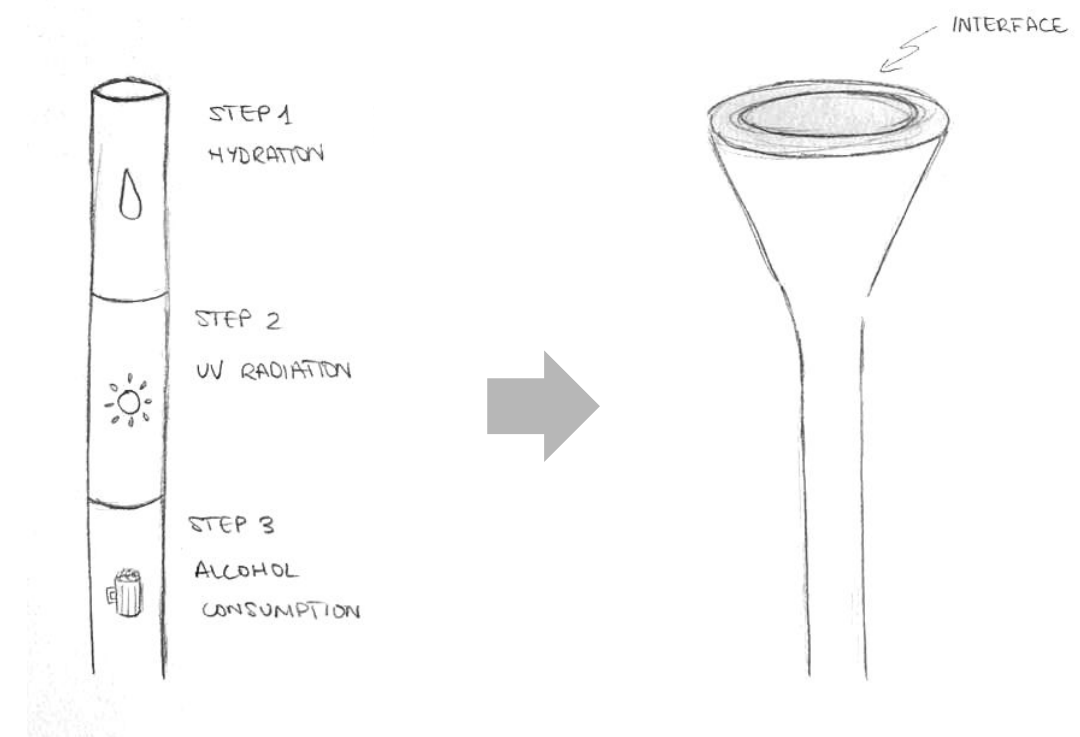
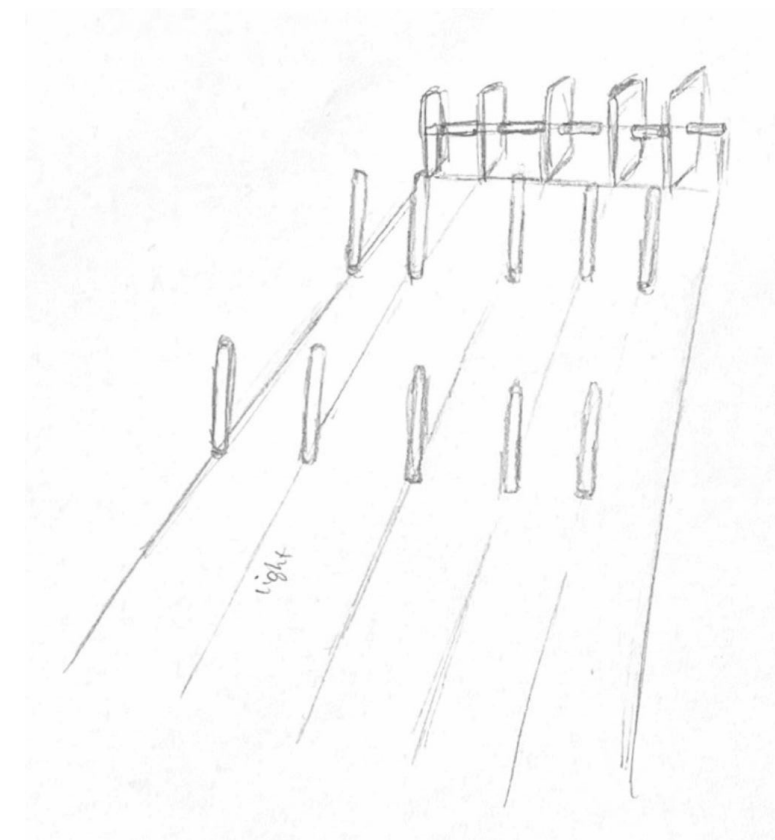
Finally, this option was discarded for its low efficiency, a high volume of snow is required for a liter of water, and because the first step to act correctly is to acquire information of the measures and consequences.

For the second point, different methods were explored to inform skiers of the importance of health aspects during skiing. Graphic resources (posters, videos...), interactive elements(experiments on site, games, workshops).

For the user to feel more involved in the learning and receive information related to themselves an interactive and personalized method was considered the most appropriate.

It consists of a pole placed at the queue of the lifts that gives information related to hydration, UV radiation and alcohol levels of the skier. The product knows this information by processing certain data of the user either that he has introduced or that the product has collected from him through some specific technology.

It was decided to continue developing this alternative, reaching the final concept.





IV. Health

CONCEPT

Starting point

One of the most critical pain points identified by skiers is the loss of time in queues at lifts. It is a waste of that period of time as there is no activity for the skiers to do.

On the other hand, research and observation shows that skiers are not aware of the risks of health aspects in the skiing environment. Both of these aspects place user experience at a very unfavorable level.

These two problems are complementary and can be solved simultaneously in one concept.

What does it do?

- Offers an educational entertainment for the skiers while waiting in line.
- Marks the different rows from the beginning to the end of the queue area.
- Improves organization at the queue of the lifts.
- Informs skiers of their personal state concerning hydration, UV radiation and alcohol level.
- Provides a measure to prevent consequences of dehydration, solar exposure and alcoholism.
- It intends to increase safety on the slopes.

How does it do it?

Different technologies have been studied in order to measure the values of the factors involved in the product:

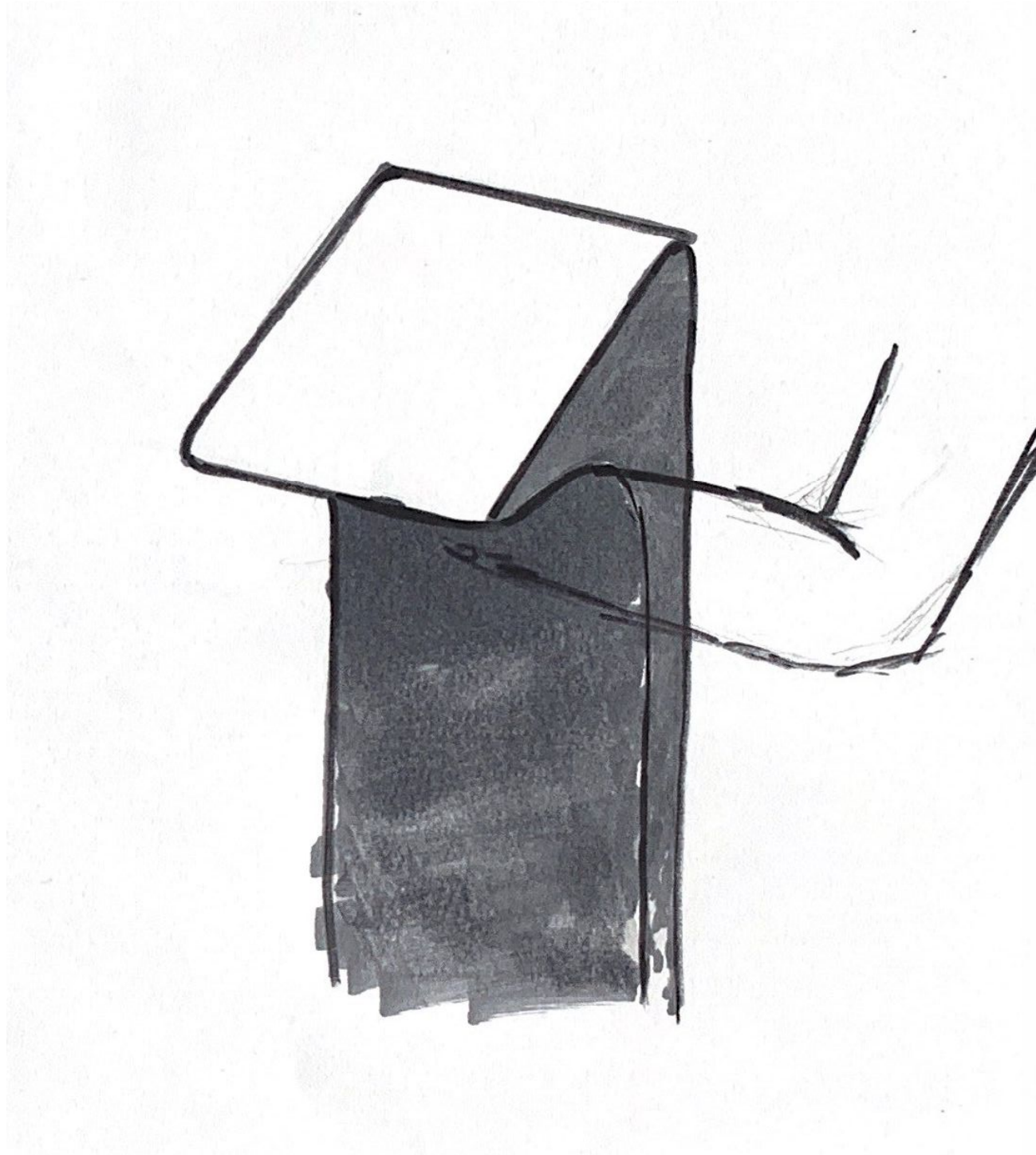
- Hydration:
 - pH level: sensor that measures pH level of the skin being normal skin acidic and dehydrated skin slightly basic.
 - sweat analysis: sensor that measures the mineral content in sweat
- Alcohol level: infrared spectroscopy is used to measure blood alcohol levels under the surface of the skin.
- UV radiation:
 - fiber-optic spectrometer to measure the face skin exposure to UV spectral irradiance.
 - an app that calculates how long it will take for your skin to burn by having access to several data: skin type, whether you are wearing any sunscreen, UV index, location.

For the delimitation of the lines a projection of light generated by the product will be marked on the snow from the beginning to the end of the queue.




IV. Health

CONCEPT



Scanning



UVI 5
0 h 20 min
until you start burning



V. Selection of the concept

The chosen concept is the concept of health awareness. The decision has been taken considering different factors.

- **Feasibility:** there are already existing technologies that measure the health parameters we want to analyse, so they can be incorporated in our product knowing the result is going to be positive.
- **Severity:** This concept has a double aim. It solves one of the main points identified by users, waiting time in ski lifts, and recognizes the importance of health issues. On the other hand, concept 3 solves a problem that doesn't meet an essential need and concept 2 has alternative solutions like the existing racks and locks.
- **Innovation:** It is an innovative concept, it is not just like any other health app in the market. This product-service is a whole user experience, turning the idea into a solution that adds value from a user's perspective.

The **challenges** we are facing in the following steps are:

- Make use of the waiting time, as it is not possible to reduce it since it depends on the capacity of the ski lift. Make it more bearable for the skier.
- Educate skiers on different health parameters.
- Integrate it in the current sequence of chairlifts.

In the fourth phase the development of this concept will be continued to its complete definition.



VI. Analysis of User Journey

After the selection of the concept, a further development and study of the problem has to be carried out. For that purpose a more careful examination of the situation in which the detected problem is developed is undertaken.

The objective of this analysis is to determine the following:

- Timing throughout the sequence of the lift.
- Takt time.
- The elements that the user interacts with in the process. The environment where the scene takes place.

For the development of this study, the process of a skier using the lift was documented and, with the contribution of other videos online, subsequently analysed.

Documentation

The graph on the right represents the sequence of a skier using the chairlift from when he approaches the queue until he hops off the chairlift at the top of the mountain.

Observations

- When the skier approaches zone 1 he comes across a net that delimits the queue area.
- The entrance to the ski lift area (zone 3) is framed with a structure where a screen or panel is located to display information of the ski resort.
- When you enter zone 3, the prior chairlift stands in front of the skier. The back of the chair lift is also sometimes used to display advertisement.
- Steps 6 to 13 require the attention of the skier as they have to interact with the chairlift, except for step 10, where the skier can relax and enjoy.
- Zone 2 is a big enough area to make up for possible delays at Step 3 (scanning the ski pass). Decoupling: when action diverges from the expected or normal pattern. This distance to the second and finale gate works as a buffer. In manufacturing, a buffer is positioned to maintain enough supplies to keep operations running as planned. In our case, the buffer is used to gather enough people in zone 2 in case of decoupling at the previous step (step 3). In other words, if a person takes more than the expected time to go through the first gate (step 3) and there is no skier in front of him to get the chairlift, this seat will be missed.
- The skier has enough time from stop 2 to stop 3 to read brief information on the screen or panel at the end of zone 3
- The skier spends more time in movement than static, before getting on the chairlift.
- The skier spends over a couple of minutes on the chairlift and the way he spends this time is chatting, using the phone or looking at the view.

	Steps	Time
ZONE 1	Enter area of queue lowering speed	
STOP 1	Approach to one of the gate ski pass readers	
	Scan ski pass	3 sec.
ZONE 2	Walk to the next gate	min. 30 sec.
	Position before one of the gates	
STOP 2	Wait until the gate opens	min. 6 sec.
ZONE 3	Walk until the mark	min. 6 sec.
STOP 3	Sit on the chairlift	Transit time
	Position skis on feet bar	
	Pull down security bar	
	Enjoy the ride	
	Pull up security bar	
	Take down skis from foot bar	
ZONE 4	Hop off: ski out of the hop off area	



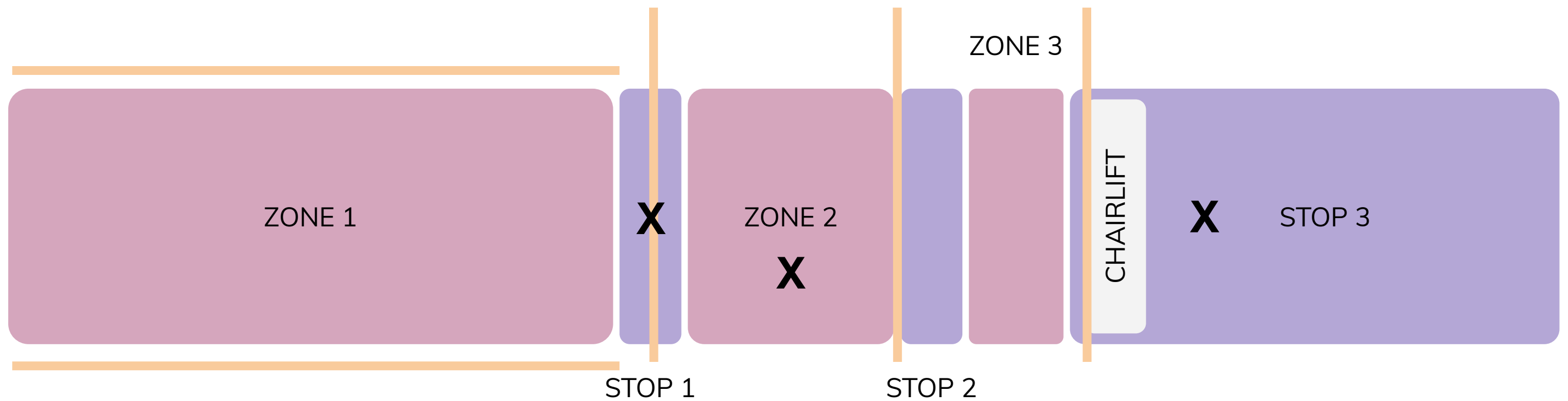
VI. Analysis of User Journey

Conclusions

- The location where the sequence takes place has different elements that can support the journey map of the service, not having to incorporate new touchpoints.
- It is a fixed sequence that skiers follow systematically, for which any new additions to it have to be notified repeatedly to the skier.
- The actions of scanning the ski pass and scanning your finger to receive the chosen parameters can be combined into one only step.
- The service of health awareness can keep playing a role on the chairlift ride, having access to the data on your phone.



VI. Analysis of User Journey



Elements:

- Nets
- Gate ski pass readers
- Screens / panel
- Chairlift

Interaction user-service:

- Gate ski pass reader: user scans his finger.
- Zone 2: user receives information of health parameters on the screens.
- During ride of chairlift user can further analyse parameters on the app.



Spots where the user interacts with the service.



Existing elements in the environment that support the service.



VI. Analysis of User Journey

CALCULATING TAKT TIME

Based on the rating and number of visits, some of the favourite resorts for skiers in Austria are selected and the takt times of a few chairlift from each are calculated. Chairlifts of different capacities are analysed (4, 6 and 8 people chairlift).

Schladming - Planai

name	capacity/chairlift	capacity/hour	TAKT TIME (sec.)
Alm 6er	6	2400	9,0
Senderbahn	4	1430	10,1
Mitterhausbahn	8	3200	9,0

Sölden

name	capacity/chairlift	capacity/hour	TAKT TIME (sec.)
Giggijoch	8	3700	7,8
Langegg	6	2400	9,0
Seekogl	4	2390	6,0

St. Anton am Arlberg

name	capacity/chairlift	capacity/hour	TAKT TIME (sec.)
Grubenalpbahn	6	2400	9,0
Steinmährbahn	8	4000	7,2
Seekopfbahn	4	2400	6,0

Ischgl

name	capacity/chairlift	capacity/hour	TAKT TIME (sec.)
Visnitzbahn	8	3500	8,2
Velilleckbahn	6	2400	9,0
Höllspitzbahn	4	2400	6,0

Evaluating the obtained values the **minimum takt time is 6-7 seconds**, reaching 10 seconds in some chairlifts. The value that is relevant for us is the minimum takt time (6 sec.) as it is the parameter that sets the time available in which the skier can remain static for the sequence of the chairlift to work adequately, with no delays.



VII. Experience prototyping

STORYBOARD

Experience prototyping is a way of testing new service ideas or designs for specific touchpoints. It is about communicating what the experience will be like to test and refine the solutions with potential users. Making prototypes 'early, ugly & often' is important in the design process. They can vary from paper sketches, to a physical model, to a fully acted out service.

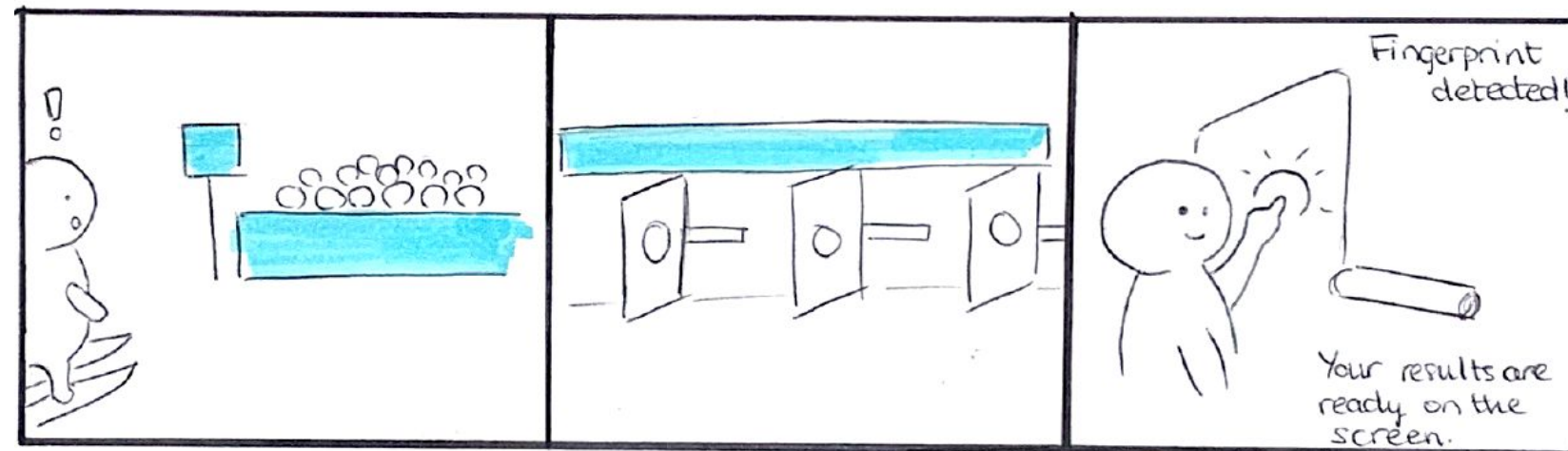
In this case, a storyboard representing the steps of the service has been drafted. Our protagonist, the skier is taken from the registration of the service, guiding it through the different touch points until the finalization of the sequence with the use of the app. The steps have been integrated into the diagram shown in *Analysis of User Journey* on page 63.

The elements marked in blue indicate the information panels of the service.



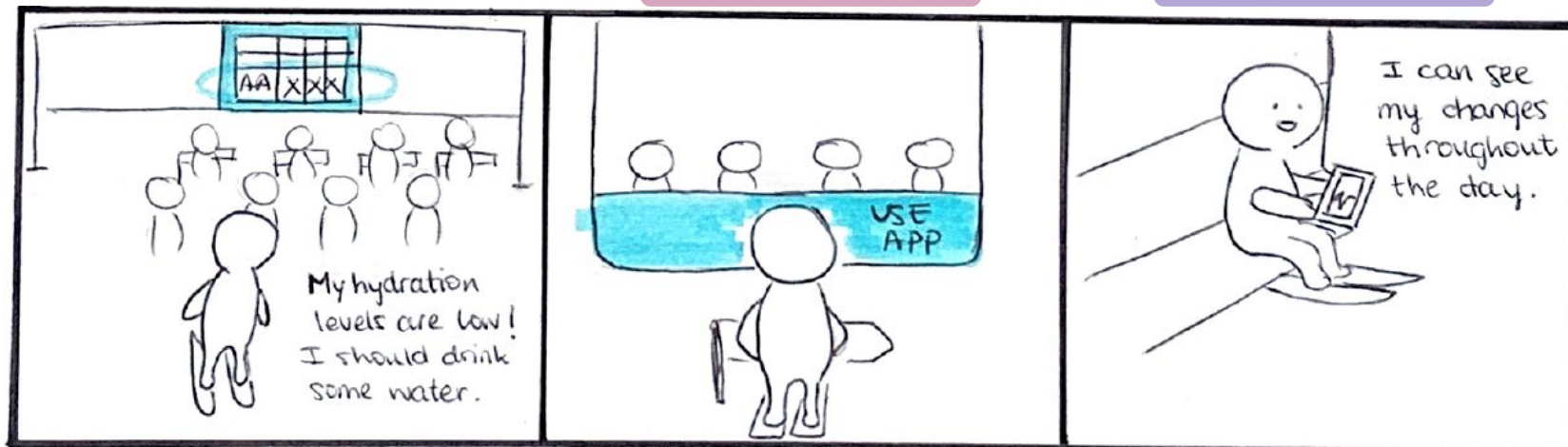
VII. Experience prototyping

STORYBOARD



ZONE 1

STOP 1



ZONE 2

STOP 2

STOP 3



VIII. Research

There are different technical challenges that have to be resolved in this product-service.

One of the main requirements is to use **non-invasive sensing technologies** to measure the metrics of interest, hydration, UV radiation and alcohol levels.

Technology to measure hydration

There are different possibilities to measure the hydration levels of a person. The most accurate are

- sweat analysis
- ph level in the skin

The study method of these alternatives is through research and understanding of existing technology in other products that resolve this requirement.

Nobo is a connected wearable that measures hydration levels of athletes using light. By illuminating tissues in the body with near-infrared light and measuring the light returned, information about the complete state of hydration is revealed – and can be measured, tracked and monitored in real-time.

Nixbiosensor is a sweat-based biometric sensor to monitor hydration levels for athletes, soldiers, and laborers. It is a good example of what we are looking for as it has several uses, all of them which we intend to implement: one-time assessment and repeat use for ongoing monitoring.

LVL uses near-infrared light technology as the first product, it can harmlessly gather information ten times deeper in the body as opposed to “conventional” green light technology and provide more insights.

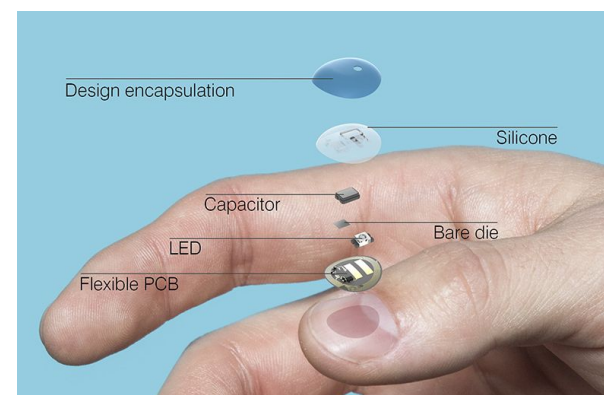
Technology to measure solar exposure

UV radiation is a very costly parameter to measure. One existing technology consists on taking photographs of the skin. It is impressive the effect that UV radiation has on our skin and that we don't even know of as it can't be perceived without being exposed to a UV light.

For this reason, it was decided to measure UV exposure. Knowing the location for the weather status and the UV index. This information, together with the information of whether the skier has applied sunscreen or not, we can define a range of UV exposure for the user, notifying of the time remaining for sun burns.



La Roche -Posay sticker



L'Oreal UV sense



UV photo of skin



VIII. Research

Technology to measure alcohol levels

The DADSS (Driver Alcohol Detection System for Safety) Research Program is working on a new approach to measuring blood alcohol concentration: a touch-based system that uses spectroscopy to measure alcohol in the driver's tissue.

We have studied this system for its implementation

The blood content alcohol detected in the capillaries, skin's surface of the user, is analyzed by this touched based system. How is this done? An infrared light is shined on the skin of the user, moving into the tissue. Part of this light is reflected back to the skin's surface and collected by the touch pad. This light contains information on the skin's unique chemical properties, including the concentration of alcohol.





IX. Development stages

The concept went through different stages in its development until the final product. Initially the concept was thought as a separate product placed in the line of the chair lift for the skiers to interact with while waiting for their turn.

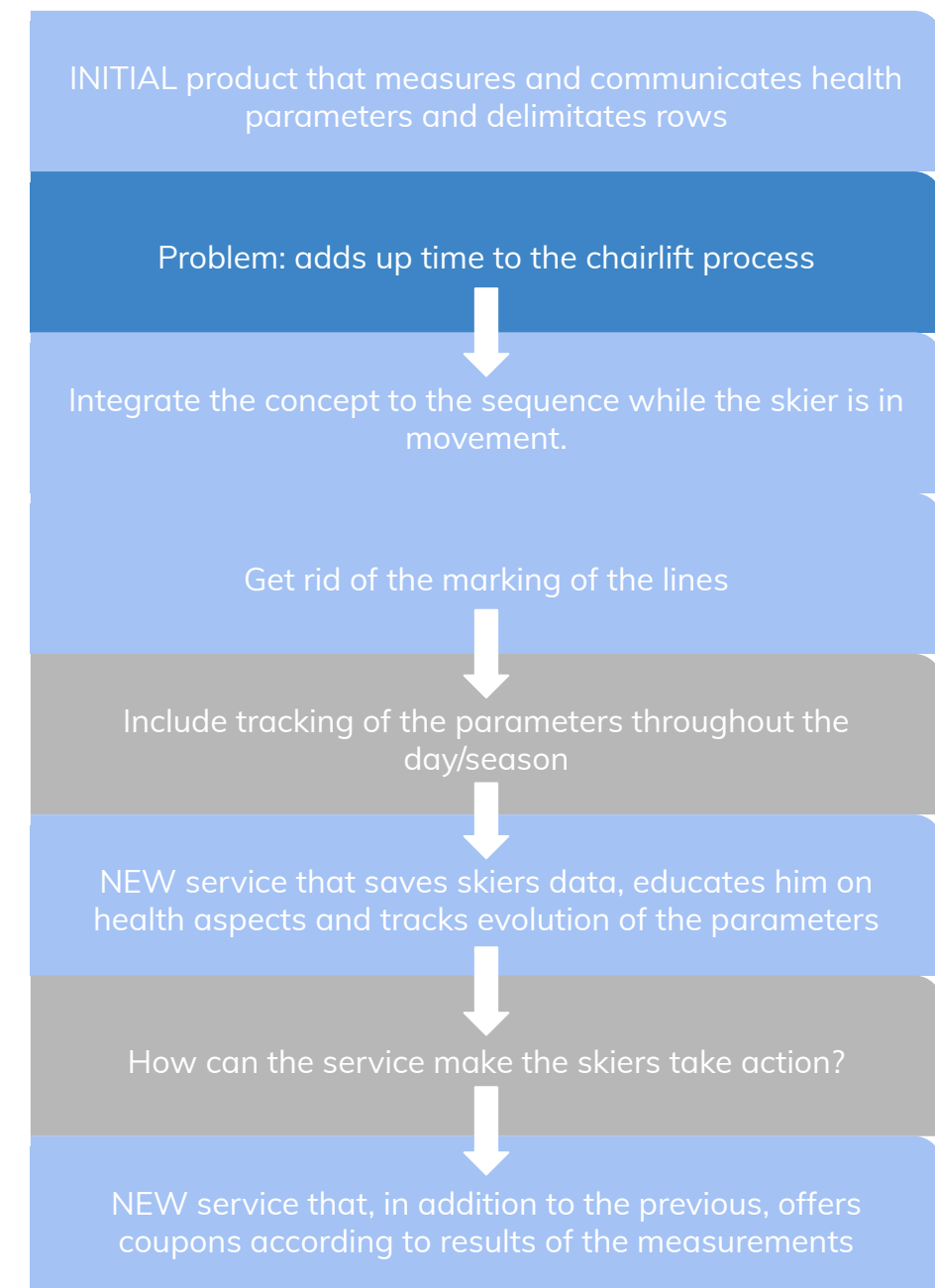
When developing this concept a big problem was spotted. Adding an extra step to the sequence of the chairlift queue would increase the waiting time and delay the line if the time spent using this product exceeds the takt time. Then, the product would no longer be competent as it would not solve the stated problem.

On the other hand, this concept had a secondary function, to delimitate the lines from the beginning of the queue. This was found to be a failure as it would also alter the time in the line. If the space is organized into fixed lines, before the step of scanning the ski pass, it constrains the people to a specific line, avoiding to fill the possible gaps if a person delays one line. The capacity of the chairlifts would decrease and the time would increase, the opposite result we are aiming for.

After analysing the chairlift sequence and measuring the times, the takt time was determined. A period of 6 seconds is not enough to carry out the activity in a static position. For this reason different alternatives had to be explored. The initial concept should be resolved in movement to maintain the timings. So the new concept should be incorporated to the sequence and implemented at the same time as the skier approaches the end point. At the same time, it would be interesting to make use of the existing resources and points of interaction between these and the skier.

A further research of the technologies needed was undertaken and it was concluded that a tracking of the health parameters throughout the day engages the user more in taking care of the different aspects. An app linked to the periodic measurements is proposed to store the users data.

In order to close the system, the last step shouldn't be to receive the results of the parameters but to provide the skier with solutions to take action. It was thought not only in the skiers that obtain negative results but also in rewarding users that have positive health parameters to keep up the actions. On the other hand, one of the main goals of this service is to promote positive health actions during skiing, for which it is wanted to motivate skiers that are not using the service to join.





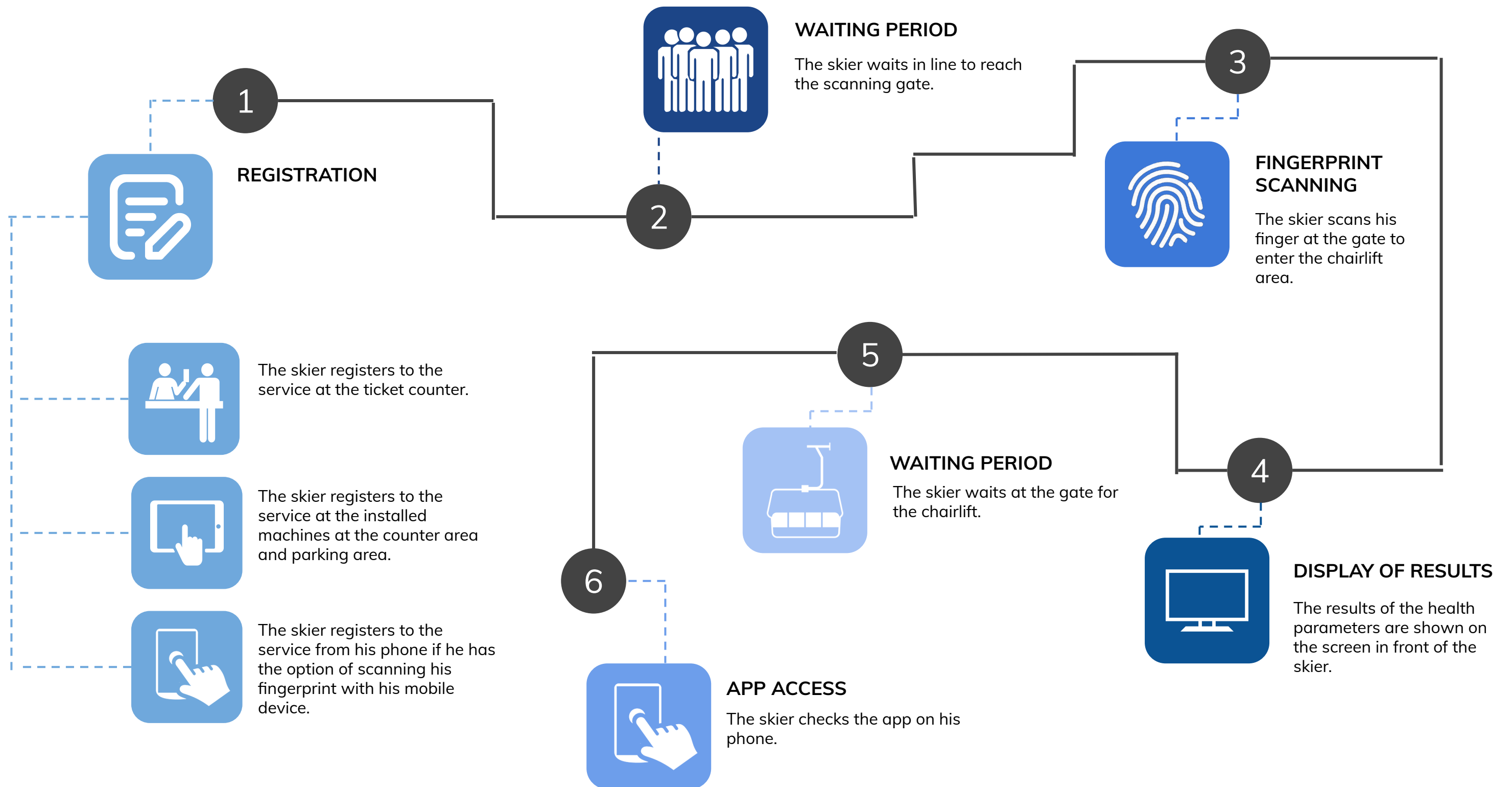
Phase IV

Deliver





I. Final concept





II. Values

The values that we are looking to transmit are **innovation**, **professionalism** and **trust**.

- Innovation: The service that we offer is completely new and uses the most current technologies for health measurements. Most importantly, it responds to the user needs.
- Professionalism: Health is a very important topic. This product-service is designed to promote this message for which we want to convey seriousness. Even so, we have to leave place for creativity as skiing is a sport that is practiced, in the majority of the cases, for fun.
- Trust: The image of the product-service has to transmit the concern for the users, putting them at the centre of its mission. On the other hand, it should show the reliability of the technology used to perform the function of the product-service.



III. Visual image

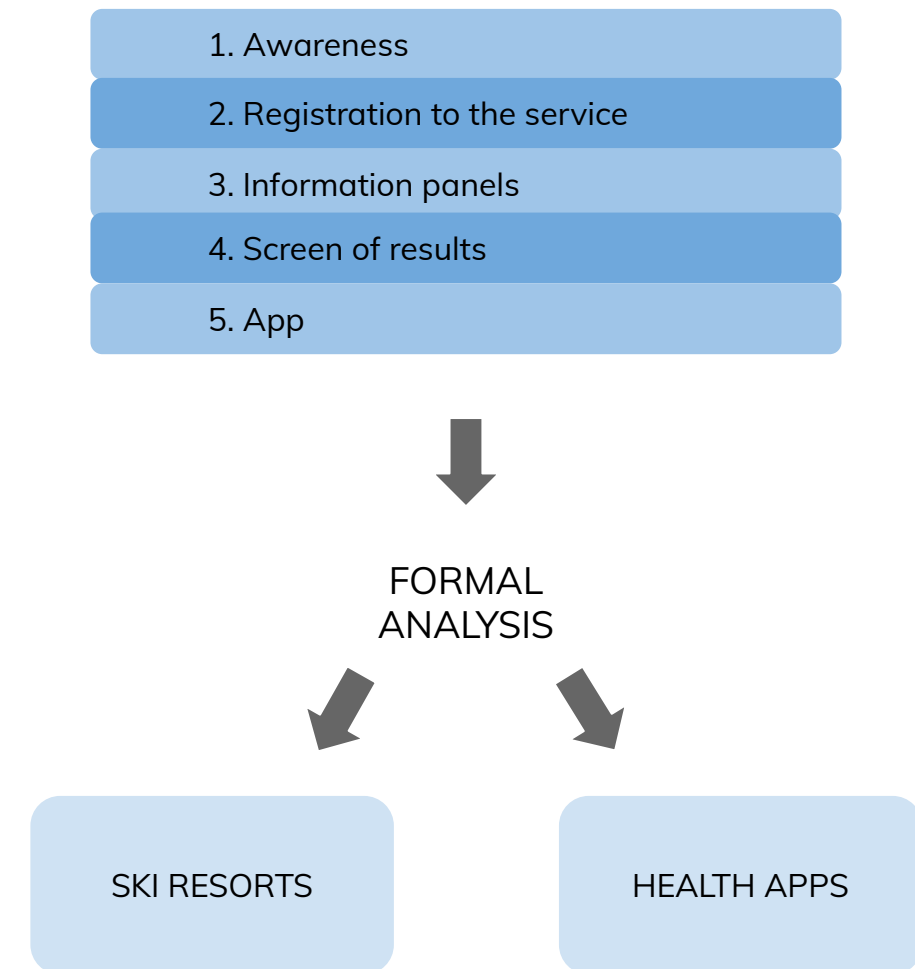
The designed product-service has several phases in which it interacts with the customer.

1. Awareness: Introduction of the product-service showing its value to gain customers. (Advertisement on the ski resort platforms and at the ski resort)
2. Registration to the system: the user has to create his profile.
3. Information that explains the customer how to use the service, anticipating them the steps that he has to take.
4. The format that displays the users information of the measurements.
5. App where user can check further information of his measurements.

All of these visual formats should follow the same line in terms of visual image. In order to reach the best approach a **formal analysis** is carried out.

Several aspects have to be considered. On one hand, it is a service for ski resorts, for which we have to study the already existing ski resorts and also the environment. On the other hand, its function is to inform and keep track of the personal data of the user in relation to three health parameters, hydration, alcohol consumption and UV radiation, so we will analyse apps already on the market that keep track of these parameters.

First, in the following pages we will analyse existing ski resorts in Austria to identify the recurrent elements in the visual image of them. We will be analysing three different platforms: **logotypes, web pages** and **apps**.





III. Visual image

SKI RESORTS

We see a clear trend in the use of blue and red combined with white, grey and black, and a occasional appearance of green.

In the logos we can distinguish two tracks, a traditional and smooth style and a more modern and geometrical. This difference can't really be seen in the aesthetics of the web pages or apps. They all maintain the use of the corporate colours and play with the combination of images and text. The use of symbols referring to elements related to the mountains and the winter season is also recurrent.

LOGOTYPES

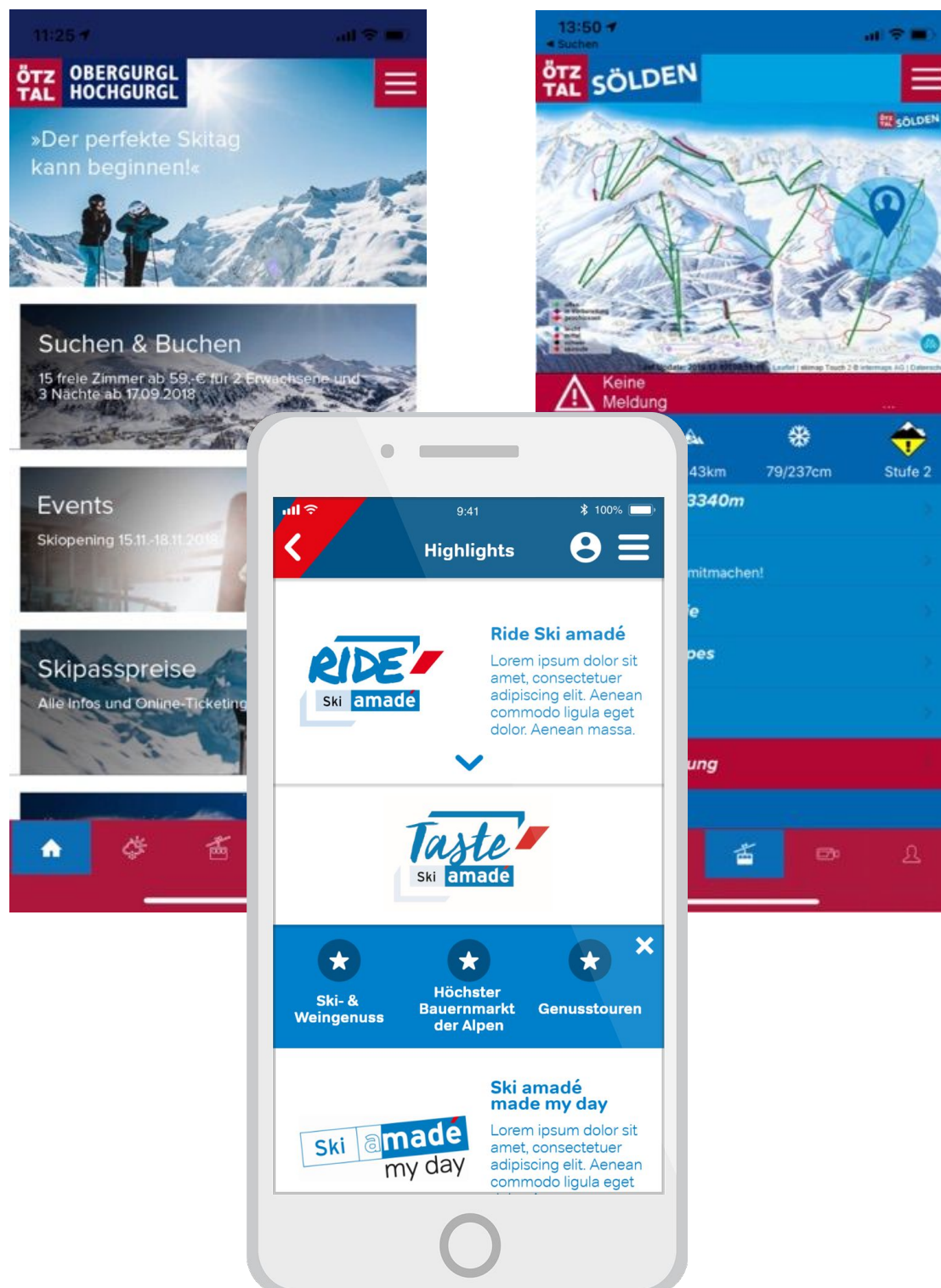




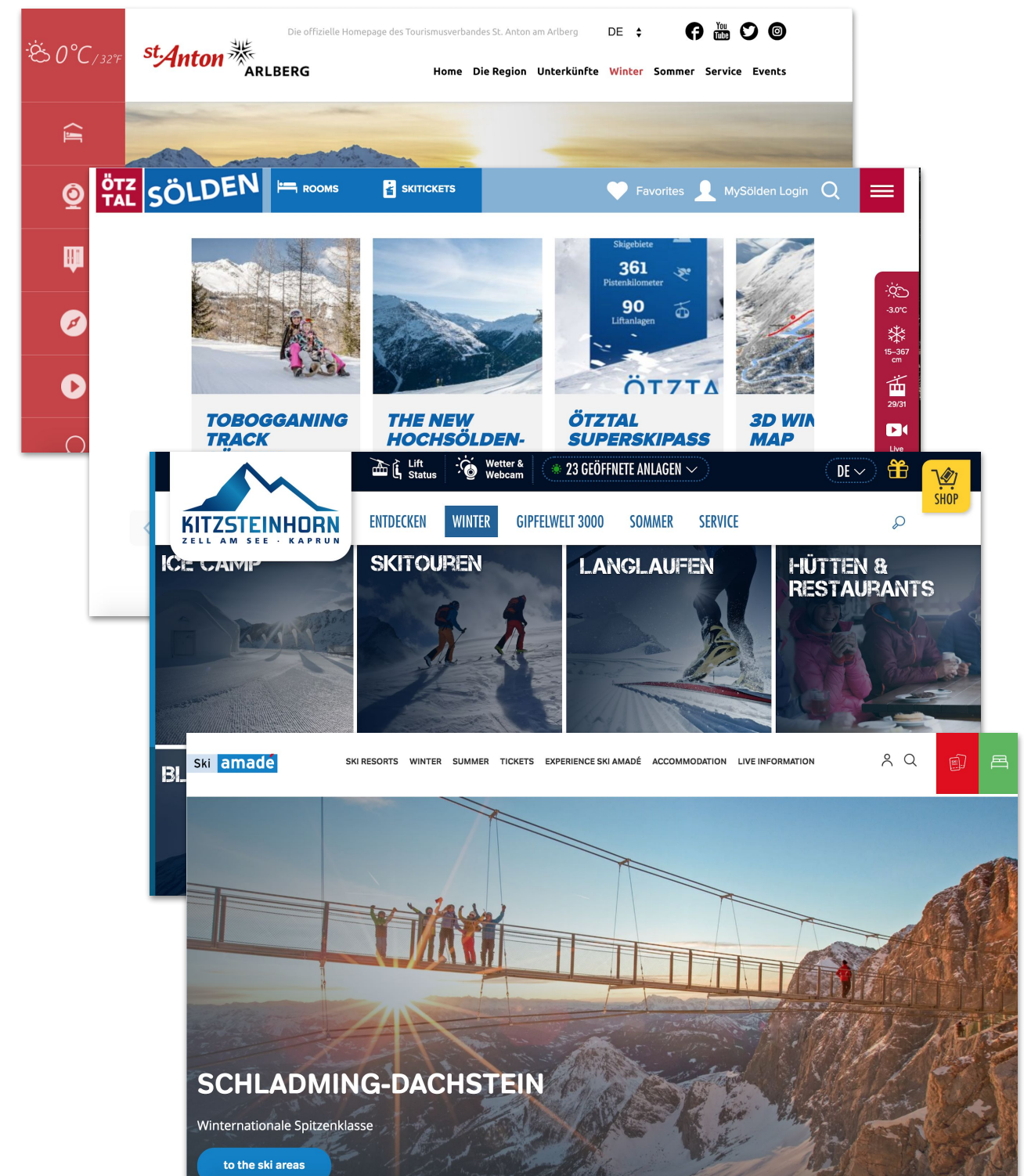
III. Visual image

SKI RESORTS

APPS



WEB PAGES



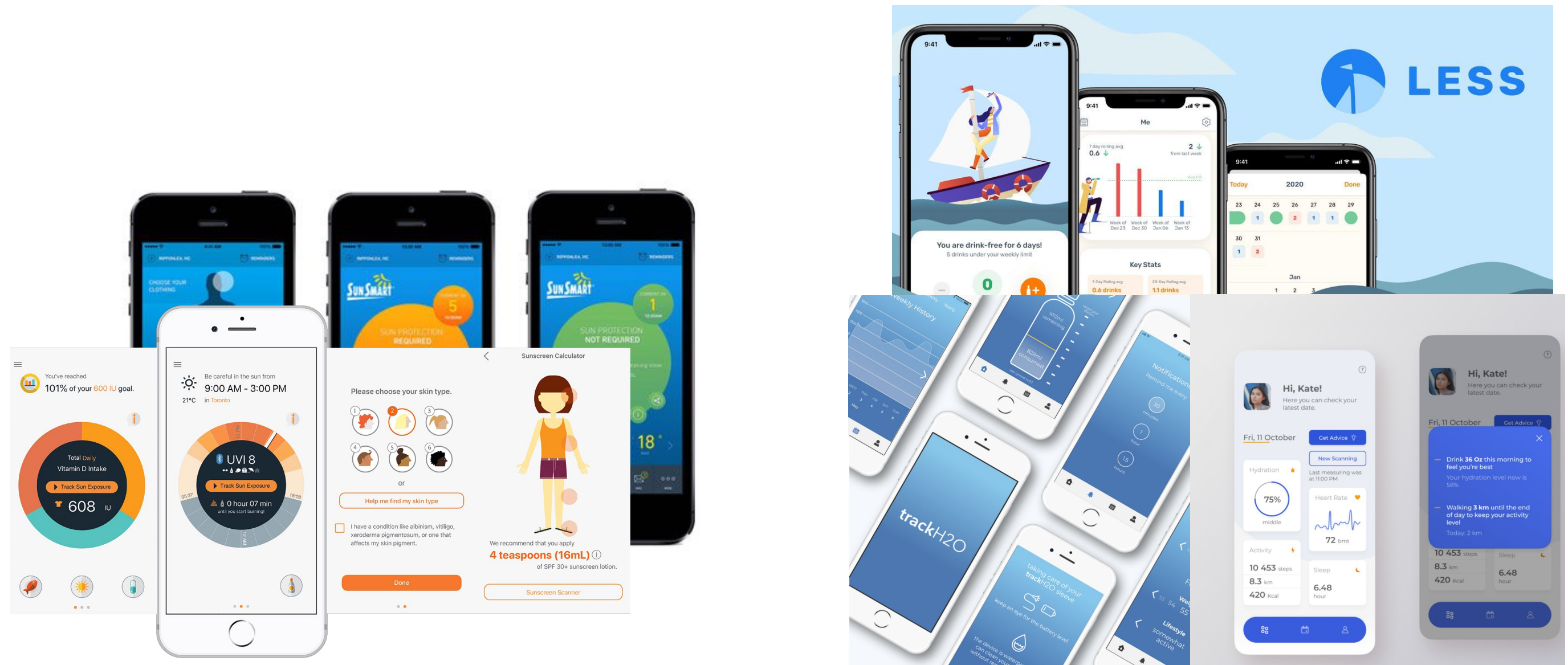


III. Visual image

HEALTH APPS

Next, a research of health apps and information panels has been carried out. The recurrent colors are the different tonalities of blue for hydration, and orange, yellow and red for solar radiation. The market for apps that measure alcohol consumption is not so developed.

We have to make sure not to unleash confusions as the characteristic colour of beer is yellow, but at the same time it is the symbolic colour of the sun. A clear distinction between alcohol consumption and UV exposure has to be made, considering different alternatives to represent them: colours, symbols...





IV. Market research

In order to design the structure of the app we have analysed a series of popular health apps in the current market.

HEALTH (APPLE)

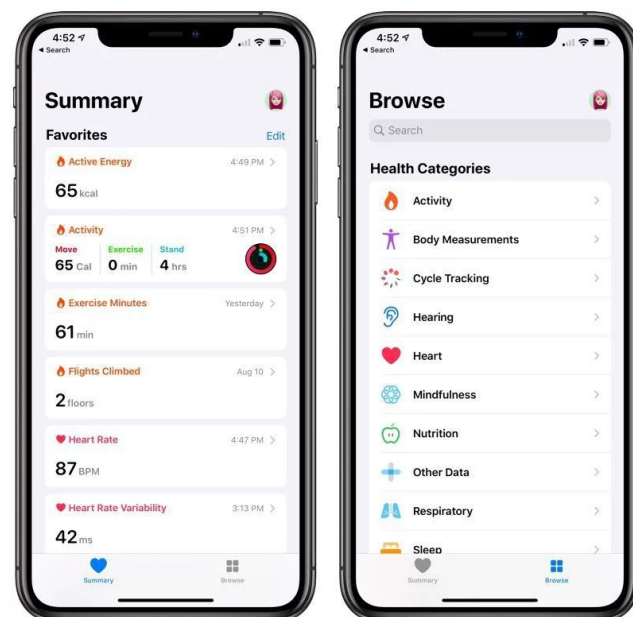
This app for apple users organizes important health information, giving him access to your progress but also letting you learn the daily details of this wide range of health metrics.

The new update of the app has two main sections: **Summary** and **Browse**. The first section displays information of your favourite selected metrics. On this same section we find *Highlights* which shows information of the most relevant metrics for the user. It will also alert you of unusual higher or lower rates. The highlights can be examined in detail with daily, weekly, monthly and yearly graphs of the user's progress.

The second section, *Browse*, shows all the available health categories with its corresponding details once you click on the category name. Again, firstly only the results of that day are shown but allows you to visualize the daily, weekly, monthly and yearly graphs of the category.

The charts make an hourly comparison of the results of the day with your average.

It combines colours and different font sizes, together with symbols to differentiate information.



WATERMINDER

This app tracks your daily water intake and monitors your goals. Its goal is to motivate the user into drinking water and staying hydrated.

The menu is located at the bottom of the screen and has four sections: *Hydrate!*, *History*, *Achievements* and *Settings*.

Hydrate! shows you your current hydration state, letting you know from what sources you have obtained it. *History* represents the progress of your hydration in daily, weekly, monthly and yearly graphs. In the section of *Achievements*, badges of different goals are displayed and marked if completed.

The app also sends you notification to reach your daily hydration goals.

In the same way as the Health app, it combines colors and font sizes to indicate the most important information, but this time only one colour is used, blue, representing water.





IV. Market research

QSun

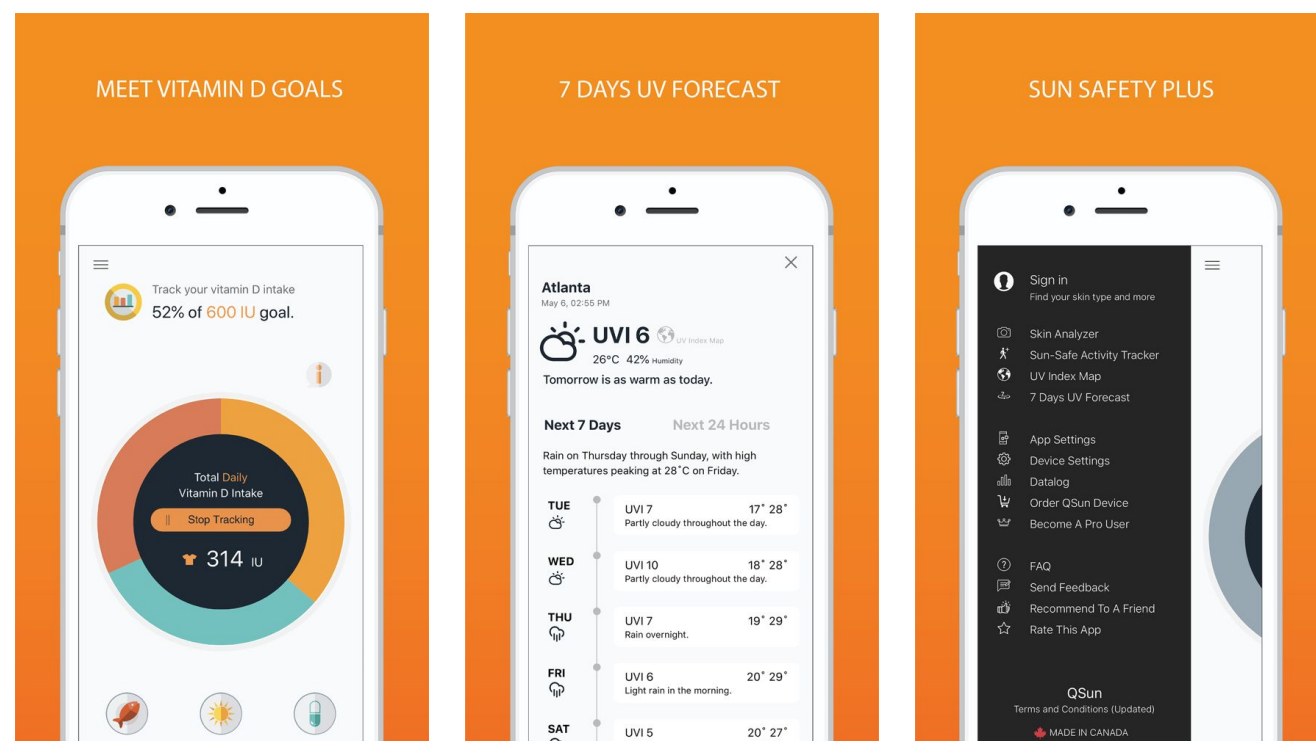
QSun has three main screens. To change from one to another you just have to swipe left or right. Three dots at the bottom of the screen tell you where you are at. The main screen shows your personal time to burn as well as the weather and UV index based on your location.

If you swipe to the left you will get the weather forecast of your location. If you swipe right, track your vitamin D from sun exposure.

On the top left corner you find a symbol that opens up a menu with many different options: *profile, settings, skin analyzer...*

On the right left bottom corner the icon of a sunscreen bottle opens up another menu with three options: *Sunscreen Checklist, Sunscreen Calculator and Sunscreen Reminder.*

QSun uses the corporate colour, orange, to indicate the section and other relevant information.





V. Information panels

As we had concluded in the analysis of user journey, the process of the chairlift is a fixed sequence that the user follows systematically. For this reason, the user has to be led through the steps of the new addition, our service.

In the analysis of the user journey we pointed out different elements that already exist in the chairlift area that can support the service. These spots are appropriate to place information panels that describe the steps and guides the user through the steps he has to take to use the service. Information for the users in advance also reduces delays in the system as the user knows what he has to do at every step, reducing time loss.

PANEL 1 - NET

This information panel is placed on the nets at the entrance of the queue of the chairlifts and indicates the user that the service starts there. It is the first thing that the skiers see when they are reaching the end of the slope and the beginning of a chairlift, for which it is the optimal location to inform them that the service they have acquired is used there.

It contains the name and logo of the service (+ski), together with the slogan (+ health, + safety). The sentence Ready for the challenge? refers to it being the starting point of the service.





V. Information panels

PANEL 1 - NET



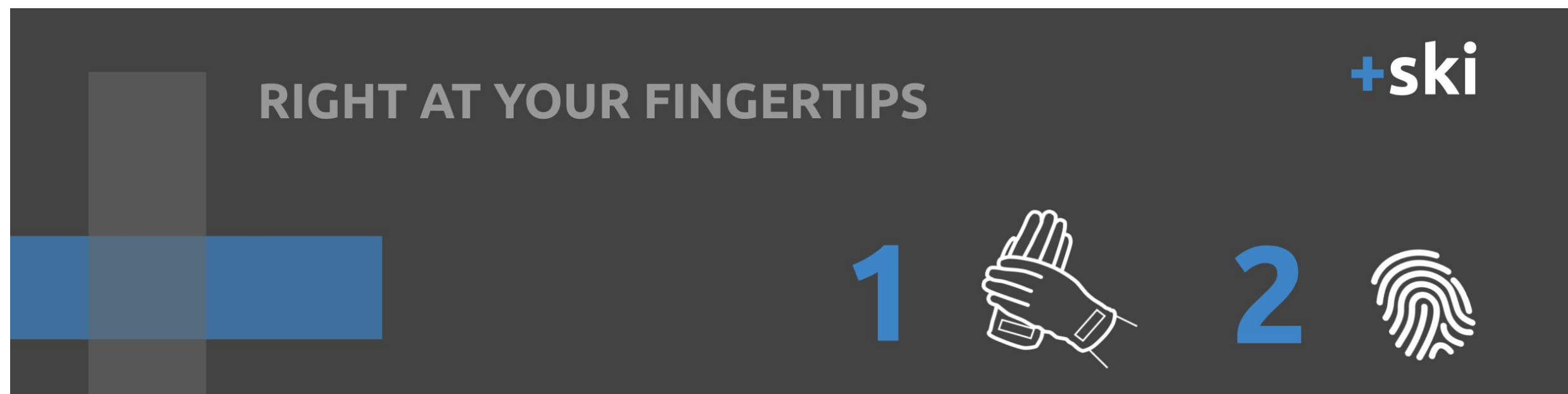


V. Information panels

PANEL 2 - SCANNING GATE

The first step that the users have to take in the sequence of this system is to scan their finger at the gate where the ski pass is usually scanned. This panel is placed on top of the gate for the skiers to read it from further away in the queue and get prepared for what they're going to have to do.

Again, the panel includes the name of the service, but this time in a smaller size as it doesn't have the same relevance. The important element in this poster is to inform the user of the following step he has to take. In the first place, they have to take off their glove and, secondly, scan their finger. To make it an easy and quick reading symbols of the actions have been selected instead of words.





V. Information panels

PANEL 2 - SCANNING GATE





V. Information panels

PANEL 2 - APP advertisement

The last panel that the user comes across with is a panel that presents the app. After receiving a brief display of the personal health metrics, the user can have a further examination of the results on the app. This poster invites the skiers to use the app while sitting on the chairlift, waiting to arrive to their destination.

The back of the chairlifts is a place where companies advertise their products. This is a perfect spot to include the advertisement of our app, as it is also an element that the users have at first site while they are waiting at the gate to hop on to the chairlift.





V. Information panels

PANEL 3 - APP advertisement





VI. Display of results

The first time the skier receives his results after scanning his fingerprint is through the screen located in front of him, on top of the second gate to get to the chairlift.

This screen has several **requirements** to perform the task correctly:

- The skier has to be able to read / see what the screen is showing, as the distance that he is reading it from varies from around 10 meters to 1 meter.
- The information shown on the screen has to preserve the user's privacy.
- The information shown on the screen has to inform and educate the skiers about the importance of health while skiing.
- The information shown on the screen has to be fast and easily perceived by the user as the time and space it takes up is limited.
- It has to attract more potential customers.

The screen is divided into two sections. One part contains a chart with the **personal information** of the users that purchase this service. The other part informs about the **general statistics** of the gathered data in order to raise awareness of the importance of health while skiing and attract more skiers to join the action.

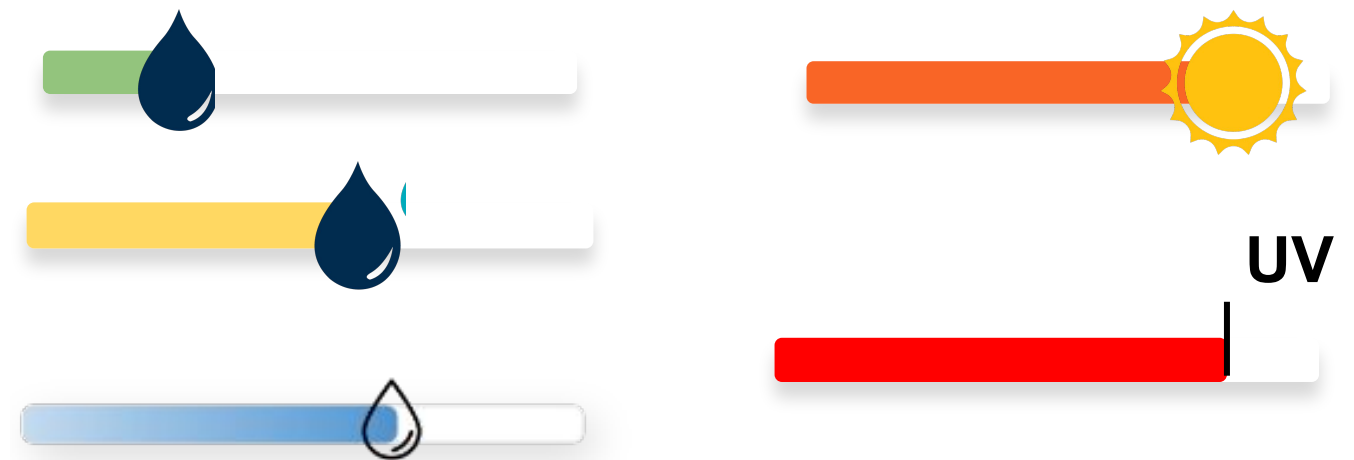
The chart includes the fields of user name, hydration level and UV exposure in the form of a chart. The parameter of alcohol consumption is decided to be left out of this chart as it could violate the users privacy by giving out personal negative information, in some cases.

VISUAL ANALYSIS

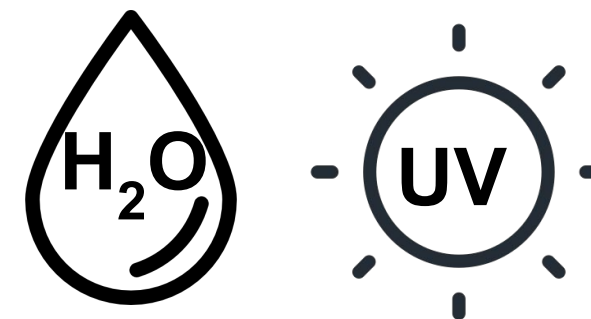
In order to transmit the level of hydration and UV exposure, different alternatives were explored to meet all the previously mentioned requirements.

Initially, it was contemplated to work with bars, as it indicates the raising or lowering of factors. This showed perfectly whether a value was lower or higher but, on the down side, it was contradictory between parameters, confusing the reading for the skiers. While, on one side, the higher the hydration level, so the fuller the bar is, the more positive, on the other side, for UV exposure, the fuller the bar the more negative the personal results are.

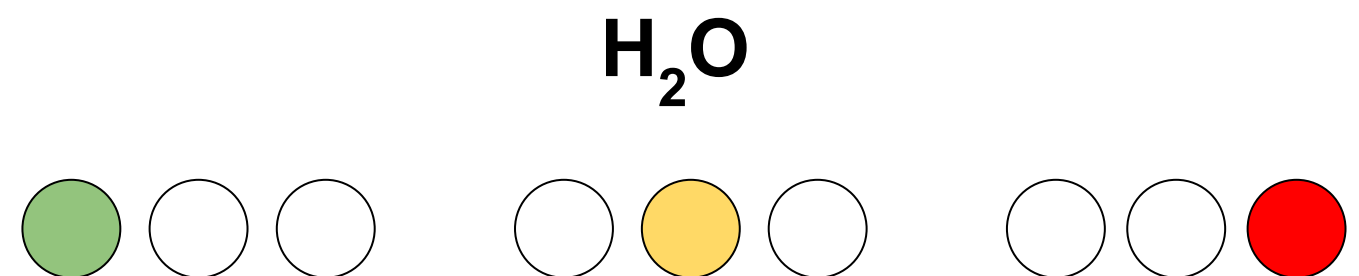
This are some of the different designs drafted that were finally decided to discard.



As you can see in these designs, the use of symbols is also explored, in order to make the understanding easier and faster. The identified symbols that represent the two parameters are, as everyone knows, a water drop for hydration and a sun for solar exposure.



Another path that was explored in parallel is working with colors. This is also a very visual way of showing the results, making it easier and faster for users to visualize. The traffic lights is a worldwide element and well known by every age group.





VI. Display of results

Taking into consideration all the previous paths it was decided that combining the use of symbols that skiers can relate with the parameters together with human emotions would be the best option. It is a visual, entertaining and relatable way of displaying the results.

These are the final selected symbols to indicate the metrics.

HYDRATION



Hydrated



At risk of dehydration



Dehydrated

ALCOHOL CONSUMPTION



*Only used for the general statistics

UV EXPOSURE



Low UV exposure



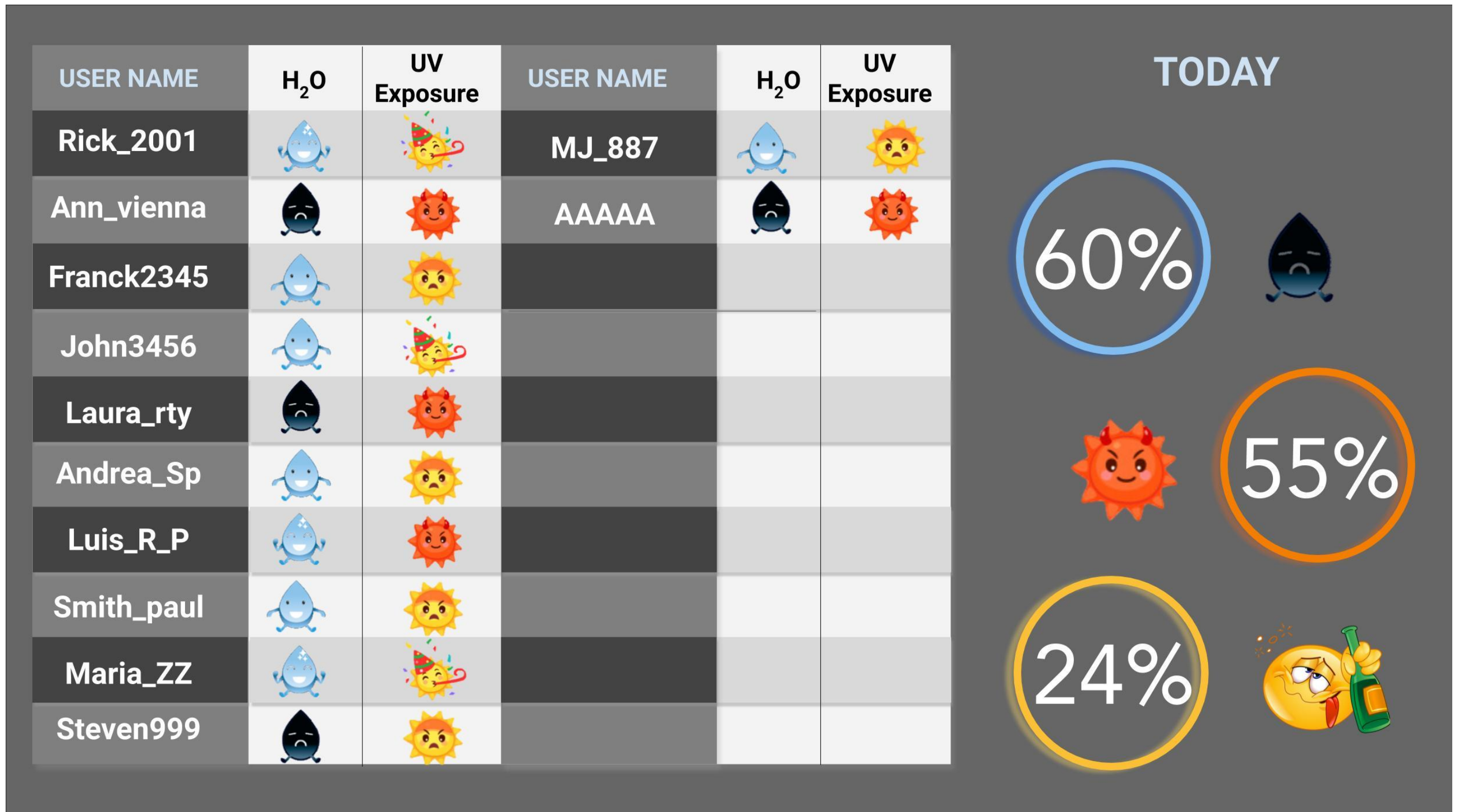
Medium UV exposure



High UV exposure



VI. Display of results



VI. Display of results



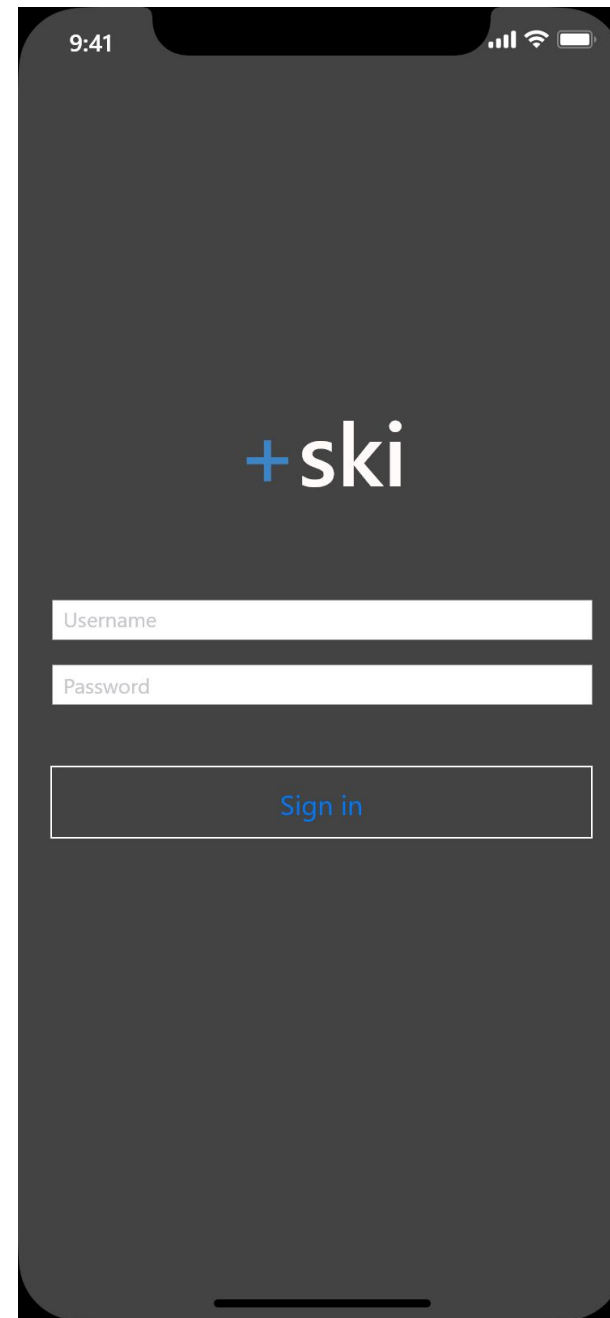
Screen in its location at the chairlift queue



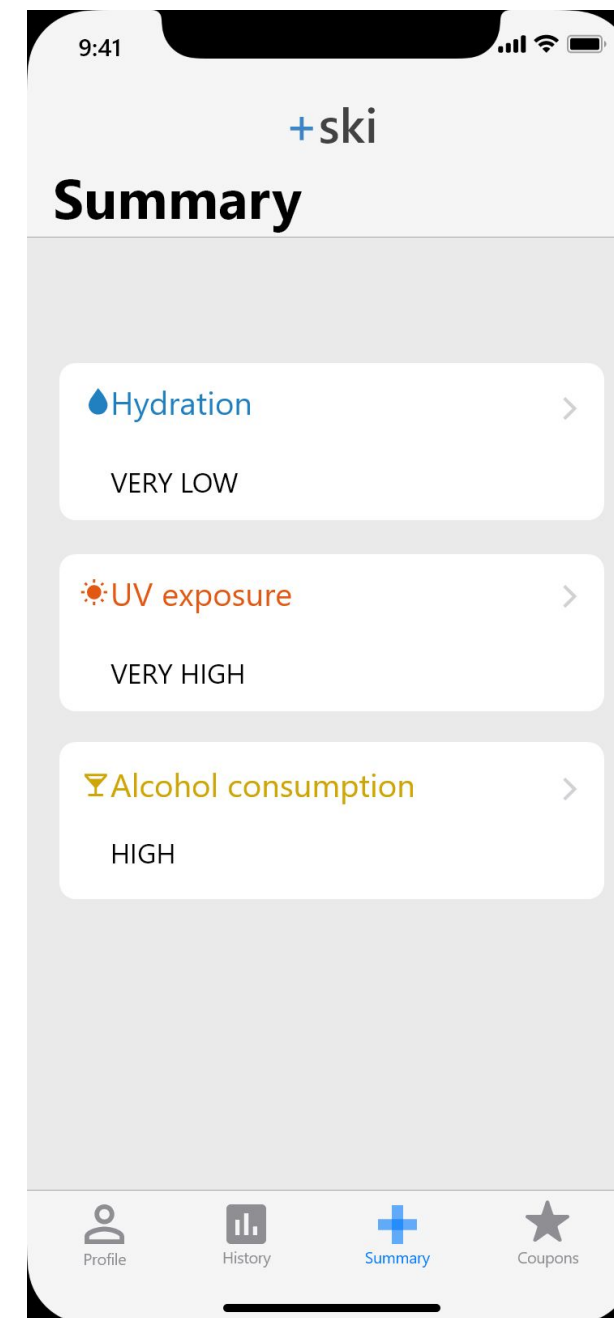
VII. App



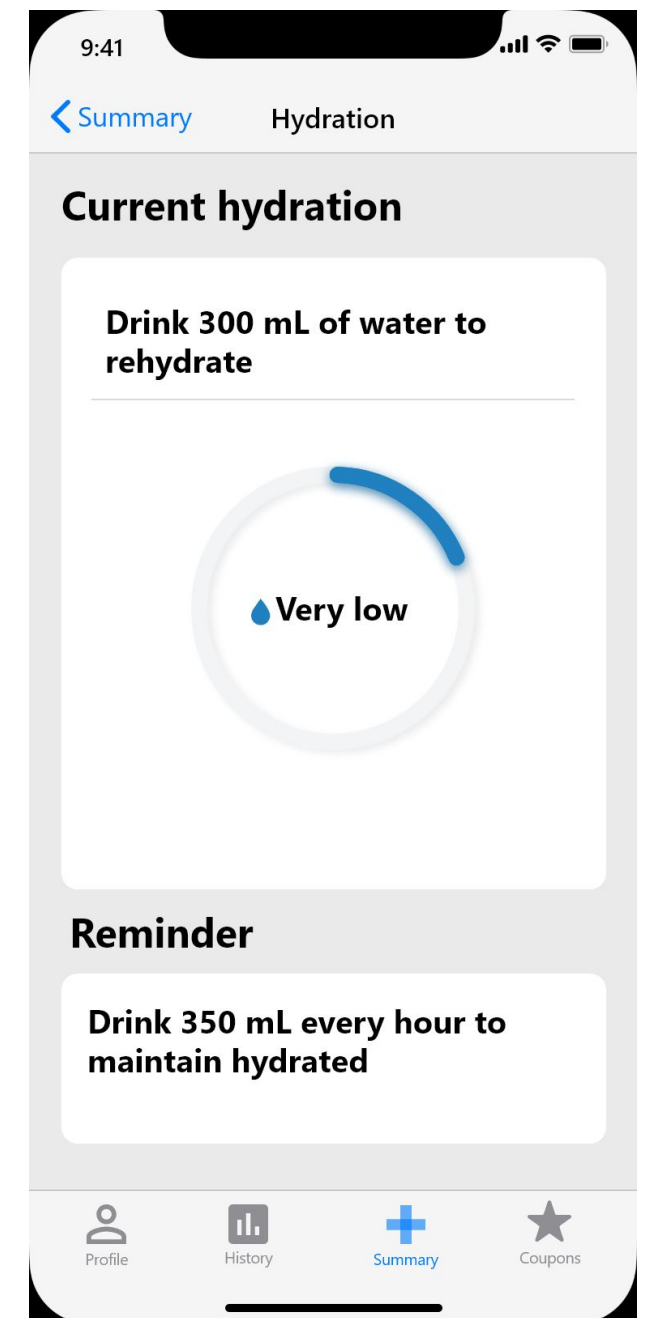
Home screen



Sign in screen



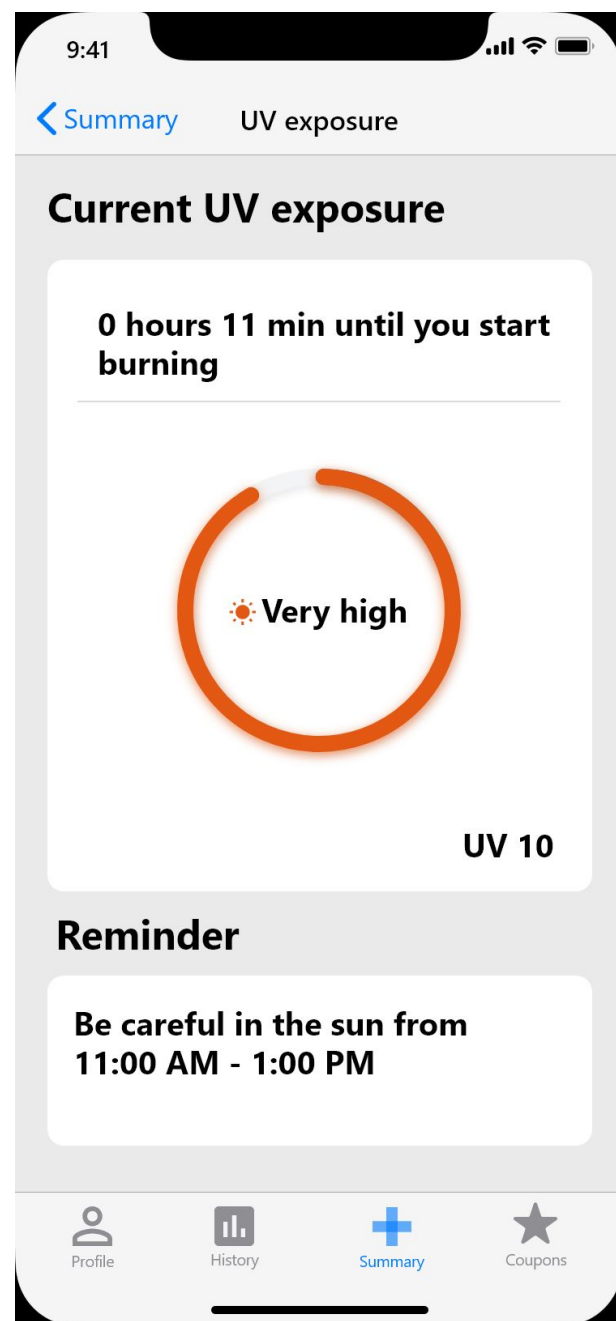
Summary



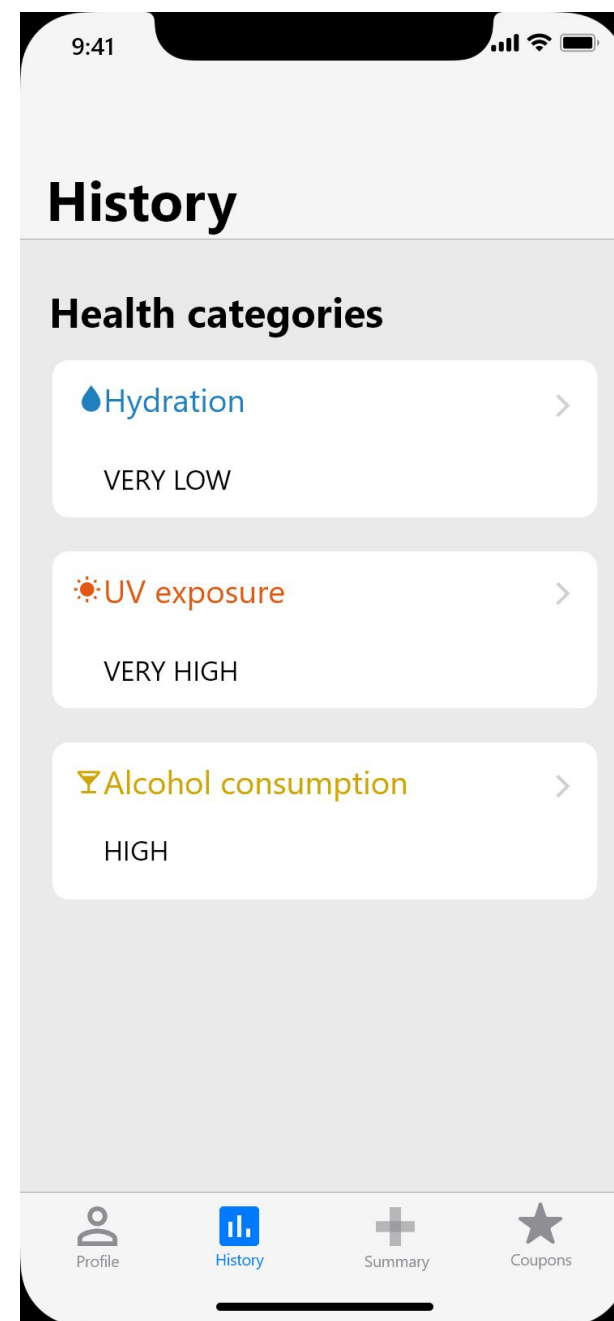
Summary > Hydration



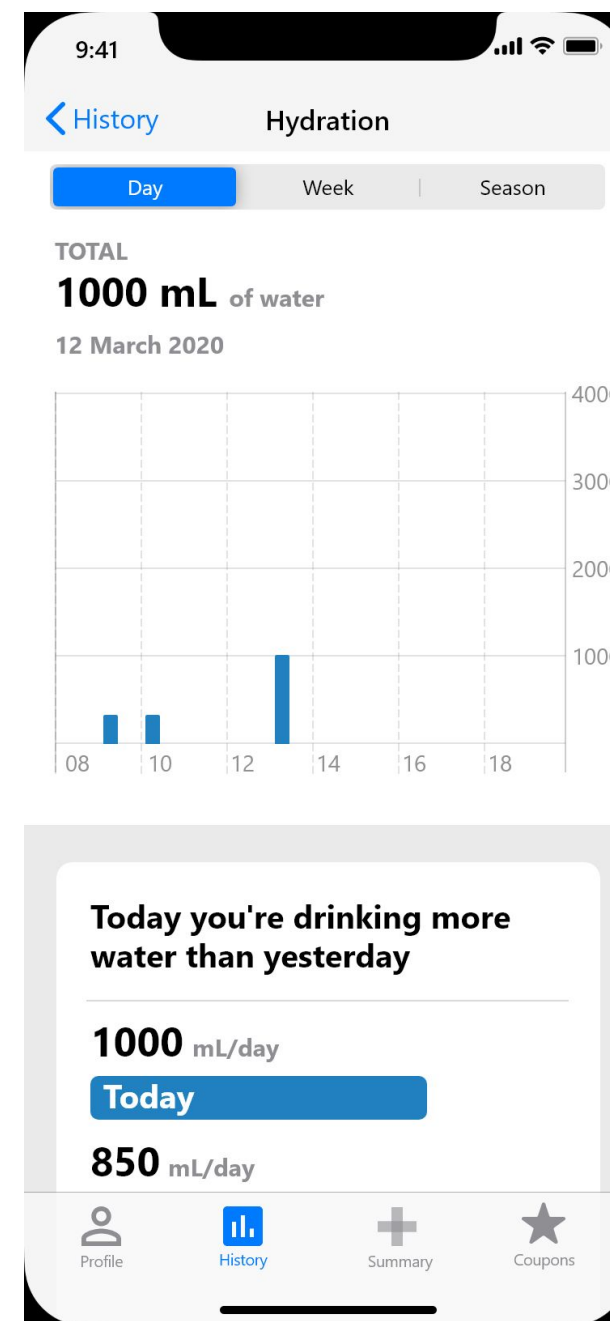
VII. App



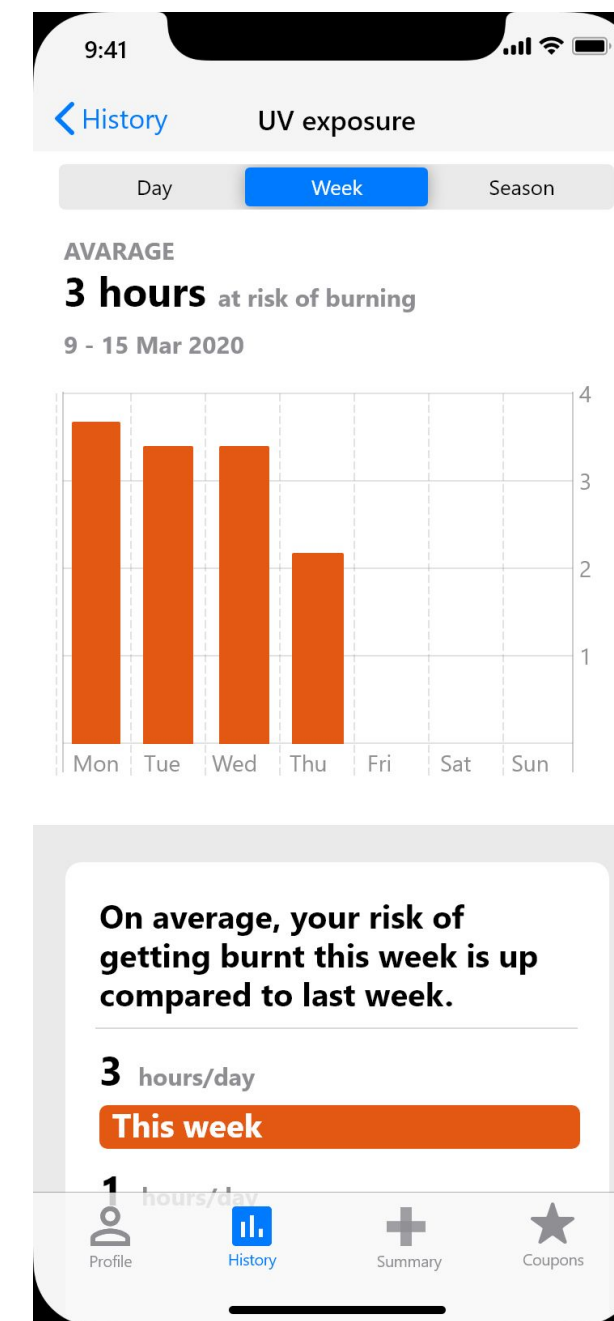
Summary > UV exposure



History



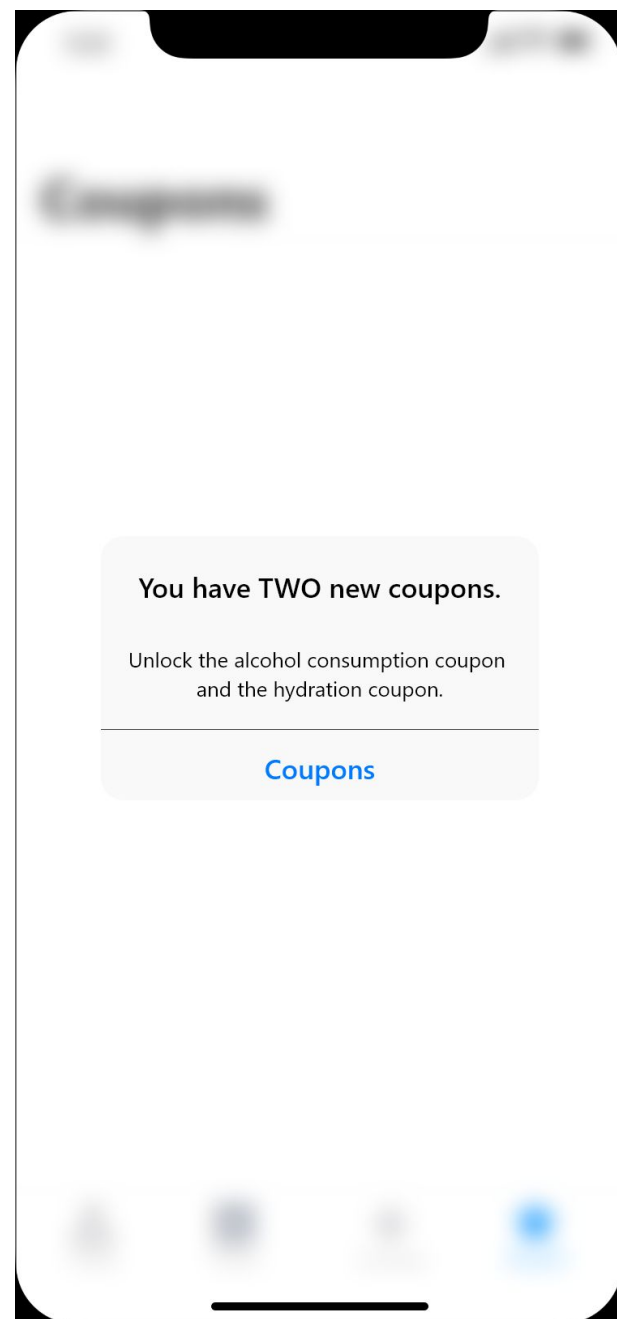
History > Hydration



History > UV exposure



VII. App



Alert pop-up



QR code coupon

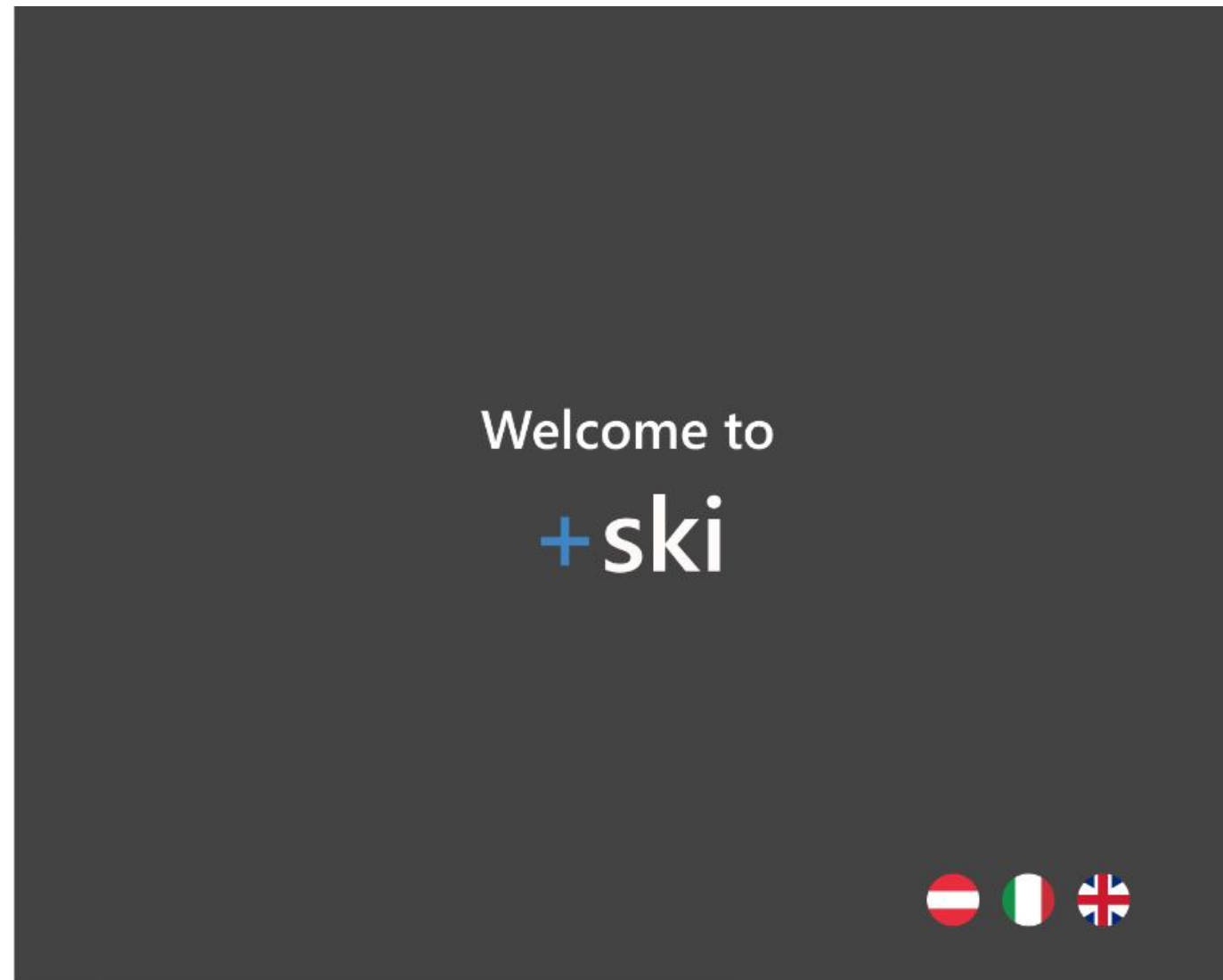


Coupons



VIII. Physical product

REGISTRATION



Home screen

Create an account

Insert an email adress:

Select a password:

Re-enter the password:

[Back](#) [Next](#)

Step 1: Create an account



VIII. Physical product

REGISTRATION

Profile

Insert a username:

! This is the name that will appear on the screen for everyone to see.


Date of birth:

[Back](#) [Next](#)

Step 2: Profile

Profile

Please choose your skin type



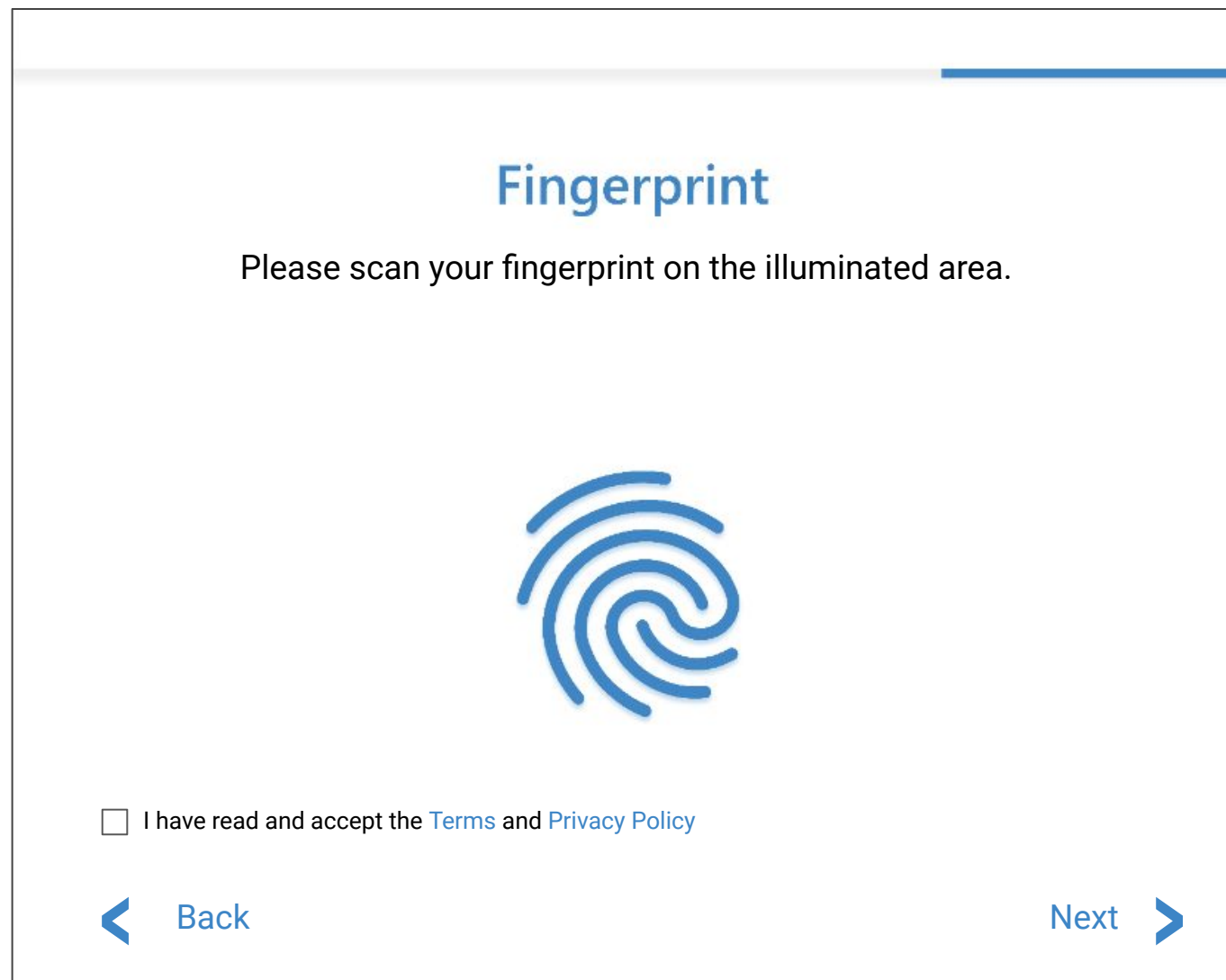
[Back](#) [Next](#)

Step 3: Profile

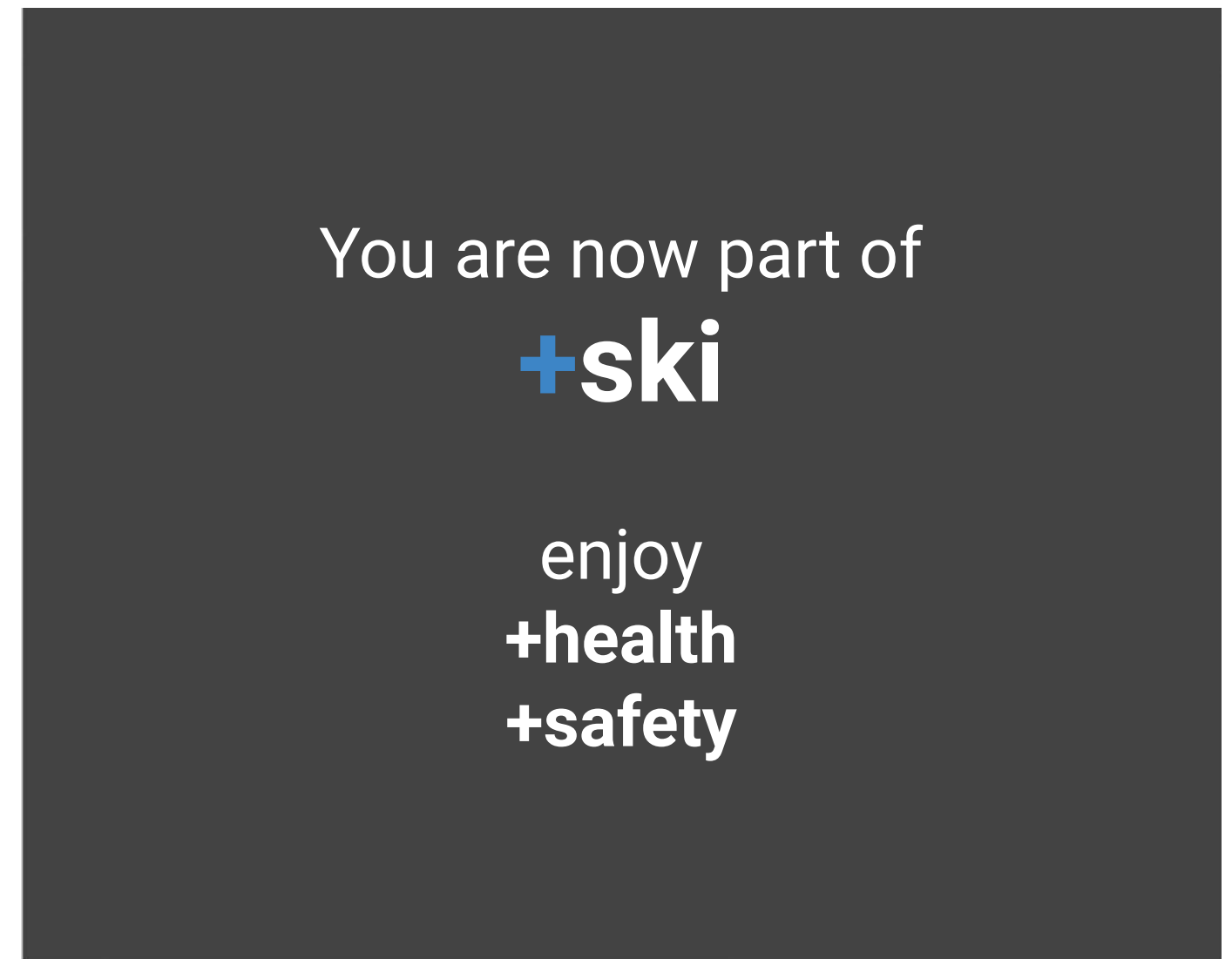


VIII. Physical product

REGISTRATION



Step 4: Fingerprint



Step 5: End screen

+ski

+health

+safety

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Interviews

PART I

Good morning, my name is Andrea Sánchez, I'm studying my Bachelor in Engineering of Industrial design in Spain, Zaragoza, but taking this semester at FH Wels. I decided to make my final project about skiing, one of the main activities of the Austrian lifestyle. My aim is to find problems and deficiencies in the skiing environment in order to design a product or service to improve user experience. So I wanted to ask for your help, you as a user of the ski resort are my target user.

Guideline:

1. Description of interviewee: some initial information about the person to position them in the right user group. These answers establish a first segmentation according to demographic data and some basic skiing information.
2. Preparation: questions related with the preparation of the trip, transport to get to the ski resort and to leave, with the equipment they use and the service they receive from renting.
3. During skiing: to find out about the journey of the user during a skiing day, the pain points and other impressions of his/her experience.
4. Post-skiing: injuries or discomfort from skiing
5. Motivation for skiing: reason why the user practices skiing.
6. Any output?

- Gender
- Age
- Country
- Is it your first time skiing? If not, what level of skiing would you say you are (Beginner, Intermediate, Advanced, Professional)?
- How many days are you planning to spend skiing?
- How do you decide on a skiing resort? What factors do you consider?
- How did you get to the ski resort? (car, bus, train, plane)
- Did you bring your own equipment or did you rent it? (boots, skis, sticks, helmet)
 - Why do you own the equipment? why do you find it more advantageous to bring your own equipment?
 - What do you find most annoying of renting the equipment?
- Do you bring with you any special object or service? (watch/app to measure your vitals, hand warmer, safety system)
- How do you find your way around the ski resort? (map, signs, asking other skiers)
- Do you ski alone or accompanied?
- How often do you stop to rest? And for how long?
- Which stage of the skiing process do you think you spend the most time in?
- Have you ever gotten injured when skiing?
- Do you usually feel sore the following days? If so, how do you overcome this?

- Why do you ski? What is the main reason that makes you ski? What does the skiing experience mean for you? (sport, connection with nature, leisure) → interested in monitoring his/her activity
- Do you have any special suggestions for improvements in any aspects in skiing?

Thank you for your time.

1. Male
2. 23
3. France
4. Advanced
5. 1 day
6.
 - How many slopes are open
 - The size of the skiing resort
 - Location of skiing resort: proximity to accomodation/home
 - Weather
7. Car
8. He rents the equipment
 - Waiting time
 - It is expensive if you're a regular skier and can't afford to buy you own equipment (in his case because he is a student)
9. Sometimes Gopro
10. Map that you get from the info point and maps at the start of the slopes/lifts
11. Accompanied
12. 30 minute lunch break (in france there are rooms in the service areas where you can sit and eat you cold lunch), small breaks in the middle of the slopes
13. Lifts
14. Never gotten injured
15. Yes, feels sore. Massages to relieve pain
16.
 - Fun
 - Exercise (sport)
 - Aprè-ski
 - A good way to spend time with friends
17. Usually the accommodations have small rooms, so little space when you are a group of people. Resting for the next day is important.

1. Male
2. 19
3. Netherlands
4. Advanced
5. 1 day
6. - Location
 - Quality of the slopes: if it has different levels of difficulty and the quality of the snow
 - Price of the ski pass
 - Reviews
7. Car
8. He has his own equipment.
 - Comfort in shoes
 - You don't have to wait the time at the rental shop, and you don't have to worry about the opening hours of the rental shop
 - You save money at long term
9. No
10. Map
11. Accompanied
12. 40 minutes lunch break, short breaks at service area and also at half slope
13. Lifts
14. Never has gotten injured
15. Yes, feels sore the following days. He stretches.
16. Leisure
17. There are too many waiting times during the whole day of skiing

1. Male
2. 25
3. Finland
4. Advanced
5. 1 day
6. - Old experience
 - Kilometres of pistes
 - Advice from other people: friends
7. Car
8. He rents the equipment.
 - You can't know if the gear is good until you get to the slopes and try it on the snow.
 - Price
9. Sometimes gopro and back protector
10. Map
11. Accompanied
12. Lunch and drinks break 3 times per day, around 30 minutes each break. Breaks at the slope to wait for people.
13. Queue to get on lifts
14. Has never gotten injured
15. Yes, trains two weeks before and continues training the days after.
16. Leisure, après ski
17. Depending on the quality of the slopes, if the slope is icy or, in general, not in the best conditions, the people reduce their speed and build-ups of people are generated.

1. Male
2. 24
3. Finland
4. Advanced
5. 1 day
6. - If it's open, number of slopes open
- distance to accommodation/home
- price
7. Car
8. Rents equipment
 - Price
 - Waiting time
 - Quality of gear: it's been used before (most of the times) and you don't know if the quality is good before you try it on the slopes.
 - Fit to your feet: it doesn't fit to your feet perfectly as your own equipment would.
9. No
10. Maps and signs
11. Accompanied
12. Lunch break for 40 minutes and coffee break for 20 minutes at service areas, stops of 5-10 minutes during skiing on slopes.
13. - Waiting for friends if they have different speeds
- Time before going down every slope, after lift: You look at the map, you check that your skis and boots are well set.
14. No injuries
15. Yes, sauna and drinks
16. Leisure, exercise, time with friends
17. - Take more care of slope conditions
- In finland there are bbq areas where you can make your own food and spend time there during breaks.

1. Male
2. 56
3. Austria
4. Advanced
5. One weekend
6. - ease to reach to the slopes
- convenience of ski resort
- how modern it is
- how trendy it is
- après ski
7. Car
8. His own equipment.
 - No waiting time
 - Cheaper in the long run
 - You take it with you from your house

On the other side, it has several disadvantages in opposite to renting: you don't update your equipment, there might be new advances in properties and you can't take advantage of them because skis last for a lifetime and their expensive to buy multiple. You can rent them according to how the snow is, the rental shop assistants give you advice on what to use,
9. No
10. Map
11. Accompanied
12. 1+2 breaks: one before skiing for coffee, one coffee break at midday and a longer break for lunch. Wait for people at the end of the slopes or in the middle, specially when you are skiing with kids.
13. Arrival and departure. When you arrive you have to get the ski passes or if you have bought them online you still have to redeem it. Put on all the equipment. And at the end of the day again the same, you have to take of your skis and boots.
14. Yes, injured the tailbone
15. Yes hurts but doesn't do anything, just waits until the pain goes away
16. Nature, leisure, you can never forget how to ski, but it has a lot of dangers so once you get older you start being more cautious
17. - No need to redeem the ski passes
 - Alternative to paper map → watch for golf that measures the distances you have to the hole
 - Something to make you drink water

1. Male
2. 27
3. Austria
4. Advanced
5. 1 day
6. - skiable vertical drop
- wide steep slopes
- quality of snow (no bumps)
- forest in low part of ski resort
7. Train, I don't mind how I have to get to the ski resort.
8. Own equipment.
- you spend less money in the long run
But sometimes I rent: it gives you the advantage to use skies that you would want to try out.
9. Backpack to carry a tupperware with lunch and water.
10. If I don't know the ski resort I study the map before getting there so that I have some previous knowledge and a basic orientation. In the ski resort I use the map anyways.
11. Alone
12. As little as possible, only to eat my tupperware. The more I ski the better.
13. Preparation, as I like to know about the ski resort before getting there.
14. Never have gotten injured
15. I do feel sore, the legs and, in general, tired
16. I like nature and the mountain, it's a way of sightseeing around the mountain with an extra of adrenaline from the speed of ski.
17. Nothing

1. Female
2. 22
3. Austria
4. Advanced
5. 1 day
6. Proximity to location
7. By car/bus
8. She rents the equipment.
 - price: in long term it is expensive
 - queues: you spend a lot of time collecting (selecting) the equipment.
 - less flexibility
 - used before (helmet and boots)
 - you can't choose what you want
9. Gps of phone
10. Map or signs, doesn't ask people
11. accompanied
12. 2 breaks: snack and lunch (1 hour and a half)
13. Spends the most time in lifts. She spends more time in action than static.
14. No injuries
15. Legs are sore, but doesn't do anything
16. - Likes to do sport outside and specially enjoy nature in winter (snow)
 - A seasonal sport that you can only do during those months which makes it more special.
 - Speed
 - Fun with friends
17. - If it's your first time going down that slope, sometimes you get to the end of the slope and you find yourself lost. You spend a long time finding your way, how to get from one slope to another.
 - Better queue management.

1. Male
2. 53
3. Austria
4. Advanced
5. 2 days, the weekend
6. - km
 - service areas
 - level of the slopes
7. car
8. own equipment
 - I ski frequently so i maximize its use and price
 - I would prefer to rent to try out other kinds of skis
 - comfortable to have your own equipment, you don't have to spend time at the renting service.
 - If you rent you don't have to carry your skis from the parking lot (if you rent right at the beginning of the slopes)
 - fast, cheap, and on-piste
9. walkietalkie, to communicate with the people I go with; video camera, to later on see it for fun and see my technique
10. paper map
11. accompanied
12. for lunch 45 min, waiting for people in the middle or the end of the slopes.
13. waiting in line specially for the lifts, and restaurants
14. no
15. yes, I don't do anything. But I would suggest to warm up before skiing and stretch afterwards. Sometimes skiing is the only sport a person does throughout the year (if it's not a regular sport) and that is dangerous because muscles are stiff.
16. I like it, it's fun, and you exercise. You see how you improve every year
17. queues for lifts are a pain point, it would be interesting to know which lifts have less waiting line. To know how many people are skiing down the slope you are interested on.