14. Appendix Report

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14.1 Graduation brief

DESIGN FOR our future

TU Delft

IDE Master Graduation

Project team, Procedural checks and personal Project brief

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

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

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

Download again and reopen in case you tried other software, such as Preview (Mac) or a webbrowser.

STUDENT DATA & MASTER PROGRAMME

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

family name: Gehlen
initials: D.O. given name: Daan
student number:
street & no.:
zipcode & city:
country:
phone:
email:

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

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

SUPERVISORY TEAM **

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

** chair: Jasper van Kuijk dept. / section: HCD / AED
** mentor: Jasper Faber dept. / section: HCD / DA
2nd mentor: Diederik Hol
organisation: Cadomotus
city: Wezep country: Netherlands
comments (optional)

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

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

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

TU Delft

Procedural Checks - IDE Master Graduation

APPROVAL PROJECT BRIEF

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

chair Jasper van Kuijk date - - signature

CHECK STUDY PROGRESS

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

Master electives no. of EC accumulated in total: ____ EC
Of which, taking the conditional requirements into account, can be part of the exam programme ____ EC
List of electives obtained before the third semester without approval of the BoE

( ) YES all 1st year master courses passed
( ) NO missing 1st year master courses are:

name date - - signature

FORMAL APPROVAL GRADUATION PROJECT

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

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

Content: ( ) APPROVED ( ) NOT APPROVED
Procedure: ( ) APPROVED ( ) NOT APPROVED
comments

name date - - signature

Initials & Name D.O. Gehlen Student number 4549112
Title of Project Reinventing Interactions in Triathlon Transitions

Reinventing Interactions in Triathlon Transitions — project title

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

start date 06 - 09 - 2021 — 18 - 03 - 2022 end date

INTRODUCTION **

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

Triathlon is one of the quickest growing sports in the Netherlands (BNR, 2020). It consists of swimming, biking and running. In general it can be considered to be divided in short distance (races up to approximately 2 hours) and long distance (races up to 8 hours for the elite athletes). It is an endurance sport characterized by a lot of training hours, that very often comes down to which athlete is freshest the longest. In short distance racing there is also the element of not missing the front pack, so transitions between the different legs become vital for staying in the mix. Athletes that lose time in transition often struggle coming back, whereas a small gap in the swim can sometimes be closed by having a quick transition to the bike.

Weich (2008) and Millet & Vleck (2000) show that there has been quite extensive research into the biomechanical part of these transitions between different sports. What is the effect on your body and performance. Research into the interactions and tools used seems to be less present. This thesis aims to do this, as this would offer opportunities to improve the triathlon experience for athletes using design. These race-day events often require athletes to have trained consistently for extensive periods of time, with usually only very few windows to actually execute what they have been training for. Improving their (mental) well-being using design interventions on this important race day can be a powerful enhancer of self-confidence and generate satisfaction and proudness over their own achievements.

Furthermore, triathlon is a relatively new sport, and at regular intervals still trying to reinvent both the format and the equipment. An example of changing formats is "Superleague" triathlon, which offers shorter distances, shuffles the order of the different legs, or even takes triathlon indoors. The rules for triathlon bikes are also more flexible compared to those of the cycling federation. The frame for example does not have to consist of the traditional 2 triangles (see image 1). The missing seat tube allows the bike to be even more aerodynamic. There still seems to be room for innovation, as several things appear to even in the present be quite amateurish (see image 2)

Cadomotus is a company that at present produces helmets, bags and shoes for (ice-)skating. Their focus is on the higher end of the market, trying to make their products functional, of high quality and having good performance (read: aerodynamic or stiff). The combination of a growing and innovative triathlon market offers an interesting opportunity for Cadomotus. Another factor making the triathlon market interesting is that the average triathlete is willing to invest a lot of money for high-end products that give them marginal gains in their performance. Even though they have already been entering the triathlon domain, the company feels there is still a lot to learn and gain. The aim of this thesis is therefore two-folded. On the one hand, research into the triathlon context would help Cadomotus to further understand what drives the triathlete in the form of pains and gains. It will help them during future design processes to really cater to the needs of triathletes, and improve their race day experience. On the other hand the design phase of this thesis aims to develop a triathlon-specific product to emphasise Cadomutus' interest in, and understanding of, the sport. Doing this by catering to a triathlon specific need, means giving triathletes the possibility of having a more pleasant race day experience!

https://www.bnr.nl/sport/10412097/triathlon-populair-in-coronatijd
Millet, G. P., & Vleck, V. E. (2000). Physiological and biomechanical adaptations to the cycle to run transition in Olympic triathlon: review and practical recommendations for training. British Journal of Sports Medicine, 34(5), 384-390.
Weich, Christian. (2015). TriTraS - The Triathlon Transition study (presentation for colloquium in July 2015). 10.13140/RG.2.1.4950.3763.

space available for images / figures on next page

introduction (continued): space for images

image / figure 1: Non-standard bikeframe developed for triathlon specifically

image / figure 2: Elastic bands in transition zone, smart or room for development?

PROBLEM DEFINITION **

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

The goal of this thesis is to thoroughly understand the competitive athletes experience during a race, and design a fitting new solution for them. Concrete problems are not yet identified, as uncovering these is the aim of the research phase. However, the transition seems to be a very promising area to look at. These are often very stressful with a lot of necessary steps or interactions in a short time. It would be valuable to make these interactions either simpler or faster.

As the target group for this thesis is competitive athletes, performance increase during each of the individual legs of the triathlon is a second promising area of interest. Performance improvers are likely to either make the athlete measurably faster, decrease their cognitive and/or motoric load or keep them fresh for longer. Further research should indicate which other desires, hopes, dreams and fears athletes encounter during a race, that new designs could also take care of.

ASSIGNMENT **

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

The intended result will be most likely a physical concept, as this is where the company is strongest. However, there is the possibility for other forms of deliverables, if they can strongly and clearly be argued for. The inteded result would optimise performance in some way, whether that is by improving the actual interactions or ease up the cognitive load.

During the research phase I will aim to alternate between being an expert and having a fresh perspective, and make these switches in viewpoint explicit. The main research activities will constitute of observation together with a triathlon novice as a set of fresh eyes), participatory research in a race, and interviews with athletes. The research phase will be concluded with an customer journey which highlights the touchpoints, pains, gains amd desires of the athletes during a race.

At the halfway point I will present and discuss a range of concepts, coming from the design opportunities uncovered in the research deliverable. After this the one that is most feasible, desirable and/or viable will be further developed in several iteration cycles. Prototyping will be used to do some further research through design.

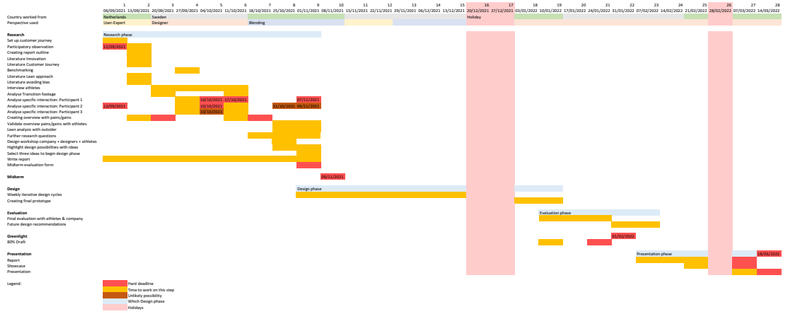
At the greenlight meeting there will be a physical prototype that has been formatively evaluated with athletes in the target group.

Personal Project Brief - IDE Master Graduation

PLANNING AND APPROACH **

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

start date 6 - 9 - 2021 18 - 3 - 2022 end date



The graduation will be completely part-time, 4 days a week. Since I am already very involved and experienced in the area, the first 2 weeks constitute of me making my already existent knowledge explicit. After this a more common user research phase involving other athletes will be done from a more "external designer" standpoint. These insights will be blended and by involving the company, triathletes and designers in ideation using a workshop, the aim is to create fitting value for the company. As well as triggering ideation outside of my perspective and bias. A journey-map with pains, gains and ideas for possible solutions will be presented at the midterm.
After the midterm, weekly iterative cycles will be conducted to reach a final concept. Meaning that every week a concept will be generated, prototyped and improved based on feedback. Starting with 3 rough sketches, the aim is to narrow down and increasing fidelity over time. Feedback will be gathered from both designers, athletes and stakeholders, looking for improvements from many different angles. The final concept will be evaluated with triathletes. The aim is to do this in a context as close to reality as possible, but due to the fact that it is too early in the season, a real triathlon is unlikely. After this evaluation there is time to make recommendations and a redesign for the future.

Personal Project Brief - IDE Master Graduation

TU Delft

MOTIVATION AND PERSONAL AMBITIONS

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

One goal is the combine my knowledge and passion for triathlon with design. This is a bucket list item for my design education. However, this also leads to the challenge of looking to something familiar with new eyes. Doing this in a way that is transparent, clear and delivers new insights is my first ambition.

Secondly, I would like to work with several iterative prototype cycles. Instead of having a cycle of research, design, evaluation and finally a recommendation, I would like to shorten the initial research a bit, and have enough time to actually iterate a few times on the concept, and find new insights that way.

Sport performance is not just a matter of equipment and muscles, but very often also has a very strong mental component. During the interviews with athletes I want to also discover the "why" behind the "how". Can I find what things help them focus in a race, and what is distracting or giving stress? This is the angle for which I choose DfI, and I believe this will lead to some interesting perspectives and design opportunities.

Even though competitive sports is about performance, speed and winning, I believe it also is really supposed to be fun. Joy is the source of success, and vital for triathletes as it is a sport that demands a high and consistent training load every single week. My personal ambition would be to also improve their mental well-being through design. I would therefore want joy to be one of the criteria in the evaluation. Is the design intervention giving the participant more joy in what they are doing?

My fifth ambition is to design something that really creates value for the company, and fits into their skill set, portfolio and line of thinking. To not just design something that makes sense out of a research perspective, but also in a real-world business view. To achieve this, I would like to really actively involve the company in the ideation and designing phase through ideation workshops and regular meetings. Also as a way to learn from their way of working.

FINAL COMMENTS

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

Initials & Name D.O. Gehlen Student number 4549112

Title of Project Reinventing Interactions in Triathlon Transitions

14.2 Interview round one

14.2.1Interview goals

- What are their dreams and hopes in and with triathlon?
- Things they have changed or learnt about over time
- What does the user journey look like on race day
    - Where are the high and low points on this journey
        - Concerns/struggles
        - Material specific problems encountered
        - Wishes

14.2.2 Interview format

One on one interviews are desirable, as we are looking for subtle differences and have them confirmed by participants who do not influence each other. The major themes that may arrive in a focus group are already known through own experience. (patton)

The actual interview script is in dutch, as the participants will be in dutch and it is deemed favourable for the participants to answer in their native language, as well as not having the interviewer translate on the spot.

12.2.3 Interview steps

Checking for consent and questions for the participants follows a structured approach.

An informal conversation interview method (Patton) is used for the beginning of the actual interview. The goal is to get the interview going, as well as learning a bit on how they see triathlon. The questions in the topic guide should be answered, but the sub questions can differ between participants. The goal of this phase is to get comfort and sensitise the participant for what is to come.

After the first 2 phase minutes, the interview moves to a more semi-structured approach. I want to have comparable insights, but also leave room for follow-up questions as I am looking to learn things I didn't expect. It is important that these follow up questions are probes but contain no judgments. Those things that the interviewer deems odd in combination with his own experience should be noted down but left for the end of the interview. This last part lets the structured angle go and allows for comparative questions based on my own experience. Here there is room to combine the latent knowledge of the interviewer with input from the participant to see where there might be potential differences.

14.2.4 Topic guide

Phase	Time (1.5 uur totaal)	Questions
Introduction	5	Consent form Questions from the participant
Who are you? (simple, common questions)	15	Imagine I know nothing about triathlon and we meet at school. How would you describe what you do? What do you think is so much fun about triathlon? What else in life gives you joy? What do you think your life looks like in five years?
What does your user journey look like? (Experience/sensory/ overview to zooming in)	30	Which three words do you associate with triathlon? What are the highlights on race day for you? What are the most stressful moments? If I were to follow you around for a race day, what would that look like? What are the most important steps?
When does it go wrong? (opinions/values/ feelings)	20	Do you ever swear during a race? And to your equipment? Do you ever feel let down by your equipment? If so, when?
Specifics (triangulation recalled experience/ zooming in on the actual products used and experienced)	15	(Could you explain what was going through your head at this moment, what were you trying to do?) (Would you now change anything in the journey?) (Are you bringing the same things to a race?) What do you do different materials wise from when you started? What do you find very impractical, material wise? Which product was worth its money most and why? Do you ever feel like you are missing certain products? Is there an interaction that you feel could be improved and if so, how? Could you move these post-its to indicate how happy a certain action makes you feel?
The future (the future)	10	What do you think triathlon will look like in 20 years Which equipment do you think the triathlon world champion has in 40 years from now?
Follow up	15	There are several elements in your story that surprised me, can we zoom in on those? What is your experience with sponsors in triathlon? Which question should I have asked that I didn't yet? Are there things that you experience as a woman that I might not be aware of? Would it be okay if I reached out to you again in the future?

14.2.5 Interview script

Phase 1, introduction - Structured
Het interview vindt plaats via zoom
Als eerste denk ik dat het goed is de officiële dingen eerst te doen. **Heb je een kans gehad om het informed consent document te bekijken?**
Mocht dit niet zo zijn kijken we er nu even naar!

Na ondertekening kan de recording aangezet worden
Hallo en welkom, leuk dat je er bent. Nu gaan we echt beginnen! Zoals je misschien wel begrepen had uit het informed consent document en ons eerdere contact, ben ik nu bezig met afstuderen. Ik werk samen met Cadomotus, en ons doel is een triathlon specifiek product te ontwikkelen. Maar om te weten wat dat precies zou kunnen zijn wil ik graag eerst kijken naar hoe een wedstrijddag er precies uit ziet. Ik weet uiteraard hoe het er voor mij ongeveer uitziet, maar ik ben erg benieuwd wat jou ervaringen zijn, waar je op let, wat je belangrijk vindt, waar er problemen en moeilijkheden zijn, dat soort zaken. Hopelijk ga ik dus af en toe ook vragen stellen die het doen lijken alsof ik er niets vanaf weet, maar dat is dan gewoon omdat ik jou ervaring goed wil ontdekken. Weet ook zeker dat wat je hier vertelt tussen ons blijft, en alleen in écht geanonimiseerde vorm bij 3e personen zoals teamleiders, trainers of sponsoren terecht kan komen. En dan is het gemixt met alle andere deelnemers, dus het is sowieso niet te herleiden tot jou. Voordat ik verderga met uitleggen wat we gaan doen, **Heb je hier vragen over?**
Komen hier al direct gedachten bij je op?

Ik wilde het vandaag over een aantal dingen hebben, eerst over jou en wat triathlon voor jou betekent. Dan over hoe je wedstrijddag er precies uit ziet (daarna wil ik dit vergelijken met wat beelden van jou tijdens triathlon roermond) en als laatste zou ik het tof vinden even naar de toekomst te kijken! **Heb je hier vragen over?**

Phase 2, who are you - Conversational
Laten we beginnen!
Stel je voor dat ik helemaal niks van triathlon weet, en we komen elkaar tegen op school. Hoe zou je dan omschrijven wat je doet?

Subvragen:
Wat is zo leuk aan triathlon in jouw opinie?
Hoe is afgelopen seizoen gegaan?
Hoe goed ben je?
Wanneer ben je ooit begonnen?
Welke prestatie uit het verleden ben je het meest trots op?
Naar welke training kijk je heel erg uit komende week?
Wat zou je graag bereiken in de sport?
Hoe denk je daar te kunnen komen
Hoe voel je je door deze droom? (bang, blij etc.)
Wat is je favoriete wissel en waarom?

Waar haal je nog meer plezier uit naast triathlon
Heb je ook nog een maatschappelijke carrière, zo ja wat?
Waarom heb je hiervoor gekozen?
Waarom doe je er iets anders naast?
Op welke manier voegt deze iets toe aan je leven?
Hoe ziet je leven er over vijf jaar uit denk je?

Phase 3, Raceday - Semi-structured

W**elke 3 woorden associeer jij met triathlon, en waarom?**

Wat zijn voor jou de hoogtepunten op een triathlon dag?
Wat is je favoriete wissel en waarom?
Wanneer ben je heel gestrest tijdens een triathlon dag?
Super. Nou dat ik een beetje een beeld heb van wie jij bent, ben ik heel erg benieuwd hoe jij de wedstrijddag beleefd. En die wedstrijddag die reken ik vanaf dat je thuiskomt van je laatste taper training, totdat je je spullen thuis weer uitgepakt hebt. **Stel je voor dat ik je een dag zou mogen volgen tijdens zo'n wedstrijd. Wat zou ik dan zien?**
Schrijf op post-its alle stappen die de deelnemers opnoemen

Dankjewel voor deze verhelderende uitleg, dit helpt al heel erg met verduidelijken. Nu is het mijn taak om hier een overzichtelijk schema van te maken. Ik heb al een begin gemaakt aan een model, maar **ik zou graag jouw hulp hebben het in te vullen**. Ik heb tijdens je verhaal alle stappen op post-its gezet, en ik ben benieuwd wat jij als de belangrijkste stappen ziet. De vakken kunnen uiteraard aangepast worden in grootte en er kunnen altijd post its bij of af gaan. Er is hier echt geen goed en fout in, ik ga hier gewoon met iedereen een versie van maken, zodat het dan later duidelijk is wat vaak hetzelfde of wat vaak anders is.
Start delen scherm **https://miro.com/app/board/o9J_ltq4Cfk=/**
Heb je wel eens met miro gewerkt
Post-its kun je plakken door dubbel te klikken.
Deel link **https://miro.com/app/board/o9J_ltq4Cfk=/**
Voor de volgende stap zou ik het fijn vinden als je **hardop nadenkt terwijl je bezig bent. Zou je post-its kunnen slepen voor welke stappen essentieel zijn op een wedstrijddag?**

Phase 4, when does it go wrong? - Semi-structured
Mochten er dingen naar voren komen uit de chat, dan deze eerst behandelen.
Nu dat we weten wat de precieze stappen zijn, ben ik erg benieuwd naar alle dingen die je eromheen voelt. De objectiviteit laten we nu lekker zitten, en ik wil vooral horen wat je meningen en gevoelens zijn.

Vloek je tijdens een wedstrijd wel eens hardop? En tegen je materiaal?
Laat je materiaal je wel eens in de steek? Zo ja, waar?

Break for those interviews that contained footage

Phase 5, specifics - Conversational
(Optional in case of footage available) Ik heb van jou nog wat videobeelden klaar staan, die genomen zijn van je wissel tijdens triathlon roermond. Nu lijkt het me een goed plan om deze terug te kijken, **zou jij hardop kunnen vertellen wat er door je heen ging op dat moment, wat probeerde je te doen?**

Deel scherm met video footage van de deelnemer, en ga hier langzaam doorheen.

Zou je na het kijken van deze beelden nog iets aan de kaart willen toevoegen of veranderen?

(After 5 interviews is deze vraag toegevoegd. Op Miro was een foto te zien van alle spullen die de ontwerper meeneemt naar een triathlon.
Neem jij dezelfde dingen mee naar een race?)
Wat doe je nu anders met je materiaal dan toen je begon?
Wat vind je qua spullen heel erg onhandig in een triathlon?
Welk triathlon product was het meeste zijn geld waard en waarom?
Heb je wel eens het gevoel dat je een bepaald product heel erg mist in een triathlon?
Is er een handeling die nog heel veel verbeterd kan worden, en zo ja, hoe dan?

Kopieer alle post-its naar de onderkant van de emotie lijn

Zou je deze post-its kunnen slepen zodat ze aangeven waar je je helemaal bent, en waar dit juist niet het geval is. Ook hierbij zou het tof zijn als je weer kunt vertellen wat je denkt terwijl je bezig bent.

Phase 6, the future - Semi-structured
Van het heden zou ik nu graag nadenken over de toekomst.
Als je nadenkt over de triathlon nu, **hoe denk je dan dat die er over 20 jaar uit gaat zien?**

Welke stappen heeft die triathlon? Hoe verschillen die van wat we net gemaakt hebben?

Welke externe factoren denk je dat triathlon zouden kunnen gaan beïnvloeden?

Als echt alles kan:
Welke spullen denk je dat de triathlon wereldkampioen van over 40 jaar heeft?

Phase 7, follow-up, Semi-structured
Er zijn een paar dingen die mij verbazen in je verhaal, en waar ik nog even dieper op in wil gaan.

Ik zou ook nog graag terugkomen op,

Ik herken … heel anders.

Wat is jouw ervaring met sponsoren in de triathlon sport?
Zou je hier iets aan willen veranderen?

Welke vraag denk je dat ik nog had moeten stellen die ik niet gesteld heb?
Is er nog iets dat je graag zou toevoegen, willen vertellen?
Heb jij nog ergens vragen over?
Optional: Een van de redenen dat ik je gevraagd heb voor een interview is dat ik een man ben, en de wedstrijddag vanuit mijn ogen beleef. Veel van de mensen in mijn team en de mensen die ik geïnterviewd heb zijn dit ik. Ik was daarom benieuwd: **Zijn er dingen die jij als vrouw beleefd tijdens de wedstrijddag, die ik als man waarschijnlijk helemaal niet eens door heb?**

Dan wil ik je heel erg bedanken voor je tijd! We gaan elkaar snel nog een keer zien, en als je het tof vind wil ik je graag na mijn onderzoek nog wel een keer spreken over wat er uit gekomen is?
Zou het eventueel oke zijn als ik nog een aantal keer bij je terug kom om wat vragen te stellen of te vragen wat je van mijn productideeën vind?

Nogmaals bedankt! Hoe vond je het?

12.2.6 Interview script Triathlon Beginners

Phase 1, introduction - Structured
Het interview vindt plaats via zoom
Als eerste denk ik dat het goed is de officiële dingen eerst te doen. **Heb je een kans gehad om het informed consent document te bekijken?**
Mocht dit niet zo zijn kijken we er nu even naar!

Na ondertekening kan de recording aangezet worden
Hallo en welkom, leuk dat je er bent. Nu gaan we echt beginnen! Zoals je misschien wel begrepen had uit het informed consent document en ons eerdere contact, ben ik nu bezig met afstuderen. Ik werk samen met Cadomotus, en ons doel is een triathlon specifiek product te ontwikkelen. Maar om te weten wat dat precies zou kunnen zijn wil ik graag eerst kijken naar hoe een wedstrijddag er precies uit ziet. Ik weet uiteraard hoe het er voor mij ongeveer uitziet, maar ik ben erg benieuwd wat jou ervaringen zijn, waar je op let, wat je belangrijk vindt, waar er problemen en moeilijkheden zijn, dat soort zaken. Hopelijk ga ik dus af en toe ook vragen stellen die het doen lijken alsof ik er niets vanaf weet, maar dat is dan gewoon omdat ik jou ervaring goed wil ontdekken. Weet ook zeker dat wat je hier vertelt tussen ons blijft, en alleen in écht geanonimiseerde vorm bij 3e personen zoals teamleiders, trainers of sponsoren terecht kan komen. En dan is het gemixt met alle andere deelnemers, dus het is sowieso niet te herleiden tot jou.Voordat ik verderga met uitleggen wat we gaan doen, **Heb je hier vragen over?**
Komen hier al direct gedachten bij je op?

Ik wilde het vandaag over een aantal dingen hebben, eerst over jou en wat triathlon voor jou betekent. Dan over hoe je wedstrijddag er precies uit ziet (daarna wil ik dit vergelijken met wat beelden van jou tijdens triathlon roermond) en als laatste zou ik het tof vinden even naar de toekomst te kijken! **Heb je hier vragen over?**

Phase 2, who are you - Conversational
Stel je komt me op een feestje tegen en ik hoorde dat je met triathlon begonnen bent, maar ik heb daar nog nooit van gehoord, **Hoe zou jij triathlon dan omschrijven?**

Sub vragen:
Wat is zo leuk aan triathlon in jouw opinie?
Hoe is afgelopen seizoen gegaan?
Hoe ben je bij triathlon uitgekomen?
Welke prestatie uit het verleden ben je het meest trots op?
Naar welke training kijk je heel erg uit komende week?
Wat zou je graag bereiken in de sport?
Hoe denk je daar te kunnen komen
Hoe voel je je door deze droom? (bang, blij etc.)

Waar haal je nog meer plezier uit naast triathlon

Hoe ziet je leven er over vijf jaar uit denk je?

Welke 3 woorden associeer jij met triathlon, en waarom?

Wat zijn voor jou de hoogtepunten op een triathlon dag?
Wat is je favoriete wissel en waarom?
Wanneer ben je heel gestrest tijdens een triathlon dag?

Phase 3, Raceday - Semi-structured
Super. Nou dat ik een beetje een beeld heb van wie jij bent, ben ik heel erg benieuwd hoe jij de wedstrijddag beleefd. En die wedstrijddag die reken ik vanaf dat je thuiskomt van je laatste taper training, totdat je je spullen thuis weer uitgepakt

hebt. **Stel je voor dat ik je een dag zou mogen volgen tijdens zo'n wedstrijd. Wat zou ik dan zien?**
Schrijf op post-its alle stappen die de deelnemers opnoemen

Phase 4, what does triathlon mean to you - Semi-structured
Nu dat we weten wat de precieze stappen zijn, ben ik erg benieuwd naar alle dingen die je eromheen voelt. De objectiviteit laten we nu lekker zitten, en ik wil vooral horen wat je meningen en gevoelens zijn.

Hoe verschilt de triathlon wedstrijddag met die uit een vorige sport?
Wat is fijner, wat is minder fijn?
Vloek je tijdens een wedstrijd wel eens hardop? En tegen je materiaal?
Laat je materiaal je wel eens in de steek? Zo ja, waar?

Phase 5, Materials - Semi-structured (optional in case of footage available)

Laat de foto met alle spullen zien
Gebruik jij dezelfde spullen tijdens een wedstrijd?
Wat doe je nu anders met je materiaal dan toen je begon?
Wat vind je qua spullen heel erg onhandig in een triathlon?
Welk triathlon product was het meeste zijn geld waard en waarom?
Heb je wel eens het gevoel dat je een bepaald product heel erg mist in een triathlon?
Is er een handeling die nog heel veel verbeterd kan worden, en zo ja, hoe dan?

Start delen scherm **https://miro.com/app/board/o9J_ltq4Cfk=/**
Heb je wel eens met miro gewerkt
Post-its kun je plakken door dubbel te klikken.
Deel link **https://miro.com/app/board/o9J_ltq4Cfk=/**

Kopieer alle post-its naar de onderkant van de emotie lijn

Zou je deze post-its kunnen slepen zodat ze aangeven waar je je helemaal bent, en waar dit juist niet het geval is. Ook hierbij zou het tof zijn als je weer kunt vertellen wat je denkt terwijl je bezig bent.

Phase 6, the future - Semi-structured
Van het heden zou ik nu graag nadenken over de toekomst.
Als je nadenkt over de triathlon nu, **hoe denk je dan dat die er over 20 jaar uit gaat zien?**

Welke stappen heeft die triathlon? Hoe verschillen die van wat we net gemaakt hebben?

Welke externe factoren denk je dat triathlon zouden kunnen gaan beïnvloeden?

Welke spullen denk je dat de triathlon wereldkampioen van over 40 jaar heeft?

Phase 7, follow-up, Semi-structured
Er zijn een paar dingen die mij verbazen in je verhaal, en waar ik nog even dieper op in wil gaan.

Ik zou ook nog graag terugkomen op,

Ik herken … heel anders.

Wat is jouw ervaring met sponsoren in de triathlon sport?
Zou je hier iets aan willen veranderen?

Welke vraag denk je dat ik nog had moeten stellen die ik niet gesteld heb?
Is er nog iets dat je graag zou toevoegen, willen vertellen?
Heb jij nog ergens vragen over?

(Optional) Ikzelf ben een man, en heb heel erg mijn eigen perspectief, maar **denk jij dat er iets aan de triathlon wedstrijddag anders is voor vrouwen, waar ik me niet van bewust ben?**

Dan wil ik je heel erg bedanken voor je tijd! We gaan elkaar snel nog een keer zien, en als je het tof vind wil ik je graag na mijn onderzoek nog wel een keer spreken over wat er uit gekomen is?
Zou het eventueel oké zijn als ik nog een aantal keer bij je terug kom om wat vragen te stellen of te vragen wat je van mijn productideeën vind?

Nogmaals bedankt! Hoe vond je het?

14.2.7 Consent form

Study information

You are being invited to participate in a research study called Reinventing Interactions in Triathlon Transitions. This study is being done by **Daan Gehlen** from the TU Delft.

The purpose of this research study is discover where the pains and gains in triathlon are, and how we could improve the race day experience, and will take you approximately **90** minutes. The anonymised data will be used to create an overview of the race day experience.

Your participation in this study is entirely voluntary and you can withdraw at any time. All you have to do is indicate this to the researcher. You are free to omit any question at any given time.

We believe there are no known risks associated with this research study; however, as with any online related activity the risk of a breach is always possible. To the best of our ability your answers in this study will remain confidential. We will minimize any risks by anonymising your data during analysis (by changing names) and deleting all video recordings after the project has ended, at the latest the first of May. Your personal data will not be shared beyond the project team before anonymisation. The analysed results of this thesis research will however be shared in a public repository of the TU Delft, as well as with the members of the project team, including the company Cadomotus and employees of TU Delft.

You have the right to request access to and rectification or erasure of personal data at any given time, even after the interview.

Study contact details for further information:
Daan Gehlen
+31621413395
d.gehlen@hotmail.com

Consent Form for user research interviews Daan Gehlen's thesis

Please tick the appropriate boxes	**Yes**	**No**
Taking part in the study		
I have read and understood the study information dated [DD/MM/YYYY], or it has been read to me. I have been able to ask questions about the study and my questions have been answered to my satisfaction.	☐	☐
I consent voluntarily to be a participant in this study and understand that I can refuse to answer questions and I can withdraw from the study at any time, without having to give a reason.	☐	☐
I understand that taking part in the study involves a video recorded interview, which will be analysed and destroyed after the project ends (latest first of May).	☐	☐
Use of the information in the study		
I understand that information I provide will be used for a thesis report which will be publicised publicly in the TU Delft repository	☐	☐
I understand that personal information collected about me that can identify me, such as [e.g. my name or where I live], will not be shared beyond the study team.	☐	☐
I agree that my information can be quoted anonymously in research outputs.	☐	☐
Future use and reuse of the information by others		
I give permission for the analysed anonymised results of this interview and the generated content under the session that I provide to be archived in the TU Delft repository so it can be used for future research and learning.	☐	☐

Signatures

_____	_____	_____
Name of participant [printed]	Signature	Date

I have accurately read out the information sheet to the potential participant and, to the best of my ability, ensured that the participant understands to what they are freely consenting.

_____	_____	_____
Researcher name [printed]	Signature	Date

Study contact details for further information:
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14.2.8 Miro board template

14.3 Interview round two

14.3.1 Goals

- Gaining a better understanding of the defined problem areas
- Knowing priority order of the problem areas according to athletes

14.3.2 Participants and set-up

Aiming for 6 athletes, with a mix of elite athletes and athletes more in the target demographic for cadomotus (ambitious amateur athletes that might invest in good equipment).
The aim with this is to make sure that a solution would cater both to the target group of this thesis (competitive elite short course athletes), as well as create value for cadomotus.

Interviews will be conducted over zoom for accessibility reasons, and Cadomotus will be present during several of them, to further understand who they are designing for. It is preferable if this is during interviews with athletes *not* currently engaged in a sponsor relationship with cadomotus, for them to be able to talk freely. Interviews will be done in dutch in order for athletes to be able to express themselves freely.

Thirdly these athletes have, before and during the interviews, perhaps been thinking about possible solutions, it is nice if they have a moment to share these. This is good to gain actual solutions, as well as extract some possible design requirements for further phases.

14.3.3 Topic Guide

Phase	Time (max 1 hour)	Questions
Design opportunities	30	What is your first thought when seeing this? Do you recognise this as a potential area for improvement? If you had to give this problem a title, what would it be? Do you have more problems in this domain?
Ranking	10	For each of the design domains, how important is it that this gets solved? And why? If you had to choose between these two, what would be the most important one and why?
Design opportunities	10	For the most important design opportunities, do you have your own solution already?

14.3.4 Interview script

Introduction
Hallo, ik wilde even dubbel checken dat je het informed consent form inderdaad gelezen en ingevuld had? Is het dan oké als ik nu de recording start?

Zoals je misschien al begrepen hebt ben ik voor mijn afstuderen bezig een triathlon specifiek product te ontwerpen. Nu heb ik al een eerste ronde interviews gedaan, en daaruit zijn een aantal gebieden, of onderwerpen kun je het ook noemen, gekomen die interessant zijn om verder voor te ontwerpen. Maar voordat ik daarmee begin wil ik graag weten of jij die problemen inderdaad ook hebt, wat die dan precies zijn, en welke problemen jij denkt dat ik het eerst op zou moeten lossen!

(introducing company representative)
Hoi, dit is Diederik, hij is van het bedrijf waar ik voor afstudeer en hij kijkt eventjes mee. Dit zodat hij beter inzicht krijgt van de problemen die triatleten hebben, zodat volgende producten nog beter op onze behoeftes afgestemd kunnen worden.

Het idee van vandaag is dat we eerst een kleine powerpoint afgaan waarin we alle 8 probleemgebieden bespreken, en daarna zou ik graag kijken naar de volgorde waarin jij denkt dat deze opgelost zouden moeten worden.

Design opportunities
Going through the powerpoint slide by slide, first reading text, then watching video.

Hoe herkenbaar is dit probleem voor jou?
Wat is je eerste gedachte bij deze mogelijkheid?
Herken je dit als iets dat verbeterd zou kunnen worden? En wat herken je daaraan?
Wat voor titel zou jij dit probleem geven?
Heb jij nog problemen hiermee die ik niet aangestipt heb?
Wat is belangrijk aan dit probleem?
Heb jij problemen met iets in dit gebied?
Is er hier iets waar jij direct aan moet denken dat beter kan?

Ranking
Het volgende wat ik graag van je zou willen weten, nu dat we ze allemaal gezien hebben, is hoe erg je de problemen vindt.

Zou je van elk van deze problemen aan kunnen geven hoe erg je dit probleem vind, oftewel, hoe belangrijk is het dat dit opgelost wordt.

Design opportunity
Nu dat we weten welke problemen belangrijk zijn wil ik even inzoomen op de paar belangrijkste, want ik vroeg me af:
Heb je zelf ook al wat in je hoofd zitten wat een mogelijke oplossing zou zijn voor probleem X?

Dan wil ik je nu heel erg bedanken voor je hulp. Heb jij nog iets anders dat je eventueel graag wil delen? Iets waar ik aan moet denken?

14.3.5 Consent form

Study information

You are being invited to participate in a research study called Reinventing Interactions in Triathlon Transitions**.** This study is being done by **Daan Gehlen** from the TU Delft.

The purpose of this research study is discover if participants also recognise identified pains and gains, and how important it is to change those. It will take you approximately **60** minutes. The anonymised data will be used to make a decision on what to design in the near future.

Your participation in this study is entirely voluntary and you can withdraw at any time. All you have to do is indicate this to the researcher. You are free to omit any question at any given time.

We believe there are no known risks associated with this research study; however, as with any online related activity the risk of a breach is always possible. To the best of our ability your answers in this study will remain confidential. We will minimize any risks by anonymising your data during analysis (by changing names) and deleting all video recordings after the project has ended, at the latest the first of May. Your personal data will not be shared beyond the project team before anonymisation. The analysed results of this thesis research will however be shared in a public repository of the TU Delft, as well as with the members of the project team, including the company Cadomotus and employees of TU Delft.

You have the right to request access to and rectification or erasure of personal data at any given time, even after the interview.

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17/11/2021

Consent Form for user research interviews Daan Gehlen's thesis

Please tick the appropriate boxes	Yes	No
Taking part in the study		
I have read and understood the study information dated [17/11/2021], or it has been read to me. I have been able to ask questions about the study and my questions have been answered to my satisfaction.	☐	☐
I consent voluntarily to be a participant in this study and understand that I can refuse to answer questions and I can withdraw from the study at any time, without having to give a reason.	☐	☐
I understand that taking part in the study involves a video recorded interview, which will be analysed and destroyed after the project ends (latest first of May).	☐	☐
Use of the information in the study		
I understand that information I provide will be used for a thesis report which will be publicised publicly in the TU Delft repository	☐	☐
I understand that personal information collected about me that can identify me, such as [e.g. my name or where I live], will not be shared beyond the study team.	☐	☐
I agree that my information can be quoted anonymously in research outputs.	☐	☐
Future use and reuse of the information by others		
I give permission for the analysed anonymised results of this interview and the generated content under the session that I provide to be archived in the TU Delft repository so it can be used for future research and learning.	☐	☐

Signatures

_____	_____	_____
Name of participant [printed]	Signature	Date

I have accurately read out the information sheet to the potential participant and, to the best of my ability, ensured that the participant understands to what they are freely consenting.

_____	_____	_____
Researcher name [printed]	Signature	Date

Study contact details for further information:

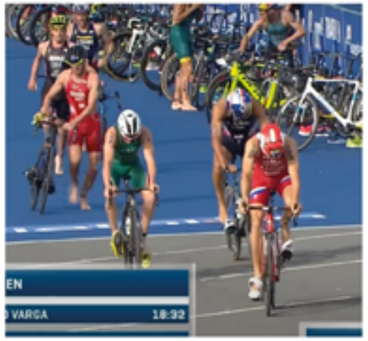
Daan Gehlen

+31621413395

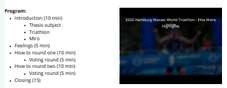
d.gehlen@hotmail.com

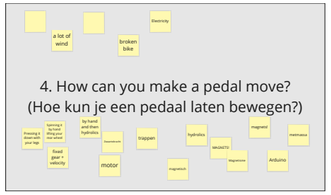
14.3.6 Materials used

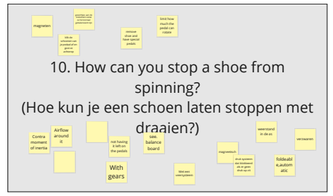
The participants where shown a slide deck (https://docs.google.com/presentation/d/17S0wHdskIn2ltK2X7qLA0K7gom_MFc_yeUqEte5xsFc/edit?usp=sharing) of the eight problems as can be seen in the images below. Each of them had a description and a video linked to the image to further illustrate the design opportunity. These results were gathered as can be seen in image *design opportunities overview.*

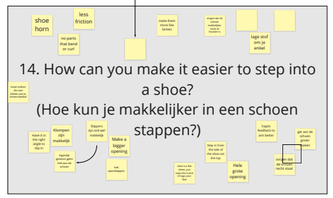


14.4 Creative session board + ideas









14.5 Final evaluation

14.5.1 Purpose

- Learning how the product is evaluated by user's.
- Learning how the design can be further optimised in next stages of the design process.

14.5.2 Research questions

- How different user's perceive the products performance
- How the product holds up in a context outside of the imagination, with all different motoric capabilities, and foot shapes.
- Learning where there could be improvements for the future
- Performance level around each of the different affordances
- Alignment with interaction vision, design goal and interaction qualities
- Would they buy/use the product?

14.5.3 Simulated context of use

In order to easily reach participants, I attended a break in between training practices where I could test 3 elite short-course athletes directly after each other, as well as receiving some general input from other elite-athletes (that had too big feet to participate in the user test). 2 other athletes that fit more into the age-group target group that cadomotus serves were visited at home.

I created a bit of a contextlab by putting a bike on an indoor bike trainer. This to make it possible for me to clearly see what happened when participants were interacting with the shoe, and for them to be able to point to things, instead of them cycling away and telling me things after the fact. Preferably participants would use their own bike/trainer, as to not get distracted by the difference in ergonomics of the bike. When this was not possible I had my own bike for them to use. Laptop with recording is placed in such a way that it is clearly visible what the foot and shoe are doing.

On the right a conventional triathlon shoe is placed so that they can actually compare and see what works better for them.

14.5.4 Data collection methods

There is video recorded, interview conducted and a form to be filled out in the end.

14.5.5 Interview script

Introduction including consent form

"Voor cadomotus heb ik een nieuwe triathlon fietsschoen ontwikkeld. Nu dat ik een prototype heb zou ik graag testen wat jij er van vindt. Wat al goed is en nog belangrijker wat nog beter kan. Houd je daarom niet in met feedback geven, want uiteraard kunnen er nog dingen aan deze schoen verbeterd worden. Dat ga ik dan waarschijnlijk niet meer doen tijdens mijn afstuderen, maar als het bedrijf deze schoen daarna echt zou willen maken dan is goede feedback voor de volgende modellen super belangrijk.

Eerst ga ik je vragen om de schoen een beetje te gebruiken, en dan tijdens dat je dat doet opmerkingen en feedback te geven over hoe je ervaring is. We gaan een normale wedstrijd simuleren op de tacx zodat ik het een beetje goed kan zien, en daarna heb ik nog wat losse vragen en een klein formuliertje om helemaal te snappen wat wel en niet goed werkt.

Voordat we gaan beginnen wil ik je echter wel vragen dit formulier (consent) in te vullen, waarin je aangeeft vrijwillig mee te doen met deze test, en je ervan bewust bent dat je op elk moment mag stoppen enzo."

Product testing

First the shoe is talked through with the participant. Going through each of the individual steps, letting them fiddle with the prototype and ask questions about things they do not understand. The goal is that the participants are able to evaluate the performance and interaction of the product, rather than the limitations of the prototype or their understanding of it. When clarification has been reached. Afterwards a small video of racing is shown, in order to immerse better into the context of racing.

Each step gets an introduction assignment, the user afterwards executes the step, and feedback is obtained with the thinking out loud method.

Task 1: Setting up transition:

"*Je kunt de schoen op je pedaal klikken op de positie die jij wilt.*"

Task 2: Getting in the shoe

Task three: tightening the shoe

Task 4: cycling with closed shoe

Task 5: getting out of the shoe

Task 6: stepping off

"Je kunt op de fiets stappen, maar dan nog zonder met je voet in de schoenen te gaan. Vervolgens kun je eerst met je voeten de schoen in vliegen, de schoen aantrekken, er een stukje op fietsen, hem weer uit doen en afstappen. Geef wel even een seintje als je begint met de schoen losmaken, want als je je voet uit de schoen haalt dan moet ik weer wat doen, want dit prototype kan nog niet alles zelf doen."

What I do in the meantime:

When there is no foot in the shoe I hold the shoe level by hand, and provide the feedback to the user that the shoe is locked in place/unlocks when stepping in.

Questions afterwards

How was it?

How was it different from shoes you have used in the past and was this better?

What word comes up to you when thinking about this shoe?

How could the shoe be better?

Which needs do you feel like that it is not taking care of yet?

How could this become an ideal shoe.

How likely are you to use a shoe like this in the future, and why?

What would be hesitations for you to use a shoe like this in the future?

How much would you be willing to pay for such a shoe?

Anything else from the shoe that you would like to tell me that we haven't discussed yet

Form for the participants to fill out after the testing:

https://docs.google.com/forms/d/e/1FAIpQLSe8Aq-MOrrlQWzFWSoC5LIdp88bL1Ht4mtpx_MIl0DsN_ixBA/viewform

15.5.6 Consent form

Study information

You are being invited to participate in a research study called Reinventing Interactions in Triathlon Transitions. This study is being done by **Daan Gehlen** from the TU Delft.

The purpose of this research study is discover if the solution that I have designed actually makes sense and is perceived as an improvement or not. The anonymised data will be used to make a decision on how to design further in the near future.

Your participation in this study is entirely voluntary and you can withdraw at any time. All you have to do is indicate this to the researcher. You are free to omit any question at any given time.

We believe there are no known risks associated with this research study; however, as with any online related activity the risk of a breach is always possible. To the best of our ability your answers in this study will remain confidential. We will minimize any risks by anonymising your data during analysis (by changing names) and deleting all video recordings after the project has ended, at the latest the first of May. Your personal data will not be shared beyond the project team before anonymisation. The analysed results of this thesis research will however be shared in a public repository of the TU Delft, as well as with the members of the project team, including the company Cadomotus and employees of TU Delft.

You have the right to request access to and rectification or erasure of personal data at any given time, even after the interview.

Study contact details for further information:
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d.gehlen@hotmail.com
22/02/2022

Consent Form for user research interviews Daan Gehlen's thesis

Please tick the appropriate boxes	**Yes**	**No**
Taking part in the study		
I have read and understood the study information dated [22/02/2022], or it has been read to me. I have been able to ask questions about the study and my questions have been answered to my satisfaction.	☐	☐
I consent voluntarily to be a participant in this study and understand that I can refuse to answer questions and I can withdraw from the study at any time, without having to give a reason.	☐	☐
I understand that taking part in the study involves a video recorded interview, which will be analysed and destroyed after the project ends (latest first of May).	☐	☐
Use of the information in the study		
I understand that information I provide will be used for a thesis report which will be publicised publicly in the TU Delft repository	☐	☐
I understand that personal information collected about me that can identify me, such as [e.g. my name or where I live], will not be shared beyond the study team.	☐	☐
I agree that my information can be quoted anonymously in research outputs.	☐	☐
Future use and reuse of the information by others		
I give permission for the analysed anonymised results of this interview and the generated content under the session that I provide to be archived in the TU Delft repository so it can be used for future research and learning.	☐	☐

Signatures

_____	_____	_____
Name of participant [printed]	Signature	Date

I have accurately read out the information sheet to the potential participant and, to the best of my ability, ensured that the participant understands to what they are freely consenting.

_____	_____	_____
Researcher name [printed]	Signature	Date

Study contact details for further information:
Daan Gehlen
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d.gehlen@hotmail.com

14.5.7 Data analysis

Qualitative

For the qualitative data, recordings were looked back and all relevant information was noted down and gathered per task. The result can be seen in appendix FIXME.

Quantitative

When looking at the quantitative data of the affordances to look for problems, everything that is good is just good. Those can be ignored. I gave all the answers from the participants a score, in which *very poor* needed to be the most prominent, and therefore became a 5, as it is a serious issue. Poor became a 3 and fair is not good or bad, but still indicates that a certain function isn't loved yet. What was good to note is that not one issue got more than 2 negative scores, so the differences were generally speaking one very poor + some fairs or poor + some fairs. This indicates that there were no super significant affordances that were poorly designed, but it still gave some indication of where the most significant improvements were to be made.

The risk of working with such an analysis approach is that one negative scoring person has a lot of influence on the final design (if you shift every answer two places to the left, it becomes a bit of an overdominant voice in the analysis). Upon closer inspection, one person did indeed score everything a bit lower than the others. However, even when taking this person out the top affordance to be changed remained the hard push-off in T2. Changing all the numbers until the average was the same seems like a possible solution for this problem, but if something was okay for someone making it go lower makes no sense and vice versa. It is therefore I used words to score instead of numbers, so that it would be clearer when a certain affordance was okay. I decided therefore to move forward with everyone included.

4,266666667
2,4
3,266666667
4
4,866666667

Average scores per participant when translating the worded scale to a 1 to 5 scale, with five being the highest.

Drawing conclusions

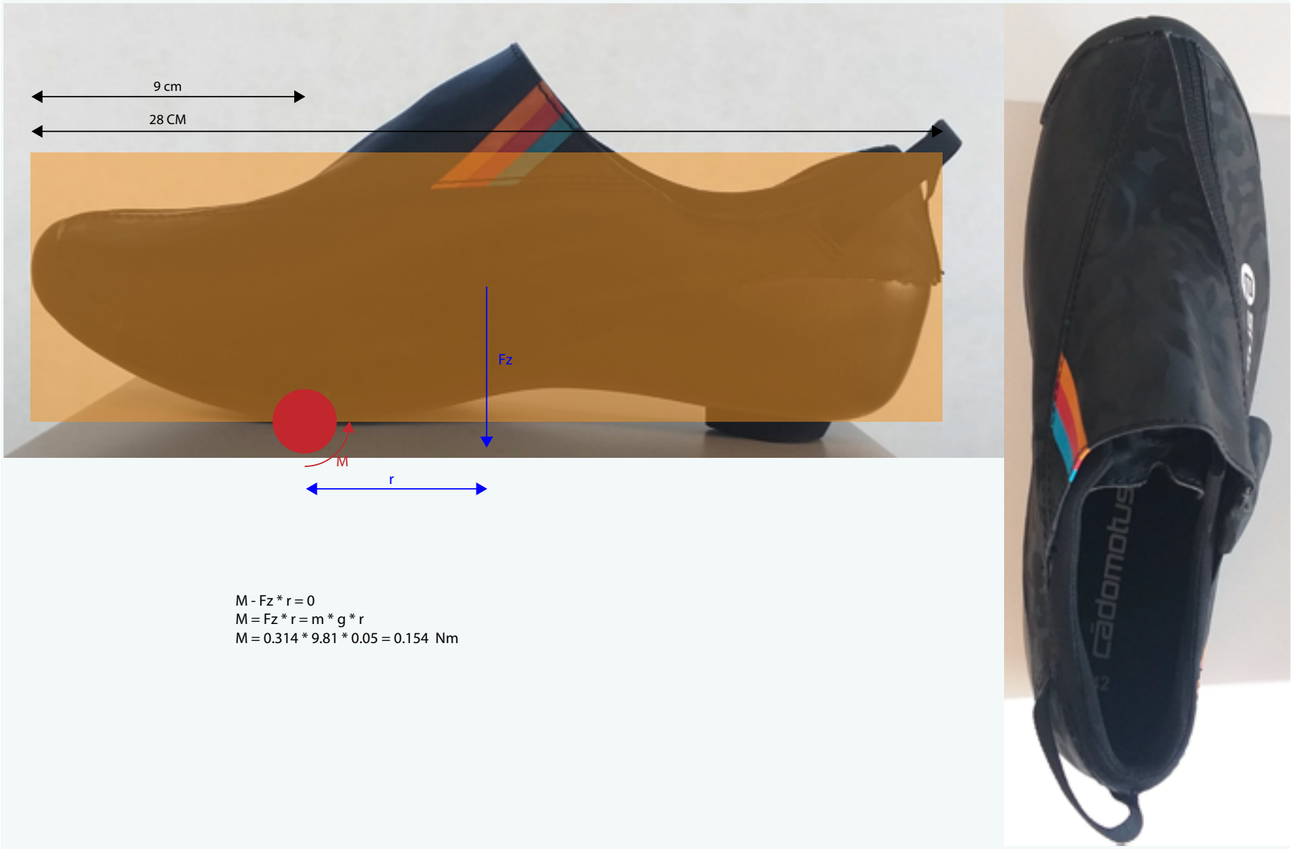
The results, both the qualitative and quantitative, were put together in the following grid. How much something would ruin the race was put on the impact scale, as well as how often a problem was likely to occur, which was placed on the frequency scale. This gives an indication on how the next steps should be prioritised. However, if things take relatively little effort to improve, they will be tackled in the final design anyways.

Frequency/ Impact	**No impact**				**High impact**
Highly unlikely to happen		• Fabric can not cut in the bare food			• Vulnerable position on the back of the shoe if it for some reason touches the ground
				• Spinning cranks after a hit in T1	• Front foot too much space
		• Ventilation dilemma			• Needs to close tighter
		• Under ankle too much space • Washable	• Stepping off should be better	• Front folds over	• Heel closes a bit when you push the front up
Highly likely to happen				• Open further • Still need to push back heel to get out	• Feasibility brake • New sensor position necessary • Increase safety feeling • Increase confident feeling

Meaning that the most important things to tackle, taken from the diagram above were:

- Feasibility of the brake
- New sensor position necessary
- Increase safety feeling
- Increase confident feeling
- Open further
- Still need to push back heel to get out
- Heel closes a bit when you push the front up
- Front folds over

14.6 Calculations brake power



M - Fz * r = 0
M = Fz * r = m * g * r
M = 0.314 * 9.81 * 0.05 = 0.154 Nm

14.7 Price calculation

The Talaria shoe without the brake mechanism would probably cost somewhere in the range of 350 to 400 euros. A breakdown of the costs can be seen here below, and is based on Cadomotus' experience:

2 moulds for the handle part (between 5 and 6.000 dollar)

When selling 1.000 shoes in 3 years-> 6 dollar per shoe, 8 dollar purchase price.

Recommended retail price shoe: 80 x 4.5** = 360*

Recommended retail price handle mechanism: 8 x 4.5 = 36

(price of making a carbon sole shoe, ** multiplication necessary to go from purchase price to recommended retail price. Both are estimates by Cadomotus)*

Total = 396