Implementation strategy of a data enabled service design process at Ford

MSc. Graduation Project Strategic Product design

Ford x TU Delft

Pim Jansen

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Author

Pim Jansen
Strategic Product Design

Supervisory team

Tu Delft

Prof.dr. P.A. Lloyd
Dr. M. Gonçalves
Delft University of Technology
Landbergstraat 15, Delft
The Netherlands

Company

Ir. N. Eikelenberg
Ford Research and Innovation Center
Süsterfeldstrasse 200, Aachen
Germany

Preface

Dear reader,

This thesis report is the embodiment of a seven month process to finalize my Master strategic product design at the technical University Delft.

The process was followed in a strange situation, the COVID-19 pandemic forced the world back inside to the bedroom office. This influenced a multitude factors for me and others during this graduation project. First of all, it created the situation of a student performing a project for a design team in another country and collaborating with a company mentor without ever having spend one minute in the same room. Finishing this project successfully was quite a challenge and not possible without the advice, dedication and support of a number of people.

I want to thank all the Ford employees that collaborated with me during this process and especially my company mentor Nicole Eikelenberg, who was always available for questions and extensive discussions. Although there were no possibilities to work together physically, the online meetings and workshops really helped me keep moving forward.

At the start of this project, theoretical nature of the topic made it difficult to become more concrete this led to a very extensive literature review and some moments of being lost in the abstract terms and theories , I'd like to thank my Chair Peter LLoyd, for reminding me of the "van" every now and then. Your critical view on my process helped me to stop theorizing all the possibilities, and start to actually design.

Next to the practical issues of the lock down, the possibility to collaborate, get together, relax and even exercise were constrained causing also pressure on the mental well-being of many students. Therefore, I'd like to thank Milene Goncalves, the project lead of the university research project and the mentor of my graduation project. Your availability for questions, elaborate comments on the many typed pages and your positive constructive feedback made me feel I was not alone in this process.

Finally I want to thank my parents and friends for endlessly hearing me out and supporting me when I started a vague monologue about one of the types of data designers could use in their process.

Thank you for your support.

I hope you enjoy reading,

Pim Jansen
23 / 03 / 2021

Executive summary

This report describes the development of an implementation strategy for using data in the design process of a design team at the RIC of Ford in Aachen. The implementation strategy consists of a card set and a poster to show contemporary developments in using data in the design process, a service concept, a practical tool kit to start using the data and an organizational implementation roadmap. Throughout the project, a co-creation approach was used by working on one of the commercial vehicle concept projects. This resulted in barriers, enablers and drivers of different approaches for the team.

First, I consulted literature on design and data to create an overview of the approaches in this field. I concluded that contemporary approaches use open data such as social platforms to find users expressed thoughts and feelings, or (owned) sensor data to find users functional needs in measurable behaviour.

In a case study the insights from literature are visualized in the form of cards to create a tangible artefact for evaluating the different approaches and also act as later reference. This was the first deliverable of this project. The case study resulted in a set of preliminary set of drivers, enablers and barriers for using data.

Next, a design intervention was done in the team's service design project. Together the qualitative insights gathered and analysed. Then I chose parameters for "a behavioural data profile" and designed a service concept based on these parameters. In this service concept behavioural data of the user is used as input for personalized service functionalities. This allows the team to research behaviour and create the foundation for more advanced research. From this step I translated the learned lessons into a final set of barriers, enablers and drivers. This set allows the team to use this specific approach in future projects as well.
The main barriers are now defined as: (1) Designers and researchers having different perspectives when setting up research projects resulting in an inability to create the described design concept. (2) There is no clear indication for the design team where and how to use data in the design process.

To overcome these barriers a practical tool-kit was designed to allow the team to bridge the gap between the qualitatively gathered data and defining a product-service concept based on a data profile. The value of this practical tool-kit is supported by literature showing the trend towards in-situ research approaches and an evaluation process.

The roadmap, the final deliverable of this project, presents directions for applying this approach and presents steps for further organizational implementation. For future research I recommend developing an accessible persona dashboard of the implemented services for Ford to perform easier and more focussed research in the relations between the different sub-functionalities of the vehicle.

The practical tool-kit, set of cards and the roadmap help the team in answering their question: "how to use data to better understand our users and their behaviour" by indicating an appropriate approach, an example project and a practical tool-kit.

Content

Reading guide & glossary

These sections indicate an important objective or goal of a chapter. For example the objectives of these reading guides are:

- Inform the reader
- Fill this list of objectives
- Finalize this list of objectives

This indicates an important piece of theory or an important finding. These indicate the read thread of this thesis.

DITD =	Data inquiry trough design (design research method)
DED =	Data enabled design (design research method)
PERSONA =	visual representation of a typical user
USER BEHAVIOURAL PROFILE/ DATA ENABLED PERSONA =	visual representation of data from measured behaviour
FUNCTIONAL BEHAVIOUR =	measurable human actions
EXPERIENTIAL BEHAVIOUR =	emotional or rational human expressions
C.T. team =	craftsman track team (collaboration team)
RIC =	Research and innovation centre (collaboration organization)
CAGR =	Cumulative annual growth rate: the rate in which a market value grows.
URP =	University research project
GDIA =	Global data, insights and analytics department
LCV =	Light commercial vehicle

Project introduction

In this chapter I introduce the motivation for this project based on the context and the involved stakeholders. Also, I explain the research questions and the project approach.

1. Project introduction

1.1Introduction

In an increasingly connected world, the mobility demand becomes more dynamic and complex. For example, the sharing mobility market has a CAGR of 8% over the period between 2018-2026 and will reach an estimated value of US$ 608 Bn in 2026 (PRnewswire, 2020) As different mobility solutions change according to the desired travelling distance, mobility solutions also transition towards making the time in spend in the vehicle fit to the customers' needs as can be seen in the Purpose-built-vehicles (Hasenberg, 2018). As expectations and solutions evolve in an increasingly connected world, creating one solution for one problem starts losing its reason d'être.

Therefore it could be said that a company like Ford which was built on the foundation of solving one problem in a great technologically advanced way has a need to start to evolve. For this strategy Ford is using an ambidextrous approach where they focus on strengthening their core business while also exploring new opportunities. (Ford Media, 2016, 2020). In this way there is room for a broad spectrum of new possibilities in the areas of increased connectivity, autonomous vehicle technology and big data collected from cars to understand their customers better. Ford already acquired multiple companies in the shared mobility space, services around cars and last mile solutions. (Ford Media, 2016, 2020)

In an effort to build innovation capabilities around these new types of product-service systems, Ford is moving from a technical product development innovation perspective to a more human centred service design perspective (Ford Media, 2020). An example of this is the recent graduation project on service design methodology implementation at the Ford Research and Innovation centre in Aachen (Jong, 2017).

Understanding and involving the user is one of the pillars of the service design mindset, (Sleeswijk-Visser, 2013) and therefore better ways to do so could improve the outcome of the process. Especially as the problem space is getting more complex, more straightforward design inquiry methods might not suffice to navigate the complexity the way computational systems can. For example, the previously mentioned sharing services are based on complex algorithms that calculate the best possible available vehicle for you.

Furthermore, part of our behaviour is happening and or being recorded in a virtual environment (information searches, navigation, shopping), therefore 'datafying' our world (Lycett, 2013). For Ford specifically this means a wide variety of data which can be researched and used in design for example: vehicle maintenance data or behavioural data from users such as driving distances or charging frequency.

In practice we already see this happening; data in ethnographic research is used to better understand behaviour through digital probes (Bogers et al., 2016, 2018), data is used to optimize digital products by testing different solutions (e.g. A-B testing) and analyse user behaviour. (E.g. heat map analysis) (King et al., 2017). But in order to navigate through all this available behaviour data and use possibilities, it is important to understand what kind of data the Ford design team can act on in order to use data for creative purposes.

Therefore, it is important to create a strategic foundation so that the design team at Ford RIC Aachen can use this is opportunity and start utilizing their technical capabilities and digital touch-points to exploit data as a 'strategic material'. In this way they can improve their design capabilities and be ready for the increased complexity of tomorrow, which motivates this graduation opportunity.

1.2 Project context

In order to formulate the project assignment and research questions, first the context needs to be better formulated. Starting off with the Ford R&D Aachen & Tu Delft research collaboration. As we can see in the visual representation, there are multiple (graduation) projects performed in the Ford-IDE collaboration. These are some of the more relevant projects. In a broad sense we can divide the research project collaborations in three parts: The first project focused more on sensing activities (context mapping, customer journey mapping etc.) the second more on seizing activities (business modelling, service blueprinting) and the third and current URP on using data throughout this project. The previous graduation projects are mostly centred around either using service design methodology to create insights and opportunities in the small commercial vehicle space and one in creating a service design methods toolbox for the Ford team. (Figure 1: URP's)

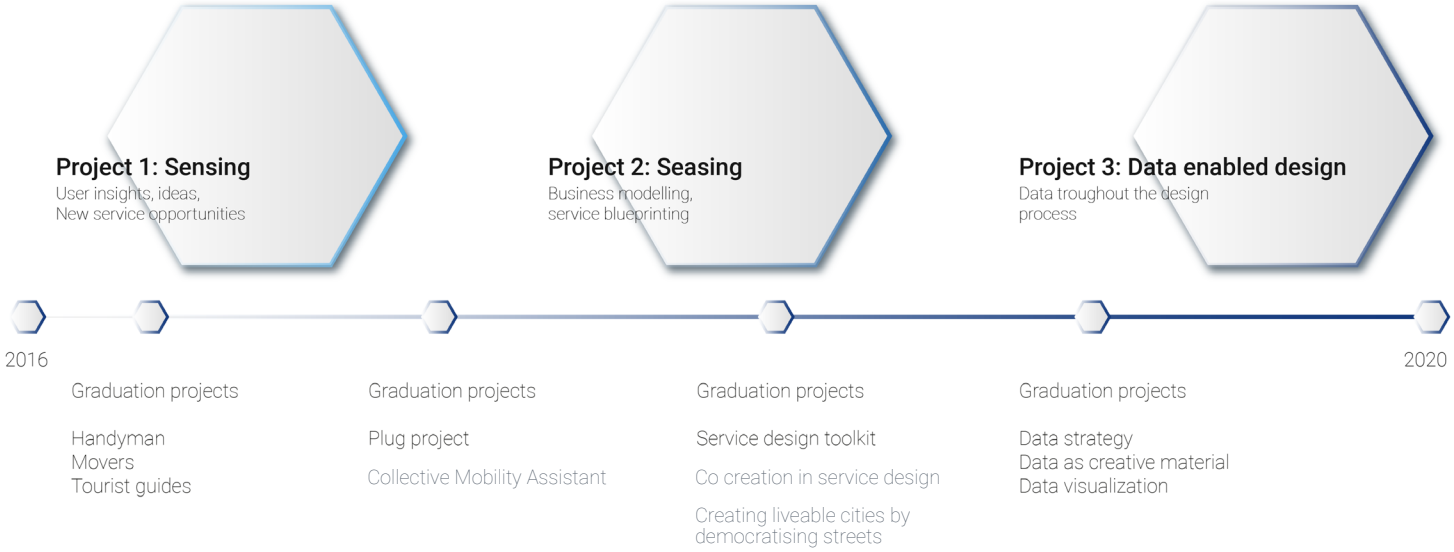


Figure 1: URP's

The RIC team at Aachen described this URP as opportunity for further research into the usage of data in the service design process. The main goal of the development of this opportunity has been formulated as the following:

• Use data in the very early process of design thinking to better understand the user.

• Use data in the creative process to generate new ideas / service opportunities based on data

The following possible outcome directions for this URP are defined by Ford as:

• Using data as inspiration source for new ideas
• Using data to validate user behaviour
• Using data to understand behaviour

In order to reach these goals three threads have been formulated that were -in collaboration with the Tu delft- further developed into three graduation projects: Ford internal project presentation (2020)

This graduation project focusses on the thread: creating a data strategy. This means specifically that during the project the focus will not be on using data in the final design 'form' as the other two projects do, but rather on using data as input for design problems. (Figure 2: components of this URP)

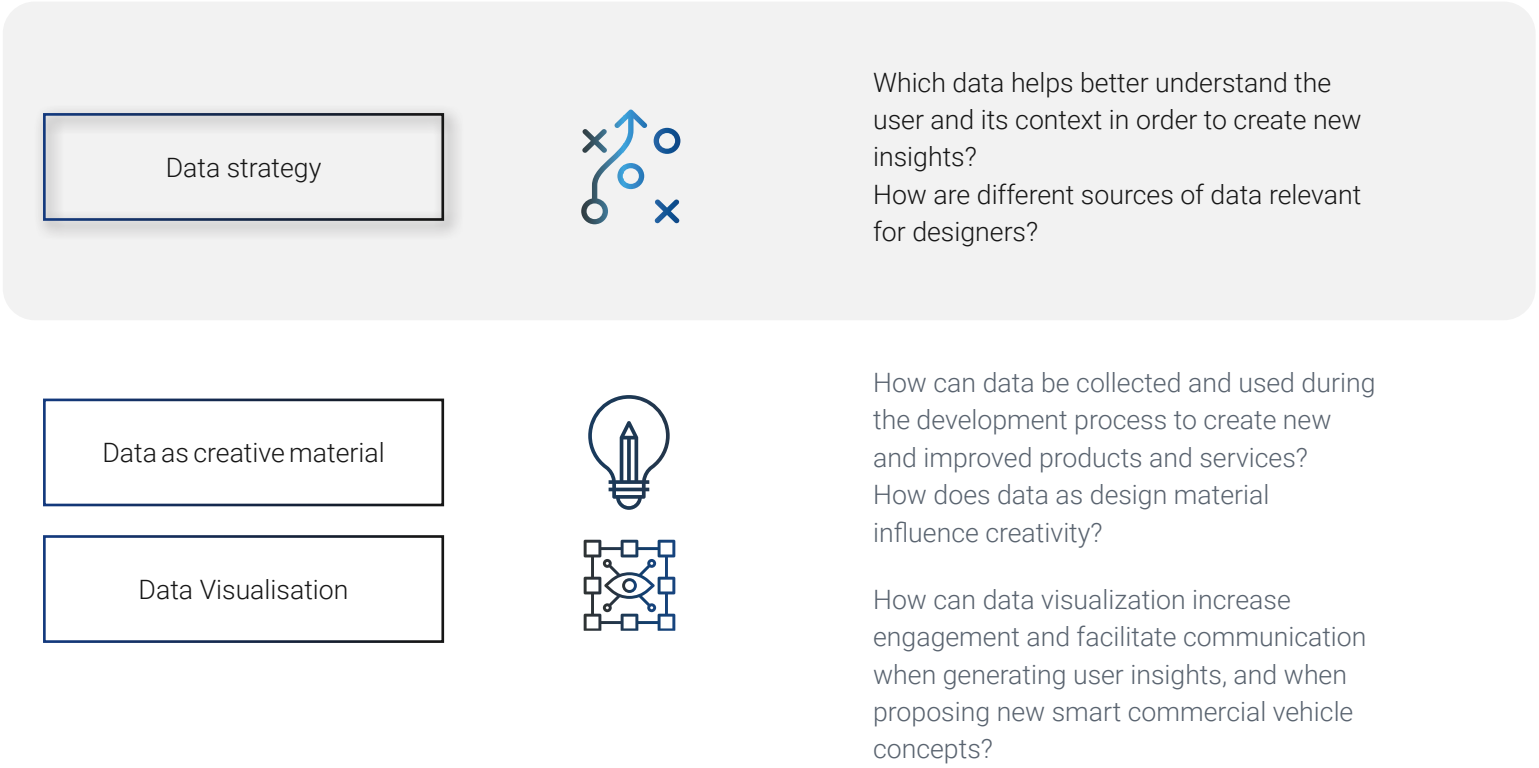


Figure 2: components of this URP

1.4 Stakeholders

In this project the most important stakeholders are the Ford RIC team, the URP team, the mentor & chair and myself. The secondary stakeholders are the Ford customers, the London and other Ford D-labs, the future graduation students and Ford Motor company in general. A overview of the relevance of this project for the different stakeholders is given and the RIC Aachen organizational context is elaborated. (Figure 5: relevance of this project for stakeholders)

RIC Aachen organizational context

The RIC Aachen is one of the Ford departments situated in Germany. Next to the RIC Aachen there is also the GDIA department, which is the global data insights and analytics department which will be further described later.

The RIC Aachen houses multiple departments of which one is smart mobility department. This department is an innovation department that develops new mobility concepts for medium and long term implementation (horizon 2 and horizon 3). The supervisor of this department is Walter Pijls.

The smart mobility department consists of multiple tracks that focus on different projects and target groups. Below the different tracks and involved persons are shown. In order to understand which team members to interview with what purpose, some background information is added.

Craftsman track team: (C.T. team)
Design researcher (and company mentor)
Design researcher (& project manager Smart Rack)
Research engineer (telematics expert)
Research engineer (Seat Comfort and Bio-mechanics)

Active lifestyles track & other:
Design researcher (Innovation management background)
Department supervisor GDIA

Craftsman track Team

This project is done together with the craftsman track team. N. Eikelenberg is the company mentor of the project and weekly meetings to keep the goals aligned.

With the current understanding, the main goal of this team is to design product and service concepts for the Craftsman segment within the small commercial vehicles product line.
The product and service concepts focus on craftsman jobs involving the vehicle and the working routines. For example storing materials and tools, doing administrative work or enjoying a break.

The company research should take the organizational context into account and be aware of the specific role of this team in order to have a mutually beneficial project outcome.

Current projects the team work on include:

Physical concept design work stream:
In this work stream, the team is working on developing a design concept for in the Craftsman trunk. This concept design is focussed around the storage of materials and tools in the trunk.
Service concepts work stream:
In this work stream the team is researching the possibilities to offer digital services that fit with the above described physical concept.

Way of working

When Jim Hackett became CEO of Ford Motor Company, a more user centred approach was implemented based on a four phase process. In this process user centred methods are used in an iterative process. (Figure 4: phases in the design process)

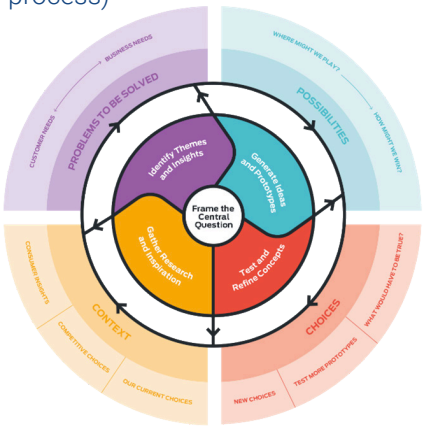


Figure 4: phases in the design process

Service design
Next to the more user centred design approach, Ford is also increasingly using a service design approach across the organization. Service design has seen an increasing interest from businesses and organizations. Economic trends explain this increase by the higher customer loyalty and therefore customer lifetime value that service design can bring over product design. (Reason et al., 2015, p. 3)

Methods and the Craftsman community
The C.T. Team uses qualitative research methods to research the craftsman community, creating photos and videos of the working environment, and performing in depth interviews

The C.T. Team works closely together with a small community of local craftsman in the area of Aachen. This group consists of craftsman with various types of vehicles (not only Fords) and various specific professions: plumbers, painters, construction workers etc.

As the team is now working on a service design concept, service design will be the context in which the process will be explored.

In the context of the goals of this team this graduation project could:

Help the team choose if, and what kind of, data should be used to get additional insights to improve the physical or service concept.

Help to understand in what kind of future projects the currently gathered vehicle data (or other data sources) can help to understand the user better.

As the Ford team is relatively new to the service design methodology, in this research it could be important to show the additional value of data always in relation to the current service design process. This would help see the value of data in a good frame of reference.

Mentor Milene Goncalves & URP lead
The Mentor of this project is also the responsible for the university research project (URP). As URP lead the relevance of this project is to create a solid foundation for future graduation projects as explained in the URP section above.

Pim Jansen (Me)
For this project, my own interests can be summarized in learning objectives and overall expectations of the project.

For this project I want to build my knowledge on the field of digital innovation, gather experience in a corporate innovation setting and overall use a clear scope, structure and planning to have a stress-free project as much as possible.

This project fits my personal interest on how to use data (virtual representation of reality) in the innovation process. I researched the possibility to gather data for CX improvement and the value of google data before pursuing this graduation opportunity. This project best fits my ability to combine my interest in digital (virtual) representations of reality, creating innovation frameworks and working in a corporate environment. My personal learning objectives are:

Project learning objectives

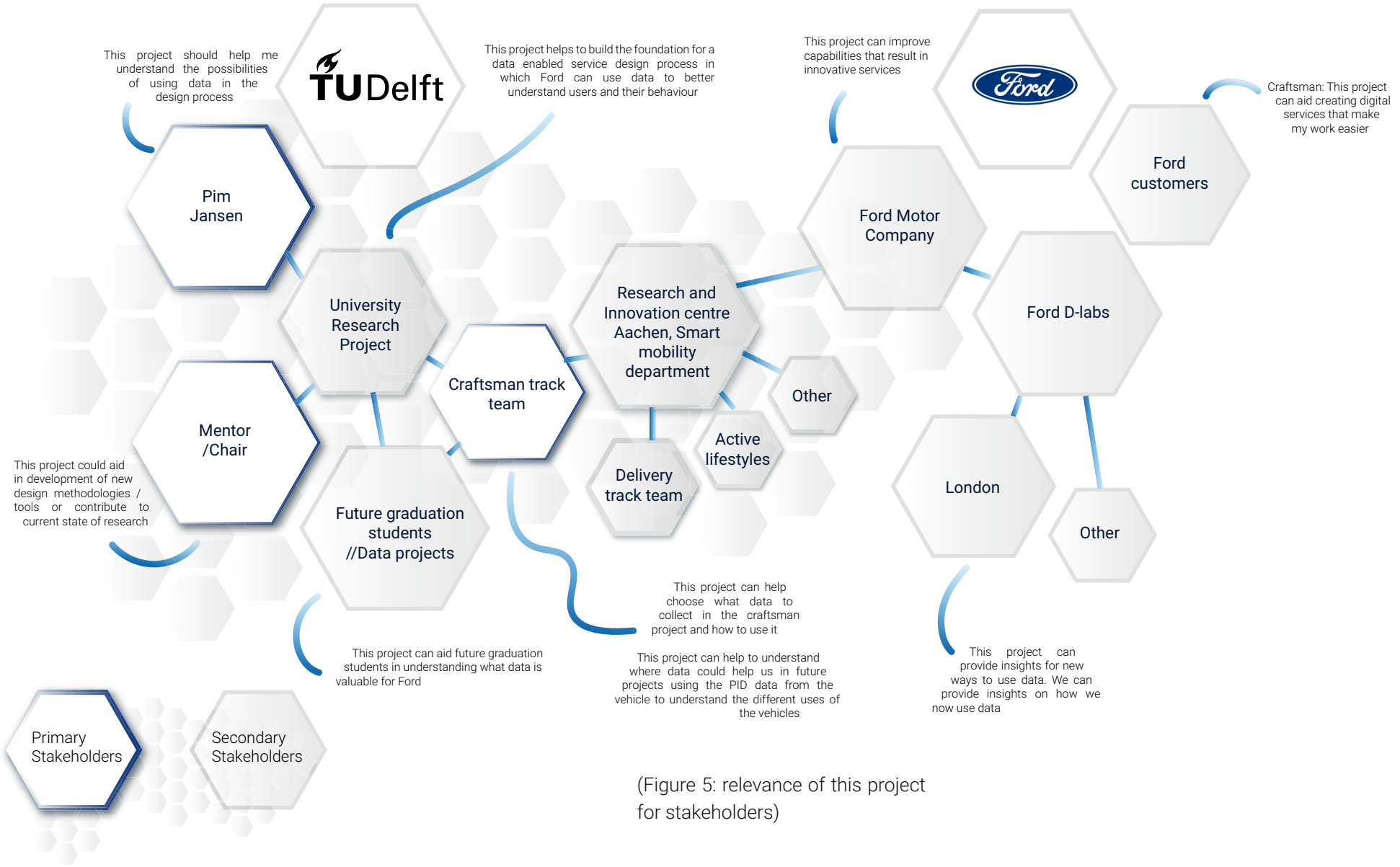
1. Understand what kind of innovation insights can be used for service innovation.
2. Understand how data can be gathered to create these insights.
3. Understand the barriers and facilitators of implementing this in a corporate innovation process.

Process learning objectives

1. Learn to better structure my design process and decisions according to a set planning.

2. Learn to communicate my design process in a clear way for corporate non-designers.

Relevance of this project for different stakeholders



(Figure 5: relevance of this project for stakeholders)

1.5 Research Questions

A preliminary literature review revealed the design inquiry through data framework (DITD) (Kun, 2019). A design inquiry is the process of performing design research in order to come to a design.

The framework proposes an iterative inquiry process that is built on an annotation to the abductive design reasoning framework (Dorst, 2011) (Figure 6: annotated framework by Kun (2019).

This and other frameworks or approaches will be elaborated in the literature review.

The core of the problem is that Ford currently does not know what data and data processing techniques would be available, to what kind of value that would lead and why that is more valuable than their current qualitative observation and interviewing approach.

This led to the following research question in the project brief:

Which design questions (value) in the current service design process can be solved using a design inquiry through data approach? (data-set & data processing technique).

However, based on the previously described context and iterations on the project brief together with Ford a new research question was defined. Now the problem definition are still difficult to define, as the specific value of contemporary data approaches is not yet clear. Therefore the problem definition is formulated as an exploratory research question. In the craftsman track project Ford currently still has a number of uncertainties that need to be solved in order to move the project further. This project and possibly a new data method, could help here.
The main research question can be stated as follows:

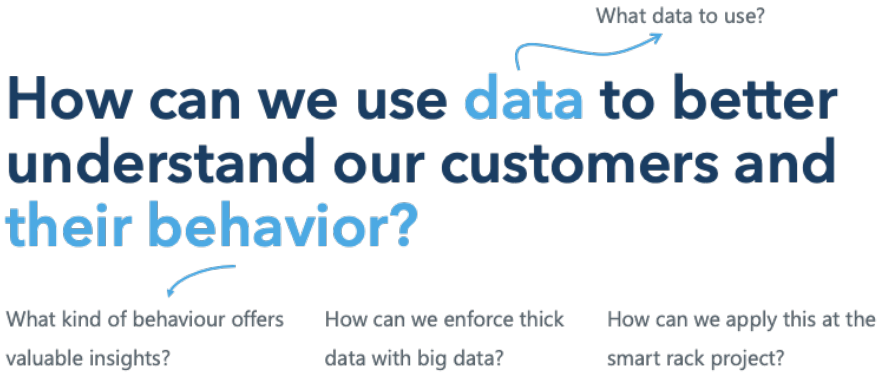
When there is a clear understanding of the possibilities of contemporary data and design approaches the team will be more closely involved and their project will be used as case study.

This research question can be broken down in smaller parts to guide the literature review.

When there is a clear understanding of the possibilities of contemporary data and design approaches the team will be more closely involved and their project will be used as case study.

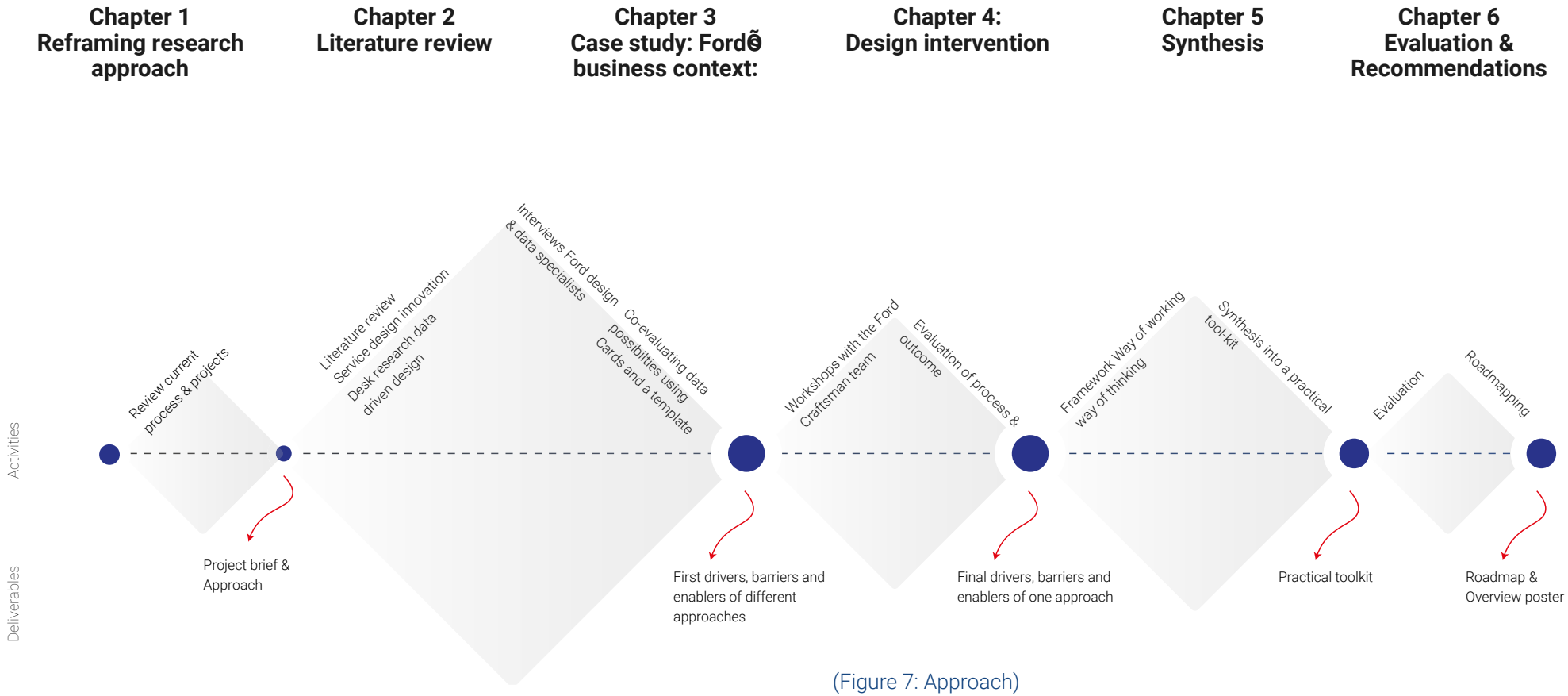
Dataset	+	Data technique	leads to	Value
(thing)		*(working principle)*		*(Aspired)*

Figure 6: annotated framework by Kun,2019



1.6 Approach

The project is divided in five parts to create a structured approach to create clear goals and deliverables to communicate the process to all the involved stakeholders. (Figure 7: Approach)



(Figure 7: Approach)

Chapter 1 Re-framing research approach
In the first chapter the design challenge has been framed based on the business context at Ford and the possibilities based on a preliminary literature view.

Deliverable: Research approach

Chapter 2 Literature review
In the second chapter a theoretical foundation will be created. As this domain is inherently abstract with subjects as 'data' , 'innovation' and 'design' it is key to develop a solid theoretical summary that will provide the Ford employees understanding in the contemporary methods used in the design field. This will also help by serving as foundation for further discussions about what approach would be best.

Additionally it is important to also elaborate practical case-studies where data is already being used in the design process to create tangible examples of theory. The starting point for the literature review will be the dissertation on design inquiry trough data by (Kun, 2019).

Chapter 3 Case study: Ford's business Context:
In this chapter the context in which the Ford team works is researched. Here I will also reflect back on the design goal set in the beginning of this thesis.
First the barriers and enablers of using the available vehicle data are discussed with technical data experts from Ford. Then the possible approaches are reviewed by creating a template that follows steps to choose a specific method. If it appears it is difficult to choose a method, a more practical approach is used.
Deliverables: Cards for later reference & barriers, enablers and drivers of using data in the Ford RIC craftsman team context

Chapter 4: design intervention
As the core problem or the design goal is not yet clear, the current service design project can be used to start to design an approach that makes clear what the value of data should be and how to create a project.
Deliverable:
Service concept, final drivers, enablers and barriers.

Chapter 5 Synthesis
In this chapter I will create a framework from the evaluation of the design intervention and create a practical tool for the Ford C.T. team to overcome the main barriers for implementation of the framework. This tool could be a clear process and thinking guidelines to start implementing data. This approach is based on the learnings from applying the theoretical research in the Ford business context.

Deliverable: Practical tool kit

Chapter 6 evaluation & recommendations
In the final chapter of this thesis I will evaluate the process, show project recommendations and organizational implementation steps.

Deliverable: Roadmap and recommendations.

Concluding

The are many different stakeholders involved in this project. The craftsman track team will be used as case study and for the application of the design intervention. While maintaining structure and scoping to manage the project the focus is on:

1. Practical contribution to the Craftsman team project
2. Repeatable method or tool for the RIC team based on the
3. Contributing to strategic level RIC team goals.
4. Creating the strategic foundation for the URP project

This led to a research question and described approach which has been discussed and agreed upon with the different primary stakeholders.

Literature review

In this chapter literature is consulted to create a solid foundation for the strategy and find what has changed in the field of design, data and mixed method approaches.

2. Literature review

Guiding questions

Q1 : Where in the design process do we perform user research?
Q2 : What tools and methods are used for user research in (service) design?

Q3 : Which types of user insights are gathered for (service) design research?

Q5 : What are the main possible types of data and data processing techniques?
Q6 : What can we learn from previous design inquiry trough data industry case examples?

2.1 User research in the design process

Introduction
A literature review is done to get a better understanding of the contemporary uses of data in the service design process for user research practices.

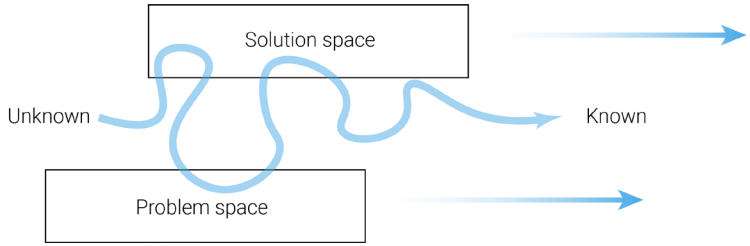
Q1 : Where do we perform user research in the design process now?

In design research process we use an abductive approach where we simultaneously, use user research to better frame and develop the problem space ("what is the problem"), and design the solution space("how should we solve that") (Dorst, 2011, 2015; Dorst & Cross, 2001). (See figure 8, co-evolution model.)
This means that the problem could develop while designing. Making it distinctively different from scientific deductive thinking.

If we want to use data in the design process I should allow for this abductive thinking behaviour. This might become a challenge as most data research is done deductively.

This design process could be described as "stages" according to the Design Council (2015):

Discover: Understanding what the problem is. In this stage we gather insights by e.g. performing interviews



(Figure 8, co-evolution model Dorst & Cross.)

and observations. When all insights are gathered the situation is mapped to better understand the situation.

Define: Using the insights from the previous phase to analyse the situation and make decisions what problem to solve.

Develop: Exploring a multitude of possible solutions based on technological possibilities, co-creating with users, prototyping or other.

Deliver: In this stage we start to test and further develop the solution. Imagining how to seize the found opportunity.

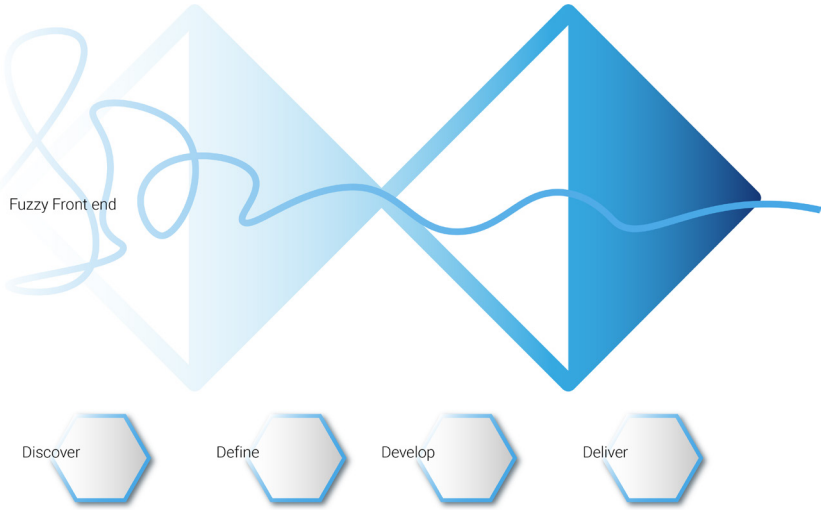
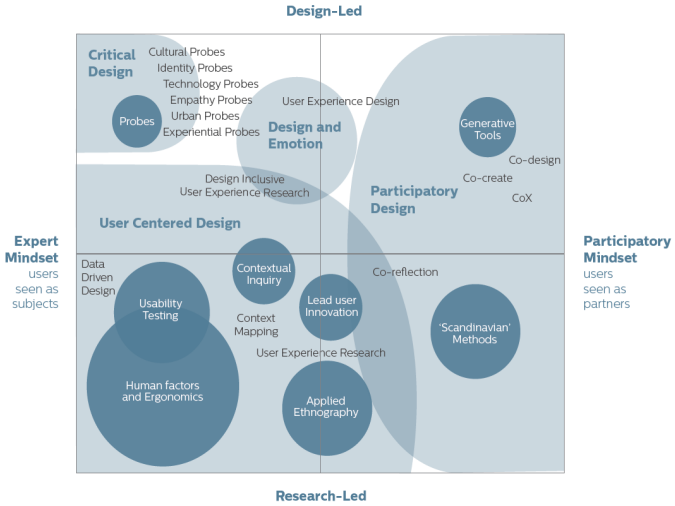


Figure 9, the design process (Design council 2015)

Q2 : What tools and methods are used for user research in (service) design?
Service design in general has a very congruent mindset, methods and tools with design practice in general. Using user research as foundation and design a solution that is viable and feasible.

So how do we perform user research currently throughout this process? There are a variety of tools and methods. (Sanders & Stappers, 2018) explain the difference of different user research methods and their place on the research map on four axis, from a participatory-mindset to expert-mindset and from Research-led to design led. Here we see that there could also be a more abductive design led mindset and a more deductive research led mindset.



(Figure 10, Kollenburg (2018) annotated from Stappers)

Kollenburg (2018) annotated the mentioned research map (See Fig. 10) and also show where the current data-driven design methods (e.g. A-B testing) are placed where an expert mindset is used. This means the user is treated as research subject rather then research partner.

Making a conscious decision about whether or not to include the user is important for the data gathering approach later in this thesis. A more participatory mindset could be more valuable when designing services for example.

Furthermore service design often results in intangible interactions, making visualizations of the insights

important to create a boundary object to help move the abductive process forward (Segelström, 2010).

Interestingly, Kun (2019) describes the use of visualizations also as boundary objects in the design inquiry through data process. Therefore the visualizations used for service design might also be interesting as technique for the process .

Segelström (2010) notes six frequently used techniques: The six techniques are blueprinting, customer journey, desktop walk-through, persona, storyboard and system map. (Fig 11) Where the customer journey and persona are used relatively more in the beginning of the process and the storyboard, blueprint desktop walk-through and system map more towards the end of the service design process. Therefore the customer journey and persona might be interesting to use early in the design process.

Figure 11, visualisation techniques for Service design, Segelström (2010)

Q3 : Which user insights are used for (service) design research?

Visser et al. (2005) explain that we can analyse what users: say/think, do/use, know/feel/dream by using different techniques and revealing specific knowledge. (See figure 12).

Reason et al. (2015) also describes similar user research analysis components for service design:

• What tasks are people undertaking, and how easy are they finding them?

• What are they thinking? Are they conscious of the irritations or on autopilot?

• What are they feeling? Are they highly stressed or relaxed as they feel in control?

Figure 12, user insights

2.2 Different types of data & possible use

Q5 : What has changed in data availability and data processing techniques?

In order to understand how we can use data in the design process we need to know how the data availability changed and how this data is used.

In engineering and science, data is and was described as quantified output from a sensing device. However in the business world, the available data on customers has changed the way we perceive data.

Starting with just demographic data about customers in the form of the Zip-codes for example showing who the customers are. Telling us where they live, if they are male or female and how old they are. This evolved as companies understood that also psycho-graphic or attitudinal data could have value to understand their customers.

Finally with the rise of social media and other online expressive channels, massive quantities of user expressions data became available. This is the realm of real "big data" revealing how customers openly express themselves on businesses, products and so on.

But next to social data, big data also often refers to (a) traditional enterprise data, and(b) machine-generated / sensor data (e.g. weblogs, smart meters, manufacturing sensors, equipment logs). (Dijcks, 2012) When trying to describe big data the applied view of using complex mathematical models for big quantities of data in order to generate probabilities can also be used.

How could we analyse that data?

As the type and availability of data is changing so is business analytics. Business analytics is the term mainly used in describing the process of using techniques to extract business insights from a data set.

In the Gartner Analytic Ascendancy Model (Gartner, March 2012) we can see how the use of data is evolved from descriptive to diagnostic to predictive and finally prescriptive. (See Figure 13) .

Descriptive analytics focusses mostly on reporting, and visualization of historical data. The second step is diagnostic analytics explaining "why" did an event occur?

Predictive analytics focusses on using data to predict possible future scenarios.

Prescriptive analytics goes even one step further by predicting what actions might influence future scenarios.

Predictive and prescriptive analytics are the domain of data science. Large quantities of data are needed for these practices, and are therefore less appropriate for small scale prototyping research.

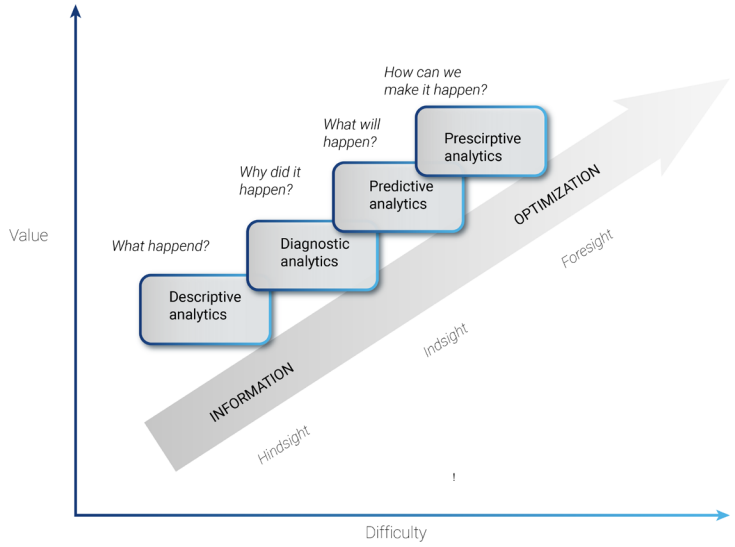


Figure 13 based on Gartner ascendancy model 2012

Q6 : What can we learn from previous design research trough data industry case examples?

An opportunistic exploration of literature on the use of data in the design process shows the development of the type of data (Big/ thick/thin/small), the used analytics (technique) and the aimed value of the researchers.

Bornakke & Due (2018) distinguish big-small and thick-thin data. Social media data (text) big thick data and big data sets from sensors (like in ethno-mining: GPS, time codes etc.) referred to a big thin data. Small thick data are observations/interviews and small thin data are sensors used in a small sample size. (Descriptive analytics)

The currently mainly used types of big data are either on the experiential side showing what people say (trough digital channels) and on the behavioural side: what people do (trough sensor data). See Fig 14

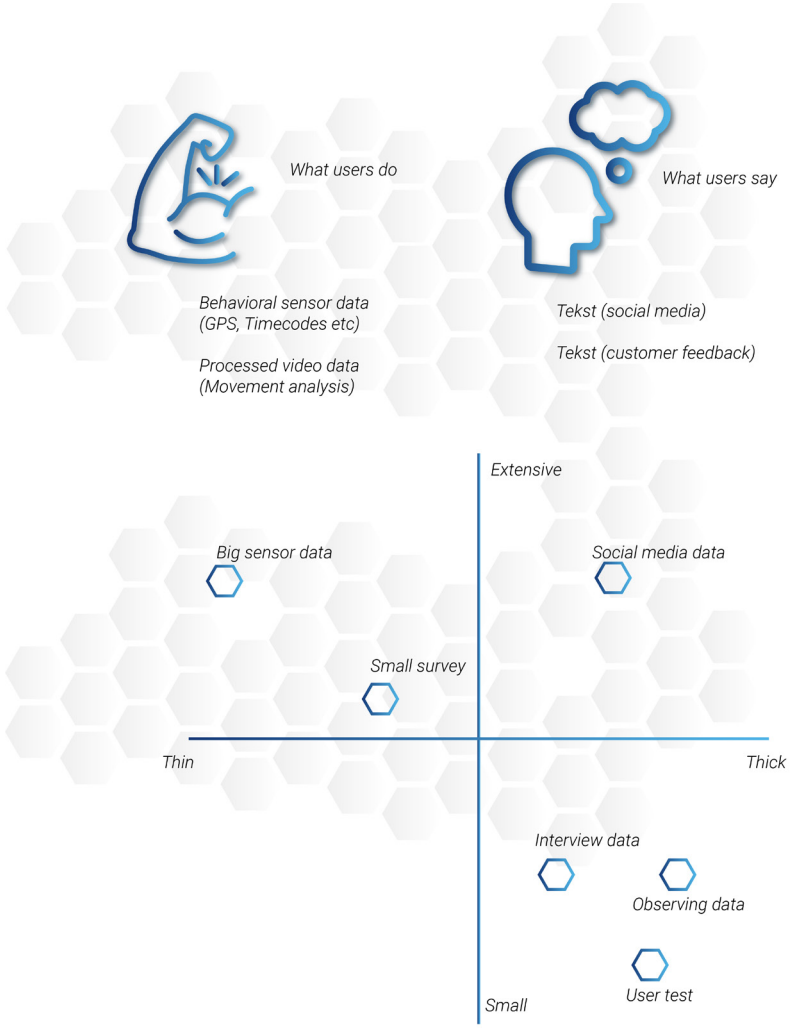


Figure 14, types of data & user insights based on Bornakke & Due (2018)

As the scale and the interaction importance between products and real world behaviour becomes more important for design research, the researchers more often need leave the comfortable research or innovation lab and go out “into the wild” to perform in-situ studies (Chamberlain et al., 2012).

Gathering data on the use of products however, is under explored within the industry as a means to generate insight and design new products (Gorkovenko et al., 2020). Although there are examples of the use of these methods and the differences of researching behaviour “in the wild” vs in the lab has been illustrated (Crabtree et al., 2013), the challenges of scaling these practices and adding qualitative data are still limiting adoption.

One of the main concerns for in-situ research are related to privacy and surveillance capitalism. Next to increased regulations and consumer averseness against data surveillance there are many ethical considerations

in gathering data to prevent taking in a similar role comparable to social media corporations selling consumer data to advertisers. However there are ways to evade these practices and take a responsible approach. If the collected data is part of the core functionality of the product, (Zuboff, 2015) and this collected data is also visible or accessible for the users the transparency and therefore adoption and opportunities for scaling the research responsibly increase.

Finally, by including the possibility for the user to interact with his data and add feedback, a more complete image of the use context and experience is created and the users are continuously reminded and informed about the collection of the data (Gorkovenko et al., 2020). "The acceptability of the process would be crucial to adoption, and the experts felt this could be increased by giving users access to and ownership of their own data, "everyone has visibility and control of the data collected about them" (Gorkovenko et al., 2020). Kozinets (2002) is amongst the first researchers on the analysis of online customer behaviour or expression in the form of communities for marketing purposes, called net-nography. (Small online thick data). Jones et al. (2007) uses a slightly more advanced analysis in a combination of process logging (small thin) and qualitative methods (small thick) (interviewing, observing) in a design process of redesigning a software product.

Anderson et al. (2009) describe a specific method of combing thin and thick data: ethno-mining. This method combines database mining techniques on behavioural data. For example location log data. In this example behaviour was logged using laptop use data and location to discuss with participants when they felt busy and when they were actually working hard on their laptops.

These data on behaviour is also referred to as digital traces. Two specific case studies show how Bornakke & Due (2018) envision this blending of big and thick data.

The first case uses video data and advanced facial recognition to analyse movement in a optometry store in combination with in depth observation. This resulted in important places in the store interaction. A second case study first analysed cycling routes (thin) see figure 15 and blended this with interviews and observations (thick).

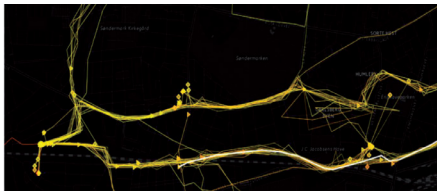


Figure 15, cycling routes (Bornakke & Due)

Meierhofer & Meier (2017) describe the use-case of a big dataset of demographic and behavioural data in combination with clustering to define natural groups/segments. Which used energy usage data patterns for a new service offering for the connected home.

In the "connected baby bottle" case study performed by (Bogers et al., 2016) the question of how contextual (thick) data can be blended with quantitative (thin) sensor data is explored. This approach is later developed in Data enabled design. (DED) They use interviews and observations together with sensors in a baby bottle to define which factors influence specific behaviour. Measuring the factors that are almost invisible to human perception (baby drinking distractions) and making them visual can give insight into specific patterns and motivates the decision for this method.

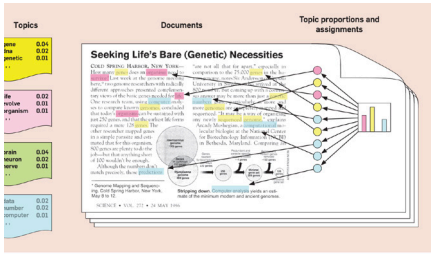
Pannunzio et al. (2020) refer to this Data enabled design method as valuable use of data in service design. They refer to the value in temporary use as quality of services resulting in the essential need to continuously use data to ensure timeliness of the personal experience. DED especially accommodates for the development of these personal services using in-situ remote gathered data on the use of and context around the prototype.

De Götzen et al. (2018) show discussed a case study where open (social media) data is used in

explorative approach in order to first explore and then frame the problem space. The combination of public data could provide a much more “live” picture of large scale events, trends, or social phenomena.
Data could be especially valuable in service design for these kinds of large scale problems. Service designers could use the abstracted data ideas into human-scale service offerings. This is also seen in workshops in the dissertation by Kun (2019).

In the workshop students study a complex social phenomena of mental health for students. By using a framing method known as NADI (Needs, aspirations, Design, innovation: van der Bijl-Brouwer & Dorst, 2017) they used open-data in combination with interviews to “frame” the problem.

McColl-Kennedy et al. (2019) Use text (thick) and numeric (thin) data from a customer satisfaction survey together with advanced descriptive and predictive text analysis techniques to better understand, manage and improve their current customer journey. This case study shows the possibilities of applying a combination of qualitative and data science approaches.
Blei et al. (2010) show an example of manually coding of text that later can be used as input for to create a machine learning / topic modelling algorithm that gives better insight in the big-text data. (Figure 16)



Kun (2019) created cards to show most common data-sets & data techniques. (see Fig 17) these show a general overview of the different types of data. Ranging from more thick: Text, to more thin: timestamps.

Design with or from data

The found examples can be divided in design by, with and from data. (Speed

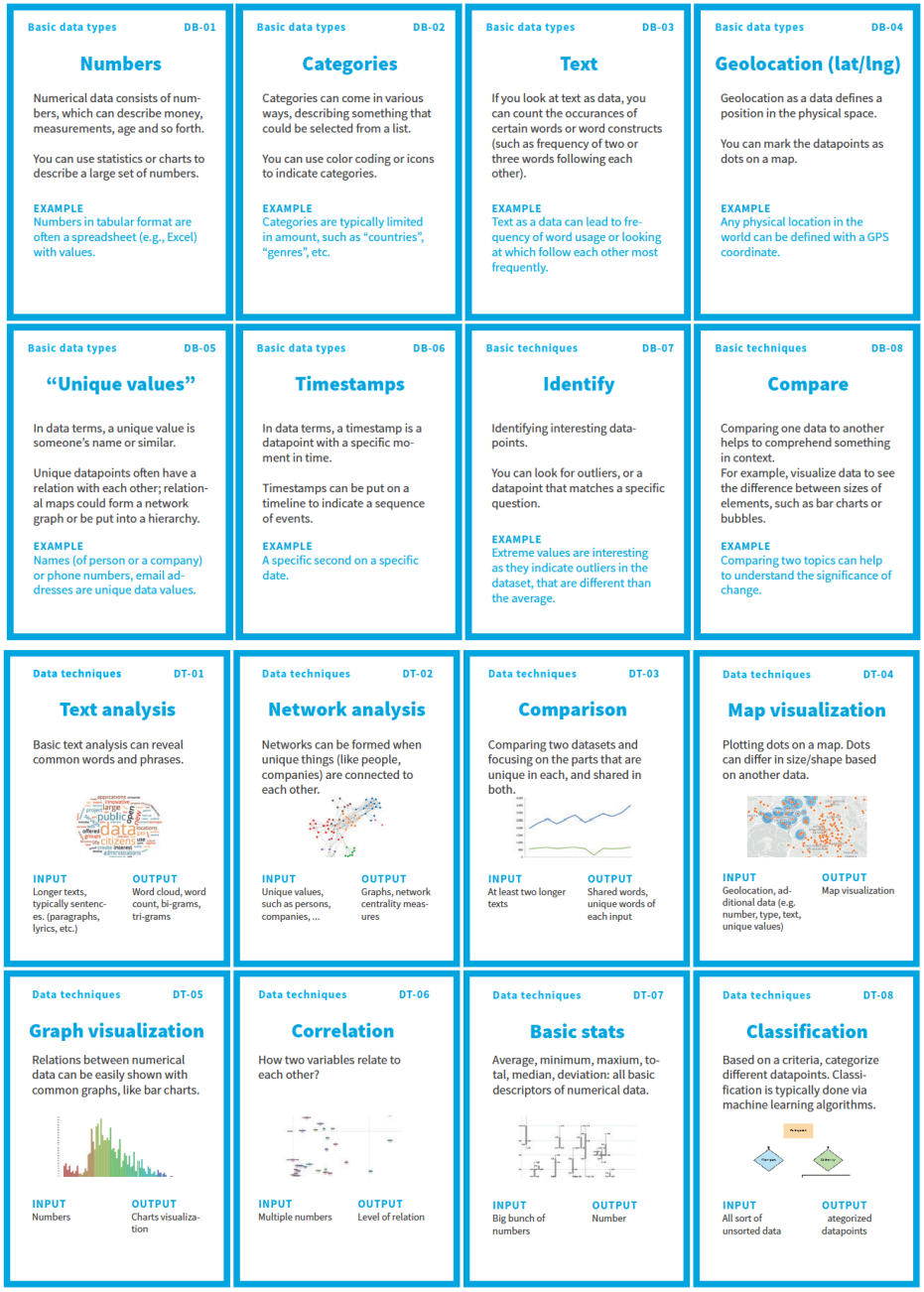


Figure 17, Common data types and techniques

& Oberlander, 2016)

- Design from data (using data to inform or inspire designers)

- Design with data (using data as material to design with for example data visualisations)

- Design by data (data fuels algorithms that create or adapt products and services)

Mostly , the examples use design from data as this was also the first focus of this thesis (using data to better understand the user.)

However in some service specific use cases of data , data is also being used in the final design providing information visualizations to the user, to design from and with data. (DED)

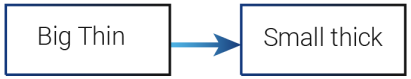
Processing techniques

In general the data that is being gathered is processed with descriptive methods. We see two themes emerging where there is always a mix between the four quadrants.

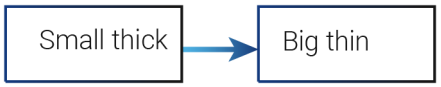
These mixed methods are not new however and could be compared to traditional mixed method strategy of performing a survey to ground observations of a specific phenomenon. (Bryman, 2006)

However, the extreme granularity of big data allows us, as Bornakke & Due (2018) state;

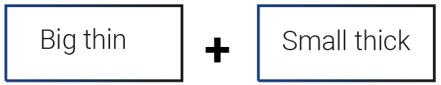
Creswell and Clark (2017) show three main research purposes of sequenced mixed methods research, freely annotated with some previously mentioned examples from literature.



1) Explanatory capacity; (using interviews to explain a found behavioural pattern in the data: Cycling routes (Bornakke & Due, 2018))



2) Exploratory capacity (using interviews to select which data to gather (Kun, 2019))



3) Converging capacity. (Using Thick and thin data to compare differences)

Bornakke & Due propose (2018) four strategies for the use of data in mixed methods. Calibrating, contextualizing, adding the why and adding scale of behaviour. See figure 18.

Strategy	What is done?	When should it be used?
Calibrating	Observations from Big thin data are blended with Thick observations to calibrate the data.	When working with experien-tal data that is succeptible to noise
Contextualizing	Observations from Big data are blended with data extrac-ted outside of behavior that leaves digital traces.	When working with big data that is limited to a specific infrastructure
Adding the why	Observations from big data are blended with thick data to explain the ofund patterns.	When working with abstract thin data.
Adding scale of behavior	Exploiting the granularity of big data: showing the extend of found behavior in thick data.	When the need is to evaluate the extend of certain behavior.

Figure 18, four strategies for the use of data in mixed methods

What is the aimed value?
In the previous section several examples showed what kind of different data-sets are used. Looking back at the framing factors of a design inquiry we can see these cases use mixed methods approaches for with different purposes or aimed outcomes. These can also be plot into the framework of Bornakke & Due (2018). (See figure 19)

Exploring topics in the early phase of the design process.
Researching large scale phenomena by using open text data and small interviews/ observations/ manual coding.

Directed: analysis of owned sensors
Using small data to strengthen the value of big data, adding the why to found patterns when the behaviour is clear and has just one parameter: e.g. location for bicycle routes. (DITD) (Bornakke & Due, 2018; Dove & Jones, 2014; Kun, 2019; Muller et al., 2016)

Directed: finding specific functional needs in measurable behaviour. Using new sensor probes.
When the question is how different users behave differently on a specific task, for example biking to work, based on Bornakke & Due (2018) baby's drinking from a bottle. (DED) (Bogers et al., 2016) The value of data

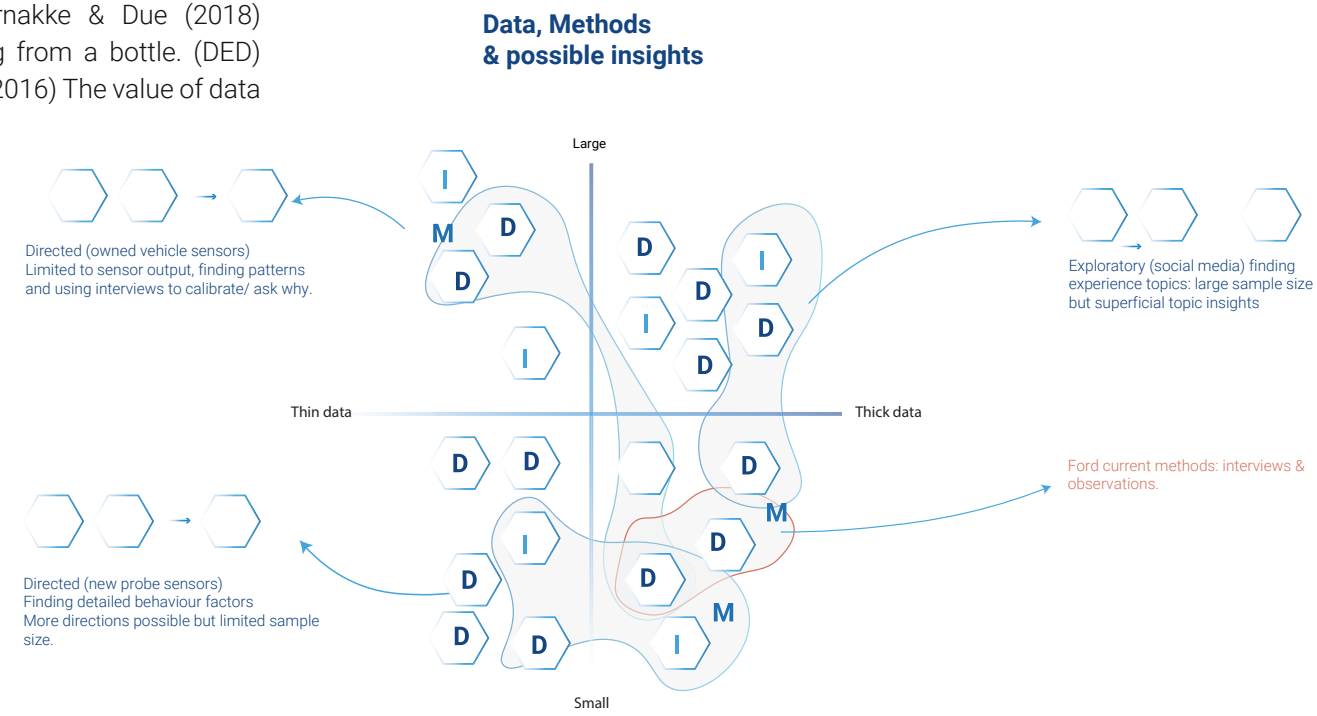


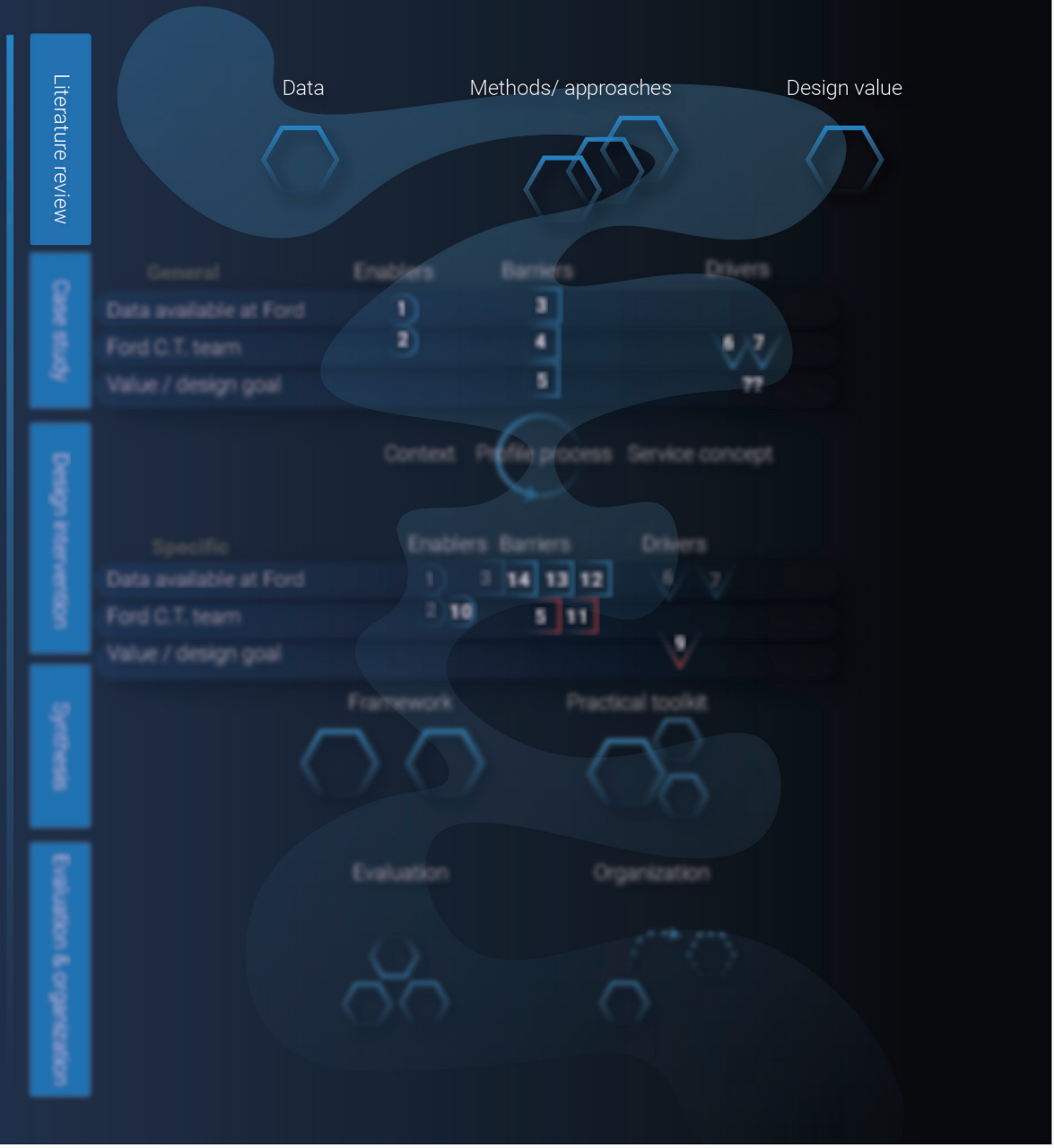
Figure 19, contemporary mixed method approaches

Concluding

A designer mostly follows an ***abductive process,*** where the problem space and solution space co-develop. Visualisations like ***customer journeys and persona's can help as boundary object*** in a service design process. Designers can use open data from social media, collect sensor data from our current products or use new sensors.

For users' ***explicit functional needs we can use sensor data*** that represents parts of the customer behaviour e.g. time-coded opening of a freezer for snacking behaviour. ***For expressed users needs or contextual information (big) text data can be used*** from social media sources, customer feedback or experience probes. In the (service) design process we see a plethora of mixed methods where qualitative and quantitative are being combined using big, small, thin and thick data. It is ***important to purposely choose the sequence in mixed methods*** as they are categorized in specific purposes for a sequence (first big then small etc.): explanatory, exploratory and converging. Calibrating, contextualizing, adding the why, adding scale of behaviour.

In literature we currently find two approaches that are valuable for service design and not linked to one specific problem or use case.
The first uses open and social media data very early in the service design process to (re)frame complex open problems better. (Design inquiry trough data) Kun, 2019) The second uses ***behavioural data for the development of personalized and context depended services*** where, in an iterative process in-situ data is gathered to understand the value the service should deliver. (Kollenburg & Bogers, 2019; Gorkovenko, 2020; Pannunzio et al., 2020)



Case study at Ford

In this chapter the theory from the literature review will be used to start exploring how this relates to the Ford C.T. team.

Case study at Ford

3.1 Case study methodology

Methodology in study

Now that a broad overview is made of all the new possibilities of using data in the design process, we need to better understand the Ford context and see how this context resonates with the found theory.

For example, if the theory suggests researching sensor data for behaviour, who in the C.T. (Craftsman track) team would research which data set, how would they gather the data and most importantly what design problems or challenge do they have to start researching?

A Case study is chosen as research approach as this best fits the needed insights. And allows for an in depth investigation in a specific phenomenon. The intention is not to research the whole company but rather the processes and possibilities concentrated in a specific situation. (Yin, 1994) An overview of the data gathering methods and participants is shown in the figure 20 and 21 on the right. The rationale for specific participant selection, methods and the outcome of the research is elaborated for each method separately on the following pages. Below the main set-up of the case study is shown. For more detailed information about the teams, see the stakeholder overview on page 10. The results of the informal conversations are added to the results of discussing the data template.

Research context:

During this case study the stakeholders unfortunately were still all in lock-down due to the COVID-19 Virus. Therefore all the research and collaborations are trough online channels.

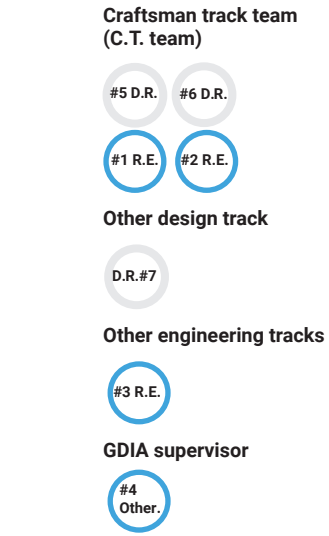


Figure 20, Participants

Participant selection

For this case study in the three used methods different participants were selected. The participants were selected by purposeful sampling based on their role within the department and their specific expertise. The participants were selected either based on their knowledge about data availability within the company, or by their knowledge of the way of working in the team. Participant #5, #3 and #2 were Dutch speaking so the quotes are translated.

Data gathering method	Objectives	Participants	Interview date	Time/ amount of meetings
Online, recorded interviews Semi-structered interviews	Data availability and limitations of research directions.	#1 Research engineer (Involved in S.R. project)	8-12-2020	+- 60 minutes
		#2 Research engineer (Involved in S.R. project)	20-12-2020	+- 60 minutes
		#3 Research engineer (Not directly involved in S.R. project)	07-12-2020	+- 60 minutes
		#4 Supervisor connected vehicle & analytics (GDIA)	11-12-2020	+- 60 minutes
Working together in online workshop environment (MIRO) Discussing data template	Understanding team way of working Discuss which approach that fits problems/ hypothesis of team	#5 Design researcher (Mentor & team member S.R. project)	10-12-2020	+- 60 minutes
		#6 Design researcher (S.R. project lead)	11-12-2020	+- 60 minutes
		#7 Design researcher (not involved in S.R. project)	3-12-2020	+- 60 minutes
Informal conversations	Getting a better understanding of specific components	S.R. project team members	//	//

Figure 21, Case study overview

3.2 Semi-structured interviews

Objective semi structured interviews

1. Data availability & limitations
Mapping the available and usable data Ford team to use in their design process.

Data gathering method:

Semi structured interviews
In order to gather in depth knowledge on the working context in the smart rack team and the rest of the department, semi structured open ended interviews were conducted (Patton, 2002). This was to allow for a more open and informal conversations. In order to guide the interviews and allow for the objectives to be answered, two guiding templates for the interviews were used for the different objectives and different participants.

Interview guide:
To make sure the necessary data was gathered a interview guide with specific topics was made. As the goal was to research how the theory would relate to the situation at the Ford design team, the insights from the theory were used as main check with the research engineers. The interviews changed the understanding of the context and therefore each interview informed and slightly changed the direction of the interviews. However the following main topics were discussed:

1.The role of the researcher in relation to the C.T. team

2. Discussing the two main theoretical directions:
- Researching (open) social data sources
- Gathering new or existing sensor data from vehicles.

These directions were evaluated based on a couple of factors that in influence the possibility for application. These were:

- Limitations and possibilities of the different types of data
- Limitations and possibilities of the team's capabilities of researching the data?
- Enablers in the organization in terms of capabilities or resources.

Participant selection
As explained in the project context, the RIC Aachen is a research institute where a large group of technically schooled researchers perform technical research to improve the Ford vehicles. The research engineers from the C.T. team are selected as main sample. As they have the most experience with research projects and expertise on the available data in the vehicles.

Furthermore, snowball sampling led to one other research engineer from a different department and the supervisor of the GDIA department.

The other research engineer has specific experience in setting up data research projects and the supervisor from the GDIA department has specific knowledge on the availability of data within the company.

3.3 Results

Introduction
The interviews led to understanding of how currently sensor data is used and what the possibilities are for including sensor data in the design process. The transcripts can be found in the Appendix A.

General insights about the available data and data gathering possibilities

Vehicle data gathered from modems
Starting around 2015, Ford took a new path in their data strategy. (Interview supervisor GDIA, 2020) By implementing modems in all new vehicles data of the main functionalities could be collected and send and stored in the cloud infrastructure. In order to become more user centred Ford created Ford D-labs which started to use the gathered data from modems to create new products and services that support the vehicle functionality. Many of these services are available from the Ford pass pro app, an application that aids the users with tasks related to the vehicle: checking if the vehicle is locked, checking car maintenance etc.

PID Modules logging data
As not all vehicles already have modems installed that send out the data, Ford research teams also use CAN (Controller Area Network) loggers to gather the OBD2-PID (On-board diagnostics Parameter IDs) data. (see figure 22)

This means that Ford connects a data collection module to gather specific parameters of data (PIDs) from a small part of the functionality of the vehicle (CAN networks). This could for example be some sensors that measure engine related parameters or driving parameters.

This approach is currently also used in other research projects.

In figure 23 we see an overview of the available data sources that are currently gathered with use of this specified measuring module and the behaviour we could research with this.

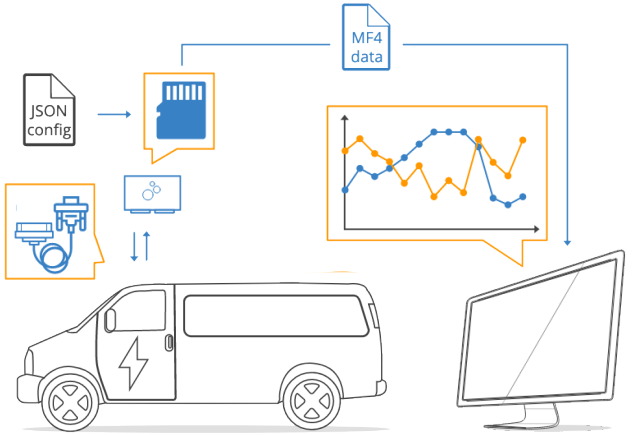


Figure 22, OBD2-PID layout example (csselectronics,2021)

	Available sensors	What behavior can we distill from this?
City context	Timecode Gps location Ambient air temperature, ambient air pressure	Where are people going? How long are people staying there? How often are they doing that?
Driving context	Gas pedal, brake pedal, steering, gear, speed	How are they driving?
Battery system	Battery status/ charging status, driving distance, driving area (GPS)	How often are they charging? How much do they need to charge? How much distance do they need to cover? How far does there reach need to be?
At location context	Door open/ closed Door locked Timecode	How long are they spending in the trunk? How often are they in the trunk? When are they in the van?
Engine context	Brake warning, oil pressure, fuel economy, tyre pressure	How well is the engine doing?

*non behavior revealing data.

Figure 23, overview of the currently available data sources

Open data

Next to the vehicle data, it is also possible to collect data from social media or other open online sources. In the specific use case of the smart rack, performing small scale netnography studies on Youtube video comments or handyman communities can reveal additional insights. However, after discussing these directions with the research engineers, the general view was that this did not fit the capabilities of the research institute as they are more used to using sensors and sensor data.

Therefore using the sensor data seems more interesting for the first steps in using data in the design process.

Discussing practicalities of gathering sensor data

#1 C.T. Research engineer:

When setting up a research sample group a strongly limiting factor is getting recipients with new vehicles that are already equipped with modems. This is difficult and currently the team only has a small group of handymen in the community with a mix of vehicles old new, Ford and other brands. As the cars with modems & Ford pass apps are more difficult to recruit for the research it is more feasible to implement independent pid module loggers. Also the Ford pass pro App as data source is limited due as there is not yet a close collaboration with that team:

"The Ford Pass app can be used as data source, however this is made by a specific team and needs a specific access contracts to be able to work with the data. "(#1)

#2 research engineer

From the PID's we can log data, however there is not a dedicated and skilled person currently to start analysing this data yet. If we would use a video camera for example, this can cost around 2/3 days for a single handyman data log of a week. Furthermore, the PID stops logging when the car is turned off so for example the door opening/closing data is already not reliable. This also became clear in the analysis of the data in previous projects.

When discussing the behaviour mapping approach using sensor data, as in the Data enabled design methods we discussed the possibility to research the daily activities of users trough GPS logging.

"It is possible to gather GPS logging data in order to map the route. This data could be gathered now and a project could be created." (#2)

As the data is not always reliable, good calibration and data cleaning is needed. Furthermore mixing qualitative and quantitative sources is very important.

#3 Supervisor GDIA

The GDIA department is responsible for the collection, storage, management and analysis of the data from these modems. The supervisor GDIA mobility is responsible for the research projects that are done with this data. Although this data has now been collected for a period of time, the projects according to the supervisor, are mostly focused on maintenance and performance improvement of the vehicle.

Insights using data in the design process:

In general the researchers know how to perform research, meaning they know what data to select to find the right answer. However, during some informal conversations it seems that the researchers need a clear research question or problem that the design team needs to indicate. In one of the conversations when asking a researcher about the types of data in the vehicle this also became clear:

"It is not about what data there is, but it is the other way around, what question do you have, then we can look if we have the data." #1

3.4 Discussing possibilities with a data template

Objective discussions:

2. Understanding team way of working

How would the designers go about selecting a data source and approach for research?

Data gathering method

It needs to become more clear how the design team would select one of the contemporary approaches from all the found literature. This could help to identify what kind of research problems or interesting directions should be further developed. However, the Ford design team currently does not have a clear overview of all the possibilities of data to choose or create an approach. This report might not be the best format for an open discussion.

By designing cards with the most important insights and recent developments in a visually clear an appealing way, the Ford design team can understand what has changed in the possibilities of using data in the design process. The cards will be used as a starting point for further discussions with the team to see how they can act on these developments. However the cards alone will not help the team choose. A "flowchart like" template (Figure 24) where the available data tools and methods are shown has to be created. This, under the assumption that the designers would be able to recognize the approaches and link them to problems they have in their design process. The template will be evaluated with the team on the approaches or directions and an attempt will be made to fill in the steps.

Participants

As explained, the C.T. design researchers and a design researcher from a different project are selected for this study. With participant #5 (the company mentor) The template is evaluated and iterated across three meetings. With participant 6# The template is evaluated and discussed once with participant 7# the template is discussed once.

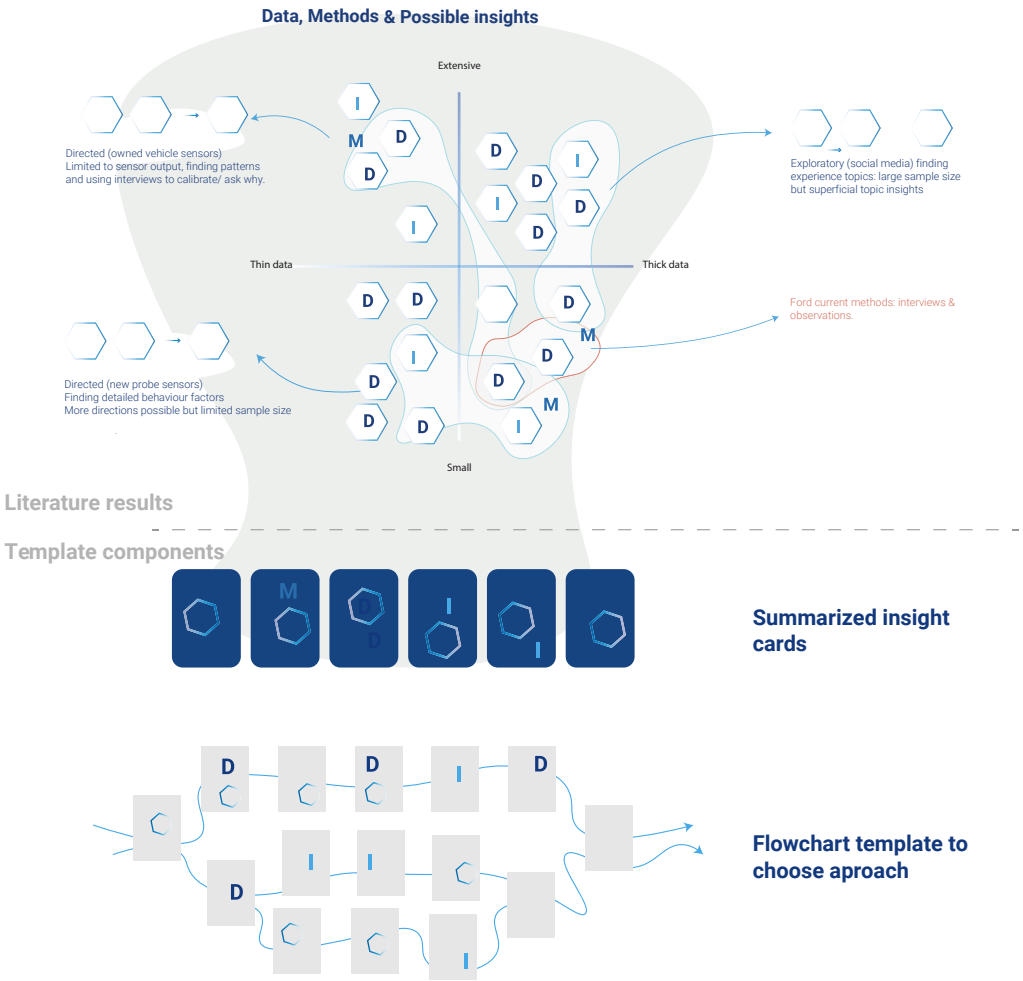


Figure 24, Contemporary methods, summarized insight cards and template

Creating the cards

When reviewing the insights from the literature, I want to show what has changed in the data landscape and how the designers can act on this. Therefore I created 7 questions that in my view give the best framework for identifying what's new in using data in the design process and that are relevant for the Ford design team.

1. How can we designers use data in general?
2. What has changed in data availability?
3. What insights would we want to gather?
4. What differentiates big, small, thin and thick data?
5. What types and techniques are there available?
6. With what purpose should we use these mixed methods?
7. When should we use new methods?

By creating the cards in a clear and visually appealing way, they could be used as tangible artefact for the ford team to review the key insights when this project is done .

Figure 25, Designers using data

Figure 26, What changed?

Figure 27, What do we want to know??

Ford could use data in two main ways: designing with and designing from data (Speed & Oberlander ,2016). Designing from data is feasible when the scope allows for already available data. However when implementing new sensors the process will use a more design with data approach. (DED)

Although there is a large quantity of data being generated there are limitations to this data having value for Ford. Open social data could be used for many open problems, (Kun, 2019) but sensor data is limited to the sensor output. (Bornakke & Due, 2018). DED could be valuable for service design when using very specific sensor data. Pannunzio et al. (2020)
We could gather data to find two main types of insights:

Functional needs when gathering data about functional behaviour.

Emotional or contextual needs: when gathering data about expressive behaviour.

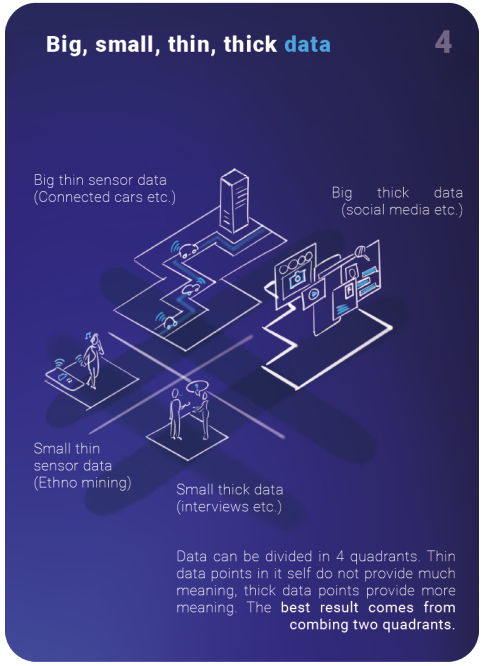


Figure 28, Big small, thin ad thick data

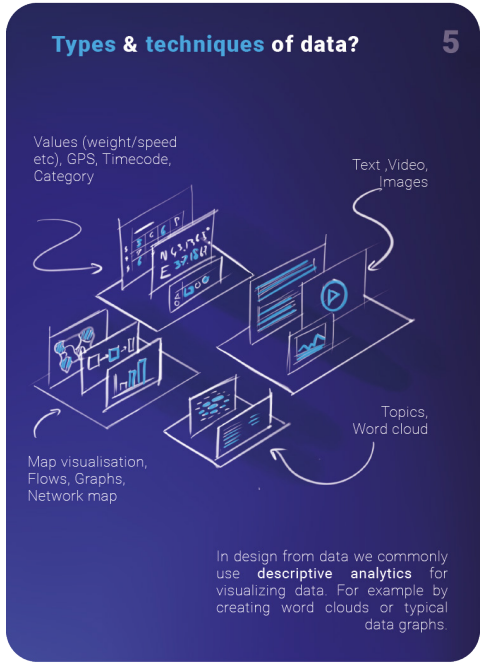


Figure 29, types & techniques

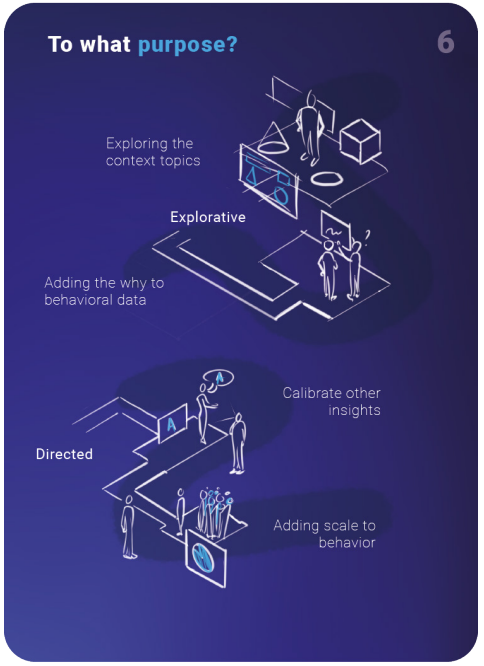


Figure 30, Purpose

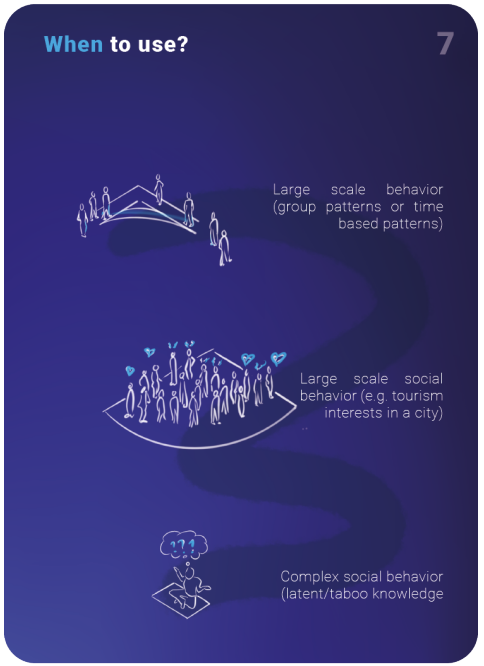


Figure 31, When to use?

The different forms of data allow for different approaches. Using small thin sensor data is better for small scale prototypical research (DED), where the big scale data allows for more complex analytics, e.g. McColl-Kennedy et al. (2019). The quadrants are especially helpful to better understand the mixed method approaches. (See card 6.)

The different types and techniques also can be organized by thick and thin. Where usually the thick data sources are more easily openly available and the specific owned sensor data. For example energy use data (Meierhofer & Meier, 2017).

In order to gather valuable insights, a combination should be made with the two quadrants by using a mixed methods approach. E.G. finding context topics by first interviewing and then exploring open data (Kun, 2019), or interviewing/observing, then placing sensor data (DED), and then calibrating, adding the why or adding scale of behaviour.

Finally we see three main purposes to use these new types of data. These purposes use the qualities of data to either make complex situations understandable: user behaviour on a large scale (opinions/behaviour) by using computational capabilities.
Or using data on smaller scale latent or seemingly invisible behaviour to the user and the designer.

Creating the template

As discussed in the conclusion of the literature review, two main themes are described with different approaches. Methods similar to the data enabled design method implementing new sensors in a prototyping probing approach (more DED), using available sensor data to research behaviour data or using (social) text data to explore context topics (more DITD).

The design inquiry trough data approach (Kun, 2019) could be used earlier in the process when specific behaviour has not been chosen yet and open data sources in combination with interviews are used to better understand a situation. This approach really fits the design from data description. This approach however is limited to available open data sources. If there is nobody from you target group actively expressing him/her self online about your market it does not make sense to do this.

New sensors or using current sensors to measure behaviour (more DED)

The data enabled design method (Kollenburg, 2018) follows a more directed approach that helps to find patterns in behaviour when there is not yet data available. This asks for more specific decisions as sensors need to be installed that are focussed at specific actions, in contrast to the open text and thick data sources. This is a more design with data approach, but could therefore also result in more personalized services.

These two main approaches are used as foundation for the template, where we look at one of the approaches as more exploratory: trying to find topics , and more defining: sensors to measure behaviour. I imagined which factors play a role in setting up a research project and combined these after some iterations in two main flows. (see Figure 32)

In this template you as a designer first imagine where you are in the design process based on the challenge you are facing.

Then you identify what kind of questions there are in this problem and with what kind of data you could research this.
In the next page the main outlines of the template are shown with some example steps consisting of a topic and questions I used in the template. (See figure 33)
Each card illustrates a step in the template where an important decision is made. The full template is available in appendix A

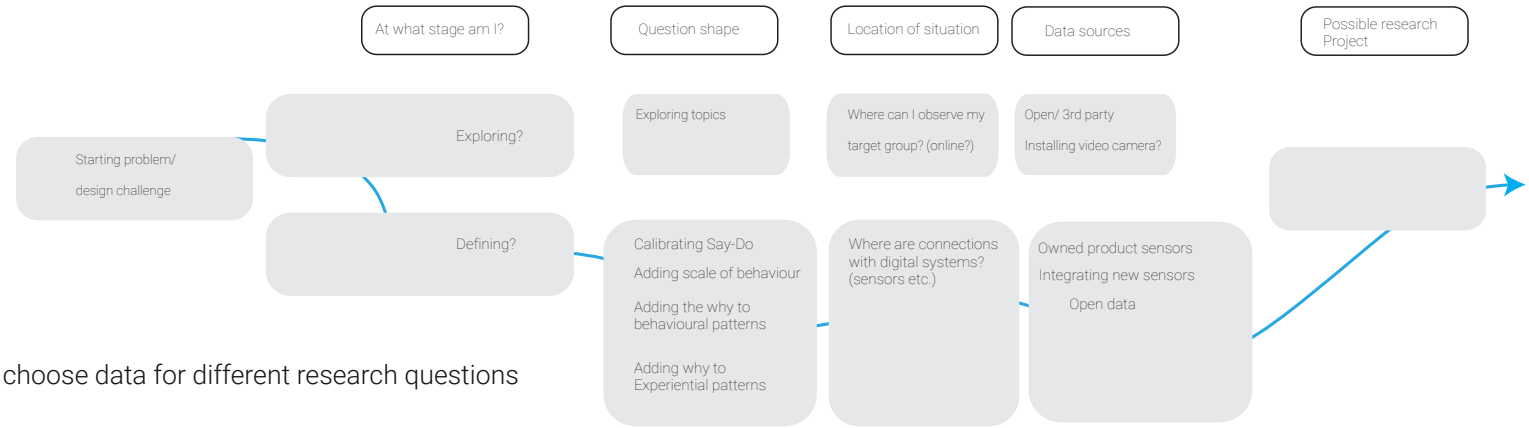


Figure 32 Part of process to choose data for different research questions

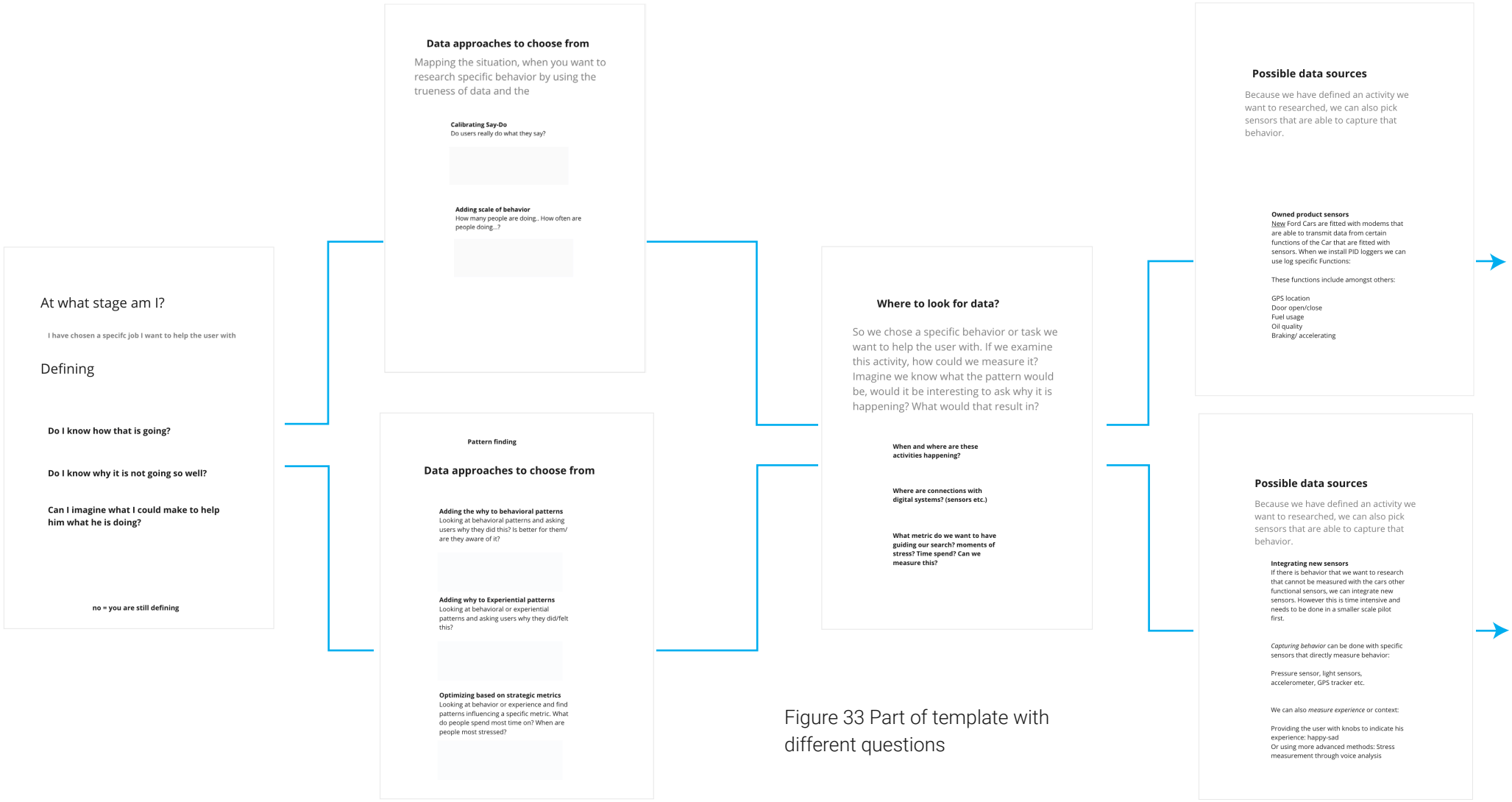


Figure 33 Part of template with different questions

The first example card triggers the designer to understand where he/she is in the design process and what kind of design question he would have in that phase.

The second cards shows possible approaches to solve that design question.

The third shows how to imagine where this problem could be researched. (Specific location or on the web)

The last examples show possible data sources that could be gathered to solve the design problem or design question.

3.3 Results

Results evaluation and interviews

From the evaluation and interviews, quotes are gathered to elaborate the problems I found.

While evaluating the possibilities the team had trouble imagining the value they could find using these methods or the design problems they could solve using the cards.

Although the team was somewhat enthusiastic about the approaches, it was difficult to find one most suitable approach. Some questions could be filled in but it did not really lead to a specific 'best fitting approach' .

I think this was because the possible outcome or result of the research was not very difficult to imagine without. This could be because of the abductive thinking of the designers: they did have one clear problem yet because they were still identifying it.

The template started with defining the research question but I think that because the design goal or aimed outcome of the research was not yet clear, it was more difficult to come up with questions that would lead to a research setup.

Participant #7 , also confirmed the possible value of helping to imagine this possible outcome:

When talking about the example: I'm forecasting what I would get out, and I would then like to discuss to find out if that would be enough to figure out what we need and in a different way figure out what we don't get answered. **So can you help us with this imagination process?** *(D.R.#7)*

Also when reviewing the outcomes of the approaches, the approaches of installing the sensors, are not simple and quick, so choosing one of the approaches would have to really solve a major part of the design problem, otherwise it might defeat the purpose.

When comparing the conversations between the Research engineers and Design engineers there seems to be a difference in research perspectives.

The other RIC teams are more research oriented and they already know how to use data to answer questions they just are less inclined to use the design thinking approach.

"Finding the type of method and then choosing the data type is not new, we have done this for years…" "However my colleagues [participants #5, #6] not having a technical background there might actually be a difference in perspective between them and the other researchers." (D.R. #7)

This shows when discussing the template with participant D.R. #6 it seems difficult to actually create a research proposition from this template now.

So the problem is how to setup a research question?? I think it is somewhat clear but how to write it down and how to formalize it? {..} D.R. #6:

It seems difficult to move from imagining yourself in a project in the design process towards a specific research question and posing this in such a way that can be chosen what data might be most helpful. This also happened when going through the other questions in the template.

"So guidance: on **what could the outcome be**, *and questions to ask yourself and principles to come up with this statement. " #5*

Over all the template was not helpful enough because the assumption of the designers having clear problems that would show which approach would fit best was not true. I think this was because the design challenge or main problem is not clear.

So the goal is I can use this by myself? No I need more information on how to set up these kind of questions. It is difficult now to say, can I come up with these research questions, I would need more guidance for this.D.R. 6#

Participant #5 also mentions

3.5 Informal conversations on the results

helpfulness of their design circle (see way of working design team chapter 2) to show possibilities of data.

"Maybe this is an idea we have an design circle where we focus on our circle and add your questions on this circle. So we are enlarging it with your data research." #6

When evaluating all the possible approaches with the team, it appeared that the possible value of specific approaches are difficult to imagine without actually working on the project itself.

The team would need a more design like abductive approach to define their research questions so they could imagine the result of their research. They find it difficult to imagine the value of the research as the design problem is not clear yet.

As implementing sensor data is a resource heavy endeavour, before choosing an approach the outcome has to be somewhat clear to justify the efforts. For example when the idea is to start measuring behaviour through sensors the possible research value needs to be imagined to actually start the project.

Therefore, in some way the actual outcome of a research project needs to be imagined in some way.

This "imagining" would need to show why the current methods and processes possibly do not suffice and indicate how this new approach would actually be valuable.

However when discussing the way of working of the designers, it seems clear that the designers are working abductively, together with the craftsman community to find out what is important for the for them, where the research engineer, has a more expert perspective and research led deductive approach. (Sanders & Stappers, 2018). (See figure 34)

This results in a paradox between research engineers and design researchers that they need to overcome to be able to start imagining what they would want to research. (See next page)

When discussing the missing main problem, design challenge or reason to choose an approach with the company mentor D.R. #3 we were able to distil key qualities of that are thought of as missing in current methods. (For an overview of the current way of workings see chapter 2)

These were described as:

- Being able to map behaviour that is closest to reality

(What people say might not fit with what people actually do)

- Finding patterns in behaviour

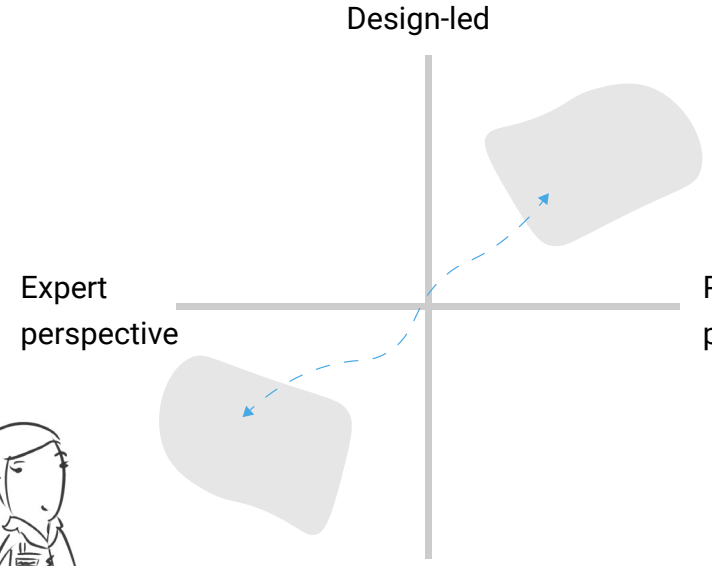
(How could we adapt our product/ service to specific behaviour patterns?)

Ford employees have different perspectives resulting in a paradox.

Design engineer D.R.

I have a direction (abductive)

So what could the outcome be, and […] how to come up with this statement? D.R. #6



"It is the other way around. What data do you need? We can then take a look, whether this data is available on the specific vehicle." R.E.#2

Research engineer R.E

I want one question (deductive)

Figure 34 insights from case study annotated in design research method framework (Sanders & Stappers, 2018).

General barriers, enablers and drivers for contemporary approaches

Enablers

(**1**) Data: PID modems can be used to log specific parts of the vehicles or new sensors can be implemented.
(**2**) Team: The technical staff is capable performing this research. (But they need a clear question or goal from the design team).

Barriers

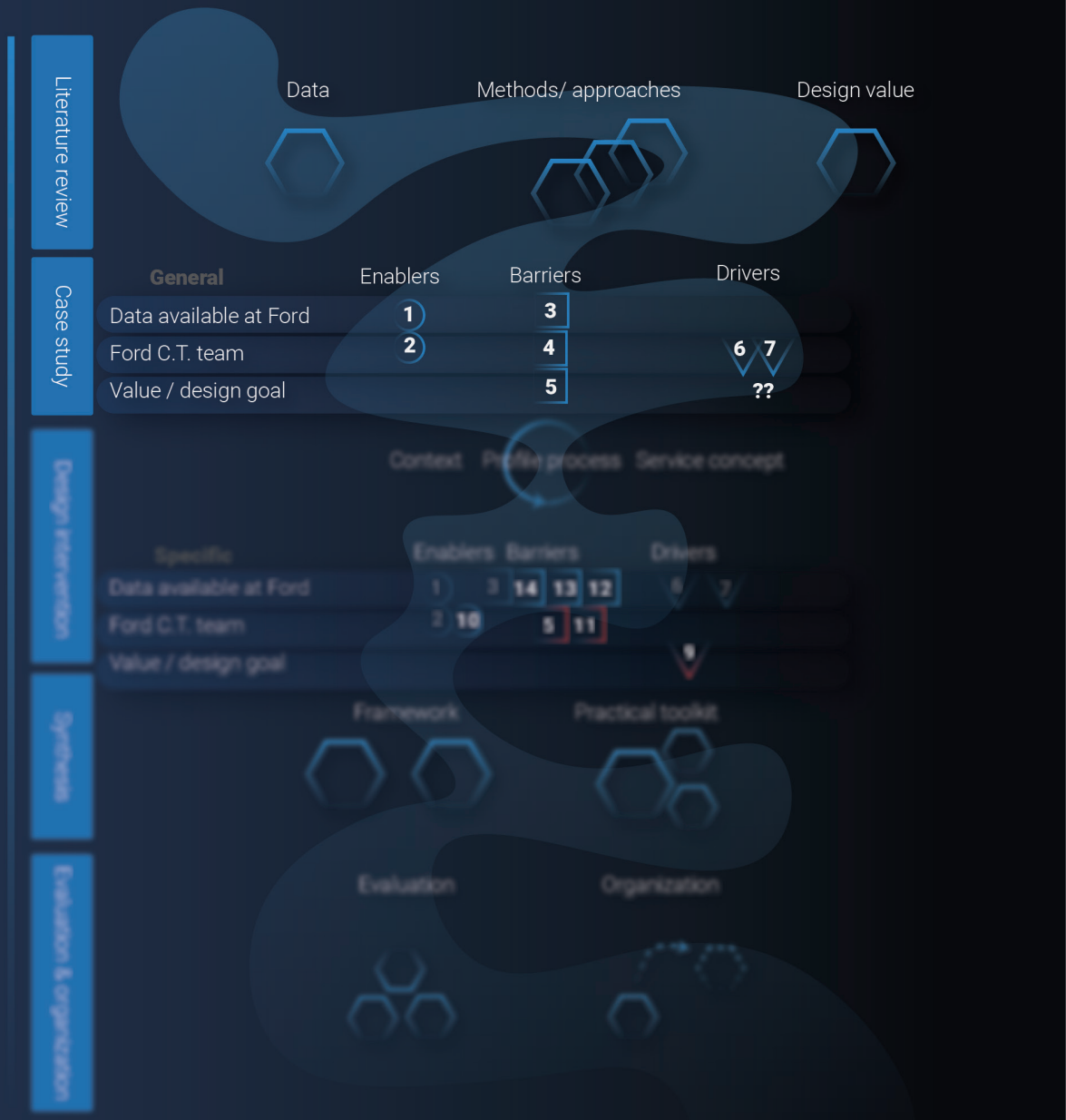
(**3**) Data: Vehicle data needs to be directly linked and mixed with qualitative data. By using PIDs to log data from specific community members this can be done.
(**4**) Team: The research engineers are less capable of social media scraping & analysing.
(**5**) Value/ design goal: It is not clear how to choose a specific mixed methods approach as the outcome is not clear. This has to do with the mismatch between the current abductive and exploratory designers perspective and the deductive thinking perspective of the research engineers.

Drivers

Now mostly qualitative methods do not provide detailed enough information for personalization or high trueness as the behaviour is too complex or due to a response bias. The drivers to using sensor data to research behaviour over current approaches are defined as:
(**6**) - Being able to map behaviour that is closest to reality
(**7**) - Finding patterns in behaviour

Next steps

We should now create a list of requirements to start defining how to help the team choose one of the approaches. What process would fit the conclusions and allow the team to follow and abductive approach? How to imagine which sensor data might yield valuable results. And what could these valuable results be?



Design intervention

In this phase the results from the case study will be used to create a design intervention that shows how to actually choose a research approach to use in the C.T. project and the possible resulting value.

4.1 Design intervention setting

Introduction
In order to better understand where and how the different data approaches data could have value in the current design process and what possible implications of different methods are, a more practical design approach is be used. This design intervention has the following design goal: (Figure 35).

Design goal:
Create and use a process or **design tool** to design **a service concept** where:

(1) Gathering sensor data to research behaviour,
(2) Would allow the service to better fit users needs.

Design setting:
Over a time period of two months, four workshop sessions were attended to get a good understanding of the context and the kind of design challenges the team is trying to solve. (Figure 36). Two of these workshop sessions were prepared by the author to help team add some structure in the design process by evaluating which directions were more suitable for designing services.

In these workshops the team used the qualitatively gathered insights to ideate service directions.

When the context was clear, the insights from previous graduation projects, qualitative insights gathered by the C.T. and some added market analysis is combined into a broad context overview.

This context overview in combination with the previously defined barriers, enablers and drivers are used to create a process and imagine what the possible outcome would be.

This design approach is performed without implementing actual prototypes with sensors. Therefore the learnings will be related to understanding how we can imagine what sensor data and behavioural mapping could influence the design outcome.

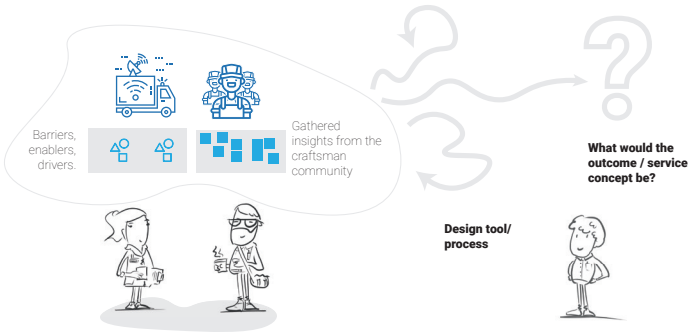


Figure 35, Design goal: creating design tool to create service concept

Figure 36, Design Setting

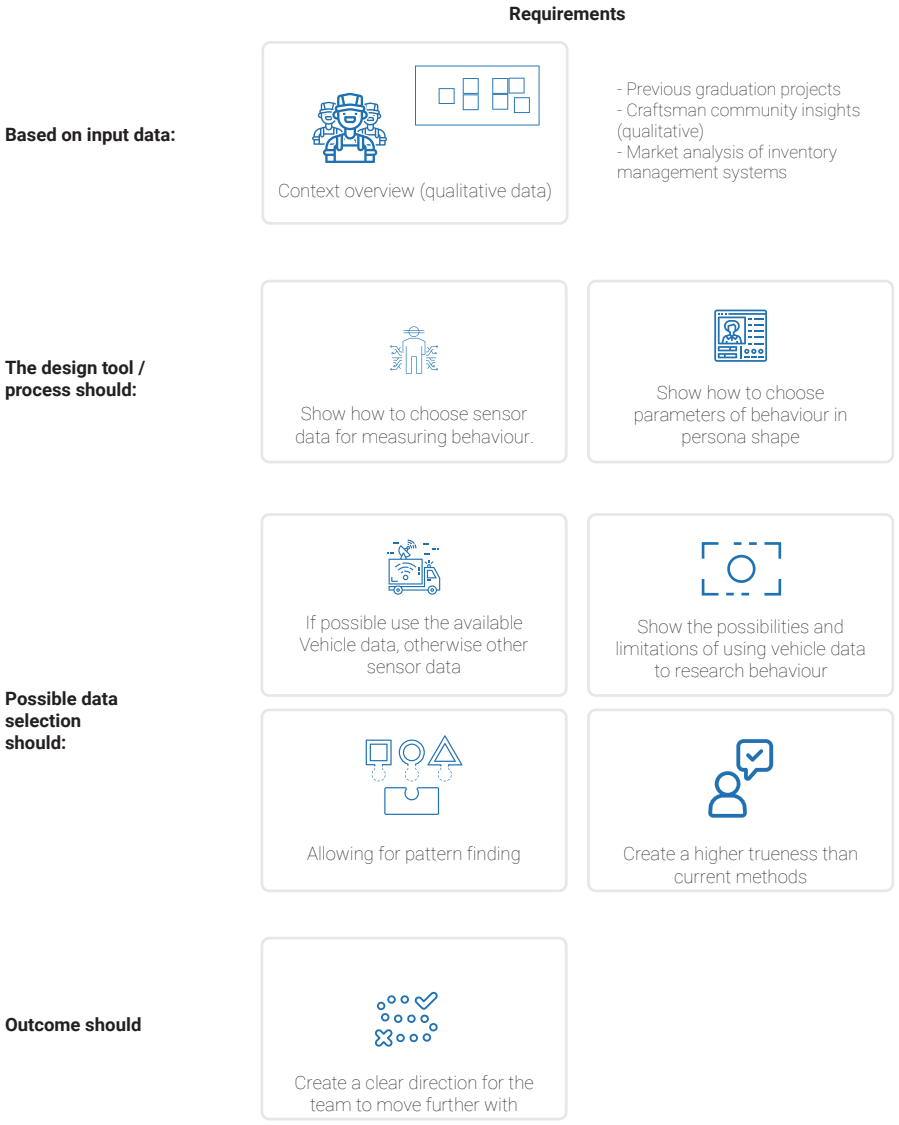


Figure 37, Requirements

Requirements

Together with the company mentor two main qualities of data are defined as main possible differentiator on the currently used methods (see chapter two).

1. Use data in the design process to map behaviour to get data closest to reality.

2. Use data in the design process to find patterns in behaviour.

These qualities and the barriers and enablers defined in the case study will guide the process as requirements. (See Figure 37) A “data enabled persona/profile” process will be the frame to imagine which parameters of behaviour could be interesting to give a representative image of the users behaviour and the influence of that behaviour on new service directions.

We choose this approach, because the “persona” or “profile” is described as one of the key tools for service designers to use in the design process (Segelström, 2010).

4.2 Gathering context overview

The craftsman project context:
In this design of this concept, the Smart rack design team project and situation is used. As we have seen in the project context introduction, Participant #5 & #6 are researching the craftsman context to design products or services in the area of the trunk where craftsman are storing his materials and tools they need for their job.

Currently there are two main work streams; designing a physical product (a racking system) and designing a service that works well together with this product.

Craftsman Context
The craftsman or handyman is a practically skilled worker, describing a range jobs from carpentry, plumbing and electricians, facility maintenance and more.

The craftsman are the target segment for the Light commercial vehicle product lines. Ford is very successful in the Light commercial vehicle (LCV) segment with the Ford transit as market leader product for over 40 years. (Autocar, 2016)

Recent developments in this segment are the increase regulations regarding C02 emissions and ultra low emission zones at inner cities.

In a recent statement by the Dutch Government, (Ministerie van Infrastructuur en Waterstaat, 2021) the implementation of zero emission zones in cities is announced with available grants for switching to cleaner electric vehicles.

These legislations increase the need for LCV owners to have cleaner or more efficient vehicles or switch completely to an electric vehicle.

Furthermore, the Light commercial vehicle weight has increased by +10% and engine power has increased by +30%. These developments imply that lower CO2 emissions would be possible if vehicle weight and/or engine power were reduced. (ICCT, 2017)

In previous graduation projects, extensive context mapping (Hnatiuk, 2016) and service prototyping (Spierings, 2017) has been done. From these reports the opportunity areas were described (figure 38), here two examples are shown that were relevant to the opportunity areas defined by the team.

Figure 38 Roles of the vehicle (Hnatiuk, 2016)

Administration
As many Craftsman are self-employed and always on the road, much administration is done on the job or in the vehicle.

The vehicle as toolbox
The vehicle is one of the Craftsman's most important assets. As different jobs require different tools and materials, the vehicle is used not only as transportation mode to get to a job but also as means to manage the inventory, store and charge their tools.

(Figure 39) Storing and managing the tools and materials are mostly done in “up-fittings” these are available in many different variations.
The market for these up-fittings is significant. For example, a large Dutch dealership corporation “Stern Automotive” had a take rate of 20% for these up-fittings (Stern Automotive, 2018) with new vehicles resulting in an additional 4 M in gross rev.

An observation from an up-fitting set-up in a facility management vehicle at the TU Delft showed a very organized vehicle with many small materials/ parts organized in compartments (Figure 39).

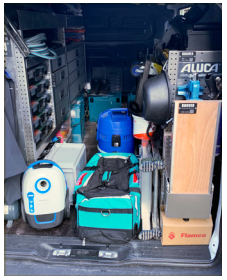


Figure 39, Up-fitting in facility management vehicle at TU Delft

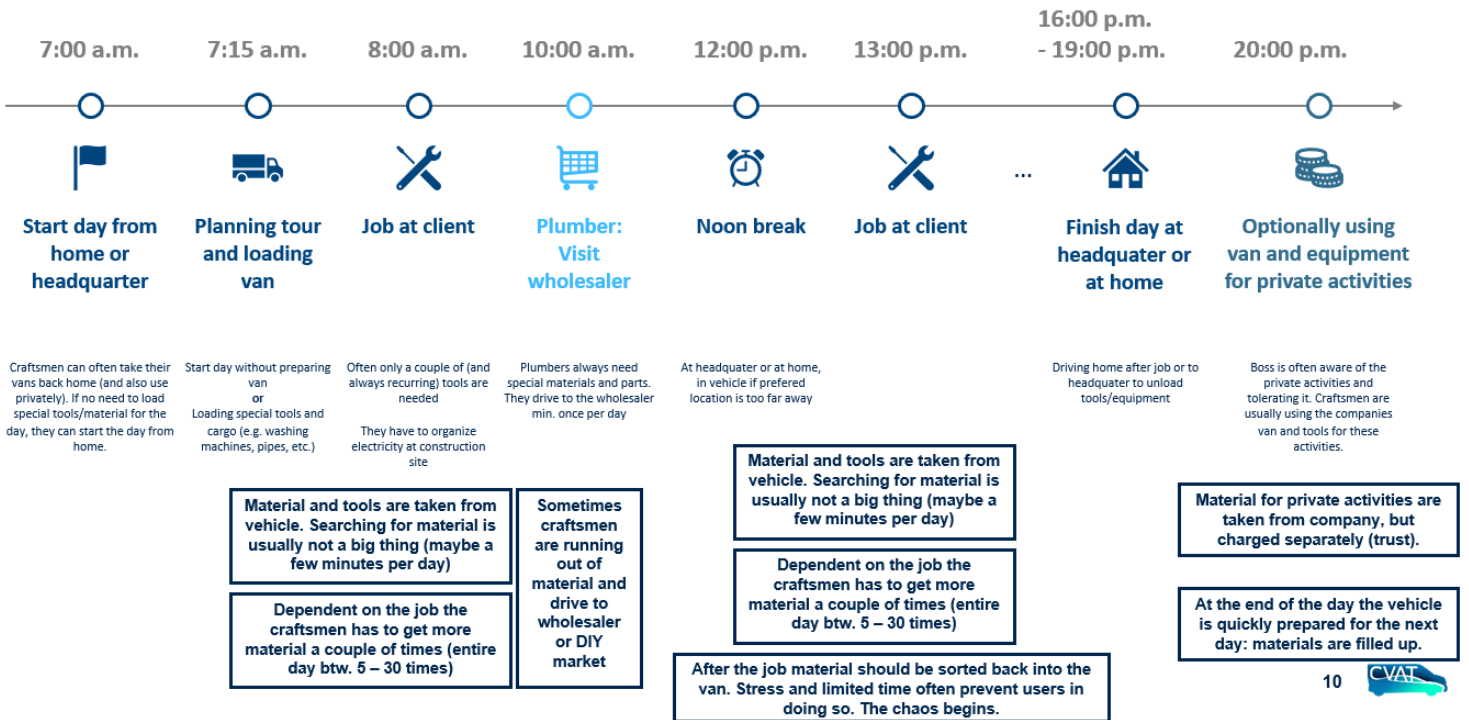


Figure 40, Customer journey as result of qualitative research with craftsman community (Ford workshop 2021)

Workshop results

In the workshops, some problem directions and ideas were created based on the gathered qualitative data (Figure 40) from the meetings with the craftsman community.
The ideas mostly aimed at the topics of inventory management, cleaning and organizing the vehicle and planning.

However the ideas were still very open ended and not very defined. Therefore only the insights from the craftsman community were taken into account for the following design steps .

4.3 Design intervention

Now the all the contextual information is collected we can start processing this qualitative data and analyse where and how the we could create an interesting concept direction for further research.

Step 1.
Summarizing the findings from the qualitative research and opportunity areas in such a way that I could imagine what kind of sensors could measure that behaviour. In this persona we show the different activities of the user in our context. (See figure 41).

In order to identify what behaviour is actually interesting to measure, we use the behavioural factors defined by Kollenburg (2018).

This is split into practical behaviour the user performs in order to get a job done, the experience factors that are important to the user and finally some relevant context information. In order to prepare for the research, we already write down where this behaviour is happening.

Step 2.
The team now needs to choose a specific job they want to focus on. Without choosing a specific action, the possibilities are very broad and it's difficult to choose specific sensors. Therefore we need to set aside the "holistic" designer mindset and switch to a more "computational" mindset (Kun, 2019).

From the context overview it became clear that many craftsman have a very disorganized rack system with many small parts. These parts are used in different amounts depending on the job the craftsman perform. Therefore Inventory management is chosen because of the complexity of the process and the fit of with the rack system product that is being designed.

By detailing this process further specific actions can be identified that could be measured. We also map where the behaviour is happening and with what artefacts the user interacts. This helps to later identify the places where and how we can

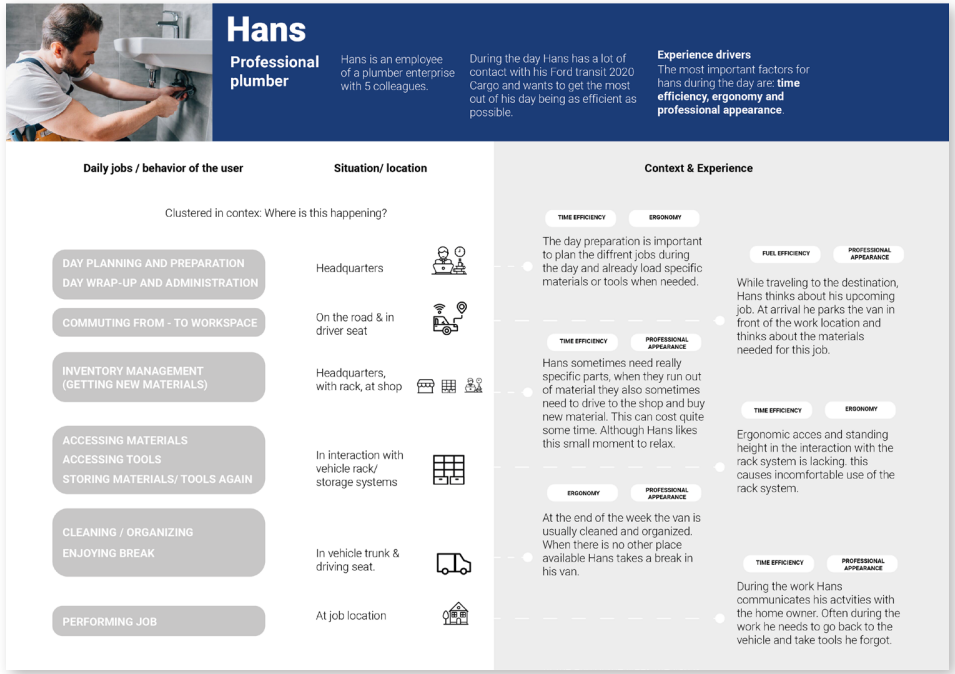


Figure 41, Step one summarizing qualitative data

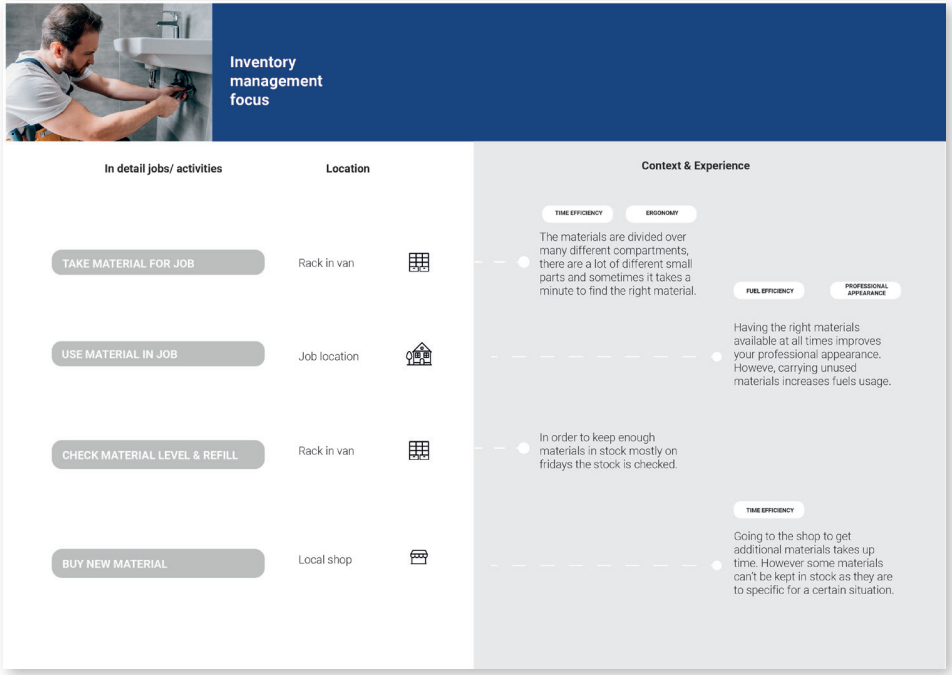


Figure 42, Step two detailing a specific process

Step 3.
Now the scope is defined as inventory management ideas are generated on how to create new products or services to aid the user to get his job done. From this ideation assumptions came up. These were mapped on an axis of uncertainty and impact. (Figure 43)

Using the vehicle sensor data, we can analyse current behaviour in different contexts. For the assumption of the shopping behaviour for inventory management we can use the sensors that reveal city context. The GPS, speed and time code data provide us information about how often, where and how long the craftsman stop. After pre-processing of GPS data, stops could be identified and manual checking could reveal the shop-stops, this however would take a lot of time and effort and requires a big privacy authorization. Therefore, we need to add a qualitative layer to the thin data. This is validated and tried out with the research engineer (participant #2 from the case study)

But what kind of sensor data would possibly show interesting patterns?

Understanding patterns in behaviour only makes sense when we are designing services or products that allow for personalization or segmentation based on behaviour. Therefore you need to imagine what the impact of differences in behaviour would be on possible solutions. For example, a bike, by analysing the speed or distance travelled we could change the comfort or stiffness of a bike to allow for touring or racing.

After performing a brainstorm some ideas regarding material usage indication and material ordering are created.

This can be measured by implementing weight sensors in the bottom of the compartments. By providing valuable information to the users (in a service), we can have the users also provide additional information. In this case the users could indicate which materials are in certain compartments.

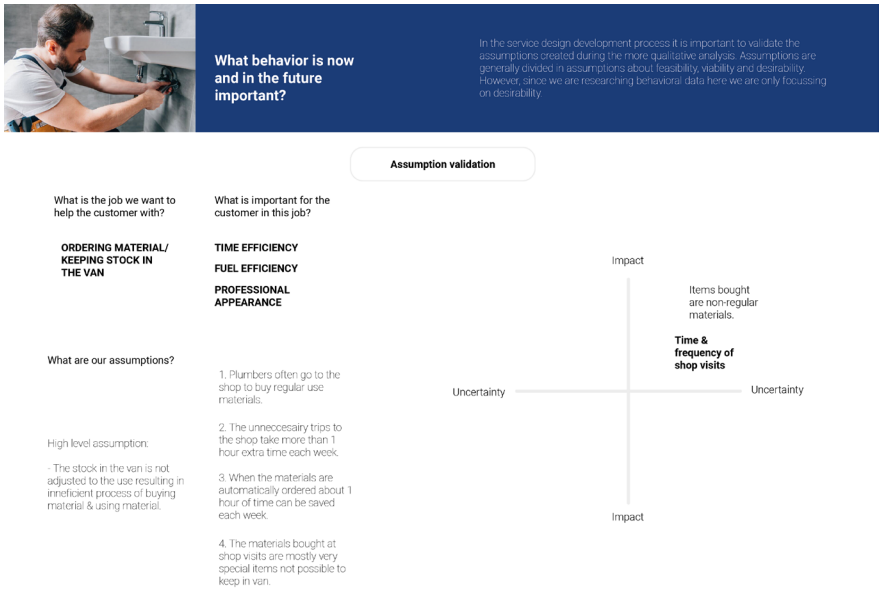


Figure 43, Step three checking possibilities for assumption validation

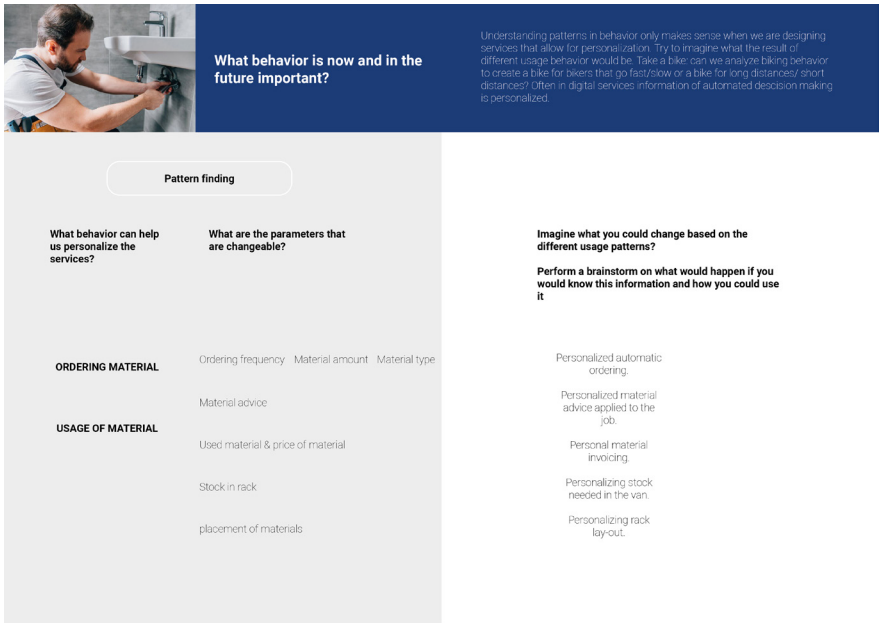


Figure 44, Step four checking possibilities for pattern finding

Step 4.
Now that the important parameters and processes are defined sensors are chosen to define how to measure this process. A visual representation of the behaviour parameters (how much material used (Figure 46), and stopping time at different locations (figure 47)) and impact of these on the experience of the user is made. As the material logger seemed more interesting to further develop, a persona or user profile is designed from this logger. This could give an indication of how Ford would be able to view and research this information in a dashboard. (Figure 48)

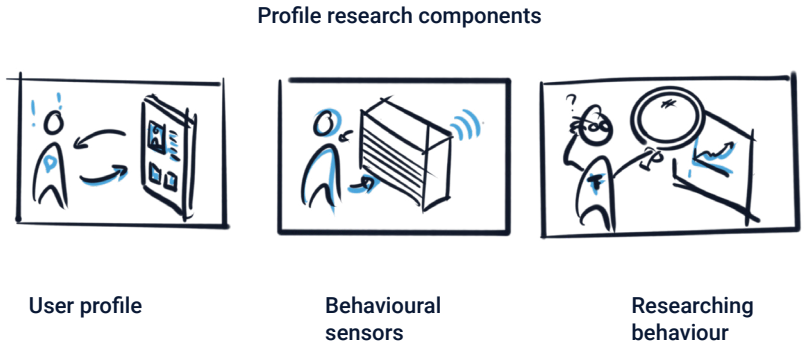


Figure 45, components of research approach

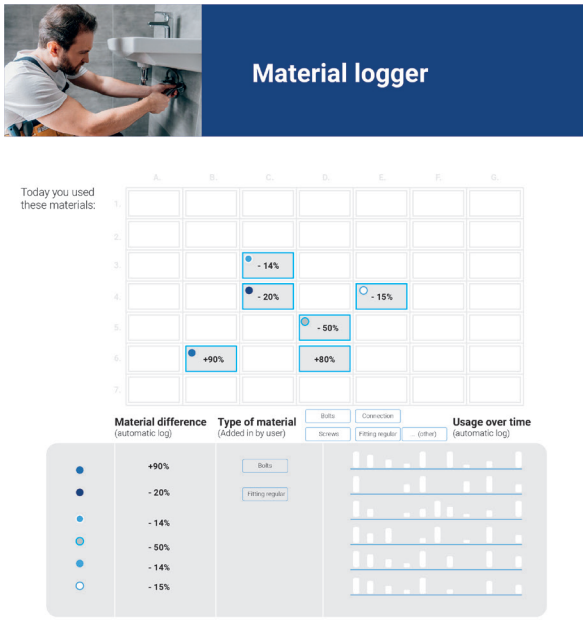


Figure 46, Profile/ persona for material usage

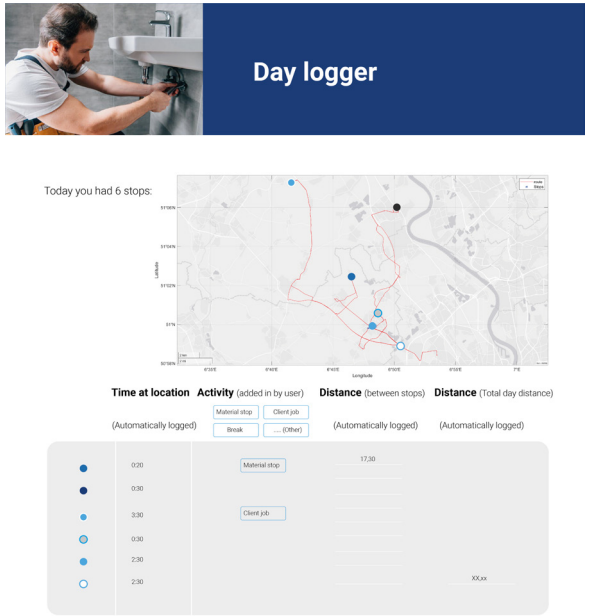


Figure 47, Profile/ persona for activities

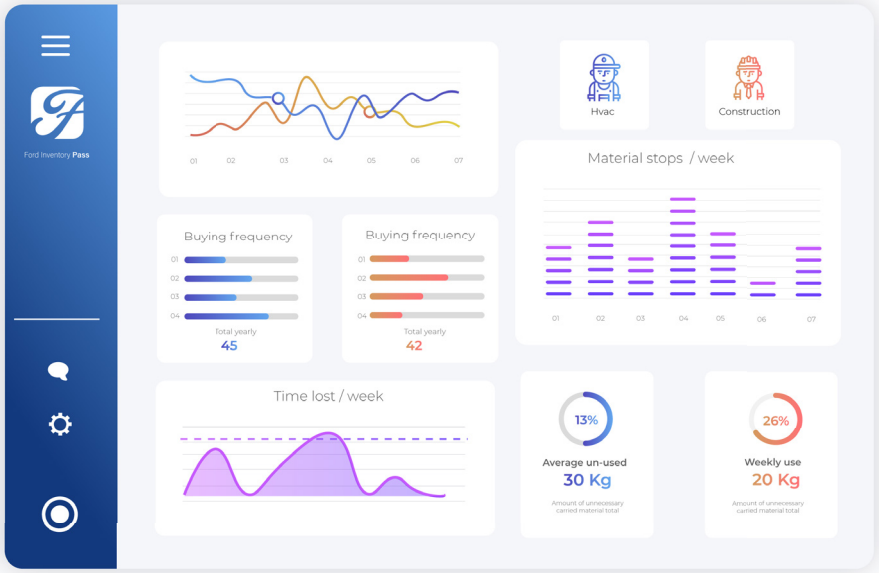


Figure 48, Profile/ persona developed into a dashboard for research

Step 5.
With the parameters set in the profile, we can develop the service ideas and directions that came up during this process. (See Figure 49)
For this purpose an additional ideation session was held with the C.T. team. I then selected interesting ideas and combined them into the Ford Inventory pass service. The service components use the digitalized process (profile) of inventory and rack use, to aid the user to improve this process. However, the need and specific parameters of use need to be researched. The Ideas that came out of the measured parameters were:

1. Informing the users about the material usage.
2. Advising the user about needed materials for specific jobs based on previous material usage.
3. In vehicle delivery when materials run out.
4. Invoicing of used materials
5. Optimizing rack based on frequently used compartments.

Figure 49, Service concept board with 5 service functionalities based on material usage

4.4 Evaluating design intervention on Process & outcome

Evaluation factors

The approach of the data enabled user profile will be evaluated on the following factors:

Limitations of using the available vehicle data:

- If only the currently gathered vehicle data could be used what would be the limitation of that?

Process:
- What are the important steps that could be reproduced in the taken process or approach?

Value for the design process:
- If data is used to measure behaviour, what kind of solution would that result in?
- In what kind of design projects would this kind of research be valuable?

- What is the impact on the outcome of the design process when trying to find patterns using behavioural data?

- What is the impact on the outcome of the design process when measuring behaviour to get a higher representation of reality?

- When would this kind of tool be more valuable than currently used methods?

- Where in the design process could this approach have value?

Evaluation Process

- If only the currently gathered vehicle data could be used what would be the limitation of that?

Vehicle data is thin data:
There is need for an interactive profile, with the described process and the "thin" vehicle data, the use of the vehicle can be quantified, but only actually lead to the insights that help to progress the project when the user provides additional information.

Owned sensor data research is limited to the function of the owned product's sensors.
It might be logical, but the components that are included in the vehicle with sensors can only provide information about the user interaction with that component/ function. The driver location and time spend at that location could however provide on a high level information about the activities the user performs. Therefore In this specific example it is possible to research different activities because the user performs activities that relate to the rack system using the vehicles GPS, but the information is very shallow and does not provide enough information to design new services.

Privacy
When gathering data from the users, it is very time consuming and goes against privacy regulations when for example the GPS data is analysed from multiple users without the involvement of the users. Therefore the data should in some way not be personal identifiable or users should be closely involved in gathering the data.

- What are the important lessons that should be taken into a possible process or approach?

Focus on simplifying behaviour:
From the start of the design process it became clear that when we want to analyse behaviour using sensors, it is very important that we can very clearly define which behaviour we want to measure.

As noticed in previous meetings with the design team there is a very clear “exploratory” mindset that is thinking about “all” possible things that could be, but this does not work when choosing sensors.

In order to streamline the process to move from context mapping towards gathering insights by measuring behaviour, multiple detailing steps are used to define what the jobs are the user is trying to fulfil, where this behaviour is happening and with what kind of sensors this could be mapped. What is important to focus on is that there is that in order to help the team take detailing steps and create questions, the user’s important experience factors or goals are used to understand what to measure.

Variable factors allow for finding patterns:

When imagining what behaviour could lead to interesting patterns, I tried to imagine which specific actions different users could perform differently. Also I tried to imagine what kind of result this would have on a possible solution.

- What is the impact on the outcome of the design process when trying to find patterns using behavioural data?

Imagining what patterns could be valuable:
When imagining what the result could be if the rack system would be equipped with sensors, it is valuable to imagine what variable factors of the solution are influenced by behaviour. For example material use. (Figure 46) Here it could especially be valuable to think about behaviour that is not so easily observed due to its complexity, large scale or taboo nature as mentioned in the Cards.

For example, when measuring how the rack is used, the data could be analysed to show the user which parts of his rack system he does not use. This could help future teams optimize or personalize rack systems based on their usage patterns. Furthermore by measuring the usage of materials, personalized ordering or inventory management services could be designed.

- What is the impact on the outcome of the design process when measuring behaviour to get a higher representation of reality?

Using vehicle data for assumption validation:
When the goal is to use data to get a higher representation of reality, the goal is to reduce the uncertainties regarding the concept regarding market size or validating the need. This could be done by adding scale to the specific activity as mentioned with the GPS vehicle data. However, this still provides a rather shallow view of what is happening and in this stage does not fully help to validate the concept. Furthermore there could also be other approaches to validate assumptions that are less time consuming.

Evaluation outcome

In what kind of design projects would this kind of research be valuable?

In the design intervention we saw that if the users behaviour is digitized, design interventions can be done either in the product or in the service to come to a better outcome. The service design concept (Ford Inventory pass) shows this and helps to understand the components of a possible outcome of using data to better understand behaviour of the user.

Sensor data can allow to make a complex as inventory management less complex and create the possibility for the service to directly adapt to the users preferences. Therefore this approach is valuable in projects where response to complex or very situation depending behaviour impacts the desirability. (See figure 50)
Based on these kinds of problems, and using data to analyse behaviour there are roughly three possible outcome directions imaginable:

Personalized products:
By gathering data about the interaction of the user with the product, possible optimizations could also be made in the needed shape or form of the product. (For example changing the shape of the rack system based on usage data of large groups of users.) This is interesting to research when the use of the rack and therefore ideal lay-out is personal. (See figure 51)

Personalized (behaviour change) services:
By digitalizing and visualizing the behaviour of the user, not only Ford can research the users behaviour, but Ford could also provide this information to the user. In this way the user can be aided in changing his behaviour as well. (For example in relation to the inventory management, aid the user to order material in time to evade unnecessary trips to the shop.) This is interesting to research complex situations.

Personalization of existing products:
By creating profiles that gather preferred settings for certain persons, the vehicle can automatically adapt to the user when he/she enters the vehicle.

After discussion with the company mentor, this behavioural data approach fits the goal of the Ford design team to create personalized products and services.

Therefore, **this is a valuable approach to further develop.**

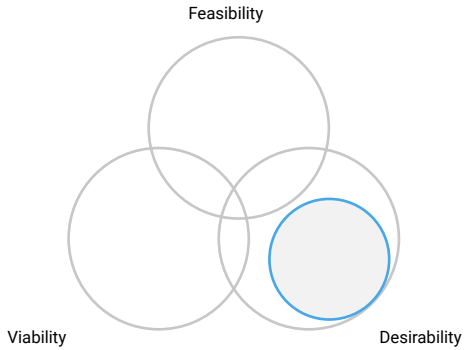


Figure 50, for services where adaptation to behaviour important for desirability

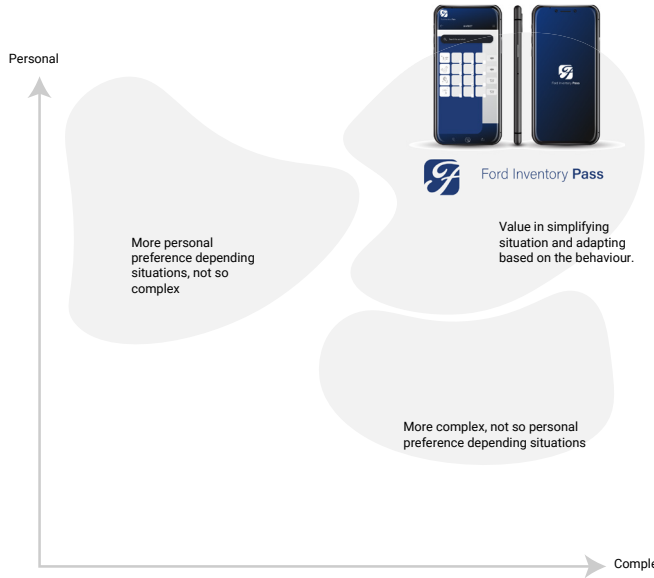


Figure 51, possible outcome directions from a more complex or more personal situation

Drivers, enablers and barriers for starting to design personalized services using behavioural data specifically

The previously found barriers, enablers and drivers are now supplemented with the specific barriers for this approach.

Drivers

(9) **Personalized service directions with a behavioural profile** are a promising outcome.
(7), (8) This fits the teams previously mentioned drivers of trueness and pattern finding. (Design value)

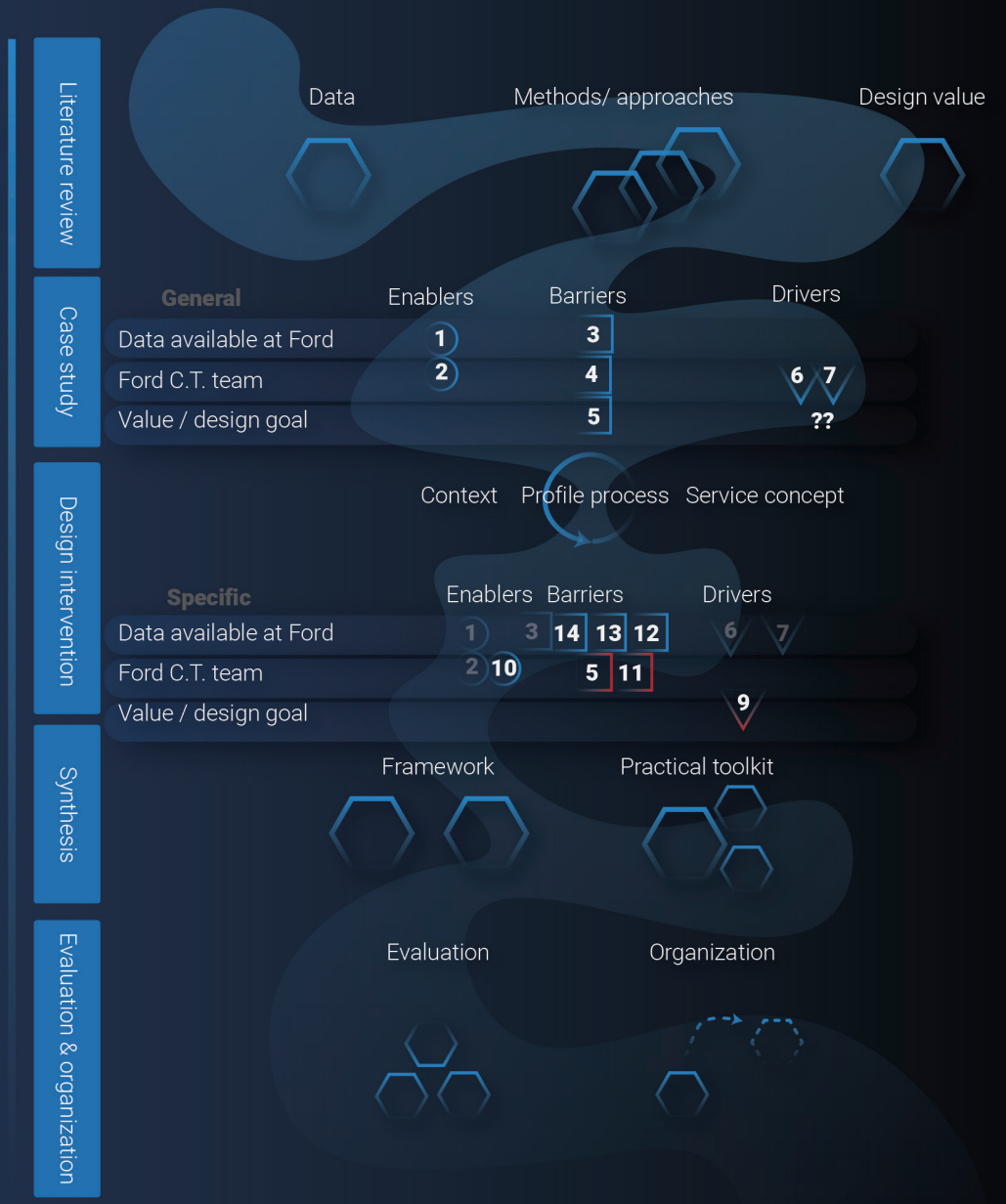
Enablers

(1) (2) Data: New sensors can be implemented for this and the research engineers are capable performing these kinds of research.
Focussing on behaviour that relates to variable factors in the solution help to find insights to adapt that solution on. (Process)
(10) This approach could help the design team overcome imagination barriers by designing how the data could be valuable for the users with data profiles. (Process}

Barriers

(5) Mismatch in perspectives lead to inability to choose a direction.
(11) No clear process to create a profile and choose a direction.
(12) Researching the current vehicle data could result in privacy and surveillance concerns. (Process)
(13) Vehicle data limits the research possibilities to the functions of that data. (Process)
(14) Privacy increases the need for the use of the data in the service in stead of just measuring for surveillance /research. (Process)

In the synthesis the design goal should be related to helping the team repeat the process followed in the described design intervention and overcome the main barriers (5) Mismatch in perspectives and (11) missing process to choose a valuable direction.



Synthesis

In this chapter the learned lessons from the design intervention are used to create a solution that aids in repeating this process in the future.

5. Synthesis

5.1 Synthesis: a framework for creating a data enabled behavioural profile

In the design intervention and the literature we found that if we choose the parameters that illustrate the users behaviour (measurable behaviour) and the impact on the users goals (experience factors) we can create an insightful profile.

We can use this profile as a foundation to research possible product/service directions that are adapted and personalized based on this behaviour.

This profile can help to design service concepts based on the chosen parameters.

However, the C.T. Team now needs more guidance to actually follow this approach as well.

Therefore a solution needs to be created that allows them to overcome their barriers of their different perspectives and to help them choose interesting parameters to create these profiles.

In order to do this, first the learned lessons from the process evaluation (see chapter 4) need to be synthesized in a format that allows for understanding the right way of thinking and the right way of working. (See figure 52)

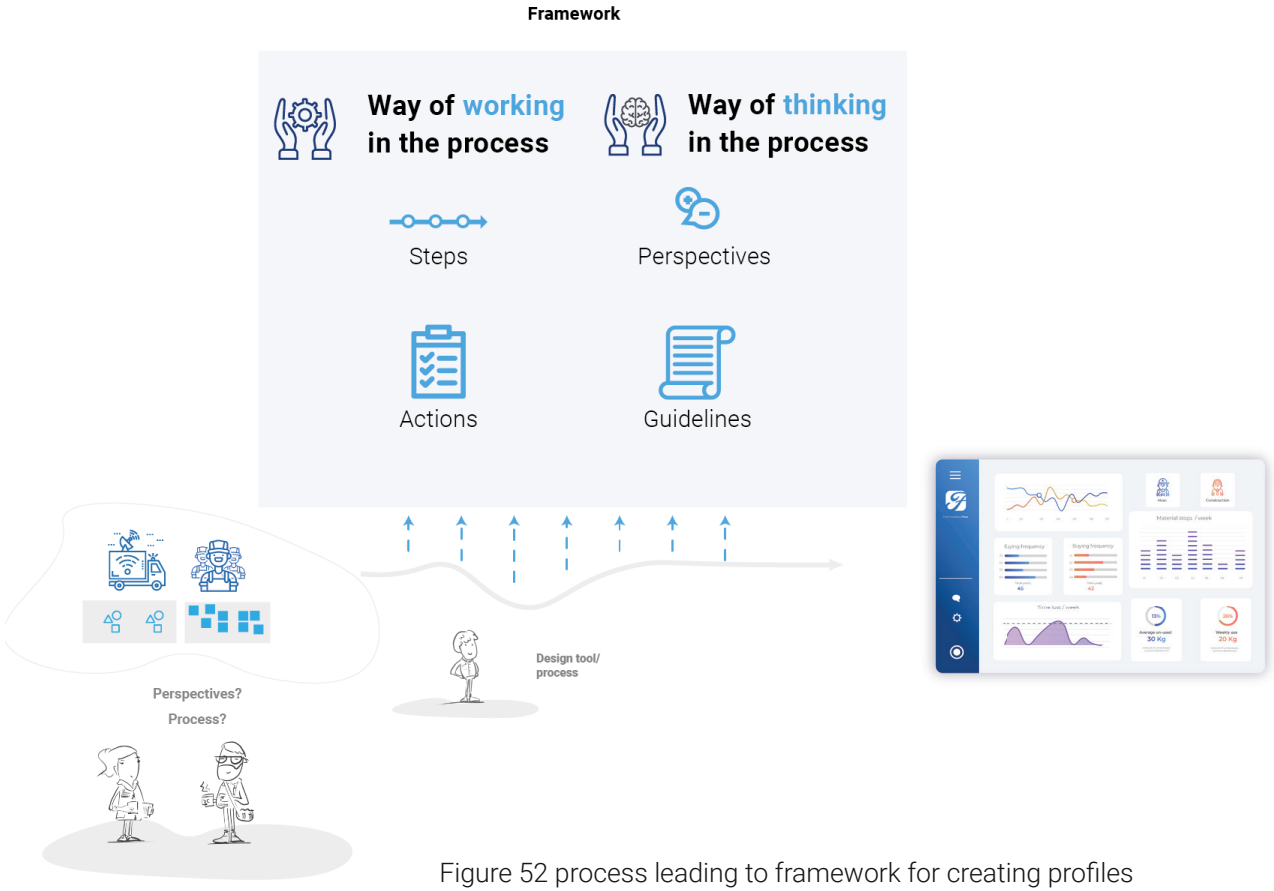


Figure 52 process leading to framework for creating profiles

Way of working

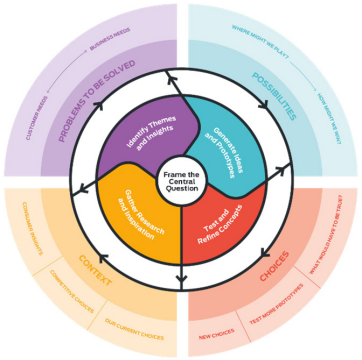
From the design intervention, the steps that were taken to create the data enabled behavioural profile are summarized in a four phase process (See Figure 54).
This process helps to transform qualitative user research data into research directions and important parameters for the data enabled profile.

To make the process easily implementable, the phases is linked to the current design process. (See the four design phases circle figure 53) Before starting this process, qualitative user data is gathered. And the result of this process can aid in setting up tests with sensors.

The phases consist of: Mapping, Evaluating, Creating a Profile and Imagine.
Each phase has one clear goal to make the team aware of what the final goal of the phase should be. The phases are based on the results from the case study, the literature of the data enabled design method and value of this method regarding personalization.

When a research direction is designed, sensors need to be installed, data gathered and the mixed method approaches should be used. (Calibrating, adding the why, adding scale of behaviour) These activities are not part of the framework.

Figure 54 four phases design process



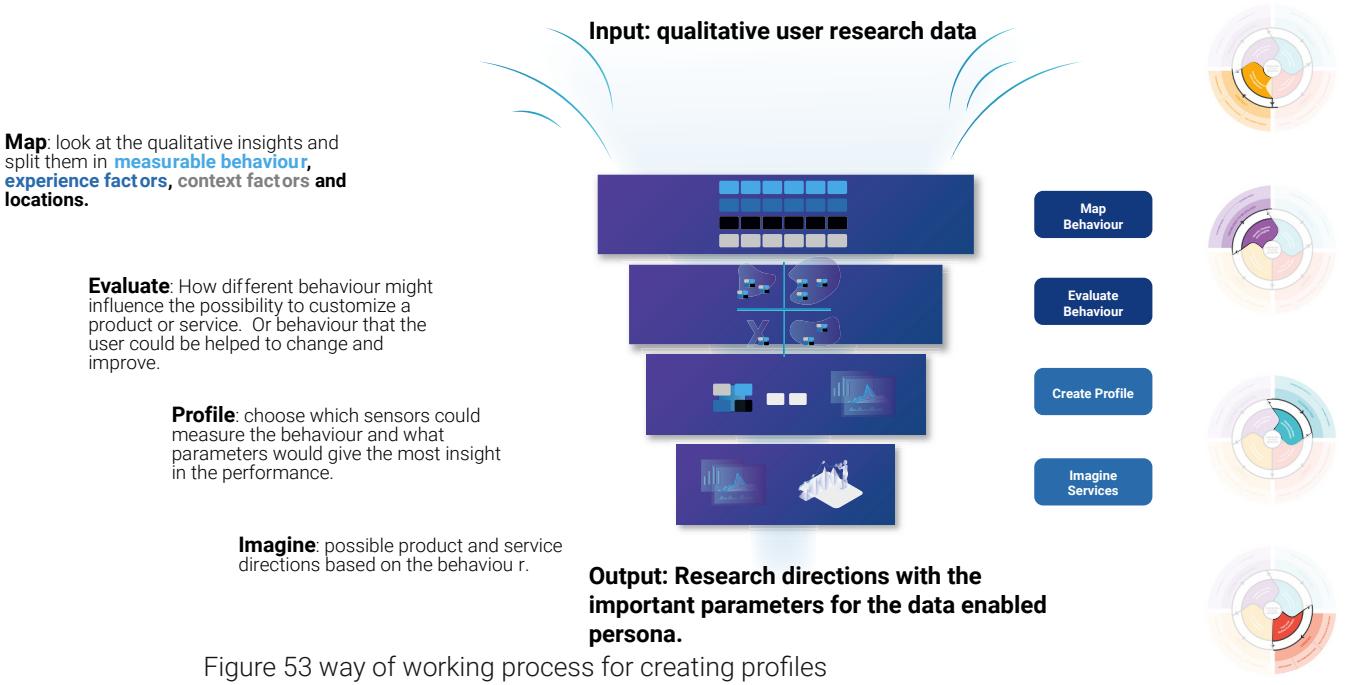


Figure 53 way of working process for creating profiles

Way of thinking:

One of the main barriers for working with behavioural data is the different perspectives of the team.

There is a gap between the design researchers and research engineers when making decisions on what data to use, what data would be valuable and how to start utilizing this.

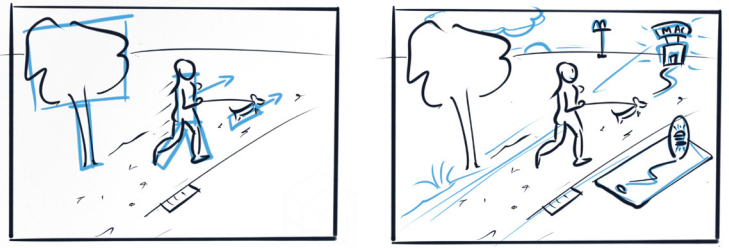
The design researchers have a somewhat exploratory perspective, where all possibilities are still open. The research engineers want to know directly what to research, with what data and with what possible outcome. In order to help the team at specific phases of the process know what kind of thinking they need, thinking guidelines and perspectives can be created. The thinking guidelines are based on the case study and design intervention .

Functional (reductionist) perspective
(fit with research engineers)
In this process it is necessary to first simplify the situation and find the measurable behaviour.

By staying focussed in these phase it is easier to make decisions and take steps earlier in the process. During the case study, when the team used a more exploratory mindset it is very difficult to make decisions about sensors to choose which makes it even more difficult to imagine possible services. In this phase the aim is to evaluate the situation and make it less complex. It could be said a more reductionist perspective is used to simplify the complex situation into the different components.

Imaginative (holistic) perspective
(Fit with design researchers)
In the later stages of the process, when the profile is designed and the data is made meaningful we start using a more imaginative approach. At this stage more holistic thinking can be applied, taking a broader perspective of influencing factors into account. Keep in mind, in this perspective we look at all possibilities and give our mind the freedom to ideate.

These different perspectives could be translated in different roles for the design researchers and research engineers. (See Figure 54)



First reductionist: taking out components from qualitative research & identifying ways to measure.

Later imaginative:
What could we do with this information?

Figure 54 process leading to framework for creating profiles

Important guidelines to design profiles:

Focus on behaviour
In order to create insightful profiles that provide the user with insights in his own processes we need to focus on behavioural data. With real personal profiles, personalized services can be designed.

Co-create user profile
In order to contextualize the collected sensor data the user needs to add additional information or preferences in the profile. The contextual user layer differs for each situation and is dependent on limitations of the sensors.

Imagine value for user
Directly use the behavioural profile in the service. In this way the data does not only offer value for later personalization or research, but it becomes a functional aspect of the product and service. In this way we also stimulate the transparency and decrease surveillance practices.

Be transparent about gathered data
In order to take the role as this "sports trainer" partner of the user and not fall into surveillance practices, the user must be aware of the gathered data and information. By creating an interactive profile the user will have access and ownership of his data.

Design for ecosystems
Ford wants to become a provider of integral solutions, therefore we need to understand how all the components connect and be able to link different influencing factors. For example, we want to know how a specific profession relates to specific amounts of material need in the vehicle and the needed battery capabilities. (This is further explained in the final implementation chapter.)

Personify but keep anonymous
Although Ford wants to be able to understand he differences between different user segments, Ford does not need to know which specific person is doing what. By creating an overview of behaviour of specific segments without going in such detail that the data becomes personally identifiable information, Ford can better understand the general user: the plumber without needing to know the details of Plumber "Heinrich". In the craftsman community, specific interesting behaviour can be further researched in detail if necessary.
In later stages user could be send surveys or small questions about their behaviour to better understand the segments without knowing who it is about.

5.2 Translating framework into a practical solution

Now the way of working is elaborated the C.T. team needs to be aided to start using this way of working.

As the team expressed a concern of templates being not open enough to allow for different projects, according to the company mentor;

"A cookbook like format would be best to aid us to follow this process in different projects." (Company mentor/ Participant #5)

This leads to the following list of requirements in format and content: (See figure 55)

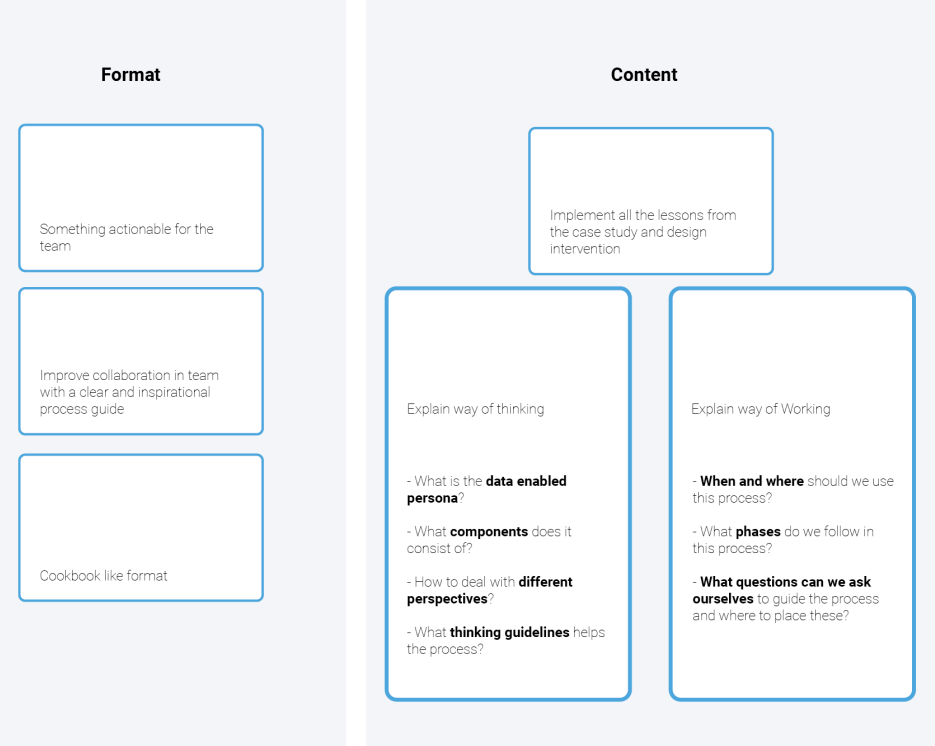


Figure 55 requirements for practical tool

Ideation

With some fellow graduate students, an online (MIRO) ideation session is done to ideate on possible formats to synthesize the process. (See figure 56).

The following steps were taken:
1.Explaining the framework

2. Using questions to shape the format:

- How to make the Ford C.T. team understand the steps without using a template? (or should we make a template?)
- How to trigger collaboration?
- If we would use cards for the actions, should they be linked?
- How should the way of thinking best be explained?
- How to stimulate the different perspectives at the right moment?
- Who should be responsible for this process?
- Where and how should it be used?

While discussing and ideating on the different questions, next to some detailed insights on how to trigger the team better, the main format became clear:

A practical tool kit for the Ford C.T. team to start creating data enabled profiles. The tool-kit uses **a combination of cards and templates** to guide and trigger the actions and **an explanation cookbook** to provide information for the workshop leader (process champion).

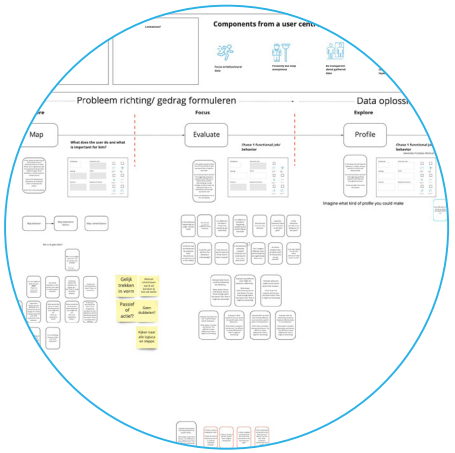


Figure 56 requirements for practical tool In Miro, shaping the content in a format that best fits the requirements.

Tool-kit for designing data enabled behaviour profiles.

When?

Who?

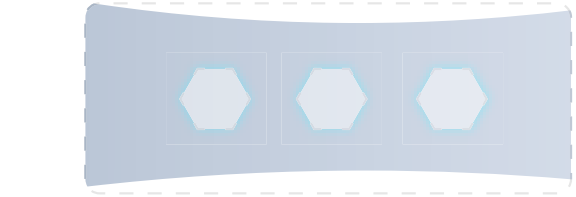
Bridging the gap between qualitative research and sensor data research, by aiding designer researchers and research engineers overcome different perspectives to start designing behavioural profiles.

Why?

What?

Different perspectives

Absence of clear process



* Courtesy of Ford Upfits consulted feb 2021

Designing the solution
Now the shape of the solution is clear, the components from the approach are transformed in a "cookbook" shape with cards and templates to create a full tool-kit for workshops.

Booklet: Used by the process champion to prepare the workshops. (See figure 59)
The booklet is divided in two parts:

Way of thinking (approach explanation, guidelines, metaphor and perspectives in the process).

Way of working for the workshops (the four phases, and how to go trough these phases.)

Cards & templates
The 'way of working' phases each are accompanied with cards that describe actions to fill in the templates. The cards and templates are to be used in the workshops by the full C.T. team. This will be elaborated in the following pages. (See figure 58-75)

Process champion role
As the workshops are rather complex, a facilitator or process champion is needed that prepares the workshops. After each workshop, the process champion could evaluate if the qualitative data are saturated enough to use, or if another qualitative interview is needed to detail the insights more. These responsibilities are shown in the figure below. (Figure 57)

Figure 57 process champion activities

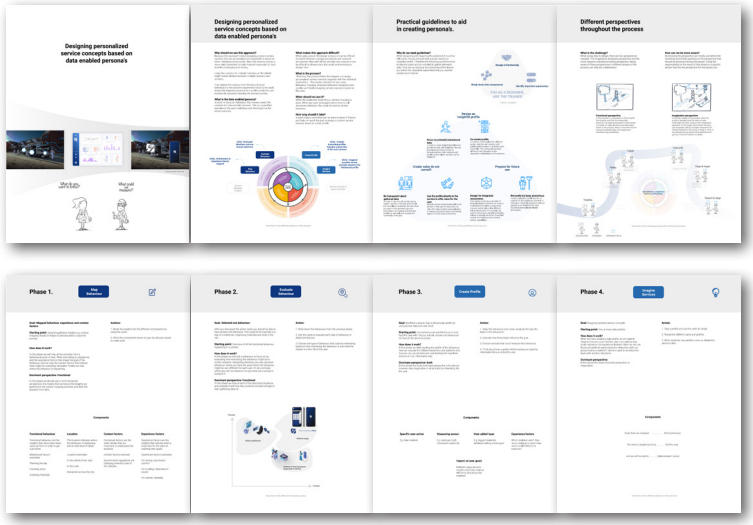


Figure 59 Booklet for the process champion

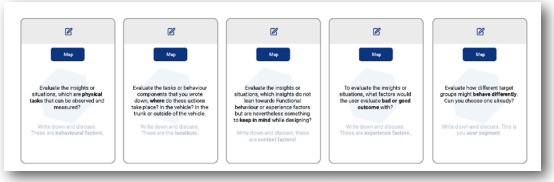


Figure 58 Cards to use in the workshops

Figure 60 templates to write down the results.

Way of thinking (part one of the booklet)

Page 1 (figure 61)
This page gives a general explanation of where to use the tool-kit, for what kind of problems and with what result. (See framework)

Page 2 (figure 62)
Thinking guidelines
The thinking guidelines (see framework) were simplified and grouped into three main topics for clarity: designing an insightful profile, creating value for the user not surveillance and finally: preparing the persona for future use.

Trainer metaphor (figure 64)
During the ideation it became clear that the thinking guidelines can be linked by a metaphor that helps to get a better understanding of how the role of the design researcher better. Therefore next to the guidelines, the metaphor is created.
In this metaphor the design researcher becomes the professional athletics trainer and the user becomes the athlete. Each sport has different parameters that are important for the performance of the athlete (the user). For example measuring the running speed (behaviour) and the preferences and trying to improve the performance by making interventions.

Page 3 (figure 63)
Placing perspectives in the process
As the needed perspectives change in the course of the process and the team needs to be aware of these differences. Therefore I assigned "dominant roles" in different phases, so the team knows what is expected in terms of their role in the process. In this way both perspectives can be used optimally.

Figure 61, page 1

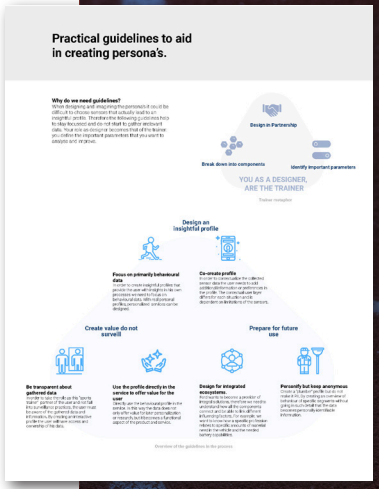


Figure 62, page 2

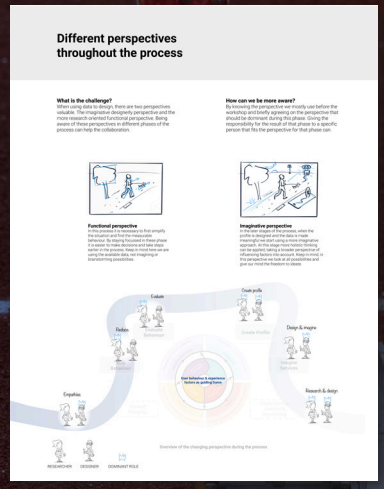


Figure 63, page 3

TRAINER METAPHOR

Interaction characteristics:

- Partnership
Together with the user researching and tweaking the influencing factors.

- Optimization
Each action has an influence on the goal that is being aimed for. These actions "just" need to be documented and understood

- Break down than build up
First the components need to be understood before we can start imagining solutions or training schemes!

Figure 64, Metaphor Picture courtesy of N. Hoizy

Way of working (part two of booklet)
The way of working is elaborated in the booklet, templates and cards. In order to create the cards and templates, the goal of each phase in the framework is used as starting point.

How long should it take?
The total process takes 8 hours and can be done in four separate workshops of about two hours. This was chosen to match the teams previous way of working and allow the process champion to prepare in between.

When to use this process?
When the team has finished the most part of the qualitative user research and wants to imagine if, and how to implementing data could be valuable.

Process/ workshop pages
In these pages, the reader is taken trough the workshop steps. Each page consists of a information section (left top), an action section (right top), the components of information that need to be worked with in the templates (mid section) and an indication of a specific important guideline (bottom left)

Cards
By providing cards for each phase the team has an easy to use actionable piece of information.

The cards are formulated in two parts: explaining and action. First a description is given and then a task:

Example:

Evaluate the tasks or behaviour components that you wrote down, Where do these actions take place?

Write down and discuss. This is where you will need to start measuring later.

Templates
Although the team initially expressed that templates were less used, the steps were to specific to leave the opportunity of making them more clear. Therefore the templates are also included.

Phase 1: Map (Page 4)(Figure 65)
For this phase cards and a template are created to explain how to analyse the gathered qualitative data and map the components in the template.

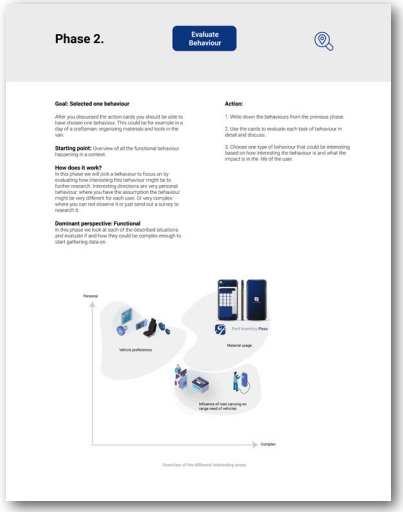
Behaviour, experience factors, context factors, location and user segment.

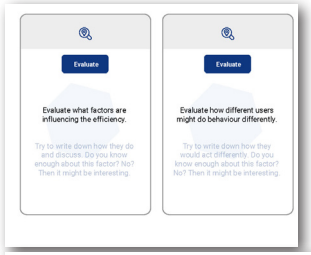
(Figure 65, Phase 1 components)

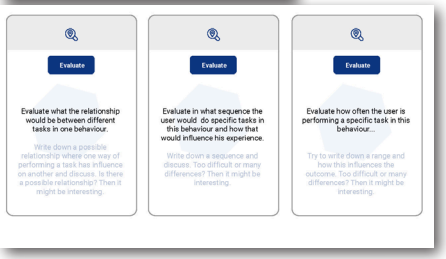
(Figure 66, Phase 2 components)

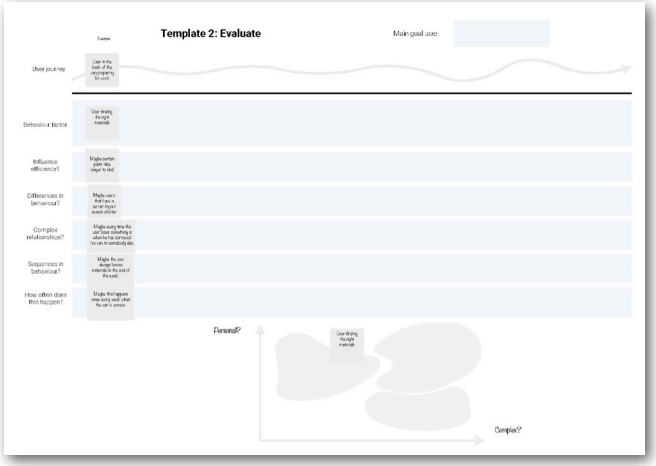
Phase 2: evaluate (Page 5) (Figure 66)

For this phase cards and a template are created to help the team imagine what behaviour might be complex and interesting to analyse. By answering 5 questions regarding the complexity of the situation, discussion will show which situations are interesting to research. Some directions are shown as example. See (framework)





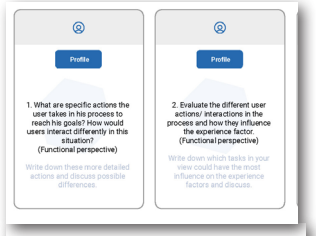


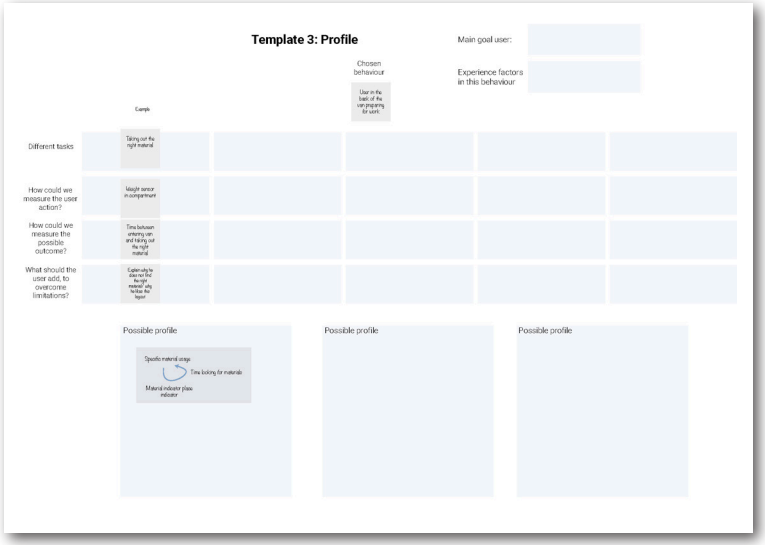


(Figure 67, Phase 3 components)

Phase 3: Profile (Page 6) (Figure 67)

For this phase cards are created that show how to create a profile . By detailing the behaviour in different actions we can evaluate how to measure those by using sensors. When we can map behaviour, we need to imagine how to make this informative. Two main approaches for creating profiles are when users actions are evaluated on the experience factor 'efficiency', to map the behaviour over time. This gives insight in where to improve. Other approaches are aimed at user feedback, where the behaviour is evaluated against preference (like/dislike), this works better with processes that are less complex.

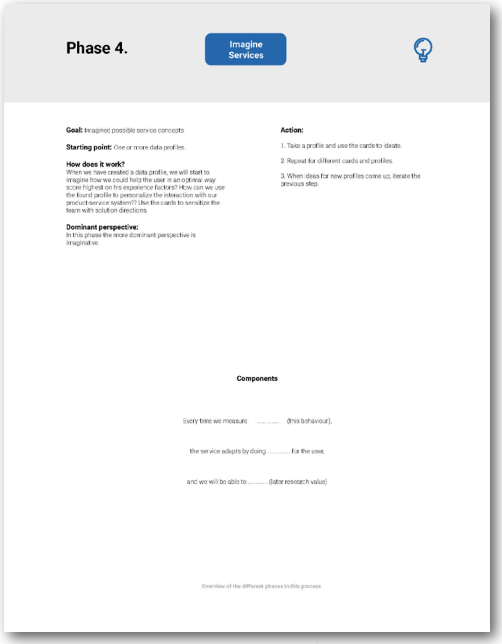


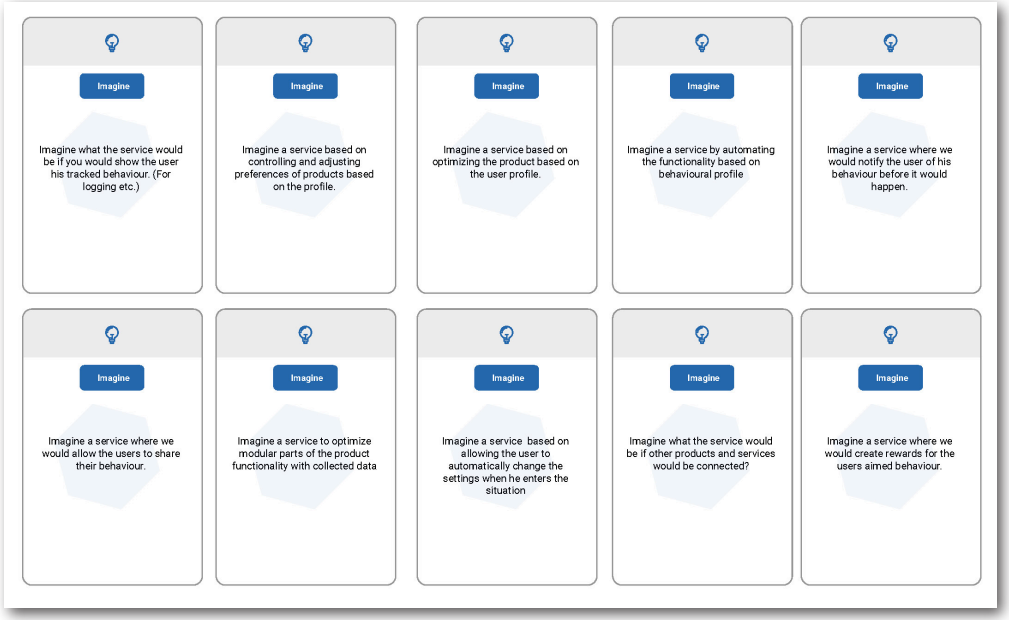


Phase 4 Imagine (Page 7)(Figure 68)
For this phase cards are created that sensitize the C.T. team to create services. As the design intervention outcome showed only three main directions, the product-service development framework (HBR, Porter & Heppelman, 2014) was annotated with results from the design intervention and used as basis to create sensitizing questions for service ideation. (Figure 69)

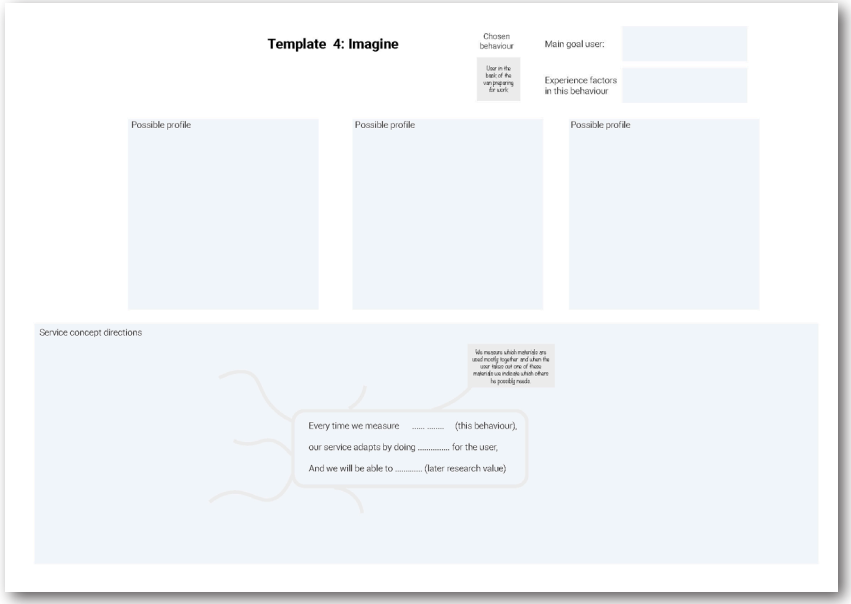
The format for creating the final service shows that the service is build out of three main components: a behaviour profile, value for the user & research value.

Every time we measure ....
The service adapts by doing....
and we will be able to.....





(Figure 68, Phase 4 components)



Show the profile to the user

Enhance user experience by adding information about use

Control and adjust preferences of products based on the profile

Allow user to save used settings
Allow user to control functions remotely

Optimize performance & Fit of product based on profile

Optimize product functionality with collected data
Personalize / specify product for specific target groups based on gathered knowledge

Automate functionality based on behavior profile

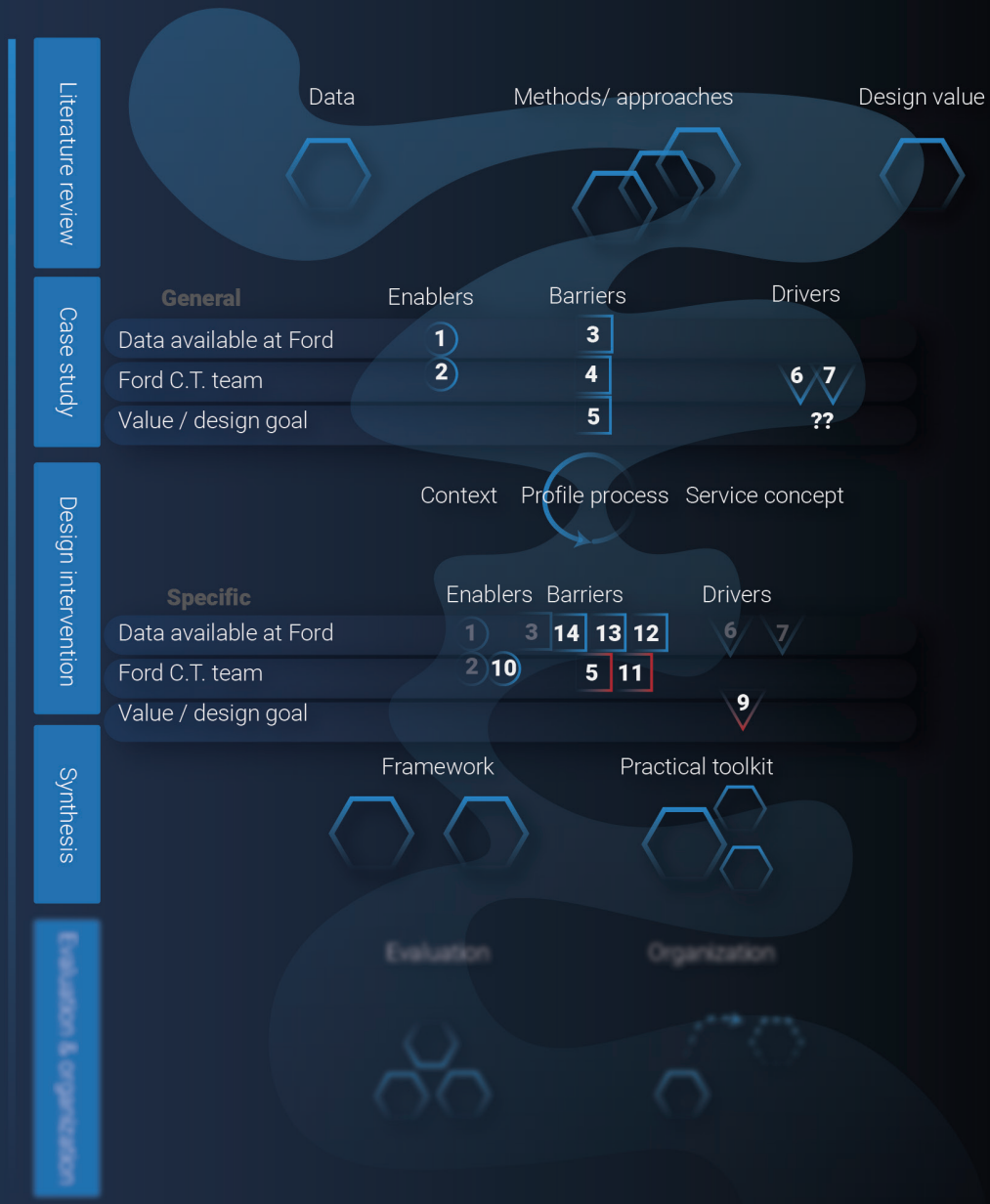
Automate user behavior allowing for self coordination/ organisation of product-service system

Figure 69, Results from design intervention added to HBR, Porter & Heppelman ,2014

Concluding

This chapter led to the development of a framework consisting of a way of working and a way of thinking to analyse qualitatively gathered user data and imagine if there could be interesting behaviour to research.

This framework was developed into a practical tool kit with a booklet with information and a set of cards and templates to work with.



Evaluation & Recommendations

In this chapter I evaluate the process and create an implementation roadmap for this process and the resulting profiles.

6.1 Evaluation

Evaluation

What is the goal of this evaluation?

The quality of this developed tool-kit stands with the usability (desirability) of the different components and the value of the outcome (viability) of the using the tool-kit.

The process must be understood by the process champion that leads the workshops. Also it has to be clear enough also for other employees to participate in the workshops. There is less focus on the evaluation the feasibility of the tool-kit now, as this is seen as less uncertain.

Evaluation factors

From the learnings in page 53 the most important 2 barriers are overcoming the two different perspectives and choosing interesting directions. This is done by following the trainer metaphor, thinking guidelines and using the different perspectives appropriately. Finally the process that guides the employees through the tool-kit has to be clear and result in a valuable outcome. Therefore the following evaluation topics will be used:

Trainer metaphor:

Does the team understand how to take a partnership role?

Does the team understand how to break the insights down in components?

Does the team understand their role is to identify important parameters?

Thinking guidelines

Does the team understand what an insightful profile is? (Behaviour/co-create)

Does the team understand the need to create value instead of just researching?

Does the team understand the value of preparing for future use?

Different perspectives

Do the different perspectives help the team to be aware of where to apply which thinking?

Does the team agree with the changing perspectives in the process?

General usability

The general usability and understanding of the process in detail has to be evaluated on the understanding of the process and by evaluating the work of the student in each phase. This is done based on these main questions:

1. Can we map behaviour and experience factors?
2. Can we choose a behaviour direction?
3. Can we understand where and why we should place sensors?
4. Does the process trigger to imagine services?

General value

The general value of the tool-kit needs to be evaluated based on the employees understanding and opinion about the value of the outcome.

Evaluation plan components:

1. Testing usability in a relevant context : workshop study

2. Evaluating the tool-kit with Ford employees: semi structured interviews

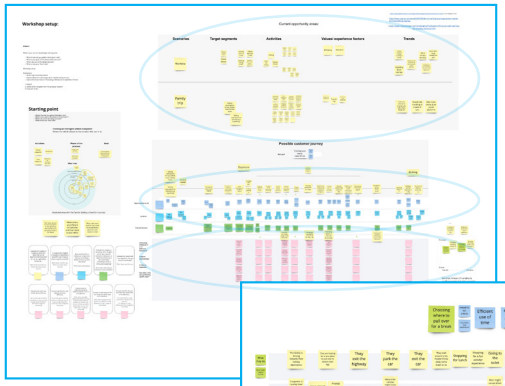
1. Testing usability in a relevant context: workshop study

In order to fully test the usability of this process with actual Ford cases, all the steps in the workshops need to be performed. This is not relevant for the Ford team now as they are following up with the previously developed service concept. What would be valuable, is supporting one of the fellow starting graduation students in defining interesting directions for further research.

The strategy implementation project of L. van Wijnen will be used as practical use-case to evaluate the usability of the tool and the possible outcome.

In the figure on the right we see the process of the workshop. (Figure 70)

The study setup & full results are included in appendix B.
The conclusions are shown on the following page.

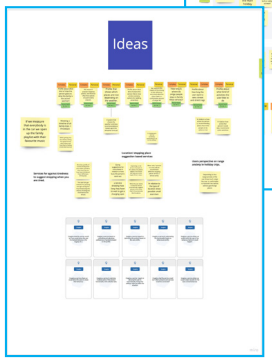


0. Preparing the workshop by placing the qualitative user insights.

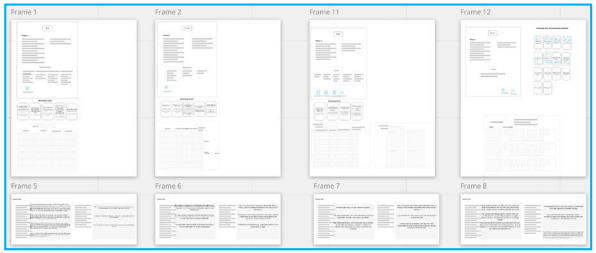
1. Mapping the behaviour

2. Evaluating the behaviour

3. Thinking about sensors and creating profiles.



4. Ideating with the profiles



5. After each step filling in the questionnaire template (below) and reading the booklet page for the next phase.

Figure 70, Followed process in the evaluation workshop.

2. Evaluating the tool-kit with Ford employees

In order to evaluate the tool-kit with the Ford employees, the tool-kit is in detail discussed with the Ford company mentor and one of the Ford researchers. In this way the understanding of the tool-kit and their perception on the value of implementation will be discussed.

The tool-kit will be discussed following the mentioned evaluation factors (metaphor, guidelines, perspectives) in a semi structured interview.

Also the value of the process of measuring behaviour to create personalized services, will be discussed with the outcome of the workshop with the graduation student and the service concept that was developed with the team. Before the meeting the tool-kit materials are send to the Ford employees for review.

"I understood the goal, but I'm also curious to see how the results of this step are going to develop. I don't yet see where this is going to end"

L: " You normally stay to much in helicopter view but now you can really zoom in. That's handy because then you find new things. That helps you to move further than this abstract level."

L. "Nice to follow the steps, they are difficult steps but they do bring you to interesting insights."

L: "Some parts could be explained a bit better during the whole process but that could be easily fixed with examples"

Concluding workshop

The workshop went quite smoothly and the results were interesting. However, in order for the workshop to function better without the author, there should be a more clear explanation of the approach in general, the need for a profile and the goal of the tool-kit. Also the different components (experience factors etc.) need to be more clearly explained. Also, in the evaluate phase it seems more important to explain we are looking at measurable and influential behaviour, also the cards for this process need to be less complex.

A. 13:18 I think it's very nice work, how you went through. And I think that's really helping to focus and to explore the view, that's really something I am thinking is very valuable.

25:00 A: digital persona? I am puzzled about this? Is this a digital avatar? [...] You read very long until you understand what is happening.

A 40:00 I think the process you did with Laetitia is fabulous. But you have to put it in words that are understandable.

N: I like the metaphor! In the presentation and the report it was more concrete. I think when you break it down in components and rotate the knobs that is where the trainer metaphor comes out really well. "

Concluding interviews

In general the value of the tool-kit was acknowledged, but there is still some parts that need to be more clear. Especially giving a clear explanation of the total process, then the role of this tool in the process and finally the use of thin sensor data and thick user data has to become more clear. Also phase three needs an iteration to better suit evaluating and choosing a direction.
In the workshop with the student the tool-kit seemed more clear, this could be because actually doing the work makes it easier to understand.

Combining the feedback and creating points of improvement:

- The placement of this tool kit, in the whole approach needs to be more clear.
- The role and definition of the profile needs to be more clear.
- The use of data in this process needs to be more clear. (When do we add user data?)
- The definition of the different components (experience factors etc.) need to be made clear with examples.
- The trainer metaphor needs to get a more prominent place & explanation. (For the designers).
- The goal of the evaluation phase needs to be more clearly defined and needs elaboration on how the different axis help to choose.
- The axis in the evaluation phase should possibly also explain we are looking at measurable and influential behaviour
- The cards for this phase need to be less complex.

6.2 Final changes

Final iteration
The previously mentioned points of improvement are changed in the final design and by creating an overview poster.

1. Creating an overview poster

The use of data in this process needs to be more clear, therefore a poster is created to give a clear overview of the placement of this tool-kit in the full design process. Also the cards from the literature review are implemented to give the story a better foundation.(See figure 71).

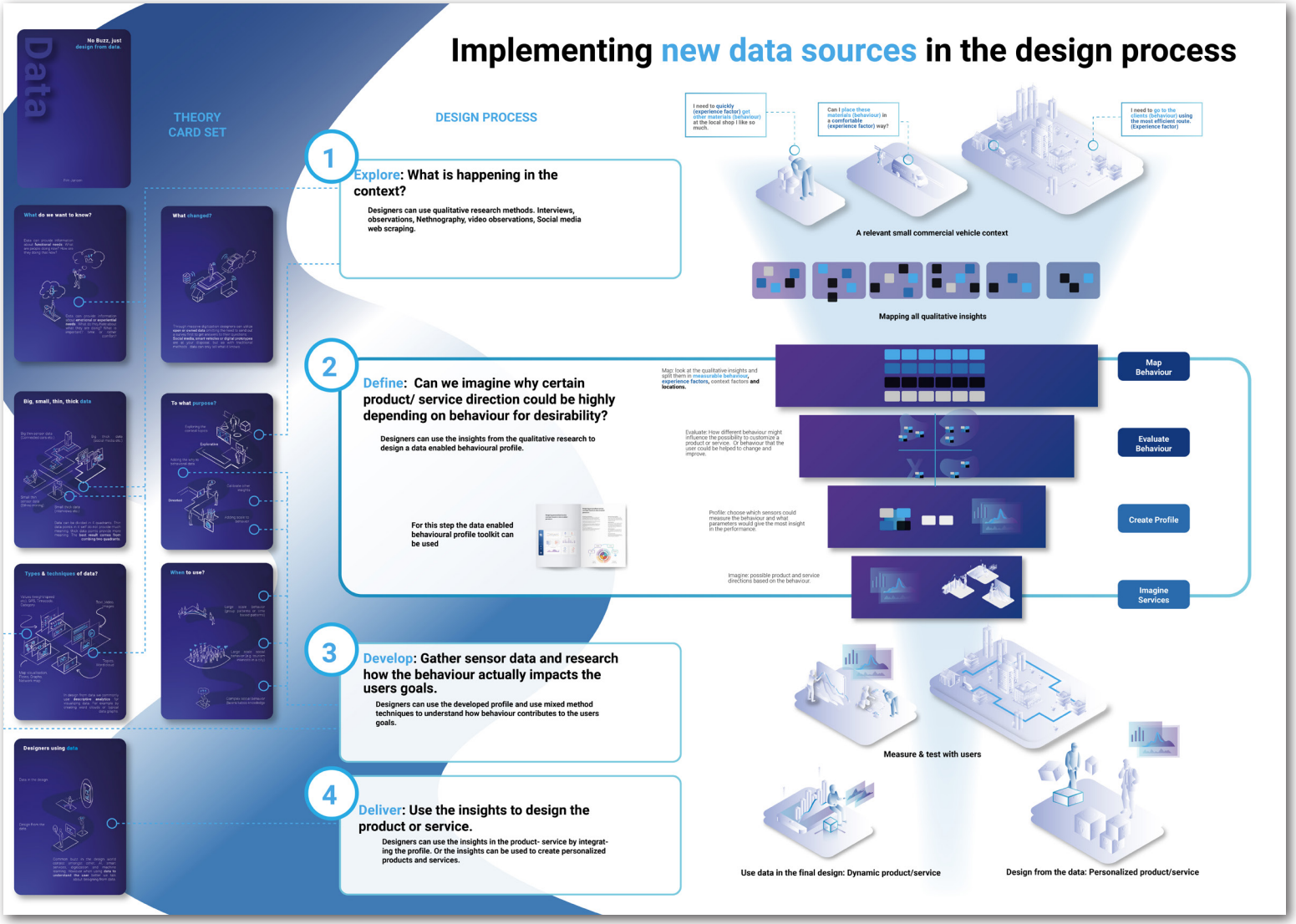


Figure 71, Overview poster

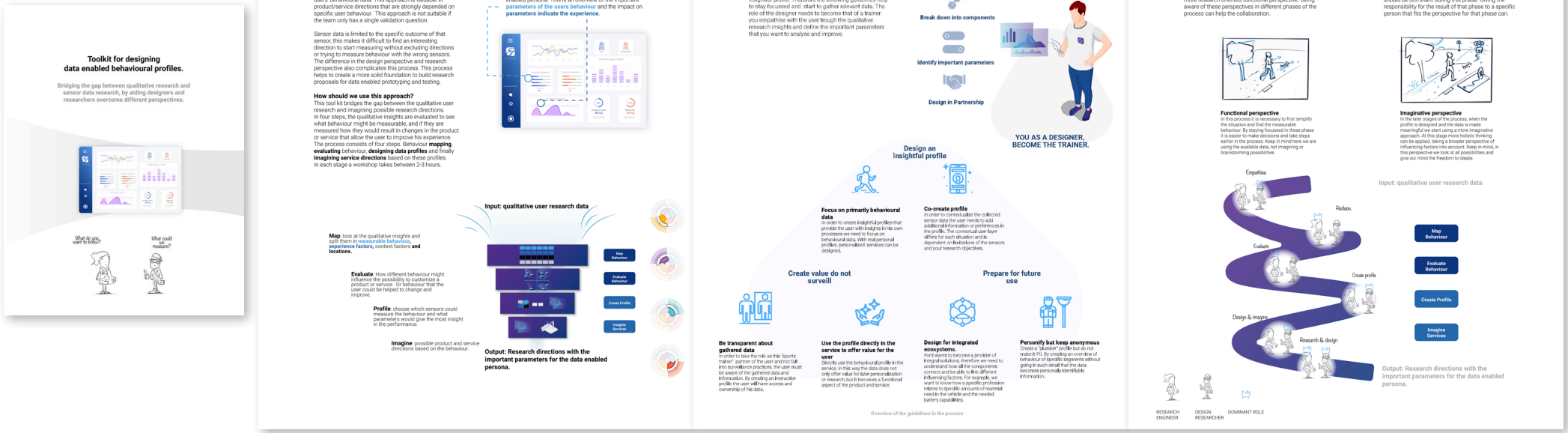


Figure 72, Final changes in way of thinking pages

2. Changes in the final design:

Way of thinking pages: (Figure 72)
In three pages, the approach and the process of the tool kit is explained. The metaphor is clearly illustrated and the guidelines are shown and elaborated.

By showing the pathway to the behavioural profile in the first page with the different components, it becomes clear what the goal is of the tool-kit.

The different perspectives are explained and the dominant roles of the design researcher and research engineer are visualised in the process.

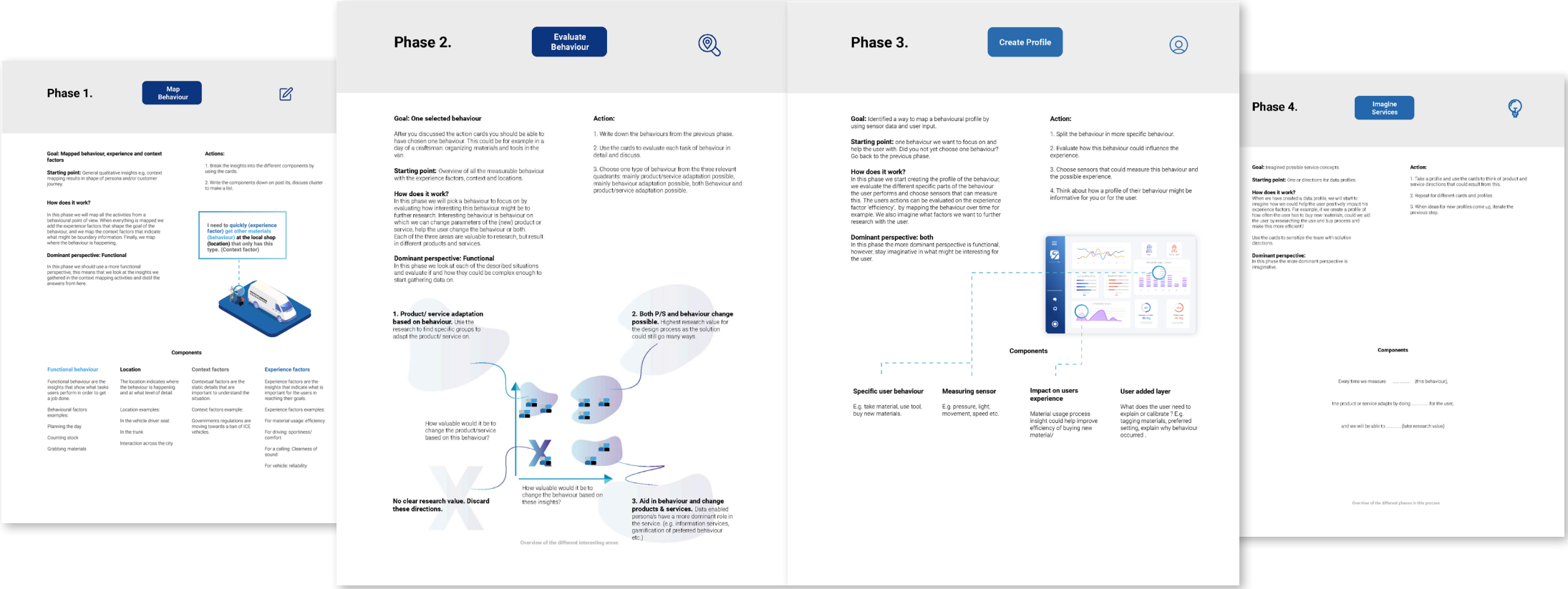


Figure 73, Final changes in way of working pages

Way of working pages, templates & cards. (Figure 73)

In order to improve the usability all pages are made more explicit and visual examples are used.

Phase two was iterated and the axis were created to less focus on the how complex or personal the situation is and more on what different parameters of behaviour might lead to product or service change or behaviour change.

The profile phase is elaborated more clearly by showing what components the profile is built out of.

6.3 Use cases

In order to show where this approach could be applied to other projects, I did an ideation where I imagined what the value would be if the behaviour or user preferences in some cases could be researched and put into a profile.

When looking at the functionalities of the vehicle we can imagine possible differences in use already by thinking about functionalities that have variable settings.

Also we could be looking for current functionalities that might be related indicating possibilities for connecting them to create better integrated solutions. We could think about how different subsystems might be related to other subsystems.

So for example when we look at driving profiles we could understand how that would influence the battery usage. Also we want to be looking at areas of recent developments of changes as these areas could be areas where the vehicle functionality is not yet fully fitting all different behaviour. An ideation session based on the above results shows the following possible directions:

Seat settings: Personalized seats based on frequently used settings

Temperature/ music Settings: Heating activation based on personal usage patterns. (Comparable with the “nest” thermostat.)

Steering sensitivity and drive train settings: allowing user to create their own preferred driving profile

Battery need: allow users to measure their driving behaviour and choose fitting battery packs in a service.

Tool tracking: Personalizing notifications service based on the frequency of forgetting materials.

Smart rack: Measuring material usage and informing or automating on inventory management

Battery & smart rack: Battery need advice based on material usage and range need. This could play into the range and charging anxiety that is limiting EV adoption.

Charging profile: offer users insight in their driving and charging patterns and inform them on the best moment and place for charging that fits their schedule.

Driving experience profile: adapting engine sound and throttle response to research how that would influence the perceived power of the vehicle, possibly leading to a lower needed actual power.

Driving & stopping patterns profile: Researching possibilities for in vehicle delivery.

These idea directions however did not yet follow the full process to detail the possible data need and therefore need to be evaluated for later use.

Inventory management service
This concept developed from the results of the case study, is the first tangible project I would advise the team to follow up on.

Next to using the tool to imagine services for products that are not yet developed, improving current products and services will also help in starting to design for integral ecosystem services. By bringing current products or subsystems/ functionalities of the vehicle further up the product service ecosystem maturity by adding personalized data based services.

6.4 Evaluation

In order to properly estimate the value of the tool-kit, it needs to be evaluated through the perspectives of desirability, viability and feasibility. This is done with the insights from the process and the evaluation.

Desirability

Can we use this?

Interviews with the team

- This process was created based on a literature review that was summarized to show all contemporary and relevant information. The case study of the C.T. team and the design intervention, allowed the project to become practical and clear drivers, barriers and enablers for starting to use new data sources in the design process.

Workshop with relevant mobility case.

Way of thinking: is validated in the workshop. Some adjustments were made to improve the clarity.

Way of working**:** is validated by following all steps in the workshop, the points of improvement were taken into account to make final changes.

Evaluation interviews

In the final evaluation interview, the understanding of the way of thinking was partly validated by the researcher. The idea was clear but additional changes were made to improve the clarity. The company mentor was more involved in the project and therefore did understand and appreciate the value of the way of thinking.

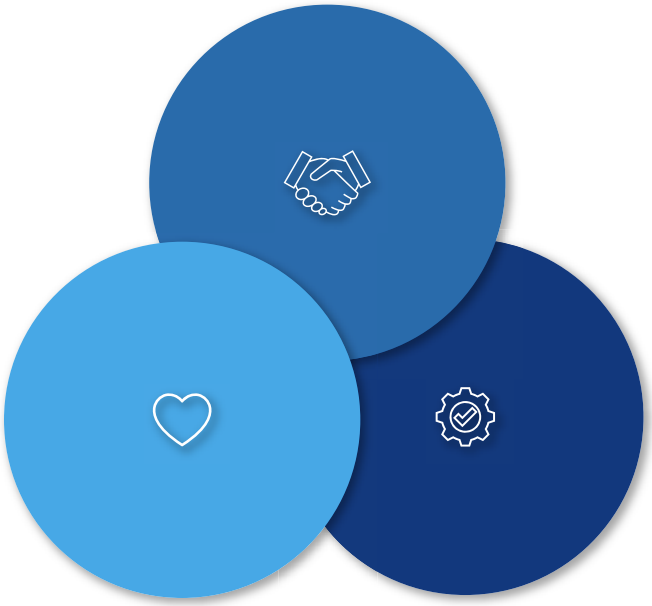
Viability

Do we see the value in this?

Evaluation interviews

In the evaluation the proposition of the data enabled behavioural profile is seen as a valuable contribution towards a more structured process. By imagining and making it concrete what the result of specific sensor research could be, there will be less abstraction and therefore possible lost efficiency in the meetings.

This process led to the development of a service concept around inventory management, which the team now continues to pursue.



Use cases

The use cases show that there can be multiple directions formulated for the team to further investigate using the tool-kit.

Feasibility

Collaborative design intervention

During the intervention it became clear that a close collaboration with research engineers is needed. By creating a process that allows the research engineers and design researchers to collaborate during the process, the feasibility of the proposed research parameters will be secured.

The approach to use sensor data to measure behaviour or actions was validated by discussing the profiles in the design intervention with.

Identifying limitations

6.5 Recommendations

This process helps the team to identify interesting behaviour to start gathering data and design services with. However, this is just the first step to set-up a project. (As can be seen in the poster) When a valuable direction is formulated, a research project needs to be set-up and the service needs to be further developed.

This process is based on the DED method and the learnings from applying the literature in a case study to design a service concept based on a possible data profile. Therefore this process needs further validation and testing to improve and enlarge the process towards testing and prototyping phases.

Also, if the team wants to use data earlier in the process more in an exploratory manner, this process cannot be used and other approaches need to be developed. Also this process does not elaborate the testing and implementation phases as this research was not scoped for that purpose.

Sharing knowledge on the approach
The process champion could serve as in company advocate of the proposed approach. When other teams would want to start using a similar approach the process champion could host the workshop. The report and the process booklet could serve also as material to educate other process champions.

Creating digital profiles dashboard
Next to allowing other team to create new services, in the future the collected data should be combined and stored in a dynamic dashboard. Showing the multiple variables of behaviour and providing an indication of the user sub-group, without gathering personal identifiable information.

This would result in the ability, to research the behaviour, not only in the development of the product and service but also after implementation. In this way Ford creates the possibility for continuously researching the value delivery process as this is partly digitized in the behavioural profile. The profiles would have three main layers:
The first layer is the raw data that is collected from the interaction of the user with the product or service.
By adding a additional layer to the thin sensor layer, we can contextualize the data and transform it into information. This could be as simple as assigning certain functionalities to the specific sensors.
The last layer makes the information personal. This can be used later to map behaviour into segments. By adding this layer, we can more easily select users to further investigate. For example if facility maintenance vehicle users have a varying material use we could investigate that target group specifically. Another possibility is allowing users to share preferences of specific functionalities or profile settings. In this way a more experience input layer is added as well.

Analytic possibilities
In the development of the personalized services, the value and possible analytic possibilities also develop. From descriptive analytics on a small scale: measuring the behaviour of a couple of people in the community. Towards predictive and prescriptive analytics based on large scale user groups that would show us how the behaviour will change in the future and what we could do to act on this.

Involving other stakeholders
As previously described, in the first phases of the implementation process a GDIA team and the Ford Pass pro development will have more of a facilitating role, whereas the Ford smart mobility department could design and utilize the user profiles.

In later phases, other teams could also access the profile dashboard and use it for user research.

Organizational implementation
In order to implement the designed concept services and be able to create a basis for data storing and organization, collaborations need to be made with the Ford Pass pro team and the GDIA department.

Ford Pass Pro app dev team
When the service concepts are designed and tested, collaborations with the development team need to be established to further implement the service.

It would be good to include the team early in the process to create a common ground to further develop the service on.

Current Ford digital ecosystem
When we want to research the opportunities to scale our research practices to larger audiences, we need to examine the current user touch points that we could potentially use for our research. For all new Ford vehicles equipped with the modem, there is the possibility to use Ford's data services. For consumer vehicles there is the Ford pass app and for commercial use there is the Ford Pass pro and Ford telematics services. I will elaborate the Ford pass pro app and the telematics solutions here to show what we can use in the current context.

Ford pass pro app
The Ford pass pro app is developed specifically for commercial vehicle owners. The app is connected with the vehicle and allows the user to interact with and gather data on the vehicle. (See figure 74). An overview of the current functionalities:

Security
The Ford pass pro app has multiple functions to ensure security. With the security mode, the app alerts you if doors are forced open. With Live-lock status you can check remotely if the vehicle is properly locked. With tracking mode you can track all your connected vehicles. With remote lock you can provide access to the vehicle.

Productivity
With the remote starting function you can preheat your vehicle just before you leave, with the WIFI hotspot administration can be done in the vehicle. Finally, with the route registration the journeys can be tracked with the kilometres and time spend with each trip.
Furthermore, expenses can be tracked with the fuel cost indicator and Live traffic updates help to be kept up-to date.

Figure 74, Ford pass pro app Ford Motor Company. (2020)

Vehicle state
The vehicle can give important alerts about possible problems with the vehicle and the state of different parts can be checked in the app. When there is an problem on the road Ford assistance can provide help and you can even track the time of arrival of the assistance vehicle.
Ford Motor Company. (2020)

Ford telematics/ data services / Oracle / Ford pass pro (figure 75)
Ford offers an array of services based on the data captured by the vehicle for fleet managers. Project oracle focusses specifically on the maintenance journey to provide managers with an overview of their fleet's "health" status and offers appointment management for when vehicles need maintenance. A service cost overview, driving behaviour like time and stops are also included in the software. The oracle service also allows for giving feedback on the dealer experience. The Ford telematics solutions are very similar but focus more on larger corporate fleet management.

Figure 75 Ford telematics systems, Ford Motor Company. (2020)

GDIA department & Ford pass pro
The GDIA currently does not have access to the data that is gathered in the Ford pass pro app. In order to build a research platform that has access persona profiles from the ford pass pro app, a data infrastructure need to be setup where the users of the service can access their data profiles and Ford researchers can setup research proposals based on insights from the data and analytics team.

Conclusion
The current Ford pass pro app, project oracle and the Ford telematics platform provide multiple opportunities to use as platform to launch new services and interact with users that are currently already gathering data about their behaviour and the vehicle.

When implementing new services, the Ford pass pro app should be able to gather and connect the user profiles to the GDIA department for persona creation.

This could also be applied at currently used functions, if there is an assumption that it might be relevant for the persona profile. For example, now most functionalities are only providing the user with processed sensor data like engine maintenance status, but there should be the opportunity for the user to add a personal layer to this data. For example the user could create a "plumber" profile, which Ford in turn will be able to better understand specific segments and provide digital services for plumbers only.

In order to start utilizing these platforms as part of the service solution and to implement the persona layers, collaborations need to be setup to include the other parties.

6.6 Roadmap

In order to give an overview of how the C.T. Team and the smart mobility department could progress using this approach of behavioural profiles and collaborating with other internal stakeholders. A roadmap consisting of three main phases is created. (Figure 76)

- Understanding data in the design process: with a possible practical use-case of data.
Creating the foundation for the profiles and connecting with other stakeholders.

- Designing personalized services: applying the profile research approach and creating collaborations with other stakeholders.

- Designing ecosystem solutions: Exploiting the profiles, if there are connections between different components, the profiles can be used to research those connections.

The team needs to be able to collaborate with other teams in the company like the Ford pass pro team, to create a shared data strategy. Where user data is stored in a user profiles, research projects are organized and successful projects are implemented in the customers touch points. (Ford pass pro app & vehicle)

If the data is better stored and managed, data dashboards need to be created that serve as starting points for new research projects.

Some project directions from the use-case examples are shown in the roadmap to illustrate how the profiles and collaboration would develop in the coming years.

Te development of the process is also shown in three phases: Understand, imagine and apply. The poster and cards help the team to better understand, the tool-kit helps the team to imagine and another process needs to be developed to perform the testing.

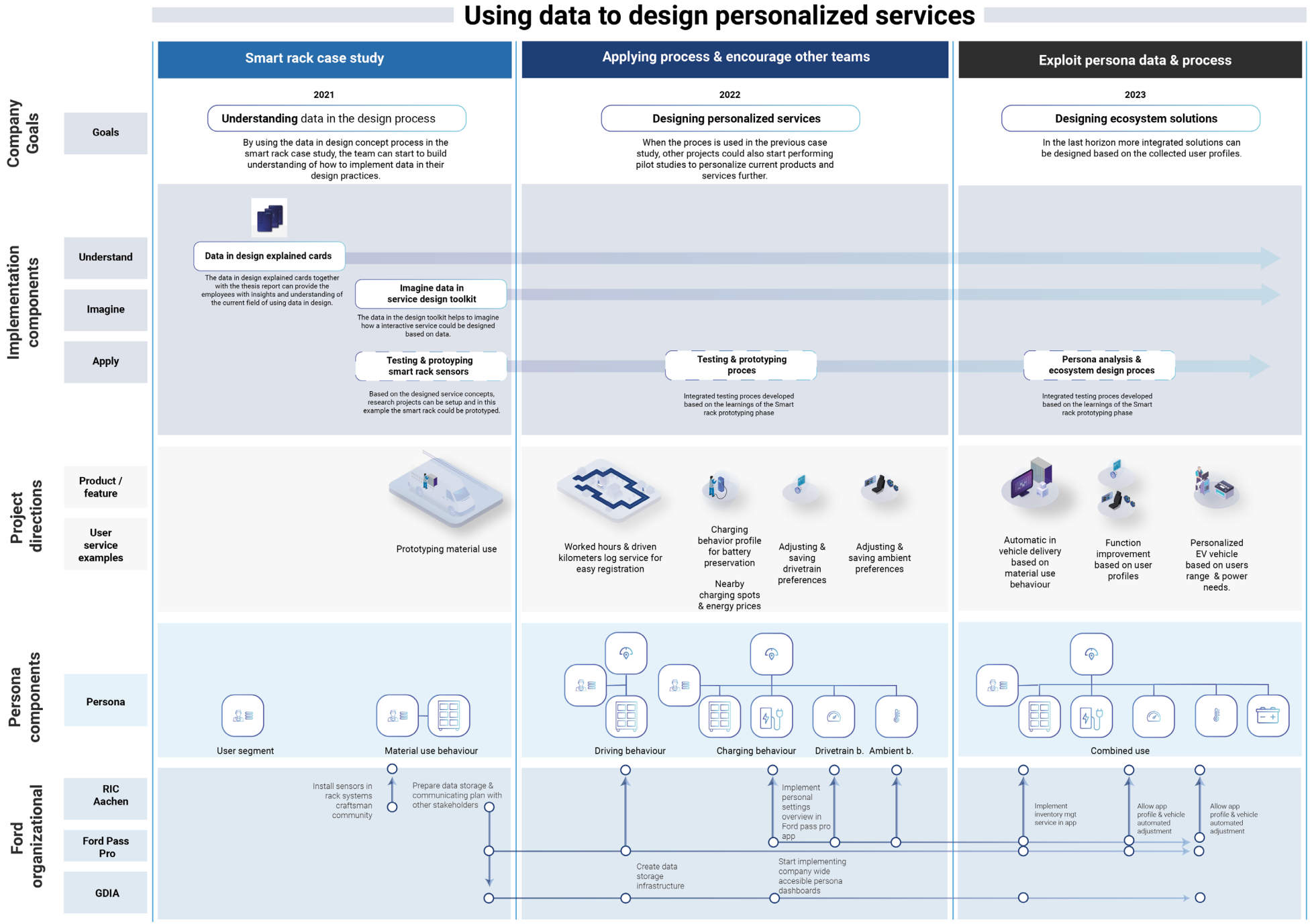
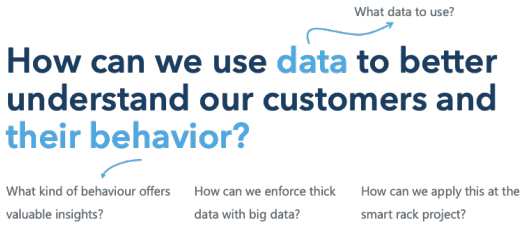


Figure 76 Roadmap for implementation

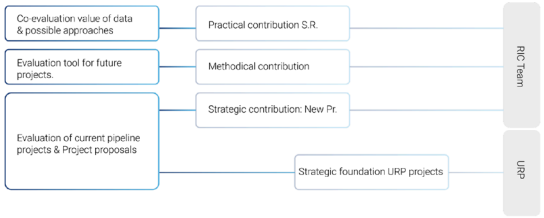
6.7 Final reflection

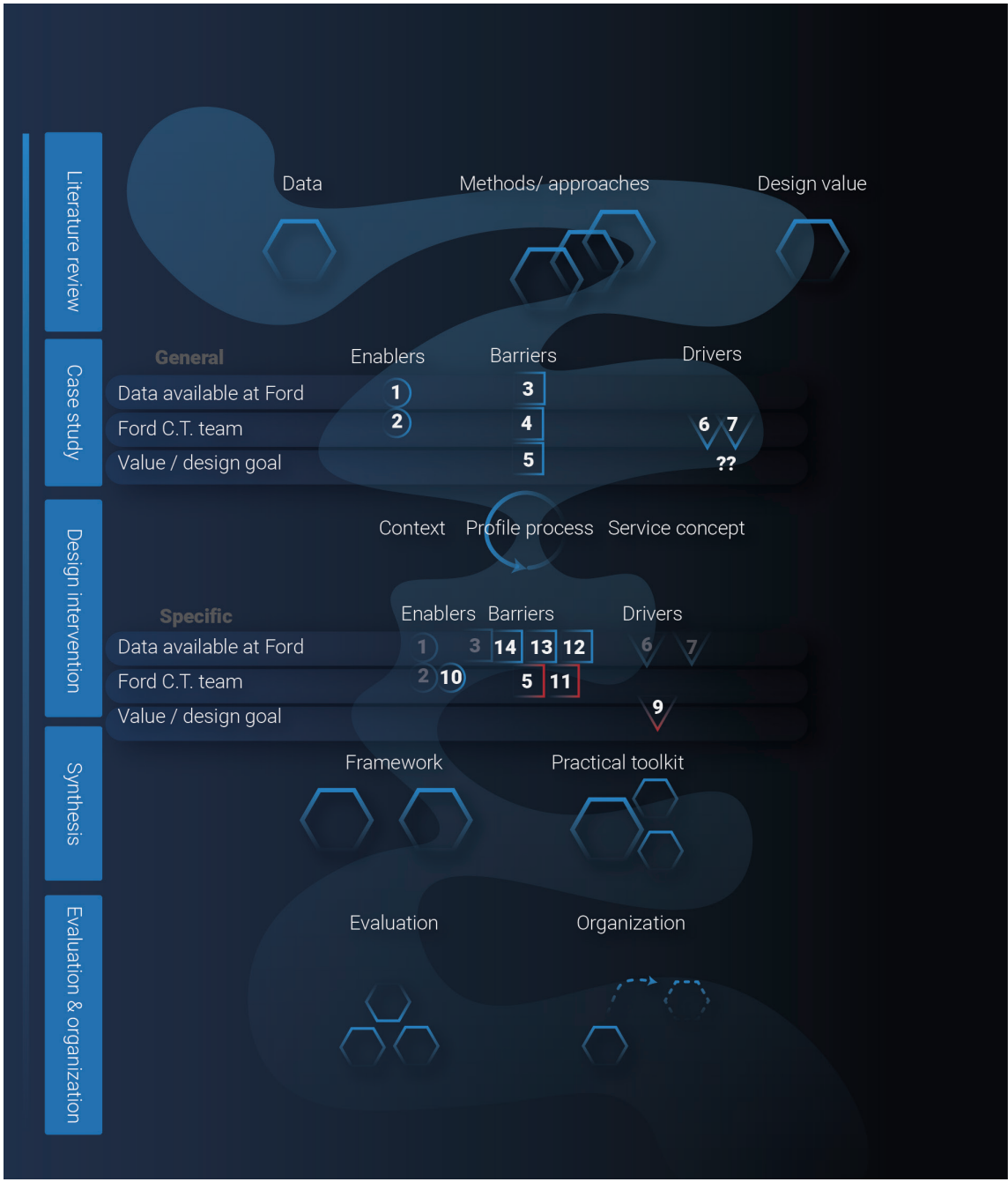
Now the final evaluation and recommendations are done we can look back at the first questions and goals I set in this project. First the exploratory research question.



In order to better understand our customers and their behaviour, we need to set-up a research project where we choose sensors to research measurable user behaviour and influence of that behaviour on the users experience.
What data should we use? Owned or new sensor data, keeping the limitations of the sensors in mind. (If you analyse door open/close data you will end up with a door related service).
How to enforce thick with big data? First use thick (interview/observing) data to find a direction, then implement the sensors and then go back to the user to discuss the results for calibrating, adding the why or adding scale of behaviour.
How can we apply this at the smart rack project? We can use implement weight sensors to measure material use and create a material usage profile.

The deliverables also helped to reach the goals I set. Together with the C.T. team I created a practical contribution to the S.R. project in the shape of the service concept, we created a methodical contribution in the shape of the tool-kit and created project recommendations for future projects.





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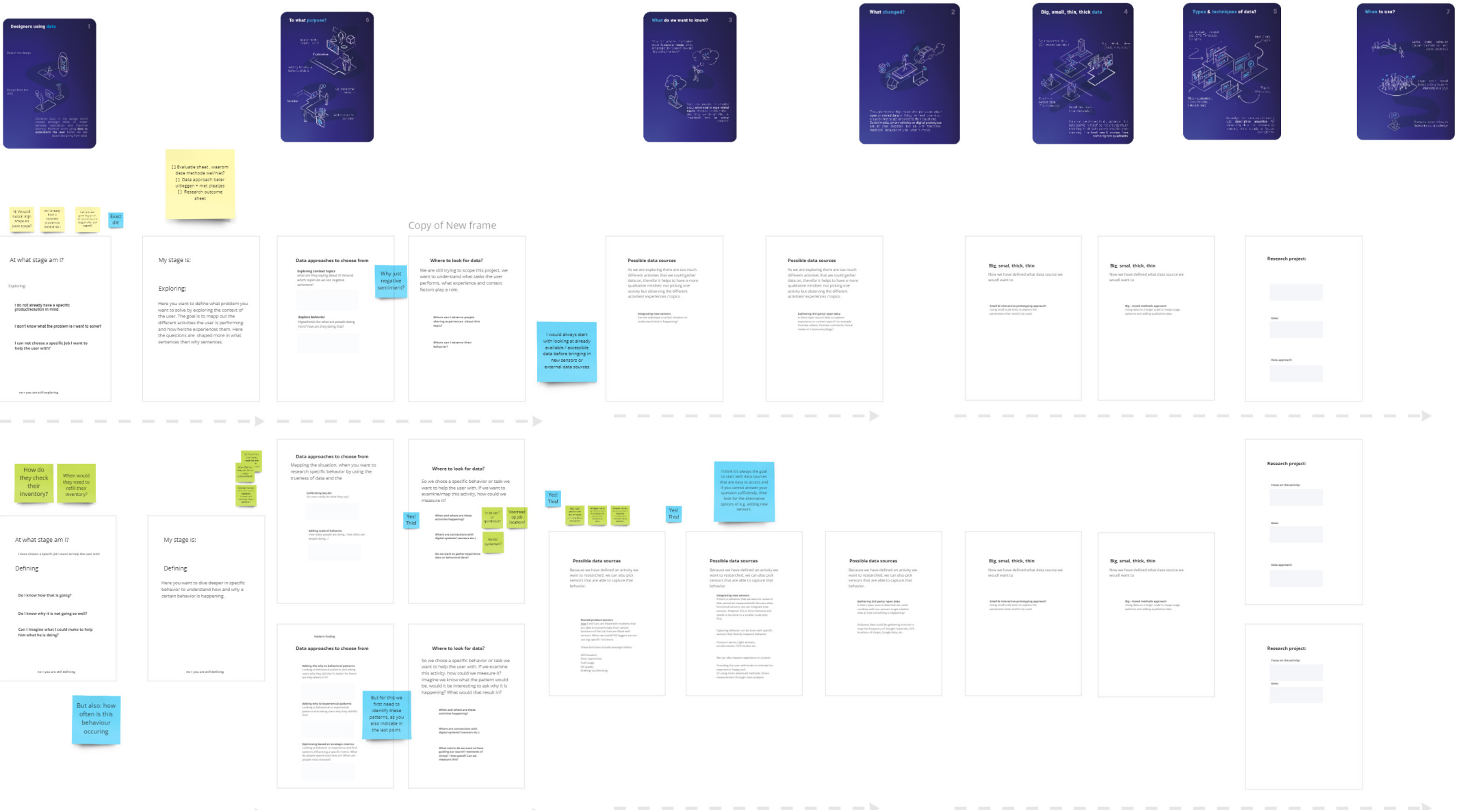
Appendix

Appendix A: Data possibilities template and interviews Ford employees



Transcript 1: Participant #1 (P) Research engineer
Interviewer (I)

I 0:00
It's easier for the analysis. I'm sorry, yeah. So either I create a tool. So you and you and the others in the team can evaluate whether data would be of some use in this as part of the process and how you can then use data in that part of the process. Or I actually choose one data source or one activity that I want to research, for example, the activities of the handyman during a day. And really try to create some kind of digital diary sort of, say, of all the activities and try to, for example, for the inventory management, try to see written research the shopping behaviour, so how often do they go to the shop to get new materials, so we can actually get some better feeling on what is actually happening. So that is kind of the two directions that I have in mind right now. So either you're the tool or more going in depth using one specific activity and research. And I think maybe it's nice to get a better view of your role in the team and in the different tracks. So could you give a small explanation of what you do within the different projects ?

P 1:38
I'm a technical experts in this groups working on strategical things, so that's what's what gives a little bit of direction. Technical intelligence things that should be solved. But also i'm also have project lead for project, strategic things and our team as if there are some certain difficult questions and help them to find a way out for that.

P 2:10
Okay. And could you give an example of some of these questions?

I 2:19
Yes, for example, for example, marcel if you talk about handyman above, there was a program to find order to find out whether a tool is installed outside the car, and evaluate that, according to the Bluetooth signals , what signals they have and to find out the way how it it's more or less stable on to find it out.

P 2:48
Okay, and until you work for or work with Marcel on the smart rack. But you also work on the delivery track.

I 3:00
More or less on every project. As I said, I give technical support. As I said, I have some delivery. I'm leading a project with the delivery van of the future subject. Mentors work in the work stream not really in the in the new stream my more and the technical stream technical work. And yeah, sure I am support marcel and the different projects, especially in the plugs on the handyman project, a smart racks, not so much. Because jeroen is now coming into this position to support on the technical sides marcel in this project. My given this project more or less strategic direction, okay. Okay.

I 3:51
And so, so maybe we can now dive, dive more into the two directions. And so maybe the first question is, as you as you're more on the technical side, and be having experience working with marcel and Nicole, and think that it would be valuable for them to have a tool to help them understand how they could use data in order to research behaviour, for example.

I 4:30
The question I have the problem which you normally have is to give the database itself enough to data itself. I think that that is the main challenge here. Because it's not so easy, for example, to get data out of the car. Now because we have a lot of information in the car you have to select every test different and yeah, so that's it's true. So that's very good. However, I see we need some challenges, to get all the data which is needed..

P 5:04
So maybe we can already dive dive into the the other direction. So for example, I was thinking I also talked to Roy Hendrix about this. So we have this this very, very clear problem, so to say right now that we think it might be interesting to help the handyman with their inventory management, because

they have to go to the shop a lot of times, and maybe that's not necessary, if they and if we keep track the inventory and help them with this. So, we would like to see if we can actually map the the activities of the the handyman, for example, taking the GPS data, when every every time when he stopped somewhere, and tries to try to match this, for example, shops that are in the neighborhood, and then with a small group of people, maybe three or 5 handyman, we would track this, this these activities, and then we take a look at these activities together with them to see okay, so why Why did you go to the shop this many times? What kind of materials that you need there? And could we also have done this in a different way? So if we would set up a project like that, we already expressed that we might need a different modem. Because the current one can't really send out the the GPS in real time. But if it would like to set up a project like that, what would you What would your strategic view on that be?

I 7:04
small as simple as one. You can have laws, which are available, we have two friends that you can measure on GPS data, I think that is not an issue. Even you get information about whether car stops engine is on status on and so on, probably no, no, no big problem. So you can develop a kind of routes per day where a handyman stops and goes to I think there is no not a in big issue to do that. The other question is whether you then go into detail and ask them what you do here what you do there half. And if it is not the only one and demanded that the company, maybe you have four or five different sentiments, which you have to interview with, and I'm not sure whether they're , maybe they're supportive, but I'm not sure whether they have lot of and can spend a lot of time for that because maybe an important chef or marcel of the handyman is can can do that. But not in but not each one will do so and maybe you have to speak to each of them. Because only they know where there was at a time. Yeah. And it could be maybe a lot of efforts. So yeah.

I 8:40
Okay, so you're only worried about that. That's, that's actually, I think, a positive thing so that the actual technical part is in the problem.

I 8:51
this is, listen, this way, there's not a problem to track GPS data engine on engine offsets using but then as soon as you go to more detail, for example, open a door that is more complicated, or you can even implement the camera inside the vehicle, but then you have to do it by yourself and think look what they're doing at each time you have to synchronize that. So you have to have the camera plus time and then you have to compare the time because the GPS data there is a lot of effort all depends really, what kind of data you need for your research. So for example,

P 9:38
all right, so if we would want to combine it because I think actually the evaluation combining different types of data and trying to to map them together to get the most the best view possible. How would you then You say that it's more difficult? Is it like, with the cost a lot of extra time? Or why is why is that more difficult?

I 10:13
For example, takes a GPS, yeah, you can do it independent from an independent from the car, you can have a look at a logger, which you can plug in the car, and you don't need any way or connection to the car. So it's independent from the car. And, for example, as soon as you go into the car and connect to the car, every car is different. Each data comes from another source, and you have to really look into what is it what kind of data is available in the car, which vehicle is it, and whether your model is compatible with this vehicle. Okay, so GPS books any anyhow, but as soon as you go into data, that's problem. So and the second, if you would like to be independent and install a camera, for example, into the car, it's also independent from the car ever, then you need the kind of synchronization between the GPS and the camera. So you need to have a time in for some our time into the video that you afterwards can see, here's the GPS boom, here's the GPS position. And you'll see the video to that. Yeah, so that's to be identified, that's normally the time

I 11:39
and so forth. For example, Roy talked about just just implementing a an additional moden with a Raspberry Pi. And he said that that's the easiest, all in one solution that you have the best data, because you can get in real time GPS, and you can get the implemented time and all these kind of

things. Get the get the data from the door open close.

P 12:15
Again, Yes, that's true. however, it still needs to go into the database, a user log on the past for one day equals one special vehicle, they have to know exactly which databases, you know, where you find the data. If you go to the handyman, maybe there's no Ford car, maybe it's a peugeot or another car. And then you have problem to find out where the data is. Because we have no data access to that, because they're not OEM. And even if we use Ford vehicles, maybe there's a signal, but the signal is different for each vehicle, so it's easy. If you have one thing all the time. Yeah, that's easy, then you go into the database, look at it all to that. But if you have more than one vehicle, this can become complicated, because it's different vehicles, different databases. It's all possible. Yeah. If you have the data source, if you have to know where the data is, yeah, you can use this longer. You can use also Allah knows. I mean, that's that is not the biggest issue. I think the issue here is if you talk about fleet, different vehicles, you have to know whether these are fought fought have a fought brand, how old they are, and, and so on. And then really, the easiest thing is if you use only GPS that's really independent from the plug

P 13:58
in the camera, so and then save some time client. So that is but I think it is handyman case. And now it's an hour tomorrow because I was often not at the place of the work, whether you're working or not only for vehicles that are different vehicles.

I 14:18
Yeah. So for example, there is this fordpass. app. And and is it a possibility to to find people that are using this this fordpass app because the fordpass app also measures the GPS and also probably as a time available. So if we have people that use those that app then we already had them we also have all that data. I think that's also how the team in London does it?

P 14:56
No, I don't think so. They have loggers for that.

I 15:00
Yeah,

P 15:01
as far as far as I know, they they use also loggers to that issue with ford pass app is it is there's a separate system. So that means they have their own contracts with it. And everybody has to let's say it's but difficult to use the data. Maybe it's possible however, then we have to do love contractual work and go to the fordpass colleagues and ask whether you can have this kind of data, which is available. However, again, if there's not a fourth branch, they have no four pass now. And for passwords, only four new vehicles were more than Miss implemented. Yeah, normally. All cars. I think there is a real issue with it.

I 15:57
Yeah. Yeah. Yeah, True. True. So I think the question is, also, do we want to design I mean, if we want to design for the people that buy the new cars, then this might be a very good target group. If we can find the people that have the fordpass app?

I 16:22
Because then it's also then they also have the newest modem, right? And then then it's easier to get the data from the car because it's the newer vehicle. Right?

P 16:39
Yes, or no, I mean, the issue is to find the people. Because if you talk, for example, marcel has a group, it was not easy to get this group of handyman which support they are very supportive. So they have already a fleet. Yeah. thought of that fleet is out for vehicles. A minor part of his are maybe vehicles which are newer. And maybe you'll find only one or two vehicles, which fulfill your cravings. And that is not enough, I think, yeah. To get all the data, right.

P 17:23
ford pass, this may be not an option for you. The question for me is what kind of data do you need? Is GPS sufficient for you? Yes or no? Do you need more data? is a combination of camera and GPS enough for you? ja? And if not, then it becomes complicated, I would say.

I 17:44
Yeah. All right. So yeah, I think and, of course, we could say that for this situation. The the GPS might might be enough. If we can also, for example, send a send a message to these to the community asking, Hey, we saw that you went five times to the shop this week. Is that correct? For example, then it's then no, or depending on how much time they have to do an actual interview. But I think if we don't want to treat this as a one off solutions, and also in the future, research, other things. And then it might be a lot more interesting if we do try to find people that actually have the modem and then we can get more people information.

P 18:46
Yes, that's possible in the future, but we start one out years ago was a modem. And there is not really a lot. So

I 18:57
okay, so that's maybe maybe for the the roadmap for for some years in the future, if almost all the guards actually have a modem. And it's possible to put together the data

P 19:13
is a there isn't the easiest way. I mean, we have the GDIA colleagues from data analytics. They already gathered all the data from four parts, which is available and investigating. So the question is, what do you really need or what what kind of group Do you would like to researche? Yeah, if there are enough vehicles available was ford pass. And the data we can use, it's fine. However, the data which comes in from the data analytics team is anonymous. So we don't know whether it is handyman or whatever it is. Yeah.

I 19:53
And that's a difficult thing. We should actually try to see if we can make Some kind of sample group where people can sign up to be yet to share their data. So we can actually get it from another anonymous. But that's maybe maybe a bit out of scope. And so, okay, for so for example, right now, if we say, okay, we want to track this shopping VA here, we can we can use the GPS. And how would that? Get it? Yeah? Would that start to work? And maybe I need to set up like a project together with Marcel, where we say, Okay, these are the questions that we want to have answered, answered. Are these the, the actual ba for that we want to research? We want to gather this data and then use that data to get feedback from our handyman and then see what see what see what comes out of it, see if we can actually better understand his behavior. And yeah, but for example, what what would you need from me? Or maybe not, maybe not you, maybe somebody else? I don't know, who's the person for this. But what should I really focus on in preparing for a project like this?

P 21:33
Yeah, I think you have to be to look, what is the first goal. Yeah, but as we use a goal, what what kind of data? Do you need mandatory? What is optional? Now make some list for that.

But what do you think? What kind of data is? And then we should come together maybe was jeroen is he is looking out for the smart rack project. Maybe that's the best man. He also have a deep, deep knowledge about what is available in the car. And then we can have tons of loggers, whether that's all of us, which Roy mentioned. So we have also other loggers, which comes from UK guys. Yeah, both is possible. we have now implemented, I don't know whether you know that. Yes, we are now going on and implement loggers into handyman vehicles. marcel knows that we know that because he's organized it. And now we have already to two vehicles equipped with loss. Okay. And from this vehicles we get already GPS data are also this door opened or close this kind of stuff in the model has already some some loggers some traditional loggers available. But these are only usable more or less on ford cars, and also another old Ford cars . Okay, we can start with that. So maybe that says a good starting point to understand and connect with marcel and jeroen. Yeah. What's going on there? Whether you can use that data? Yeah. And this master is also looking for a kind of camera solution. Yeah. Yeah.

P 23:17
in which he can, can help have a picture what what is going on? Yeah.

I 23:23
All right. Yeah, that sounds good, then I have a meeting tomorrow with the human, then I'll discuss that with him. And then I think that's the best starting point four now to really try to set up a project. Alright,

I 23:44
because this is not it's not really available. And also we have started it and maybe that's a good starting point for you as well. So

P 23:52
yeah. And then maybe last question. For from your point of view, what what would you think that is most valuable for the team to really help them understand what they can can do with the data or help them start in this project? What do you think would be a good outcome for from this project? From your

I 24:28
Um, I think it's good to understand maybe a user journey, maybe to talk as you said, How how's the behavior and do that as underlying data

P 24:46
what is what is possible? We need to find out the importance for what will be the pain points and during the day, this is all what what the handyman is doing and we can find out of the day, But if you know maybe get get already some some insights from from the handyman, maybe you can check it with the data was a really issue.

I 25:12
Yeah, that was what I mean more is not what would be a good outcome of the the actual actually measuring the measuring behavior but more. How do you think that this this project because of course this project can can contribute to the result of the smartrack project. So, showing showing pain points, or whatever. But this project could also more be on the Mithen methodical side showing how it works and how they can do it. And it could be either practical so the way that we started this project and really dive deep into this project. And we, we learn how to use data in this way. But it could also be on a more higher level, picking the different or seeing the different opportunities. So from that perspective, what do you think that there would be more valuable for the team more extra results? more practical? Yeah, doing one method or seeing this bigger overview with different methods?

P 26:39
You can come to explaining the methods which are possible, I think that is available. So but to really understand the method and really understand the advantage of it. Yeah, that is really helpful against two other methods. Or maybe there are special use cases or special projects for which this kind of projects, it's really good to use that method here. So maybe it's also to understand good. When is the best to use that method? And the other methods here? It's not only data, you have all the other methods, maybe you can find on which use cases are perfect, usable. Yeah. Yeah.

I 27:34
All right.

I 27:36
I think that's it from my side. Oh, yeah. One last question. And so you're also working on the more the delivery track with titles? And would that also not be a use case where it's actually very interesting to look at behavior? Because you're more researching bigger scale behavior of how people are delivering packages? Are you aware of any big questions regarding behavior? In that track?

P 28:24
some in question in this this case is timing. Yeah. How long?

I 28:28
Have you guys we need for for each task? to plan it? And why don't we have other methods to optimize? The time for example? Yeah. And the could also an optimization with your methods to really find out how long the stops are? How many packets delivered at a certain time? Yeah. And how is always a day from that? So to understand really, the the business you're on? How long does it need for each package for one loading to load the package to to unload it to bring it to the customer or to the package station? Yeah. Maybe to find out for us then is maybe we have a good understanding of that. And maybe we can optimize storage. to Especially design in the car, or architecture to optimize its journey. Yeah. Right. Okay.

/i 29:28
Thank you for your information. And I think our own getting contact with your own tomorrow. See if we can set up this project. And in the meantime, I'll also try to work out the different use cases of different methods. So that's that at least we have some foundation that we can work on also, if we want to take a look at different projects.

P 29:52
Yeah, that's good. Okay, thank you.

I 29:56
Thank you very much.

Transcript 2: Participant #2 (P) Here called Speaker 2 Research engineer Interviewer (I) Here called speaker 1

This transcript is one of the Dutch speaking participants. The quotes in the report have been translated.

00:00:00
Interviewer: Inventory management vinden wij interessant. Nou, als we die dan hebben we gekozen, dan gaan we dan gaan we kijken: hoe kunnen we dat gedrag meten en daar dan een een goede keuze te maken? Ik denk misschien inderdaad gewoon dat die stapjes al zo zitten in een soort van bedenken welke vragen je jezelf moet stellen om die antwoorden te krijgen, dat dat misschien ook wel veel zou helpen ehm, dan denk ik een soort van nu. Bijvoorbeeld voor deze Kees denk je dat het nu al, want – want jullie zijn dus al bij Marcel – is al bezig met die jij die voor gps klopt. Dat.

00:00:43
Participant: Ja, eigenlijk de lijst die hier staat, bijvoorbeeld op moment door die gemeente aan zn vader, komen er nog een paar bij. Maar dat is dan meer licht, staan ze volgens mij aan nog eentje zijn als een paar keer die wil toevoegen. Maar ik heb de data bekeken en dan is de vraag: gps: of snelheid rijden is was eigenlijk een probleem, dus meer in dat. Die stilstaat er. Wat gebeurt er dan? En dan blijkt in ieder geval uit de data die ik op dat moment dat ook weer dingen, maar zoals gezegd, wat ik nou met die deur liet zien dat die die events niet meekrijgt of te laat meekrijgt. Hoe doe je ja die data eigenlijk niet goed kan gebruiken.

00:01:30
Interviewer: Ja.

00:01:31
Participant: Ik bedoel eh die die auto even kijken. Die auto is dr, heeft vier dagen geleden en op iedere dag hebben ze ook meerdere. Dat zie ik uit de data van der. Toen hebben ze meer dat een ritje gemaakt. Nou, dan weet ik van Tessa. Die maakt een ritje en je kijkt even naar de data. Dat kan een half uur uur duren. En dan ga ik nog een keer. Ga je dus in ieder geval. Je hebt via het gereden – en

ik ga niet uit dat ze van nou dat is – die auto overnacht hebben. Dan verwacht ik eigenlijk acht keer hopelijk deur dicht bij de open acht keer een auto dicht cyclus van de bestuurders terug.

00:02:06
Interviewer: Ja.

00:02:08
Participant: Ik heb 11 keer deur open en vier keer is alweer 11 keer deur ook een ja en vier keer deur dicht. Met andere woorden, ik heb die een aantal cyclus, dus uit die data kan ik niet inzien dat dat dat zoals en lijkt alsof ie met met de deur open gereden en heeft u die kleine staan aan. Maar dat is onzin. Maar vandaag, daaruit klopt die data? Ik heb één of andere gefilmd dat iets die nieuwe zeg, maar dan moet je ook weer naar kijken. Want als inderdaad klopt dat je gewoon events, tenminste als die auto stilstaat, dan dan is daarna, die hebben dan eigenlijk weinig waarde. Dan moet je op een andere manier gaat meten en dan moet je denken dat je inderdaad een een bewegingssensor in die auto inbouwt. Natuurlijk voor gps positie en snelheid in dat ie rijdt, lijkt het wel allemaal een beetje oké en komen ook de signalen goed, dan lijkt alleen in dat die stilstaat. Daar zijn een team op. Dit maakte zeg ik: sta niet geïnteresseerd zijn meer van waarheid, die auto welke snelheid rekening doet of niet. Dat soort dingen.

00:03:12
Interviewer: Ja.

00:03:13
Participant: Maar wij zijn voornamelijk geïnteresseerd en wat gebeurt er met die dan ontstaat en daar ben ik op dit moment. Maar wat ik aan data eigenlijk een beetje skeptich tot wij dat wil uit kunnen halen. Ook omdat ja, je kunt alleen maar hier gaan naar de deur kijken. Maar als die data gaat allemaal op die campus. Na vijf minuten gaat die dus uit in ieder geval niet wakker totdat je de auto.

00:03:39
Interviewer: Ja.

00:03:39
Participant: Dus vandaar uit een beetje skeptisch of wij hier veel data voor kunnen gebruiken voor onze doeleinden. Maar ik denk wat jij zegt: je moet ik gaan kijken wat er precies in die auto zien. En hoe kunnen we dat? Dan hebben we aannemen. Camera zegt alles, maar dat is werkelijk om dat uit te werken en zeker als je meerdere meerdere dagen hebt als één auto over een paar dagen vast kun je natuurlijk eh wat wat doen. Maar wat kun je nog meer dan dat? Dan moeten we wel eens een keer goed over denken van ja. Wat wil je aan de volgende stap van hoe? Hoe zou doordat dat eventueel kunnen het ook op één of andere manier.

00:04:20
Interviewer: Ja, en en die gps data, ik zie trouwens dat er een beetje over de tijd heen gaan.

00:04:28
Participant: Heb je nog 15 minuten effect.

00:04:34
Interviewer: Want stel we zouden dus ik, ik zou het misschien interessant vinden. Zouden we die gps data in ieder geval kunnen matchen aan die timestamp? Zo dat we in ieder geval op bepaalde plekken weten waar die is gestopt, zodat we in ieder geval een eerste beeld kunnen krijgen. Van hoe lang zijn ze op verschillende plekken.

00:05:10
Participant: Het is gewoon een falie gekregen hebt gewerkt. Je ziet hier gewoon de de locatie staan dan ergens achter een zijn meerdere times, dames hier, waar je dan Tata uit kunt halen. Nadeel is dat die times staan. Die staan niet in chronologische volgorde. Waarom weet ik niet waarschijnlijk of op een andere dingen, maar die krijg je weliswaar zo krijg ik het wel weer aan de goede volgorde. En dan kun je gewoon iets is maken van hoe ga je je auto? Maar ook hier is het zo van ja, als je stilstaat, krijg je geen data, maar je kunt wel zien. Ja, hier staat die op dit punt en dan twee uur later begint ie pas weer te lokken. En dan kun je ervan uitgaan dat die die twee uur op dat punt geweest is.

00:06:05
Interviewer: Zou het zou het zo dat een idee zijn om in ieder geval als als startpunt eh, dit dit te gebruiken om om die activiteiten van van van één of twee Henny men is in kaart te brengen? En dan om om om samen met hun te kijken en misschien een soort van gewoon van van van twee weken, of zoiets? Ja, wat wat is daar gebeurd en en hoe misschien al in die twee weken, hoe vaak zijn jullie daarmee daarmee beziggeweest met met nieuwe spullen halen, bijvoorbeeld.

00:06:50
Participant: Inderdaad, als je kunt zeggen van eh, hoe vaak is die auto terug op de basisschool op een dak? Wat je eigenlijk niet als je weggaat zou pas op het eind van de dag weer terug moeten komen met natuurlijk kinderen te definiëren van eh. Nou ja, dan moet je even kijken. Nou, als je langs plaatselijke bank, stop je daar dan ook om wat te halen je kunt definiëren waar zij de spullen, ja eh. Je kunt ook zien wat dagen gestopt of alleen langsgereden.

00:07:24
Interviewer: Ja.

00:07:25
Participant: Kun je niet ziet, maar aan de andere kant? Ook daar is het zo. Ik moet iemand hebben die dat dan even kan programmeren. Om omdat die data te lopen en dan dat uit te filteren en te kijken van hoe en wat dat dus.

00:07:39
Interviewer: Bijvoorbeeld bijvoorbeeld, dat zou dan denk je, kosten voor iemand.

00:07:47
Participant: Ja, ik heb zelf, ik heb heel lang game al gebruikt, maar ik heb zelf – ik kijk een dag gebruikt om überhaupt die data goed in te lezen en te weten wat ik doe mee kan doen, omdat het ook hier heel veel nul. Dat kan niet zo goed met die nul overal op een gegeven omheen moeten zijn. Toen op die plots te maken hebben we nog een dag gebruikt is natuurlijk, maar ik denk je iemand, twee drie dagen is toch nodig om om die data ik eruit te halen. En dan die dingen te genereren, en van daaruit kun je dan natuurlijk dan zeggen van waar is gestopt of niet, waarbij je moet kijken van mmm, hoe definiëren stoppen, je kunt ook twee drie niet te veel stoplicht staan, en daar moet je ook even kijken van oké, eh, je moet al langer dan zoveel tijd op een bepaald punt staan.

00:08:41
Interviewer: Ja.

00:08:41
Participant: Maar je ziet niet, maar je hebt het nadeel is dat je je niet ziet van normaal zou je zeggen, want je staat hier, dat zie je en dan ga je weer rijden. Maar in dit geval, je ziet op meer de taken ophoudt aan een twee uur. Later gaat die data weer verjaardag. Je hebt een een een die van twee uur omdat die auto stil heeft gestaan, bijvoorbeeld.

00:09:03
Interviewer: Ja.

00:09:04
Participant: Dus dan moet je dan oké, nee definiëren, of dat als hij staat daar stil en je hebt gekeken is om te kijken of die punten ook matchen bij bij het begin. Als u hebt begint te rijden, dan 400 we op dezelfde locatie staat, of dat die locatie pas weer begint als iets wil. De afstand tussen zit.

00:09:25
Interviewer: Ja.

00:09:25
Participant: Het is niet meer punten, ook omdat ja, ik heb eigenlijk met land, net zolang ze nu, al heb ik niet zoveel gewerkt – heb ik ook nog niet naar gekeken – kan ze wel plot op een op een kaart, maar geen probleem. Maar ik heb nog niet zo ver gekomen om ook daadwerkelijk een landkaart, erachter

dat de klant om te kijken van hoe, hoe ver ze toch, maar als je iemand hebt die die man goed kent, moet dat kunnen. Ik bedoel ik heb gezien dat het kan niet weten hoe het moet, moet je ook inderdaad kan zien van, want ik ben een beetje sceptisch over de data, omdat ie helemaal niet veel tot is, maar in principe zou moeten kunnen, want je ziet en je rijdt, want ik zie dat inderdaad tot die ik heb wel eens een paar. Je ziet er een aantal een route, maar je moet dan ook gaan doen oke. Hoe definieer je stoppen en dan hoelang stoppen is daar en sluit het inderdaad om elkaar aan.

00:10:23
Interviewer: Ja, oké, dus dat is wel echt nog best. Wel een klus.

00:10:29
Participant: Ja, want het geld sowieso, je krijgt die data zoals ze hier staat en een database, en dat is gewoon een excel uittreksel gecomprimeerde omdat die binnen de megabyte moest vallen. Maar ja, je kunt er met met doen ik zelfs wil iets doen bij ons doen zonder dat er iets anders scripts hebben lopen om die data eruit te halen. Maar dat is nog iets wat wel ja, het moet gebeuren om op die data hapklaar te krijgen. Ook hier even kijken: als ik het goed dat per 13 de deur open of is de de dan zie je de 11 keer, ondanks dat er zelfs 11 keer is er eentje te voorschijn komt, betekent 11 keer als die deur open of dicht gegaan, moet je eruit te halen times staan er wordt, dan moet er ook iemand voor zijn en Marcel ook gezegd. Ik kan wel een beetje doen, maar eh om om zoiets in elkaar gezet. Dan ben je toch wel een paar dagen goed mee bezig een fulltime mee bezig om dat te doen. En als je met gps data en op werk je ook een beetje weten hoe dat werkt, dat u dat eigenlijk ook op een casus kunt plot en iets wat ik zelf nog nooit gedaan hebt, dan moet je iemand hebben die dat wel een beetje weet of de tijd heeft om dat uit te zoeken.

00:11:58
Interviewer: Ja.

00:11:59
Participant: En op zich wel leuk vinden om zelf te doen, maar het kost me denk ik een paar dagen op wat uit te vinden.

00:12:03
Interviewer: Ja.

00:12:04
Participant: En met alle ministers lukt me dat ook niet, want dan moet je je moet je ook aan kunnen zetten en concentreren zin om een halfuurtje.

00:12:12
Interviewer: Een half uur, en dat dat ken ik waaruit ze zijn er wel. Maar zou er iemand zijn, misschien binnen die aken een universiteit dus die daar eventueel maar zou kunnen werken, want dan zouden we eventueel met hun daarop kunnen zetten. Of is, dat wil je dan niks.

00:12:37
Participant: Is ja, ik bedoel jij bent degene met het twentse natuurlijk daar samen. Ook de andere vragen is ernaast van willen. Ik heb daar met massaal nog niet echt over gesproken. Wie die die deze daad die wij nu krijgen, eigenlijk gaat uitwerken, is gevraagd of ik naar kan kijken en ik heb gezegd, ik kan wel naar kijken, want ik heb hem ook gezegd van. Ik zie mezelf niet in de taak om een hele toolbox het omheen te bouwen, want dat kost gewoon veel tijd. Dan dan moet iemand echt geconcentreerd aan kunnen zetten. En daar ben ik nog op dit moment van die die zegt van. Ik kan dus als ik kijk naar de data en ik heb nu een evaluatie gedaan, maar ook dat kost me veel tijd en dat is niet het enige wat ik heb dat tussen alles door en dan kost dat nog.

00:13:32
Interviewer: Ik heb overigens vrijdag gesprek met Martin meeker van duurde. Jij zou het een idee zijn dat ik ook bij hem even pols of hij mensen weten die daar heel goed in zijn en die dr. Eventueel.

00:13:50
Participant: Zij hebben al die ze hebben we eigenlijk al met deze datum python scripts, die dr. Overheen lopen. Dan heb ik nog nooit kennelijk helemaal helemaal niet weten hoe dat precies

verwerkt, maar zij hebben wel al meer ervaring met het uitwerken van deze data. We hebben ook met Martin al contact gehad, maar daar komt het aan. Dan is het eerste wat ik eigenlijk gewoon dat je daar nou doen om te kijken van klopte. Daar kunnen we met de data gebruiken, maar je mag dan kunnen vraag, inderdaad van wat hij heeft bij ons kijken van waar zijn stops. Het kan zo zijn dat zij alvast een code hebben. We die dat gedeelte gedacht, maar maar er zijn herkent, fiets. Anders zover. Ik weet niet wat, maar dat komt ook daar op neer van oké hebben zij mensen die die een paar uur op een paar dagen kunnen presteren om om die data te krijgen.

00:14:46
Interviewer: Ja, want dit komt dus van de pit en want deadline, die hadden het over een aparte logger.

00:14:58
Participant: Ja, die die, dat doen we die die worden op de knack in zn kastje opkomst aan die ja had gewoon alle data, want ik ken stuurt dat dan via de telefoon naar na de database. Daar heb ik, die had ook nog voor dat toe. Sorry toen hebben ze ook bijvoorbeeld die samen met een ander kastje zetten en die ook allerlei dingen en stuurt dat ook dan hadden. Er wordt ja cloud op het idee, want wij hadden in dat kast toch wel zien wat extra's dan zorgen. Dat die optie is dan nog zo hoor dan te gebruiken, maar dat kastje zover. Ik weet dus niet aan op de bus voetballer wel mogelijk zou zijn, maar dan moet je een kabel van die op het idee connect dag nadat kastje wat op dit moment niet ligt, maar dan zou dat eventueel ook kunnen.

00:15:56
Interviewer: Ja.

00:15:57
Participant: Maar dat kan nou ja, ik ook wel weer, maar die daar wel voor. Dat is nou als ik het goed heb, en dat kan meetapparatuur nog op orde in klucht. Dat kunnen ze uitbreiden. Daarmee, en daarmee zou je dus ook die data dan kunnen verzamelen en dan via dezelfde kanalen kunnen sturen.

00:16:24
Interviewer: Want ik heb nu roy deadline, en dan in jou gesproken en roy hendriks. Die gebruikt inderdaad een zn mode met raspberry bij beetje vergelijkbaar met nou inderdaad ehm en die zei van ja, nou, je moet, je moet even Jeroen kunnen kunnen contacten, want die die is vooral bezig met de die.

00:16:49
Participant: Nou ja die die weet dat meer van, maar ik ben meer even naar kijken wat wat wat we nog meer kunnen maken. En zoals gezegd veel stilstaan, ben ik een beetje skeptisch stoppen wegens dat kan maar is. Je moet iemand hebben die even die data kan, of even tussen aanhalingstekens. Die data kan dr aan aan een platte of of werken.

00:17:16
Interviewer: Oké.

00:17:18
Participant: Maar er zijn meerdere methodes om, die kun je. Je kan ook dat dat kastje. Wat zich toetrekken kan aan als dat als je die kabel echt.

00:17:30
Interviewer: Ja.

00:17:32
Participant: Er zijn meerdere methodes om die data uit te leveren, maar zoals gezegd.

00:17:39
Interviewer: Ik was wat.

00:17:39
Participant: Ze hebben en je moet ze dan ook nog de werken.

00:17:45
Interviewer: Waaruit dan even samenvattend, de de data van de pits die is beschikbaar. Maar de vraag is, want de kwaliteit daarvan is en het is nog even een taak om dat te verwerken en ook inzichtelijk te maken. Dan zou ik ook even Martin vraag wat hij daarvan denkt. Hoe en of zijn misschien eventueel gestandaardiseerde scriptie? Daarvoor hebben.

00:18:23
Participant: Ja, zeker, als je alleen geïnteresseerd bent en daarna start stoppen gebeuren, dan zou de zal hij ook wel wat kunnen hebben, want dat is heel kort zij. Hoelang staat er nou om een bepaald.

00:18:35
Interviewer: Ja.

00:18:36
Participant: En ja, en als je een beetje logica dat toevoegt van is dat toevallig idee is of is dat een een winkel? Of is het een klant? Ja, klant zijn, want moet bekijken. Locaties bekende locaties kun je in te voeren en dan zou je ook kunnen zeggen van nou ja, hij is daar of daar geweest.

00:18:51
Interviewer: Ja.

00:18:52
Participant: Maar dan moet je wel dat script invoeren. Dat is niet omdat het zo mag en zo in wel kunnen hebben. Maar ik heb voornamelijk gekeken op dit moment naar het gedeelte. Wat kan ik als in staat? De deur heb ik voornamelijk gekeken en daar ben ik een beetje sceptisch. Dat u dan allemaal wel meekrijgt. In dat de staat ook de camera's niet helemaal altijd werkt of maakt gaan delen, werkt.

00:19:20
Interviewer: Oké, en dus stel we zouden dan nog iets anders willen. Onderzoeker ja, dan moeten we gewoon een nieuw is en zo plaatsen en dat samen met die groep van acht en eh daar een plan voor gaan maken dan voornamelijk welke is en zo nodig zijn. Nou, dan heb ik weer effe wat wat body jong meer aan de slag te gaan. Zou je zou je misschien deze twee files met mij willen delen.

00:19:51
Participant: Want degene waar ik zo van heeft, expliciet gezegd ik maxima, niemand delen.

00:19:58
Interviewer: En belde wel de lijst van data services.

00:20:02
Participant: Ik zou van deze hier ja, ik bedoel d t. Ze kan ik wel delen.

00:20:08
Interviewer: Dat had je.

00:20:10
Participant: Van deze data heeft u zegt die man die ik ga vanuit omdat het.

00:20:15
Interviewer: Je gevoelig is.

00:20:18
Participant: In de auto van ons tot ik uit die locatie data kan halen waar ze zijn en dat dat ligt omdat het collega's zijn en niet iemand buiten, maar mocht met niemand delen. Deze kan ik wel deden en misschien alleen weer welke kanalen op dit moment gemeten worden.

00:20:43
Interviewer: Ja.

00:20:45

Participant: Je mag ik ook niet dat is, dus als je als je die je hebt, kun je alles uit deze, maar deze.

00:20:53
Interviewer: We gaan hekken.

00:20:55
Participant: Ja, nee, daarom gedeeld worden omdat hier staat de als cannes ik nou hoe die gecodeerde is, dus hoe ik uit welk kanaal hier die informatie haal. Maar dat is gevoelige data, want daarmee kun je iets wat je af en toe te zien dat die auto andere dingen gaan doen als als wat die eigenlijk zou moeten doen. Ah – want anders gevoelige data, maar deze kan ik je dr was is staat gewoon een wat types allemaal doen en dat is Shell, zegt ie.

00:21:30
Interviewer: Ga dan ja, dan ga ik weer effe, ga ik weer door. Dank je wel voor je tijd en ook sorry voor iets langer is doorgegaan.

00:21:42
Participant: Je had ook om een uur gevraagd en ik had tot 12 juni. Dan moet jij zegt iets maar tot 12 uur. Tijd had de afgelopen twee dagen online meetings toevallig. Tijdens de tijden die hij kon had, kon ik geen andere bij het slot vinden.

00:21:57
Interviewer: Ja, het is helemaal prima, nou, dank je wel en dan eh, dan spreek je binnenkort vast. Super dank je wel.

Transcript 3: Participant #3 (P) Here called Speaker 2 Research engineer Interviewer (I) Here called speaker 1

This transcript is one of the Dutch speaking participants. The quotes in the report have been translated.

00:00:03

Speaker 1: Even kijken hoor ja en loopt en dan pak even mn dingen erbij. Ja, ik had dus vorige keer mijn een presentatie had ik wel wat meer verteld dat, als je dus data eigenlijk wil gebruiken om dat te gebruiken in het design proces ben je eigenlijk echt aan het kijken naar functioneel gedrag. Dus wat zijn mensen aan het doen en en hoe doen ze dat? Nou precies en meer ervaring en en context uitingen? Dus over wat voor topics praten ze? Wat vinden ze belangrijk? Wat vinden ze niet belangrijk en en voor die voor die vragen over gedrag ben Je dus echt aan het als je meer aan te exploreren bent, ben je meer aan het onderzoeken van wat zijn nou verschillende dingen die ze aan het doen zijn? En als je er meer de diepte in is, eigenlijk een stapje verder. Dan ga je kijken van oké. Hoe vaak doen ze dat? Nou, precies? Hoeveel mensen doen het nou precies op deze manier? Dus echt wat meer op één specifieke activiteit, en ja, en wat ik dus dat gezegd is dat ik nu dus eigenlijk meer gaan kijken naar wat zijn nou de data? Mogelijkheden binnen een ford om te gaan kijken hoe ik het beste team van Nicole en mogelijk ook andere teams kan helpen en en dat ze het ofwel enerzijds in de richting van dat ik een een tooltje maken zodat Nicole Marcel en je zelf kunnen kiezen wat voor data, interessant voor is.

00:01:39

Speaker 2: Ofwel.

00:01:40

Speaker 1: Dat ik één of twee richtingen kies, en dat ik die echt soort van verder uitwerken tot een ton, een project wat we kunnen gaan doen.

00:01:50

Speaker 2: En wat je met tooltje is dat zon soort ??.

00:01:55

Speaker 1: Ja, ik had natuurlijk tijdens mijn presentatie die die kaart laten zien en wat het bijvoorbeeld zou kunnen kunnen worden, is dat het een aantal sheet zijn die team als ze ergens in een proces zitten en ze denkt van ja. Misschien zou je data interessant kunnen zijn dat er een aantal vragen zijn die ze zichzelf kunnen stellen in een bepaalde volgorde die inspiratie geven over ontstaat er wel of niet ja nuttig kan zijn en hoe het dan nuttig kan zijn.

00:02:28

Speaker 2: Oké gaan een soort guideline, zeg maar wat maakt het ja of nee? Dat we ons nu focussen op data of niet? Oké.

00:02:37

Speaker 1: En wat daarbij natuurlijk heel erg belangrijk is, dat het allemaal dat ook daadwerkelijk zin heeft en dat het dat het helpt. Dus dan dan zou ik echt vanaf nu heel erg daarop gaan richten, wij bij verschillende projecten een soort van die tool gaan proberen te gebruiken. En dan steeds kijken waar het waar het wel goed gaat, waar het niet goed gaat en dat zo verder ontwikkelen en.

00:03:02

Speaker 2: De maar het uit mijn ervaring lost zich die vraag zich meestal vanzelf op. Of die vraag wordt heel duidelijk gesteld en en die project doelen, wat moet er? Oké, we hebben een traject: wat willen wij breken en hoe gaan we dat? Zeg maar aantonen met data dus het is misschien een heel eenvoudig voorbeeld van. We hebben een project gedaan met met hem Transit, het Phef dus die ook electrisch maar ook kwam op met een missie kunnen rondgereden. En daar geworden we eigenlijk met Jim Jules, ET cetera. Minder uit we hadden we zin, mocht er elektrisch gereden en een lagere sinds of niet. En als ik, dan heb je data nodig. En dan gaan ja natuurlijk afvragen Ga ik een team. Wat voor data hebben we nodig, dus dan wordt op je lijst van oké. We moeten de dr molens van de ooit. Te weten heb ik, hier heb je rechtspositie nodig hebben en nodig soorten vragen, dus dat leek me triviaal. Dus dus sommige projecten bezig dat zelf heel snel en eenvoudig uit, denk ik. Daarom ben ik er altijd een beetje in het abstracte, zo van ja was dat.

00:04:19

Speaker 1: Een praktisch.

00:04:19

Speaker 2: hebben we data nodig of niet. Ja, dan weet ik niet en dat is meer dan voor voor het draagstoel eind te denk ik dan of of op in te schatten hoe dan bepaalde maar gebruikers als groep of bevolkingsgroepen zich gedraagt. Ja, als ge, echt zon, aandacht. De projecten die wij tot nu toe je, daar hadden we echt Tata nodig op onze, zeg maar doelen te voeden om om daar zeg, maar onze

performance uit uit. Uit de tonen zeg maar gerust als was, was echt noodzakelijk data dus dan.
00:04:53
Speaker 1: Dit was, het is wel interessant, want het gesprek met Alexandra is ook gebleken dat eigenlijk en het lijkt alsof het team van Nicole en Marcel soms nog wat meer moeite hebben omdat ze wat minder vanuit een technische research achtergrond komen om die om die vragen te formuleren.
00:05:16
Speaker 2: Ja, die ik denk dat Marcel, een mega, het veld van je user experiments design, thinking, wat voor features of opties kunnen we nog aanbieden ehm. En hoe kunnen we die basis zeg maar aanbieden, zeg maar aan de aan de aan. Dan is het misschien wel omdat ik om af te vragen hebben dat dan zo'n data je ermee kunnen helpen om bepaalde vraagstellingen op te lossen of niet, maar binnen ford heb je Ook andere projecten die echt pena data driven zijn dus de vraag kan data jegens gebruiken. Die is al sowieso. Ja, het was, we hebben dat dat nodig. Dus dat is denk ik zo project en sommigen zijn er nog meer zon, research, design, taking, anders zijn meer zo al iets vaardig iets concreter, zeg maar zo al bijna aan aan de technologie kaart die die bijna geïnteresseerd wordt. En dan zeg maar een nieuwe wortels.
00:06:09
Speaker 1: Ja, dus daar zit veel duidelijker eigenlijk wat het probleem is, wat je aan het oplossen ben en dat je daar dus ook data daarvoor moet gaan gebruiken.
00:06:18
Speaker 2: Ja, en achteraf zien we wel tot met de data die we die we zeg maar verzameld hebben tot we daar misschien meer insights uit kunnen halen dan initieel gedacht hebben. Ze dat dat is, heb je soms ook van van hoe zijn de mensen omgegaan? Zeg maar met het het opladen van een batterij aan de, want daar was eerst niet onze, mijn geholpen worden eigenlijk weten: hoeveel kilometer zijn er gereden en een bepaalde zone. Maar als je dan het feit dat begint al analyseren, waarom hebben maar 70 procent, zeg maar een groene kilometers. Nou, dan moeten we ook terug gaan kijken naar het kijk het graag op. Laat het gedrag van de mensen en als je die data dan hebt, super interessant, dan dan kun je echt te zien tussen het verschil zien tussen verschillende gebruikers. Je hebt mensen die zulke nieuwe technologie je echt toejuichen en ook helemaal mee zijn, en elke keer als een auto stopt de stekker naar het stopcontact steken, terwijl andere echt zoiets hebben van er zit ook een gewone motor in de auto. Waarom moet ik de moeite doen om die kabel te nemen en een in te steken? Ik, ik ga gewoon zo.
00:07:18
Speaker 1: Ja.
00:07:18
Speaker 2: Ja, zulke dingen. Dat zijn dan bijkomende leuke conclusies en analyses die ik kan maken als je data verzameld hebt, verstandelijke worden.
00:07:28
Speaker 1: Dat is eigenlijk zit daar zit dus eigenlijk best wel veel nog in te doen ehm wat we wat we nog zouden kunnen onderzoeken.
00:07:37
Speaker 2: Ja, ja dus dus ja, ik denk als ge. De projecten opdeelt zou in project een Tata nodig, ja altijd tot gênant data die – ik heb dat dan nog meer conclusies en en en sites uithaalt een drama. Wij, ook ik weet niet bekend – steeds binnen vocht – hebben ged arjeh als een bepaalde afdeling global data analytics en insights en zij ouders zich eigenlijk bezig met analyseren van data. En dan kan hij opereert, zijn zo dat? Dat kan overal marketing. Hoe wij onze wagens zeg, maar entree op normale klant via de garage is via Hans dealernetwerk en dan wordt er gekeken naar de mengsel. Wat kopende mensen nu kleiner ooit de schotten commercial vehicles en welke kleur en dan wordt er toch markt, zeg maar zo de campagne. Een korting enzo gegeven, maar zij hebben ook aan ons project meegekeken zon naar zeg maar laad gedrag, hoe vaak stoppen. Als zulke dingen, dan wordt er meer overdag gereden dan 's nachts zo allemaal zo van die conclusies en zij keek ermee ook mee en die grote de data files waarbij je eigenlijk, dan zeg ik maar minder ook tijd voor hebben. Natuurlijk, want ze hebben de tools, hebben ervaring omdat snel op te zetten.
00:08:53
Speaker 1: Want, want je je spreekt even over mijn projecten, want welke welke projecten ben je nu werkzaam in.
00:09:01
Speaker 2: Ik ik was samen met Alexandra en het geo-fencing project dus we hebben we hadden tien auto's, een Keulen en tien en Valencia transits gestuurd hebben volgens is volgens fixed juventus, zo verloopt al langer wel eens die dan stuurt waren maar later in dat project waar die ook die die zones die namens gezet dus naar gelang de luchtkwaliteit.

00:09:25
Speaker 1: Ja.
00:09:27
Speaker 2: Dus het is echt heel die. Namens de mensen hadden er ook geen zicht meer op met de ouders, waar ik real time geïnformeerd. Als je nu te ga je dan moet je elektrisch rijden en dan mag je weer op de motor te rijden. We hebben dat voor twee grote steden gedaan en daar zelfs voor de steden, zie je ook al andere, zeg maar uitkomsten, zo en Keulen werd, was het hoge percentage groene kilometer school ook nog maar een Valencia, gewoon veel meer kilometers per dag. Je reden met dezelfde wagens omdat er al aan het was iets meer uitgestrekte regio.
00:09:59
Speaker 1: Mmm.
00:10:01
Speaker 2: Maar dat maakt het ook als je meer kilometers scheet, dat je ook de kans dat je batterij leeg is, voor dat je in een lager met emissie zone komt, ook groter is en daarom Hadden zij iets minder performance? Ja, zulke insights haal je als je dat data bekijkt, zo puur objectief je al aan complete conclusies trekken en elke keer aan use case zou eigenlijk specifieke opgestart moeten worden, zeg maar met de strategie die je eigenlijk voor ogen hebt.
00:10:26
Speaker 1: Ja, ja.
00:10:28
Speaker 2: Dus dat maakt het wel interessant om te kijken naar data.
00:10:36
Speaker 1: Eerst nog een andere vraag. Ik zag op uw link in dat je ook bezig was met en dan weet analytic ride metric development.
00:10:45
Speaker 2: Ja.
00:10:46
Speaker 1: Ehm kun je daar wat over uitleggen. Wat er precies is.
00:10:51
Speaker 2: Ja, dus eigenlijk had ik of heb ik een een dubbel rol binnen Ford in mijn hoofd is eigenlijk mijn functie is eigenlijk vierkant, amicus engineer en dan keurig over ride of comfort
00:11:07
Speaker 1: Ja.
00:11:08
Speaker 2: En dan nog meer specifiek over onze meet procedures, meet standards, mits en zorgen equipment aan ook over de routes die we reden en uitwerken van de data, dus eigenlijk een het analytisch gedeelte dus, stel bij ontwikkelen een auto waarbij het als ik krijg ik eigenlijk vast op de testbaan in lommel dus Ford daar en en daarom ben heel procedure uitgewerkt hoe we eigenlijk waar we wagens kunnen objectief kunnen beoordelen. Hoe goed zijn voor comfort eigenlijk met die worden verschillende redenen verschillende snelheden en dan zit te waken voor ons en zorgen. En dan weten we eigenlijk: acceleratie is en de auto, en daar wordt dan omgezet, een metrics en die metrics . Ons oké, die wagen zich comfortabel of zeg maar meer een family car, sportief trustees harder. Maar zolang we hebben daar heel mooie zeg, maar is dus als we een ST model ontwikkelen, leek de focus als t of juist de esthetiek. Die zal wel iets zijn zijn toen dan zeg, maar de S Max gezinswagen waar je met zeven mensen comfortabel uit Frankrijk kan treden, dus daar wordt nemen we bijna twee gigabyte data op. Dus we hebben meer als 30. Sensoren aan de auto aan zon is bijna twee uur. Dus die wordt continu over verschillende banen gereden. Stel dan maak ik kom binnen, de test is gereden. Dan wordt het data overgezet op de server, en dan loopt eigenlijk een soort van gestandaardiseerde post processing moeten we dat als een op matlab we hebben al heel veel stroken gedefinieerd. Vandaag nemen dan dadelijk kleine datasets uit. Je kan er dan meer als ik denk in totaal 4000 metrics dat zou zijn. Ik zou echt louter getallen, het drie komma twee of of vijf, maar achteraf. Ten dele ga je het is dus eigenlijk opgezet – is redelijk in ook een hele grote oefening geweest van oké. We kunnen nu objectief en wagen meten, we kunnen dat gepusht, we kunnen dat ook haalbaar doen, het hele zeg maar het instrumentatie proces te treden snelheden is. Dat is allemaal heel strikt gecontroleerd, maar langs de andere kant hadden we – het was puur objectief en toen zijn we dat gaan denken aan het subjectieve. Dus we hebben eigenlijk onze ontwikkelings ingenieurs die eigenlijk het de ophanging afstemmen. De dempers stuurgedrag, zodat die echt geen met de wagens dagelijks ga met de leveranciers praten en nieuwe onderdelen testen, zijn we eindelijk soms subjectief, objectief, korrelatie oefening gaan doen en dan telkens gaan vragen. Wat is voor jou comfortabel? We hadden ze niet comfortabel en dan zijn wij keken waar onze metrics liggen, dus ook om zeg maar de vertaling van

het het objectieve metrics naar het subjectieve te doen.
00:13:58
Speaker 1: Ja.
00:13:59
Speaker 2: En dat is eigenlijk: spreek je eigenlijk of een gevoel, hè, dat is subjectief objectief. Dat is eigenlijk een heel belangrijke stappen Er daar kruipt ook het meeste tijd in en als je een nieuwe procedures ontwikkeld.
00:14:12
Speaker 1: Ja, ik kan me voorstellen.
00:14:14
Speaker 2: Maar dan vind ik wel zeker mee gehad als dat super interessant, want hij spreekt eigenlijk over. Je moet ook verschil maak. Ik heb een een driver, de auto die eigenlijk actief bezig is met autorijden, maar hebt ook passagiers die eigenlijk niet actief deelnemen. En dan kunt je voorstellen als je zo over, dan kom ik eerder wordt ja subjectief. Voelt dat dan anders? En dat ja daar probeert dat op een een man en vrouw zijn erg groot klein dik. Dat speelt allemaal mee dat er heel veel zeg maar weighting gaat staan zolang toegepast en we hebben heel goed punt staan tegenwoordig zonder dat ik denk als vochten. Ben je daar geen vragen meer zijn.
00:14:55
Speaker 1: En dit is dus heel erg gefocust op op comfort. Ja, zou het nou en en ook heel erg ontworpen, we eigenlijk in de de test omgeving. Maar als ik dan in dus zorg over bijvoorbeeld die geofencing voor dat project, waarbij het meer dynamisch is, zou dat niet ook interessant zijn om voor een bepaalde doelgroep ja eigenlijk bepaalde metrics te hangen aan hun prestatie, die je dus dynamisch kan meten. Terwijl mensen aan het rijden zijn dus bijvoorbeeld, weet ik veel wat uptime of de tijd die mensen nodig hebben om hun weet ik veel om parkeer plek te vinden.
00:15:52
Speaker 2: Ja, maar wij keken bijvoorbeeld ook naar een ander project naar het ga ik het rijgedrag van de driver. Eigenlijk is dat een sportieve of is dat een conservatieve? Keken we, hoe ga je een stuur je agressief? Ben ik niet op het gaspedaal? Hoe? Zo ben je iemand die keek langzaam ruim of niet vandaag, proberen om een soort profiel van te maken tot stand dat je je bent, een voorzichtige huisvader, zeg maar dat je met je ook kinderen onderwijs bent die gevoelig zijn voor. Of ben je echt zo een sportieve metalhead? Gaat die maar niks rekeninghouden in dienst, zo snel mogelijk van a naar b wilt gaan aan, zo proberen we ook rijders profielen op te zetten. Kunnen ze dat bedoeld is als aan zulke analyses Wordt er wel? Daar staat er ook, al, zeg maar, voorzichtig stapjes en om dat te analyseren.
00:16:50
Speaker 1: Maar dat is, dat is dan vooral dus inderdaad voor de gewone passagiers, voertuigen en bijvoorbeeld niet toegespitst op bepaalde meer specifieke use cases van de de commercial. Vehicles, bijvoorbeeld.
00:17:10
Speaker 2: Nog niet nee.
00:17:13
Speaker 1: Zou dat zou dat niet ook interessant zijn, een soort van om die hoek op te gaan.
00:17:18
Speaker 2: Dat gaat zeker, natuurlijk ja denk het wel.
00:17:25
Speaker 1: Want, want dat daar zou ik een soort van als je het hebt over design, thinking en dat kwalitatieve een stukje linken aan het quanttitatieve stukje dat denk ik dat daar design wel waarde kan hebben omdat je goed kan bepalen van ja. Wat is er eigenlijk belangrijk voor voor onze gebruikers en als we nou continu in beeld hebben van ja eigenlijk hoe onze auto een rol speelt in het behalen van de doelen van onze gebruiker, dan zouden we eigenlijk continu kunnen kijken, ja, waar we nog kunnen verbeteren.
00:18:06
Speaker 2: Ja, maar er zijn technische challenges, maar ik denk niet dat je daardoor moet laten beperken. Zeker nu niet onze auto's, die zijn al vrij connected. Kunnen we wel een data leveren? real time, zeg maar 50 kanalen doorgeven, dat is bijna onmogelijk. Is onze modems op zijn nog niet echt niet zo voor gegeven dan dan ben je al bijna gebonden aan. Zeg maar een een soort van module externe module die bouwt die dan zeg maar zo data sturen. Maar dat is wel mogelijk zou, hebben wij ons project ook gedaan. Dus we hebben ook zelf iets en iingebouwdt op aan alle restricties van de wagen weg te blijven. Dat is dat een volledige vrijheid hadden en welke data zijn we geïnteresseerd. Kunnen we daar wat mee doen, hoe dynamisch is dat?

00:18:54
Speaker 1: De standaard sensoren die momenteel in zitten, die zijn natuurlijk ja, eigenlijk allemaal gerelateerd aan de standaard functionele aspecten van de auto. Dus ik had met Michiel hoorn had ik even kort mailcontact en die zei van ja, je moet denken aan olie, olie, kwaliteit, de hoeveelheid kilometers die gereden reden zijn de brandstofverbruik of een deur open en dicht is, maar dus misschien wel interessanter is. Is er nu met die elektrische wagens omdat daar echt nieuw nieuw gedrag ook zichtbaar wordt in in het laadgedrag en dat soort dingen.
00:19:40
Speaker 2: Ja, zeker dan zeker tot een nieuw is voor de zeg maar voor de normale gebruikers en dat was een volledige. Bijna andere transport modus je eigenlijk gaat en dan moet je natuurlijk ook de auto moeten laden, moet rekeninghouden met een beetje goed de planning. Denk ik waar, dan moet ik heb ik genoeg capaciteit, ja of nee als ik denk dat dat wel super interessant als om te analyseren.
00:20:08
Speaker 1: En even kijken dr is dus ook gps data over het algemeen beschikbaar vanuit je.
00:20:15
Speaker 2: Ja, hoe is het opbouwen? Maar wij hadden op onze module een ook een aparte extern, een gps, het gekke ook, want van de auto, die is wel beschikbaar. De minister waren ze dat tegenwoordig navigatiesystemen, maar die auto's die wij hadden hadden we bijvoorbeeld geen navigatie wij begrepen Dat zelf ook niet. Maar ja, dat we moesten we naar een externe gps module, maar dr zijn oplossingen voor en soms zijn is. Dat is nog een keurig beter.
00:20:44
Speaker 1: Ja, want het is, dat, zou je sowieso in zo'n project willen opzetten. Je kan je als een auto navigatie heeft. Kun je dan relatief makkelijk daar wel toegang toe krijgen?
00:20:56
Speaker 2: Ja, moeilijk om zeg, maar als een kruimelspoor echt binnen te krijgen
00:21:05
Speaker 1: Oké? Want wat wat zijn daar? Een limitaties van?
00:21:09
Speaker 2: Op dat het modem die in de auto zitten keurig vorige veiligheidsdiensten gebruikt worden en zoals het nu is, de strategie een modem stuurt enkel bepaalde kanalen bij het key om een key off van de auto, dus als gij key on doet dan, meet je Brandstof je per locatie dat dat dat en als je hebt op het einde terug weer, maar tijdens het is niet dat die zeg maar aan een sample rate van één keer per seconde of of weet ik veel. Alle signalen doorstuurt dat nog niet gedaan.
00:21:39
Speaker 1: Oké, maar je waar ik dan bijvoorbeeld specifiek in geïnteresseerd ben, is nou bijvoorbeeld voor de craftMen en je kijkt een soort van wat nou eigenlijk heel specifiek, hun in hun routes niet hun route is, is maar de activiteiten die ze doen. Hoelang? Hoelang staan ze op een bepaalde plek? Hebben ze drie klussen op een dag of hebben ze een klus op een dag en gaan ze dan naar de shop om weer spullen kopen.
00:22:10
Speaker 2: Ja, dan is het beter tot je nou die externe module gehad die wij hebben gebruikt. Die is eigenlijk relatief eenvoudig te bouwen. Ehm een dag die is eigenlijk geholpen op die kan alle signalen lezen van de auto, dus en een auto hebben we een canbus netwerk. Ik er bekende het ja die signalen die juist opnoemde, maar veel meer, zoals het volume van de radio. Ook je kunt alles uitlezen en via het die module die wij hebben, kun je specifieke lijst van kanalen kiezen, en die kunnen we wel real time hoog sturen of naar naar cloud of zonder dat die daar is, zeg maar opgeslagen wordt. Dan heb je veel meer flexibiliteit en kun je, zelfs als al wel op zeg maar analyses of logica's de auto ook al uit eigenlijk als als als eigenlijk die raspberry pi, dus als je is, wel fijn programmeerbaar ik eigenlijk ook geen goed. Hadden wij ook in ons programma dus.
00:23:10
Speaker 1: Dat is redelijk eenvoudig.
00:23:11
Speaker 2: Beperkingen af die eigenlijk hebt binnen de vocht auto's. Ik weet niet hoe andere merken hoe open tot cesena gebaat dat toe maar Het wordt een beetje afgeschermd Allemaal zelfs voor ons als ontwikkelings engineer. Zo wordt het zelfs.
00:23:28
Speaker 1: Want dat wat ik mn dus ook een beetje af te vragen, de dit. Dit was dus een van een van een richtingen die ik eventueel wat verder uit zou willen werken, want dus bijvoorbeeld team van Nicole en Marcel die zijn aan het kijken naar oké. Ja, wat voor wat voor? Wat zijn? Nou, de activiteiten van van zon, klusjesman gedurende de dag en specifiek hoeveel tijd besteden, is nou eigenlijk aan

het het. Het zorgen dat ze al hun inventory op op orde hebben, hangt, want sommige mensen zeggen ja, ik ga één keer per dag ga ik naar de naar job, om nieuwe spullen te halen, andere zeggen ja ik, ik weet het eigenlijk niet. Hoe vaak het gaat? Dat zou wel interessant zijn, omdat om te kijken of we dat vast kunnen leggen.
00:24:16
Speaker 2: Ja, dan kun je eigenlijk perfect, want aan stout dat je een kaart hebt en je weet ook dat zijn ze vijf shops waar je normaal naar toe gaat. Dat dan kun je gewoon. Zou je eigenlijk kunnen markeren. En dan ga ik in die zone, eenheid, dat je dan het lijkt me een telg goed gaat of dat je zeg maar oké, eens vandaag 16 minuten daar geweest, of zo dat zijn dingen hebben wij het kun je perfect, want die data is allemaal beschikbaar.
00:24:38
Speaker 1: Oke top, want stel je voor, we zouden dat willen dat transleren, ook naar een grotere groep. Ja, dan moet je dus wel, dan heb je, daar heb je dus minder toegang tot die die data omdat die iets minder goed zijn.
00:24:58
Speaker 2: Maar wat grotere groep echt duizenden auto's of of of tien?
00:25:03
Speaker 1: 1000 misschien wel.
00:25:05
Speaker 2: Ja, dat is, dat is dan iets moeilijker om die te gebruiken die wij hebben, want die je wordt eigenlijk met de hand gebouwd. Qua kosten valt daar wel mee, maar het is juist die printplaat dan zo in elkaar zetten. Ja, ik zou aanraden om een kleine pilot te doen tot tot tien ofzo. Is dat echt uit het added value? dat we die data hebben ja of nee? Kunnen we daar in uit leren.
00:25:32
Speaker 1: Want hoe kun je dus niet.
00:25:33
Speaker 2: Dat zijn er nog een grotere oplossingen. Zeg maar om dat uit te breiden naar terwijl je zijn of of op zn keer leidt, is dan.
00:25:42
Speaker 1: Want met de huidige modem, die er dus in zit, zou je dus die data niet kunnen achterhalen.
00:25:50
Speaker 2: Niet real time nee.
00:25:53
Speaker 1: Oké, en.
00:25:55
Speaker 2: er zijn ook ander soort modules die dat wel doet. Zo hebben wij bijvoorbeeld die die tien auto's die wij hadden. Daar zaten in totaal vier modules en voor ieder project verzamelen. Die andere data dus dat heel het dashboard zat vol eigenlijk beneden en daar was een module breed die eigenlijk GDIA gebruikt. Dus ik juist de knop ontdeed analytics doen, want je hebt er bijna Elk campus signaal op een van al die, dus dat bestaat wel. Maar dat is iets duurder in toepassing, ook qua data volume wat je per uur gaat geven. Geen eigenlijk zeg maar op. Ja, dat heeft natuurlijk allemaal iets met kosten aan ons te maken. Dat bestaat wel hoor dus ik zou zeggen: laat je het daar niet op beperken.
00:26:46
Speaker 1: En zijn.
00:26:47
Speaker 2: De moord.
00:26:48
Speaker 1: Stel je voor, je zou dus alleen maar met dat key on key off moment dan dus die die gps pakken. Dan zou je in principe ja, een soort van mij maakt – niet uit of ze een omweg nemen of dat ze er direct naartoe rijden. Het gaat erom dat ik weet, op welke punten is ze hebben gestaan en en hoelang ook een soort van dat? Dat kan je, dat kun je wel ook ja.
00:27:10
Speaker 2: Ja die data isis het wel, want ik ken ik weet niet of zoiets van Ford pass
00:27:14
Speaker 1: Pas.
00:27:16
Speaker 2: Ik, ik weet niet hoe ze allemaal heten, daar kun je zelfs zien waar je auto geparkeerd, dat bijvoorbeeld.
00:27:21
Speaker 1: Oké.

00:27:22
Speaker 2: Aan aan dat zijn natuurlijk die of data punten die heel anders dan oplsaat, dan kan eigenlijk de eindgebruikers in mijn ooit dus die data ook als als zeg maar zelf zien. Dus daarom worden de gebruikers ook aangespoord om te gebruiken, zeg maar aan te tot die ook kunnen gebruiken.
00:27:47
Speaker 1: En dus dus dat dat, dat is in principe nu al je hebt geïntegreerd in de app.
00:27:53
Speaker 2: Dus dat maar ik, ja ik, ik heb de apps zelf niet, want mijn ooit verliefd dan niet. Maar ja, dat bestaat wel. Ja.
00:28:00
Speaker 1: Dus daar hebben we in principe toegang tot.
00:28:04
Speaker 2: Ja, maar ik is het wel met met privacy dingen en zo maar dat mag zal zijn team en daarna die er wel een heel goed als er dan moeten omgaan. Het is niet zo dat gezegd, ik hoop vanaf morgen van 1000 auto's. Gegevens hebben zo éénvoudig gaat dat niet zeker in Duitsland niet of of waren dr. Toepassing, want daar zijn ze echt heel streng qua gegevens.
00:28:28
Speaker 1: Ja, dus, dan moet je echt toestemming vragen om om het.
00:28:32
Speaker 2: Maar ja, dan moet je eigenlijk een soort contract opstellen, wat toch beide partijen getekend wordt. En ook wat gebeurt er met die data? We die bewaren, ET cetera, klinkt allemaal, zeg maar standard, die je hebt.
00:28:47
Speaker 1: Oké, ehm maar goed als het op kleine schaal, als het sowieso mogelijk op grote schaal ook, maar dan wordt dat wel lastiger met met privacy en.
//Clock reset.
00:00:00
Speaker 1: Het idee van.
00:00:02
Speaker 2: Op grote schaal heb je eigenlijk de light versie, op kleine schaal kunt je echt heel gedetailleerd en vol verzamelen je wel van dan van heel veel kanalen van de. Wilt u dat op schaleren? Ja, dan moet je een keuze gaan maken. Zo wil ik hetzelfde ja, dan heb ik een een extra module nodig, want de hardware kan dat momenteel niet de auto kan dat niet leveren. Of kunnen we dan toch met de light versie wel leven? Ja, dat zijn echt tradeoff vragen die je moet stellen. Ja, als ge data, driven werkt gelijk we eigenlijk allemaal doen. Ja, ik heb niet zoveel mogelijk data totdat ik echt weet gedetailleerd is, geen reden waarom? Waarom? Niet, eerst naar links, in plaats van haar geeks, we hebben wij in ons project eigenlijk hebben. Wij noemden het budget drivers coaching van. Hoe kun je best gehele met elektrische auto's? Hoe kun je die past? Opladen zeker. Wat is er een hand over fase : succes.
00:01:01
Speaker 1: Succes.
00:01:02
Speaker 2: Die gedraagt zich als een normale auto in ik ze en daar kwam eigenlijk heel slecht de performance uiterwaard eigenlijk heel weinig elektrisch serieus heel weinig geladen hebben, die twee maanden later. dank u de eens bekeken. Zo – en dan waren die het heel goed eerder, maar ook andere, die het heel slecht tegen hebben we nog een keer alle mensen samen in een workshop, je gelen, dat is onze auto's, technologie. Het kunnen ze het vertrouwen dat die 50 kilometer kunnen rijden. Probeer het goed uit, maar die moet ook geladen worden. Passenger, overdag of 's nachts ook. En toen zagen we al maar die workshop een feedback dat het eigenlijk al veel beter ging tot de performance omhoog ging. En toen is er ook nog iemand van Ford die echt soort in dag mee is gegaan en het normale leven van een rijder.
00:01:49
Speaker 1: Ja.
00:01:49
Speaker 2: Om die ook, maar er wagen te coachen van oké, dat zijn ook nog andere, geen profiel. Het dat je kunt doen, dan zeg maar als gegaan tot je meer energie.. dat ie terug naar de categorie.
00:02:00
Speaker 1: Het kerst systeem als dat volgens mij toch.
00:02:02
Speaker 2: Ja, zo van die dingen aan aan dat sommige chauffeurs hebben daar echt aan Jan

hommen en ja, die zijn er echt tot tot het uiterste gaan uitproberen. Bijna hypermiling zoals die die ja er zijn die dat heel goed eerder met andere. Maakt niet uit nee.
00:02:18
Speaker 2: Niet uit dat is ook, dat is ook algemeen rijtraining of coach geen sessie of een training van drie dagen heeft vooral en standen effect, zeg maar zo de komende twee weken, maar dan het dat effect terugweg tot mensen zegt. Een wond is, zeg maar vallen en daarom, dat was ook onze conclusie eigenlijk om continu op het dashboard soms zorgt ii coach is vol te hebben, continu het gedrag analyseert zo van oké, ggg altijd full throttle of niet, of je gaan te hard zo beetje coaching te doen en dan heeft op langere termijn veel pittig effect zo, dat zijn ook dingen die wij gezien hebben. Dat was ook.
00:02:56
Speaker 1: Ja, als ik dit nu zo hoor, dan klinkt het inderdaad alsof in in deze gebieden van van echt, waarbij je echt iets nieuws aan het leveren aan de klant dat op dat moment dat je dan pas eigenlijk goed de data kan gebruiken en er veel van kan leren, en dat dat nu bijvoorbeeld voor een bijvoorbeeld voor het smart rack project ehm dat je daar eigenlijk alleen, maar ja het het gedrag wat je wat er nu gemeente wordt, namelijk de gps, data dat je dat je die die zou je kunnen bekijken. Maar ja, wat wat iedereen in die in die bus doet en welke spulletjes waar leggen? Ja dat? Dat kunnen we gewoon nog niet echt meten, omdat we daar nu gewoon nog niet echt de data van hebben. En dan misschien nog even wat meer specifieke vraag . We hebben het dus inderdaad een beetje gehad over de verschillende soorten sensoren die er momenteel in de bus aanwezig zijn, en die zijn dus redelijk gerelateerd aan de. Ja, de de de functionele logische dingen die je bedenkt.
00:04:10
Speaker 2: Dus ja, ik het dat beetje zien in uit het oogpunt van wij als manufacturer, Wij proberen alles natuurlijk zo low cost mogelijk zo goed mogelijk te implementeren. Dus wij gaan echt geen gratis sensoren weggeven die we niet nodig, mercedis kan dat enzo die kunnen voor feature 4000 euro vragen en dan zijn er nog 80 procent van de klanten die dan nemen. Maar wij als Ford. Ja, we hebben, we zijn het budget matig heel sterk. We hadden met om bepaalde Features toch te leveren, maar met minder technologie die evengoed moeten zijn.
00:04:46
Speaker 1: Ja.
00:04:47
Speaker 2: Ja, dus dat is eigenlijk de meeste sensoren zijn echt puur op rijgedrag, zie ik vele dan zorgen, baseert. Ja, maar een slimme combinatie of of algoritmes kun je toch wel soms meer insights geven? Ook wel, zo werken wij ook meestal, maar ik je doelde een beetje op. Ik wil meer controle, ook over het laadruimte. Hoe hoe die gebruikt wordt deuren open en sluiten, kun je wel uitlezen, denk ik wel, dus ik kan perfect zien wordt de zijdeur gebruikt wordt de achter deur gebruikt? Wordt de achter deur gebruikt, gaat het lampje aan, zeg maar zo van die dingen, maar dat is ook een maximum. Denk ik op dit moment wat je qua enige, want voor de rest hebben we niet.
00:05:34
Speaker 1: Nee, nee, want inderdaad, voor de voor de rest juist inderdaad die gps data die wat interessante informatie je hooguit zou kunnen geven over ja, wat voor soort verschillende jobs mensen hebben en hoe vaak ze misschien naar de shop gaan. En, want ja, dat is, dat is natuurlijk ook een ding. Ja, dan moet je dus wel voor die mensen die shops, een soort van aangeven waar die zitten. Maar als je nog kleine groep hebt, dan dan kan het wel ehm, ja, een soort van hoe als jij nu sowieso dit dit project zou stel. Ik zou dit nu nu nu pitchen voor jou en ik zou zeggen van nou ja, we willen dat graag gaan doen, want we willen we zitten erover na te denken om inventory management als service te gaan gaan bieden. En we willen weten of dat ja, of dat of dat nut heeft en of dat of daar een groot genoeg een markt voor is om dat gaan doen. Welke haken en ogen op gebied van implementatie zou je zeggen, nou, zorgen dat je dat goed op orde voordat je voordat je met die pitch bij mij aankomt, en dan bedoel ik van hoeveel gaat het kost qua misschien organisatie zou je daar een inschatting van hebben.
00:06:58
Speaker 2: Ik denk dat je moet denken vanuit het management oogpunt – je zult een bepaalde groep mensen moeten overtuigen dat dat het zin maakt. Om het project zal ik maar effectief om te zetten. En dan werkelijkheid, en meestal is dat zo. Als ze iets nieuws doet is, je een kleine pilot begint, twee drie use cases die je kiest of of zeg maar die mensen die die je hebt, er al een beetje mede werkers. Die doen interessante dingen. Dus wij monitoren die, we gaan, een klein beginnen drie dan kijken Wat hebben we nodig Wat data en wat voor hardware voor nodig inbouwen robuust, ET cetera, bij data natuurlijk ook data privacy disclaimer dus, dan moet ook allemaal goed geregeld worden. daarbij dus ook wat budget hoeveel. hoeveel heads nodig zeg maar mensen van handyman of is dat vrijwillig,

dat ze meewerken, en een tijdlijn? Ik denk ook bepaalde, objectieve of fase bij ons project ingedeeld. In vier fasen worden telkens een in een bepaalde fase een ander aspect van, zeg maar status. Die naam is ik het gewoon gecontroleerde, zonder dat je echt niet te veel in één keer maar optillen en kleiner fases om. Want meestal is er zo uit als als als je een project starten, een gedachte en een techniek ben, je al veel verder dan eigenlijk de gebruiker is. Zelfs als in kregen we ineens het systeem en dan moeten het gaan gebruiken, hadden we elke zin zoals zij waren? Er nog eigenlijk bezig met het niet goed gereden met de auto, alsof benutten van waar ik het soms eenmaal nodig gehad om de Phevs te gebruiken is eigenlijk gewoon gebruikt te worden. Dus gingen er conservatief gereden en wij waren ondertussen al in de volgende fase dus voor hun was dat zo'n beetje. Je verliest ook wel een beetje tijd om om zeg maar u zegt te krijgen: ja, dat is ook dingen die en regelmatig en feedback sessies. Workshops, zo kom maar anders dan samen te kijken naar de data. Dat is wat wij zien. Hoe denken jullie daarover? Overigens zijn er dingen praktisch die wij niet doorhebben? Waren opladen jullie niet bijvoorbeeld uit, je had geen we wallbox om een stekker in steken. Dat is een goede reden, maar voor ons rond zag dat uit van. Ja, oké, dat is heel raar. Deze auto, die die ik het graag zich niet gelijk te gaan steken, klopt iets niet. Maar uiteindelijk was er een logische verklaring voor.

00:09:22

Speaker 1: Ja.

00:09:23

Speaker 2: En dan zoek je oplossingen. Langzaam kom je tot het geheel en als je dan denken, oké, die dat feature werkt, dan kun je langzaam maar zeker op opschalen zo naar naar 100 ofzo. Of is alles. Er zijn zoveel mogelijkheden , ook intern binnen Ford als zijn ook genoeg busjes die en daar intern op een Ford, zeg maar maintenance dingen doen of of service dingen het was en hij intern of extern, er zijn leuke dingen die je kan doen.

00:09:49

Speaker 1: Want zoals bijvoorbeeld voor voor voor drie of vijf van die business willen regelen, en dan dus echt voornamelijk gefocust op wanneer gaan ze Hebben ze shop gedrag? Hoe hoeveel? Hoeveel jobs hebben ze per dag ehm.

00:10:06

Speaker 2: Ja mag jobs, ga je dan ook hun agenda linken aan de voertuig data of, want ik weet niet wat meer mee eens op als een auto zeg, maar stopt willekeurig langs de straat, dan denk je dat die daar een job en toen is, of dat?

00:10:21

Speaker 1: dat weet je natuurlijk niet.

00:10:24

Speaker 2: Normaal wel, hè als ik dit handyman was – en ik ging op maandag om tien uur, ik stop ergens in een straat. Dat is meestal om een job uit te voeren, denk ik, om geld te verdienen.

00:10:33

Speaker 1: Ja.

00:10:36

Speaker 2: Maar het is misschien ook een oplossing om puur gsm based te werken. Ik weet niet hoe je daarover denkt.

00:10:42

Speaker 1: Zou je kunnen.

00:10:44

Speaker 2: Als je enkele gps informatie – want dat heb je nog tools of of arresteerde ook voor kan gebruiken, en dan weet je natuurlijk niet, is men schuifdeuren op geweest van de auto. Dat zijn of de een combinatie van beide of combinatie van met agenda of ofzo dat ik weet niet hoe flexibel of of ruim je het wil oppakken, maar natuurlijk het samen opnemen van data van verschillende sources zeg maar kan ook interessant zijn. Ja.

00:11:17

Speaker 1: Ja, inderdaad eigenlijk alleen een link, ook van die agenda zou wel ook al wel een extra je in input geven.

00:11:24

Speaker 2: Ik weet niet hoeveel en die mensen echt al een afspraak het digitaal in hun agenda bijhouden, maar zal ook al zijn die dat doen. Ja en verder zou je in het ultieme. Als iemand zo bankrekening, gegevens bijvoorbeeld, dan weet je perfect, oké, dit is op afgerekend op zon had dat klopt, met mijn gegevens.

00:11:43

Speaker 1: Ja, of invoice, hoe heet het mooist.

00:11:46

Speaker 2: Dat dat kan super ver gaan.
00:11:50
Speaker 1: Ja, misschien moet ik inderdaad gewoon duidelijk gaan opstellen. Soort van waar eigenlijk de grootste vragen zitten en welke verschillende soorten is.
00:12:01
Speaker 2: Ik wil hier naar toe met jouw project z o aan moet zeggen. Ik wil die conclusie komen, maar ik wil gewoon zeg maar meer insights hebben over shop gedrag, stop gedrag wanneer shoppen ze voor en na het werken, of hoeveel tijd kost dat? Ja, wat wat heb je daarvoor nodig en hoe kunnen we dat opbouwen? Zo zo een beetje het verhaal eigenlijk opstellen?Ik denk dat dat wel zo doen wij het ook intern bij Ford.
00:12:28
Speaker 1: Want, ja, oké, dat hangt. Er is natuurlijk allemaal heel erg vanaf welke data zoals je precies nodig hebt. Maar stel we nemen, we gaan even uit van een gemiddelde, werden we zeggen: we willen voor drie van die craftsman willen we het stop en en en en rijgedrag stop is shop gedrag in kaart brengen en hoeveel technische persoon een soort van heb je daarvoor nodig om dat voor elkaar te krijgen. En en welke tijdsbestek ongeveer zou je dat.
00:13:05
Speaker 2: Kunnen inschatten denk je het eigenlijk niet veel van. Ik denk, als je onze module en boot denk twee uur per auto, heb je die dan zijn ze connected te stun dan maar dan is het hardware en geen software. Welke kanalen en je graag data hebt – en dat is eigenlijk puur programmering, zeg maar achteraf, welke data maar van de auto en sturen we in een cloud of direct op een op een server. Ja, dat is dat software en dan kun je eigenlijk perfect. Onze konden ook over de glir updates geven, dus eenmaal de module ingebouwd konden we onze software flashen. Dat is eigenlijk niet meer fysiek naar de te gaan. Dat was ook een hele grote win factor, zeg maar, want onze autos waren eigenlijk continu rond aan het rijden.
00:13:52
Speaker 1: Ja.
00:13:54
Speaker 2: Het is wel eens gebeurd dat een module kapot vind ik dat weer die moesten vervangen, want onze mening dat vrij goed software update za.
00:14:00
Speaker 1: Ja, oké, ik zie trouwens dat we een beetje over de tijd te gaan. Als je weg moet dan eh, dan moet je het even zeggen.
00:14:08
Speaker 2: Ik weet niet, heb je nog veel vragen, want over om half heb ik de volgende meeting.
00:14:13
Speaker 1: Oké, nou dan even kijken dan misschien nog één laatste vraag: ja, een soort van ik heb ook gekeken naar het het scrapen van van YouTube comments of community is van craftsman, omdat die eventueel ook inzicht zouden kunnen geven in wat er gebeurt in andere landen. En ja, als we heb jij het gevoel dat die capabilities ook binnen een Ford aanwezig zijn, of is dat? Er moet ik dan echt naar de GDIA afdeling?
00:14:55
Speaker 2: Voor informatie te zoeken op op andere media bedoel ja.
00:14:59
Speaker 1: Ja.
00:15:00
Speaker 2: Ehm ja, wij zelf toen dat niet denk ik. GDIA zou dan de enige echte mogelijkheden zijn. Denk ik, ik weet niet of die dat actief doen. Heb je al een contact daar?
00:15:14
Speaker 1: Nee, nog niet, ik had Martin.
00:15:16
Speaker 2: Je aan de marcel vragen wat normaal ieder project aan wat een gewoon bocht heeft. Ook een gdia contact of een om zulke dingen en voor te vragen analyses aan te vragen aan zonder dat is dus ik weet niet als mijn contact.
00:15:38
Speaker 1: Ik had volgens mij een Nicole heb, ik Martin wiecker doorgekregen, maar dat is voor mij.
00:15:43
Speaker 2: Supervisor van GDIA aken, hij kan je wel naar de persoon toewijzen. hij doet dan zelf geen analyses, maar.
00:15:53

Speaker 1: Oké, ehm ja, en dan misschien nog de allerlaatste vraag: wat zou vanuit jouw oogpunt het meest waardevolle zijn wat uit mijn project komt? Want we hebben natuurlijk nu net. We zijn nou iets concreter geworden.
00:16:10
Speaker 1: Met een bepaalde richting die ja die mogelijk interessant zou zijn, maar dat is wel nog heel erg ja voor Ford voor Nicole en Marcel. En wat is wat is jouw wat zij voor je voor jou? Een hele interessante uitkomst zijn, bijvoorbeeld.
00:16:26
Speaker 2: Ik zou een eigenlijk zo verschillende data zo verschillende data sources bij elkaar brengen. Ik denk dat dat wel heel interessant kan zijn.
00:16:34
Speaker 1: Is een kwalitatief en quantitatief?
00:16:36
Speaker 2: Niks ja, ik snap dat je voertuig data wel te hebben, maar dat is in mijn ogen, dan denk ik beperkt aan gps positie. Aan welke deuren zijn opengegaan? Dat u die bijvoorbeeld aan agenda planning, weet ik veel nog dingen om een beetje meer Als je dan naar de data kijkt om echt te zien zo van het leven in een dag op te bouwen van een handyman, is dat je zegt: oké, die heeft job a b&c gepland en die 's morgens rij hij weg En dan gaat eerst naar a en dan ineens plotseling moet je naar de winkel. En dan ga ik terug naar a en dan gaat ie naar b. En dan zit u dat weer dingen die weinig heeft. Ik denk dat je iets meer sites aan de conclusies krijgt. Zonder de persoon zou ik zeg maar achteraf telkens te vragen, want dan heb je op maandag nou gedaan, hoe zit dat dan aan? Kun je misschien niet beter organiseren? Dan zulke zaken.
00:17:30
Speaker 1: Ja, dat eh, dat is ook mijn plannen en ik denk dat dat misschien wel waardevoller is dan dan zon tooltje, waarmee ze dus een keuze kunnen maken. Eigenlijk.
00:17:41
Speaker 2: Ja, want projecten die ik deed was dat altijd was het altijd ja, had ik geen tooltje nodig. Ik wist wel dat we data nodig hadden. Het was gewoon de vraag welke data op welke manier moet dat real time zijn of niet zulke dingen. Maar dan had je de vraag, al zeg maar gesteld, zeg maar dat was er al duidelijk. Oké, we hebben het tooltje si niet aan de orde.
00:18:01
Speaker 1: Waarom dan was dat het zo duidelijk? Dat was gewoon omdat je wist dat het een situatie was, je niet wist of die niet serveren.
00:18:09
Speaker 2: En ik dat de technologie die wij toepast – dat was eigenlijk puur om te bewijzen tot je met bijvoorbeeld met geofencing echt groene kilometers kunt rijden en een bepaalde zones en dan enigste manier om dat te bewijzen was met data van de auto zelf. Mijn batterij is erg laag, dus kan zijn dat ik iedereen kan wegvallen.
00:18:31
Speaker 1: Volgens mij, volgens mij heb ik alles alles gehad we wel in ieder geval toevoegde.
00:18:37
Speaker 2: Nee, eigenlijk niet, ik zijn moest er in de loop van de jouw project nog vragen zijn. Je mag m altijd vragen of we kunnen kocht nog een en we hebben is opstellen. Dat is geen probleem. Ja super! normaal ben ik ook altijd één of twee dagen per week en ik maar nu met met corona enzo ben ik al lange tijd niet. Mag ik wist, maar ik zit niet vaak van Marcel normaal ook al twee verschillende projecten, maar we bleven wel bij elkaar dat dat altijd interessant van andere te horen wat voor hardware , maar ook de techniek en, zoals wij gebruiken, super interessant voor iedereen.
00:19:10
Speaker 1: Oké, ja, super hartstikke, bedankt voor je informatie, zoals ik het nu een beetje aanvoelen, is dus echt dat projecten opzetten voor jou om het leven van die handyman eigenlijk in kaart te brengen en vooral het kiezen van welke soort data eigenlijk die activiteiten weer kunnen geven. Dat is nu dat, dat lijkt me interessant, dus ik ga denken daar wat verder induiken en dan laat ik wel even weten soort van hoe dat zich verder ontwikkelt. En anders zie je dat vanzelf wel weer bij de volgende presentatie.
00:19:47
Speaker 2: Oké, kijk ernaar uit oke, nou helemaal super.
00:19:51
Speaker 1: Bedankt voor je tijd!

Transcript 4: Participant #4 (P) GDIA supervisor
Interviewer (I)

(I) 0:02
All right, so maybe I can first start with the introduction. So I started this project two months ago. And I started studying strategic product design at the de Delft, which is a master of the product design engineering at the TU Delft, and this is more directed towards innovation management. And of course, part of innovation management is figuring out what you should make. And user research can help a lot with that. And I think it's very interesting to, to use data for that, because currently, a lot of products are actually currently gathering data. So I think we can learn a lot from that.
So that's also why I started this project together with the fort with the Ric team in Aachen with Nicole. And they basically asked me, okay, so we hear that a lot of people are doing something with data, what should we do with data? Okay, it's like the typical question where people might not have a very technical background, and they think it's a it's a buzz, and they want to do to dive into it. And so I've figured, okay, let's, let's first do a solid literature research to really understand, what are we talking about when we're talking about data? And how does it actually influence design?
of course, you really want to know, like, how is this big data or artificial intelligence or machine learning to are there they're all these these big terms? And, and how are they actually are actually valuable for designers.
So the first thing I think it's interesting that you can take apart is the difference between using data in your design. So for example, the, the YouTubes, the Facebook's where they actually or maybe a running app, where they, they gather data, and they provide value for the user by using the data immediately.

So that's actually using data in your design. But I think it's also more interesting maybe to use data to learn from the data and then design from it. And so that's actually also where I want to focus on. And of course, designers have been using data for ages, when you're doing a survey or doing an interview is basically also gathering data. And so then you start to start taking a look at what is changed what is now new, why why do do you now want to immediately or instantly talk about this.

And that's actually, as I already mentioned, is that a lot of behavior currently is digital, or at least least digital traces. And that's, that's why it becomes interesting to take a look at these digital traces to research human behavior.

And that's also the kind of the next big thing that I found is when you're using data, as a designer, you're either looking at behavior, and using sensors or these digital traces to find a behavior. Or you're looking at experiences or context topics, for example. So what do people find important in that behavior? Because if you only look at behavior, then you might you probably won't find the needs of the user, you won't you only find what they're doing and not wider doing.

I 3:47
then I started working with the the the team of Marcel and Nicole with they're currently doing the smartrack projects. I don't know if you're familiar with that. Yep. And they're also starting to take a look at the debates and trying to see if it's what data can we actually get gather from the bits from the gammas. network? And what can we learn from that? And, and, and then for my, for my literary research in the first conversation with them, I figured it might be interesting to look at GPS data, and for the smarter EQ. And one of the tracks that we might want to do is inventory management. So can we already take a look at the GPS data and try to map their actual shopping behavior? So how often do they need to go to a shop to see whether it's actually interesting to start developing a service for them? is that in a lot of the conversation that I had with researchers at the RIC often with Roy Hendrix I really found that

I 5:03
a lot of the times when you're looking at this behavioral data, you're missing the actual experiential data. So the reason maybe why people are having certain behavior? And they say, Well, yeah,

I 5:18
we might be able to look at the data and we have this this big ball of data, but we can never find the real person that was behind this and ask him the question, well, what why are you doing it? Maybe now, we're only talking to, for example, three craftsmen that are close to the to take often. Because

we know them and we can get in contact with them. And so I think this is this is kind of an interesting problem from a research perspective. And, and we'll we can dive into that a bit later.

5:53
But I think that was kind of the overview of where I am in my research. So you have a little bit of a understanding of the context. And I think it's now maybe interesting to talk a little bit about your role in the GDIA department, and also the connection, and then the collaboration with the others.
So can you again, tell me a little bit about that?

P 6:19
Yeah, sure. So
let me first decide where to start. So yeah, I think almost five years ago for decided to create an own internal data analysis organization, so called GDIA for global data insights and analytics.

P 6:45
I think in the meantime, we are around

P 6:49
1500 people supporting all different areas within Ford is analytics capabilities. So really, from finance, to marketing, to product development, and so on. So that's

P 7:05
how we are set up really as a separate department, with one big portion in

(P) 7:13
creating also the possibilities for for others, or enabling the way for others to analyze the data. So

(P) 7:22
yeah, I think something like it, like a data lake is familiar to us. So you need some really physical storage for all data sources, you want to have some easy way to access the data, some media as well as some guidance, and so on. So that's

(P) 7:40
describing the GDIA role, I would say, and with that, then my specific role is in the field of Smart Mobility analytics, we call it but mainly focusing on all data that comes from the vehicle. So I think,almost in the same timeframe of five years, we have started to equip vehicles with embedded modems, and then getting that data as a data stream, I would say, but not a continuous data stream currently, but we have on usually three data points from a vehicle.

(I)
So the beginning and after a minute and at the end of a trip. So the key on key off moments are those right? Yeah, it's

(P) 8:35
a good summary. Not precisely, but I think for your understanding, it's fair enough to say Qian, it's a little bit later in the week really starts moving to avoid people who just turn on the key, open the windows and shut down the week or stop the week already, again, or so. That's why we wait until the week really drives away. But that's really very

(P) 9:01
dense. But in general, you can link it to key on and off. So most of the people I would say and then what's your link to the check often. Personally, I have been working with Detlef and colleagues a while for a while we have had

(P) 9:25
I'm also working with these PID devices. So we have an experiment or supported an experiment more or less from the mobility group in in London, where we have 10 done the analysis of the pit devices also similar approaches like where are they driven? In London, we had more delivery drivers so we could check where the equals overnight and all long do they stay at the depot in the morning and so on. So

(P) 9:57
yeah. Trying to identify

(P) 10:00
interesting topics for the fleet customers who supported this experiment and there was also with Michiel hoorn. Yeah, exactly. Right. So yeah, he is currently more on the NGA, we see him more as a customer. So an internal customer that he then is interested to, to use our findings to make better or give a better service to our than final customer. So in his case, maybe mainly commercial customers, and so on. So I think that's the way how we as Ford currently, then communicate with the customer is then the fordpass app, and there is a for for pass pro there for smaller fleets, where we then have the possibility to share some insights into technical information. And at the end, yeah, get a better service a better management of the vehicles. Yeah.

(I)
So if you would try to describe, so today was a very
specific project for the team in London, can you could you divide the kinds of these research projects, and kind of broadly into categories? So what kind of research so this was aimed at using GPS data or for delivery leads?

(P) 11:43
Now, it's not only the GPS information, , I would say the technical details are of more interest. So using the data for quality purposes, for example, to understand, do we experience a certain errors, error and a chain of events that we can then derive, okay, we have an issue, and can start to develop countermeasures earlier than the customers coming into the dealerships and complaining about the problem or getting stranded at the roadside and need assistance there. So that's the current currently the main interest in general and that was somehow in the first glance, also similar for the London experiment with you, are we at both aspects, one is more this behavior questions of if or how many vehicles are or how many miles are the vehicles driving this way around.

(P) 12:57
And then we had the first time that we introduced equals the other term that of was used in London then. So we check the charging behaviour, how many miles are driven in a certain area is in the cities or we have this our geo zones where we check the Weather, zero emission zones from the city perspective, we checked if the vehicle is really driving then fully or the most time on electricity instead

(I) the project with Alexandra right.

(P) Yeah, exactly. That's part of that. So we are Yeah, as you mentioned, or asked for the collaboration or the the link into the rig. So that comes all together they are then especially Alexandra and Roy, they are the experts on this blockchain piece.

(P) 13:51
And we had this experience and did the analyzes my mainly based on the pid data. And as I said, that was really then also working with a fleet customers if they have specific interests in, in understanding their usage patterns, and there was a very small group.

(I) 14:18
Um, which one do you mean now the London, charging behavior for example?

(P) 14:26
Yeah, that was only 20 vehicles, this PDFs that we have used, but the experiment where we looked into the

(P) 14:38
delivery drivers and analyze the delivery drive patterns. That was something about 100 vehicles, if I recall correctly. Okay. And

(I) 14:50

so were you able to then from those 100 vehicles also get more qualitative data? Or was it only the quantitative behavior Your data that you analyzed?

(P) 15:03
How do you distinguish these two? So, so the quantitative would be more....?

(I) 15:09
For example, for the charging VA here, they charged 70% of the or 70% of the vehicles charged every day, for example, and the other 30 did most of the time driving on the, I don't know, word hybrid or?

(P) 15:25
Yeah, so the only the other ones only drove? I don't know, what 20% of the time with electric. Mm hmm. And that's, that's what I would go quantitative. And then the qualitative part is why they actually did that. So for example, they didn't trust the electrical power or they said it costs too much effort to put it in the wall. From London or I was personally not involved in this than more quantitative questions, I would say. So I know that the local team and that is similar to an experiment we had in Cologne where then some of the colleagues really reached out to the drivers and somehow trained them in how can they better use the plug in hybrid? So and they are we got some response, then more, we are similar, like you describe it. So we see in the data in case

(P) 16:33
the vehicles are not charged, and then they reached out to this customer specifically, and then they say, Okay, yeah, we have no charging spot here on our depot area, or this has to be built and then it will be available in the future. We also saw in the data, that after this poll was available, then the people started to trash the vehicle, but for before they were not able so

(P) 16:59
yeah, a combination. Not my personal roller, but in general in the suspect experiment. It has been done in that way that Yeah, the colleagues reached out to the customers and also asked for for Weiss Yeah, so

(P) 17:17
maybe for less than did a really new product, but the products are currently in use you described that you're mainly looking at,

(P) 17:30
at maintenance and and functional performance.

(P) 17:36
And so there is not really there aren't really that much research projects that look more into the behavior of specific customers. Because

(I) 17:49
I was talking to mark Geibels and he said, Well, the I think the main reason why also our department is is set in Europe is also to be so relevant in Europe. And then I wondered Okay, so, what kind of research projects we now have in Europe to really understand how European people differ from for example, Americans hmm yeah, there are two aspects one is really that the maybe pf is a good example, that the charging infrastructure is is different. So,you have different ways of contracts with the energy providers. So that could be one portion of it, so that you need more the to know about the general market setup in that area. Also from the components themselves, so we we try to build global vehicles, but there is alway a local footprint or there are active depending on the vehicle line.

(P) 19:21
But there are that many research projects that tried to tackle this So there are if a vehicle is developed in Europe, there are differences. That's unfortunately still the case. So, not from the behavior from a technical point of view, then it requires really to, to check a vehicle in a certain market. So that you see for example, as I mentioned, the charging infrastructure the new car. the Phev vehicle is you really need to check it in a local market if everything is working fine was payment of charging and so on.

(P)19:57
So that's done then races experiments. But the the current version of the modem as I described it, it's not so much really checking for focused on able to monitor to add really more behavior or you can see the length of trips, you can see maybe some information about the weather or temperature conditions, but it's not so much how are the people driving? Or are they using certain features within the vehicle, they had the current more than set up is not as as good as it could be, I would say or as some even some colleagues expected it to be when we when they asked for some questions in how are people using the vehicle. So there is a still a lack in the data, I would say which could be then enhanced and needs to be optimized. And we are addressing what what is addressing that was a more flexible way of of using the modems or more

(P) 21:16
capabilities to update the software in the vehicle that it can deliver different data and it's not so static in a Yeah, in a sense that, yeah, the values we receive are defined years before we then finally launch the vehicles. Yeah.

(I) 21:34
Alright, so

(I) 21:36
would you say that it would have value if the current only, I would say, kind of static or a more quantitative approach of the modem? And what if that would be added with a more qualitative approach? So for example, all the people that who currently have the fourth best bro up

what if they could get an invitation into Fort pass pro up to to

(P) 22:11
contribute to a research.

(P) 22:14
And if they would want to contribute to the research, they can give extra information to why they did certain things in a certain time.

(P) 22:25
And for example, if he then if you want to research a

(P) 22:31
Spanish market segment,

(I) 22:34
for example, and you say, okay, we we want to do better there, but we don't know how to do better. We take a look at the behavior there, what's happening there, and then as certain groups that are showing interesting behavior, why they're acting in this way?

(P) 22:55
Yeah, I'm not 100% Sure. Because what you described in the beginning, I think these more

(P) 23:04
qualitative approach, I think that somehow the way how we have done it in the past, so to reach out to a limited set of customers to understand what their needs are. And

(P) 23:21
what I currently see in my role here is really that we try to maybe get a little bit away from this individual customers really in checking more. What does then the Yeah, really the full population of vehicles to so that you don't need to ask. So design the product in a way that it can already tell you how people are using the vehicles? And

(I) 23:51
you ideally don't need to ask them again. But wouldn't you agree that,

(I) 23:59
for example, if somebody is taking a walk through, or let's say we're taking a look at walking patterns in a city?

(I) 24:10
And we say, well, we want to give him the most optimal walking better. And we see that every time on this on the Sunday afternoon, he's walking through the park or no, let's definitely he's, he's taking a detour.

(I) 24:26
And we think that he's taking a detour because he doesn't know how to ride way or because we don't know. We don't know why. Because we only have this behavioral data and we can see it that the whole population is doing this, but we don't know why it is the cap. Wouldn't you then agree that it's much more valuable, even if you started at the whole population, to also have these qualitative

(I) 24:52
snippets of information to provide some more detail in or a reason behind

(I) 25:00
Measure.

(P) 25:03
It makes sense to be measuring, the more you know, the better decisions you can make ofcourse.

(P) 25:13
And also for this past example, when we say, okay, we communicate with the customer, we now have

(P) 25:23
implemented also measures then to see how the people are using the app so that we can see have they reacted on a certain messaging, or communication so that we get the feedback? Yeah, that was understandable in a way, but

(P) 25:41
so the interest is there. Yes. I'm

(P) 25:45
just from what I see, we are currently not so much. Or we are not able to do it this way. But it could be

(I) 25:57
useful, for sure. Yeah. Yeah. Right. Because I think that's, that might be an interesting outcome of my research, or my design proposal, so to say, Okay, um,

(I) 26:14
then if we, as I describe it, yeah, we we trust them on the amount of data we see. And we would then maybe in your example, we would then say, okay, there must be a good reason

(I) 26:25
that people do this detour. And then we try to make conclusions out of that, or based on that, and,

(I) 26:34
yeah, that could be wrong. All right. So a check , is needed. Yeah. Are there no, by your knowledge, any projects that are thinking about the bigger population, and looking only at data,
but actually, or at behavioral data, where this might be helpful.

(P) 27:12
So I'm not directly aware of this approach, I would say. So Nevertheless,

(P) 27:21
we have this request, as I said, and we are getting to a more flexible way of requesting data from the

vehicle. So getting this this quantitative data.

(P) 27:38
And making exactly these conclusions in a way that we think there was an article wasn't fought. And not sure if it was internally, but that we decided that we, for these key free systems, you have the opportunity to install it on different doors, I would say so that you can open or grab each handle and with each handle the door or the vehicle unlocks. And from customer research, the Ford has seen that the rear door handles were not used so often. So they decided to eliminate these functionality from the rear doors and only applied to keep it at the front doors, which hopefully, less people then will affect in a way that we would use some technology and and reduce cost for sure.

(P) 28:43
without harming too many of our customers. So I think that was one approach. And I remember that we had done some on internal questionnaire, which is a platform that Ford uses to ask the employees before they make these decisions, as well to say, okay, is the How are you using your rear doors and the key free system? So

(I) 29:11
that's maybe a good example where you see in the data, okay.

(P) 29:15
That and that behavior is what we expect. And then you make some additional question near to a group of people to validate this information. Yeah. So there is.

(I) 29:31
I was I was also wondering, because sometimes I have the feeling that when you're

(I) 29:39
trying to make this global vehicle and trying to look at the whole population, and then sometimes you would miss out on certain segments(I) 29:53
I was wondering if there are, maybe no, so this this is really a project with a vision

(I) 30:00
mentioned for a very broad range of people, and how would I use the door? Yes or no back door? Yes or not? But are there maybe

(I) 30:12
products or services where

(I) 30:16
you would want to differentiate between different segments? So you you, for example, if you do some some kind of cluster analysis of different parameters, and you say, Well, okay, we have people that

(P) 30:32
well, maybe maybe in this example that, that always use the back door, and I would really love this function. And people that would never use this door, so they don't mind.

(P) 30:42
Is there is there me made a differentiation in this or is this really focused on cost reduction, and we're just making the general vehicle to save costs.

(P) 30:58
As I said, They, in this case, they really try to work from the data, they decided this and before they have done this cluster, and there's no way to say

(P) 31:11
it will not to have too many customers. So

(I) 31:17

I would say if we have recognized, and I was not part of this investigation, but if I could think of if we would have recognized, it's maybe 20% of the customers, then we will have either decided, Okay, then we leave it as it is. Or you decide,

(P) 31:35
let's make it optional. And then the customer needs to pay extra if he wants to have this functionality, which is an alternative as well. So that's more than the possibility to have this

(P) 31:47
separation or that in certain areas. Maybe the the US market says OK, for us, it's acceptable. But in Europe, we say no, the people use the vehicle differently. So as you have asked before, so if this is the case, and we recognize that

(P) 32:03
then there is a possibility to differentiate and and have a European specific setup configuration, whatever. So that's possible and yeah, has been done in the past and or Still, the way we do it. So yeah.

(P) 32:23
It's also always discussion because you want to streamline and reduce complexity for sure. But yeah, possible and not not an exception. It's more the regular case, I would say. Yeah. Okay. So, but then. So you say okay, so that there is there is you may make already this differentiations.

(I) 32:54
But this is again, then, mainly based on big quantitative data in a little bit on the for example, the internal internal service.

(P) 33:06
Yeah, at least what what I know, so

(P) 33:13
I'm not aware that we really invite an a broad range of people, wire for the past to say, Okay, do you want to participate in this kind of question now or whatever. it's really then getting to small numbers and not really to nothing not sure if this is common in other areas that you
maybe for example the described YouTube or the video platforms.

So there you really have rather quickly maybe the possibility to say, this one I like or dislike or and then recognize if people stop watching a video, then you can quickly maybe decide okay, we need to change. I think it was the CEO or the previous year, and really expressed this need to become more of a service mobility provider. And especially in this more Smart Mobility area, it might be actually also helpful if you're designing also services in and around the vehicle. And that you will want to know how the differences are too because there you can actually To adapt a little bit quicker, quicker, I think.

(I) 34:50
Yeah, no, that's true.

(P) 35:07
Taking the customer as important, and his view, as I think also understood, and we have these different setups like the, I think there's a team in London called tea laps or that also try more to focus on, let's really do some deep. Yeah, projects to really deeply understand how customers are using maintenance, but also, especially for the service side and the mobility side, I think, as you describe it easier to be they're very customer centric, and develop the service in a way that is appreciated by the customers. Yeah.

(I) 35:57
So anything, those kind of themes would like this kind of solution better or use a solution there?

(I) 36:05

use it more. Yeah, what they are designed and set up to, to do it more in such a way. Yeah, do it more in that way. And I would say my cell resists

(P) 36:15
smart Trank project or smart wreck and also more, really, deeply interact with the customer. In that case, it's a small fraction of all our customers, but tracking them and doing this analysis is also a good example of, yeah, follow how we can understand or understand our customer. So I think that's not all.

(P) 36:49
It's difficult, I would say it's difficult to do that on a for each and every feature. So you really need to be flexible or concentrate on on on some major questions to get that feedback and really combine that risk, then the more quantitative approach, yes, that the truce for for all the others as well. So so for example, the charging data here are implementing these. With those kind of things be questions that would be interesting to look at.

(I) 37:30
Yeah, of course. So the first start there, where there has been this contact to the to the users, and they have been asked why or how confident they are, how much they like the vehicles and the behaviour, and there are some very useful, or we received some very useful feedback. And I think that will be then influenced the further development. So yeah.

(I) 38:02
So would you say that? What what stage is the implementation of these kind of vehicles in the rest of Europe? Do you know that?

(P) 38:14
These plug in hybrids? Yeah.

(P) 38:17
Um, so we are in London, we mainly use the transit but also in, we now offer, also in a certain amount of vehicles.

(P) 38:35
Is this plug in hybrid option? and transit as well is now in serious production? So

(I) 38:46
Yeah, used across Europe?

(P) 38:54
you would just say that I would say. So not a normal footprint yet.

(I) 38:58
I'm thinking about so if I would design such a servers or platform, how this could be done just to show people how you could be more user centred. And also combining qualitative and quantitative when a more context dependent approach is needed, or looking at different countries, I tried to see what would be interesting case examples and see what would happen if I would, or who I could speak to in order to really understand the context better to grades like project proposals, so to say. So would you Ford example, maybe you're not the right person to ask

(I) 39:50
to understand that I would need to speak to whoever problem owners are.

Transcript 5: Participant #7 (P) Design researcher from other track Interviewer (I)

This interview was transcribed manually, some parts might not be complete.

(I) Try to give them tools to make the link between design & data

(P): showing which phase of the design process would need what kind of data would be very good. For example exploration/ idea generation / assessment always happening you could maybe think if the different things need different types of data. I don't think that's true.. but yeah..
What I was thinking is: qual is for the why questions and quant is good for the what.

(I) explaining the first framework…

(P): Lets take the first card: what are they doing in the van: you could ask them, you could observe them, you could perform an netnography study. First I would ask myself where do I get the most true data from?? And at what stage am I?? And which is the most efficient/not so costly thing, It should be cost effective. You see with marcel is asking them/observing etc. (handyman) but most of the time the feedback is to positive because they like him and so on and so on..

Maybe we should first observe 2/3 people to see what kind of categories of behavior do we see? What differentiates them/ what patterns do we find.

Then we to find more data about it, we do and nethnography. Could also be the other way around. When we observe them maybe also ask them about the why.

When we found things we can compare we can go into a questionnaire and do comparisons of different regions and different handyman and so on.

This is my kind of processing to walk into this problem space. I don't know if we can standardize of when to use what… I'm not sure… that is puzzling me it really depends. On the kind of data you find.. if you find nothing you have to try another way.. this is really hard I'm not sure you can have a standardized container etc…

(I) maybe more of a combinations of methods?

(P): I think it is really good to have explanations to go through different methods/approaches, for example when you are not so experienced you can look at the different approaches: you can do this and this and this and it is more suitable to find this or that kind of data. That would be good!!
You will not find emotions … etc. when going through online content..

The people could be very honest or they are polishing their stuff for social media I'm not sure about the trueness of social media. When you are speaking to someone that's when you find the deep conversations, on Social media you find the snapshots. When you are going to quantitative data you will find a lot of data where you can confirm whatever you found. (1)

You could categorize the different approaches of what you could get out of it and this could give you already hints of which to use.. but that's just my understanding of data. If our GDIA people have lots of buckets of big data, maybe they are talented enough to go through broadly to find patterns that can be a hook of different problems we didn't know about, to go into.
That would be using data not for confirmation but for idea generation (2).

That I think is the topic Milene is into and might be interesting and new. But for data analytics people it is not new. The magic would be having a super easy data analysis tool to find these hooks. But we found this is difficult for people to work with if they have no experience with quantitative data..

(I) fo….. vague

(P): You always have to combine it with why something is happening…

(I) the challenge would be: oke can we for the GDIA create questions or certain behavior that we are interested in and ask them if we can find patterns?

(P): Yeah!

(I) Then the question could be can you find the person doing that pattern

(P): yeah you can get that information and then possibly try to get in contact with him..

:P So what is really new / different than what is being done already, but when working with the team I sometime have the feeling the more practical application is more helpful. As the team is less used to working with data, and they don't know what are the different data possibilities. So more practical could be more valuable than difficult stuff..

(P): but then the value of your work is wrapping up literature to know what kind of data is when applicable to a specific type of situation.. Which is good…

(I) but maybe not that interesting?

(P): Well that is not the problem.. I'm more in innovation management theory so I don't know what is expected of you. So maybe breaking this down to a user guide is hard: should be easy to use, nicely looking and helping them to navigate to the data source decision process. So interesting and not so easy.

So what we did is asking ourselves a question, imagining what kind of data we could use and what kind of content we would get and if it would answer the question..

That is what you are doing when you are thinking about what method to choose, and you got to have a feeling of what you would get out. And maybe most of the time you don't get out what you want and then you have to do something else.

That's what I'm asking myself asking what I could get out of it…

(I) now I'm deciding whether I want to build on the cards and build this guide. Or work with the GDIA department

(P): did you already speak to somebody from GDIA?
Because martin is the person that is Walter for Aachen GDIA team. Also doing data analysis by himself. So maybe it would also be good to speak to somebody that is actually working with the big data sources. He might be able to help you navigate through the different types of data. But Martin himself is not working so much with data. He can help you find the right person.

Maybe you can describe the problem a bit: explaining you would like to talk to somebody that is trying to find interesting stuff in the data. Maybe he can link you to that person. Ask him!

Regarding my topic: how fixed is your task:
- It should be something for Nicole and Marcel
- It should be interesting for you

(I) maybe the booklet does not seem so exciting but its direction that helps Nicole and marcel the most and the coming data teams.

(P): I think this is totally right: the cards would be something that would pop out at the end of the research, but the work/structuring part / what you are writing about should be the interesting part: Structuring the problem really is an important part. Find/ create a clear research question.

I think you sometime ignore the innovation mngt literature is coming from the different innovation mgmt. problems.. Design thinking and innovation management are really connected but they are not so much in literature. And a lot of the questions that you bring up are actually already answered in this field of innovation management. There is a deep literature bucket here. You could do it for design

thinking especially so you don't have to open up the innovation management bucket too much. But incremental innovation vs disruptive innovation is really being answered by a lot of authors. Also the question of how to use data is mentioned in different literature on which method to use. There are many books or students that speak about this…. This is the basic question of research..
So you need to ask yourself is the type of data/ research method different when doing design thinking than doing traditional user research.

And if that is not a different thing. Then you need to find something that is new and unique. So e.g. what combination to use and how do we decide/ what is the practitioners approach? Maybe go into mixed method approaches.

I don't know if you did this..

(I) so the question is how am I going to make this interesting

(P): If you're doing the guideline thing you should do like a perfect structured lit research/ categorize it etc.. are there 10 approaches… and this is the guideline… but I think that might not be interesting.. what is: what did we do when talking about the example: I'm forecasting what I would get out, and I would then like to discuss to find out if that
would be enough to figure out what we need and in a different way figure out what we don't get answered. So can you help us with this imagination process. That is a design process by itself it is a trigger your mind to browse free and combine your experience of data.

Can you help us with this approach because there might be difference in experience what you would get out of a specific method. So you need to understand the method and understand what you could get out.

What kind of problems would you have when you try to image what the outcome might be?
That would be interesting.

(I) I think it might be interesting to try this out.

(P): I think you can design how to imagine what kind of data sources might be interesting to use and what the outcome would be.. yeah you can work on a guideline helping us to go through this process. And it would have a very practical implication.

(I) But when data is limited, social media/new data/ car data wouldn't it be more valuable to say: we are not making a whole imagination tool, but we take a look at three main scenarios, and the data that we have could be valuable like this… For example making comparisons in van use in Germany and other countries, In Spain comparing driving behavior with Germany. Make it more practical in certain directions

(P): Yeah sure!!

Transcript 6: Participant #5 (P) Design researcher From Craftsman track Interviewer (I)

This interview was transcribed manually, some parts might not be complete.

(P): What can we learn from data that is now collected vs what can we learn from data that we could collect in the future. (smart rack etc.)

(I) explanation cards … problem space

(P): yeah let's say it was a high level assumption there was not much in the beginning.

(I) then you don't know yet what the solution is.. did you then know what kind of strategy or approach you were using?

(P): no.. hmm yess and no.. we have the Ford design thinking process. Which I in detail developed for myself based on the tool tracking. I know how to approach it. But this is more based on data now than the tool tracking. So together with you we are adjusting and refining it.

(I) So it is not 1 approach: incremental innovation..? or looking in the future..
So in what kind of phase would you place yourself..?

(P): now?

(I) no at that moment..

(P): exploration..

….

(I) could you formulate a research question?

(P): so it is a combination of both.. so on the highest level was to make craftsman live easier and more efficient… By providing him services or products

(P): so already sub questions were ergonomics/accessibility etc

(I) so that is really a high level goal: making peoples life easier. But when you are designing you are trying to understand the situation, what are people trying to do..

(P): so in the beginning we had: disorganization, accessibility, unneeded items
These were the three pain points we were trying to solve.

(I) so if you then try to describe that in functional behavior..?

(P): do you have an example??

(I) Oke so this is difficult right? I have the feeling when you are saying disorganization: handyman are trying to store materials and tools and this is not going super well. And there is a reason for that..

So if you are looking at it from that direction it might be also easier to understand what the research question is.

(P): tool tracking was very clear and straight forward , here it is more open. So storing tools and materials, not only storing.. the goal to have always the optimal amount of tools and materials with them. So currently that is not the case. So also the accessibility is tackled here.
The disorganization and unneeded items is tackled with the digital workstream.

(I) im trying to go through the steps and trying to see with what kind of steps I can help you formulate your research question. So one thing is somebody is organizing their tools and it is not

going so well, let's talk about that. At that point, if you would have an exploring research question than what would it be? What kind of question could you ask around behavior??

(P): So maybe the question would be how are they managing their trunk??
Or how are they organizing it, how are they tracking everything?

(I) that is the high level question, so we can now use a method to figure something like that out. So for example the question you could ask yourself: is that large scale behavior??

(P): What do you mean with is that large scale behavior??

(I) Is it an interaction in a group? Or in depth in one person?

(P): So is the question is the research base.. ??

(I) so we said we have an un known.. we don't know how they manage their rack system.. You did make a choice for interviewing them and now we are thinking about implementing the videos.. why would you think data would be interesting?

(P): hmm ja.. I can give a generic answer. People are expressing things but it is not always the reality, for example if you track a behavior you can find a completely different thing..

(I) it could be we think they are not honest about what they are doing.. So we are researching the activities they are performing. And then we can take another step to find out why they are doing something. Is it large scale behavior/expressions or more in depth latent behavior???

(P): What is the difference here between the three of them?

(I) The difference is: large scale you need data points from a lot of people to review it. Because with one person you could also just observe. For example people moving through a city to design a new mobility service: this is a large scale behavior that you need to research. In the handy man example of putting at the camera you can only find one person's behavior.

(P): the question is always how to generalize information.. We are just shadowing and say that overall people are doing something like that. This already can be a question..

(I) Yeah but that depends on the research question? Is it about one person or do we want to add scale of behavior??

(P): for example DHL project: than we are directly customizing solutions for them, but in our case it is for a sector or branch that is generalizable to the entire craftsman sector. So we are just taking one sample and generalizing it to the whole group.

(I) So we now said we are going to take a look at the functional needs what are they doing? And we can do that by putting a camera in the van. So if we did not have the video data would you now use different data?

(P): ja… so.. there are different data source: qualitative interviews, the PIDs to collect information about the driving behavior, so for this we are attaching the cameras. And as we said yesterday is looking at indirect data to see if people are collecting the bills of the data so we can analyze the shopping behavior.

(I) so what would help you ? so now I have the feeling you know what types of data are available and how to use it but how can I even better help you?

(P): so what data we are collecting??

(I) yeah what we do have and what we should collect..?

(P): maybe in general as many data as possible so also it might make sense to collect as many as

possible.. but it is always the question why you collected this data..

(I) but oke you said you wanted to use video data, because for this example we want to figure out just what he is doing..
Maybe here I need to give more examples of what we can actually measure in the van.. For example put a camera up? Or pid data can tell us about … or indirect data or social media or videos.. Would that help you to navigate through these new types of data??

(P): so kind of… if I am aware of the different types of data that would be helpful so for example it did not come into my mind to ask the partner companies to ask for the billing.. So having a list of different data sources / written down the opportunities of data sources and what we could potentially do with it..?

(I) So I put all the questions that you had in the workshop between functional questions and more experience or context questions.. I would like to go over these.. I think there are multiple directions. I think it is interesting to make more scenarios than just only questions..

(I) //explaining template // … so we would need data to research this..

(P): … so first of all the data we are collecting.. to design or collecting data to decide what to design (using data in a exploring way). For example when we actually have the data we can start to use the data to create new services based on this data. So now we are collecting data and creating services from that.

(I) yeah that is the difference between designing for and designing with data..
So now we are creating something new so we don't have data yet. So we need to start gathering data to make the decisions. For example what is my research questions and where would I need to find answers on that? Would I need to call somebody or do I need to use data?
How can I help you to figure this out? Helping you understand what kind of questions you have? Or giving examples?

Because if you are looking at these steps every time you are making a decision.
So what problem am I trying to solve? Is it small scale? Or more large scale behavioral problem? And what kind of data should I then use??

(P): I think when you have clarified in the first steps it is difficult..

(I) So if you have a clear research question it is easier? So if you

(P): So the problem is how to setup a research question?? I think it is somewhat clear but how to write it down and how to formalize it? So I think the important question is are you customizing the technology for 1 partner? Or looking at a bigger solution for the entire branche..? then there should be on different levels to set-up these research questions. So on the higher level how to make the craftsman life more easy? So then we would need to setup a research question. So in depth how to formalize these research questions.. then it is important to understand what kind of data we would want to collect. For example the invoices I did not think of that. Maybe summarize them in different data categories..
And also that we can make clear what assumptions were covered by the data and what data was not covered. So we can make it visually.. in this field and this field we have the information that we need. So there are different data sources…

(I) I think it is really dependent on the specific problem..

(P): I agree I think for different problems you need different approaches

(I) So What Alexandra in my meeting this morning said.. is that she asks herself: what is my research question, where can I find data to answer that question and what kind of approach can I use to answer that question?

(P): Maybe this is an idea we have an design circle where we focus on our circle and add your questions on this circle. So we are enlarging it with your data research. And then of course every

process is different but everybody is using this circle.

(I) Hmm okey I can do that now I think! Maybe more explore, define, develop. Then I would use the framework that I just showed you.. explore: what are they doing here? Then choosing a certain function and then go in depth figure out how we can solve that problem.. that would be for example specific scenarios.. That could be possible.

(P): for somebody who is acting in the field to have a framework and to check am I on the right track, however you can visualize is you can do it. For example now with this data covered half of the requirements… And then also develop questions to understand where we are now? Can we progress or not? And if it's not done maybe then we need to go back. So always a check to see if we are on the right track.

(I) so for example a framework where we list our assumptions and then you perform a research and see which are solved and which are not solved.

(P): and if we now have enough knowledge to go further or do we need to go back..

(I) oke but then I'm more designing a decision making process

(P): yeah that could be.. if you would like that on your graduation

(I) but is it valuable?
(P): yeah but many things you can do are valuable

(I) Ok but what if I created for example three directions, taking a look at social media data, looking at the invoice data, and do more of a deep dive in that direction..

So now I'm thinking going from the problem of what is my problem to thinking of a data problem… but the question is if you go through these steps would you be able to come up with these solutions.??

(I) for example do you now what your problem is/ what job are people performing? Would that help you in defining oh hey I don't now what they are doing in the van so maybe I need to explore a bit more.

(P): So the goal is I can use this by my self? No I need more information on how to set up these kind of questions. It is difficult now to say, can I come up with these research questions, I would need more guidance for this.

(I) I could ask questions:: do you know what your problem space is?

(P): It starts with problem space: is it high level? Or specific level? And both is not fine.. So in every phase I need more guidance
It is like formalizing the perfect how might we questions. You need some guidance in this.

(P): so guidance what could the outcome be, and questions to ask yourself and principles to come up with this statement. And examples can always be powerful for example.

(I) So a principle is looking at functional and experiential / contextual insights.

(I) alright I will work this out a bit further and try to come up with questions examples and principles that can guide you in your process. And then we can go through it with a different problem and see what happens when you use the cards.

(P): yeah so the thing is that, what do you want do with your master thesis. But if you want to help us through this process of working with data then it is really helpful to give us clear guidance and check if what we did is correct.. So a clear guidance and examples and a manual would be helpful I guess.
(I) I need to think about if that would be a helpful outcome of the process..

(P): Yess let's also discuss here, let set up another meeting and figure out then what you can do.

Appendix B: Evaluation of final tool-kit: 1. Workshop Setup & results 2. Interview results Ford employees.

Study setting Workshop

Participant: MSc. Student strategic product design (graduation project at Ford)
Materials: Digital Cards, book & template placed into Miro for easy online collaboration.
Duration: 2 days
Starting point: The student has already gathered insights in the by doing netnography, trend research, and brainstorming with the Ford team. The student framed the position in the process currently as the end of the exploration phase where insights are gathered and now a more clear direction needs to be defined.

Study setup:
Prior to the workshop, the participant is asked to summarize all the currently gathered insights and bring them to the workshop.

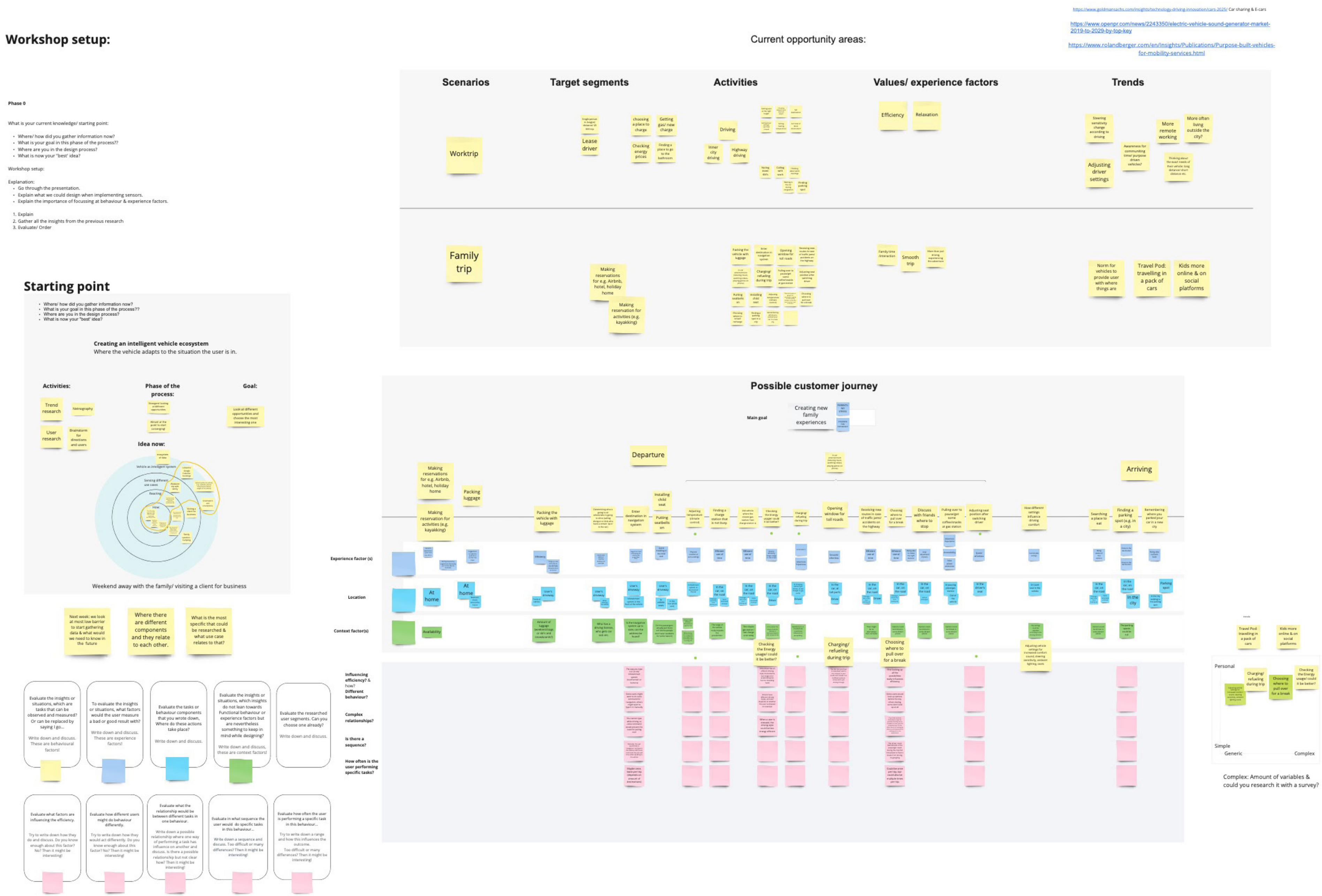
Workshop 1:
- Short explanation of the theory behind the approach
- Setting the starting point and the goal of the workshop
- Placing the gathered insights in the workshop
- Start working with the materials.

Data collection:
After each phase the toolkit is evaluated with the participant. The focus is on a high level about the specific phase and more detailed about the components of the toolkit. The data is gathered on a questionnaire at the end of each phase. Also, during the process notes were taken of interesting quotes by the student, and issues noticed when doing the workshop.

The following questions were posed in the questionnaire:

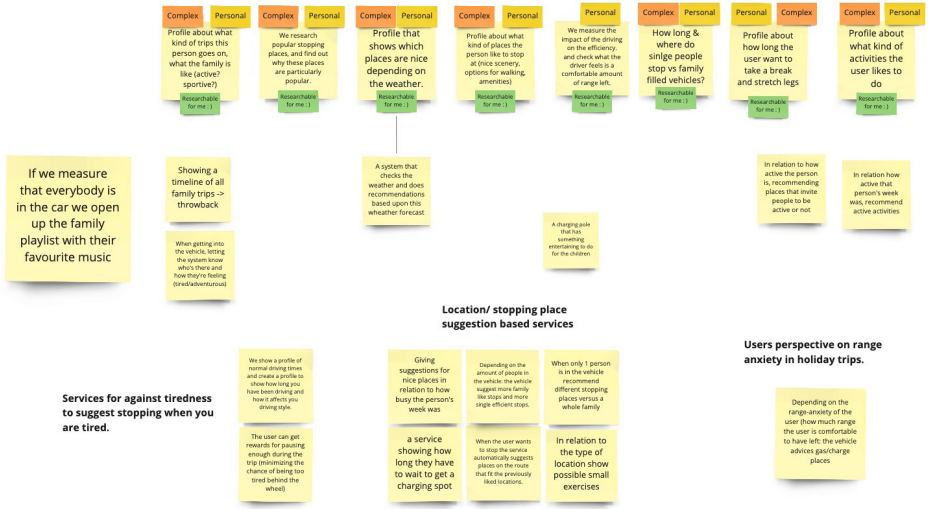
What makes this phase difficult?
Did you understand the task?
Did you understand the goal?
Were you able to perform the task?
If not, why?

Did the template help you to perform the task?
Did the workshop cards help you to perform the task?
Did the explanation help you to perform the task?
If not, why?


Workshop setup:
Current opportunity areas:
Scenarios
Target segments
Activities
Values/ experience factors
Trends
Worktrip
Family trip
Lease driver
Efficiency
Relaxation
More remote working
Adjusting driver settings
Travel Pod: travelling in a pack of cars
Kids more online & on social platforms
Starting point
Creating an intelligent vehicle ecosystem
Where the vehicle adapts to the situation the user is in.
Activities:
Phase of the process:
Goal:
Idea now:
Weekend away with the family/ visiting a client for business
Where there are different components and they relate to each other.
What is the most specific that could be researched & what use case relates to that?
Possible customer journey
Creating new family experiences
Departure
Arriving
Making reservations for e.g. Airbnb, hotel, holiday home
Making reservation for activities (e.g. kayakking)
Packing luggage
Packing the vehicle with luggage
Opening window for toll roads
Charging/ refueling during trip
Choosing where to pull over for a break
At home
Experience factor (s)
Location
Context factor(s)
Complex: Amount of variables & could you research it with a survey?


Choosing where to pull over for a break
PARENTS: NO STRESS
CHILDREN: FUN EXPERIENCE
Efficient use of time
Being able to make the right decision
What they do
What might happen around
The family is driving towards their holiday destination
They are looking for a nice place to pull over to stretch their legs
They exit the highway
They park the car
They exit the car
They walk around a bit, maybe throw away some trash or so
Stopping for lunch
Stopping for a fun activity/ experience
Going to the toilet
Gassing up
They get in the car again
They start driving and enter the highway
They continue their trip towards their destination
What could we measure?
Congestion is causing lower efficiency aka more stops
Destination distance set in navigation + Google Agenda reservation
What are the main holiday routes?
Have almost been driving for 2 hours
How long do people drive before taking a break?
Friends stopping at the same place
What is the needed stop rate at this pace?
The vehicle decreases in speed
Many other vehicles might cause no places left
Which landmark items make a stop interesting?
The vehicle has a velocity of 0 km/h
Doors open and close
Smart watch detects difference in heartrate
Time is around 13PM
How long do people stop?
Rain might cause short stops
Vehicle has increased fuel/battery
Passengers return to their seat
Speed of vehicle increases
Vehicle is on the highway, GPS corresponds with navigation GPS
What sensors do we have on which this behaviour could be measured?
GPS (location and speed), navigation (destination), seatbelts (amount of passengers), tire pressure (load of vehicle), battery efficiency (low high energy consumption due to weight of vehicle)
What are popular stopping places?
Time since ignition is on and speed >0 (or time passed since GPS detected start of trip)
Velocity meter, break pedal, GPS detects nearing an exit
Do we know how busy these places are?
Handbrake activated, seatbelts opened, or just ignition off
Smart watch detecting movement, vehicle opens and closes doors
Smart watch accelerometer /gyroscope/heart rate sensor
Clock in vehicle
Handbrake activated, seatbelts opened, or just ignition off
Fuel/battery sensor
Seatbelts are activated again
Velocity increases, GPS coordinates are nearing a highway
GPS (location and speed), navigation (destination), seatbelts (amount of passengers), tire pressure (load of vehicle), battery efficiency (low high energy consumption due to weight of vehicle)
What could the user add?
Age of children, passengers hobbies, character, preferences
Why are these places more popular than others?
What would they like to do when they pull over and what kind of place fulfills this need
Why did they choose this spot to pull over
Why did they choose this spot to park
Why do they exit the car, why is (not) everybody getting out
Why do you like to walk around, do you like to walk around here
Was this a fun stop?
What are their activity preferences
Was this a clean toilet?
Was this gas cheap?
Was there a long line for the charging places?
Did you want to stop for a break or did you only stop for gas?
What is more important a quick charge or more efficient driving & more stops?
Age of children, passengers hobbies, character, preferences
Complex
Researchable for me :)
What profiles could we create? where could we perform research?
Complex
Personal
Profile about what kind of trips this person goes on, what the family is like (active? sportive?)
Researchable for me :)
Complex
Personal
We research popular stopping places, and find out why these places are particularly popular.
Researchable for me :)
Complex
Personal
Profile that shows which places nice depending on the weather.
Researchable for me :)
Complex
Personal
Profile about what kind of places the person like to stop at (nice scenery, options for walking, amenities)
Researchable for me :)
Personal
We measure the impact of the driving on the efficiency. and check what the driver feels is a comfortable amount of range left.
Researchable for me :)
Complex
Personal
How long & where do sinlge people stop vs family filled vehicles?
Researchable for me :)
Personal
Complex
We research which charging places have long waiting lines and find out why.
Personal
Complex
Profile about how long the user want to take a break and stretch legs
Researchable for me :)
Personal
Complex
Profile about what kind of food the user prefers or allergies or specific diet needs
Complex
Personal
Profile about what kind of activities the user likes to do
Researchable for me :)

Ideas



Evaluatie sheet 1

What makes this phase difficult?	The behavioural factors were quite easy, although in the beginning it is quite challenging to start and to see in how much detail you will be going. Also, a more specific use case will lead to a more precise user journey if I think about it afterwards. For example, it would have been a bit easier to have a use-case described as 'a family of 4, with children of 5 and 8, who are going on a week-long camping trip'. But sometimes when you are in the very beginning of your project, the use-case is still very broad and you cannot specify it yet, so that makes it a bit hard	Did the template help you to perform the task?	I did not use Frame 1, I worked in the frame Workshop Setup, I don't know if this is right but here the template had not very much effect, it was mostly about the task
Did you understand the task?	I understood the yellow (behaviour) and blue (experience) post-its very well, the light blue (location) and the green (context) post-it's required a bit more explanation. Sometimes an example was needed to show how to tackle the type of post-it and to see how it must not be applied. For the rest the tasks were quite well comprehensible.	Did the workshop cards help you to perform the task?	The workshop cards did help to perform the task and gave a nice introduction about what to do and what the step is
Did you understand the goal?	I understood the goal, but I'm also curious to see how the results of this step are going to develop. I don't yet see where this is going to end (which is on the one hand nice, because that way you are open to how it may evolve) but if its too much of a mystery, people might wonder what is going to happen with these results. But I think this also part of the workshop experience, that you should fix yourself on certain expectations	Did the explanation help you to perform the task?	The explanation helped, although an example would have maybe made things more clear from the start
Were you able to perform the task?	I was able to perform the task, however, doing the tasks just by yourself takes quite some time. I think with two or three people, it will maybe go twice as fast. Also, discussing the post-its is nice to see if you are interpreting them well	If not, why?	
If not, why?			

miro

Evaluatie sheet 2

What makes this phase difficult?	The questions of this phase are a bit difficult because I keep forgetting them, because there are 5 of them. But once you answer these questions, it becomes more clear. Another thing is that some questions don't apply well to all behaviour factors.	Did the template help you to perform the task?	Yes, it is nice to have all the post-it's below each other so that you keep a complete overview of all the results and all the options.
Did you understand the task?	Yes, although the term complex was quite broad interpretable for me at first. However, after some explanation, it became more clear what is meant with this term (this was at the part of the axis personal/complex)	Did the workshop cards help you to perform the task?	The workshop cards helped me perform the tasks, I did have to look them up very often because I kept forgetting the questions that were written on them
Did you understand the goal?	The goal is well understandable of this phase, choosing an interesting direction for further development	Did the explanation help you to perform the task?	The explanation helped enough to perform the tasks, once I looked them up again
Were you able to perform the task?		If not, why?	
If not, why?			

miro

Evaluatie sheet 3

What makes this phase difficult?	It's hard to pick out a use-case to further research
Did you understand the task?	I did understand the task, the profile part needed a bit more explanation, but after I was able to make them
Did you understand the goal?	I did understand the goal, and this step was nice to combine sensors with user behavior. This went smoothly, the different tasks were quite intuitive and I could see the coherence
Were you able to perform the task?	
If not, why?	

Did the template help you to perform the task?	It was nice to work with all the post-it's below each other so that you could see what was written down and see all the relations
Did the workshop cards help you to perform the task?	I only looked at the cards once or twice, that was enough to perform the tasks
Did the explanation help you to perform the task?	The example was quite helpful, that was described underneath the cards, to get an idea of what you should write down, which was nice
If not, why?	

miro

Evaluatie sheet 4

What makes this phase difficult?	What makes this phase a bit difficult is that the ideation cards are sometimes a bit alike, but that doesn't really matter because not every profile is suited for every card.
Did you understand the task?	The task was well understandable, however it was not entirely clear for me at first that it was time to ideate different services. This became quite clear soon enough though
Did you understand the goal?	I was able to perform the tasks, but on my own it was a bit much because there were many profiles and many cards. In a team, you could divide it a bit more and ideate a bit more per profile which would be nice
Were you able to perform the task?	
If not, why?	

Did the template help you to perform the task?	The template did help, it was nice to have it all underneath each other again for a complete overview
Did the workshop cards help you to perform the task?	The workshop cards were a nice help for ideation, sometimes I did not immediately see the link but this also enabled more out-of-the-box thinking
Did the explanation help you to perform the task?	
If not, why?	
What is your opinion over the whole process & the outcome of the process?	The overall process was quite intensive because there was so much to do, but it did lead to some very promising directions that I would have never thought of out of the blue. The process lead you through the different ways of thinking which I found very helpful and eye-opening, because some of the steps I wouldn't have thought of myself. Individually, the tasks are quite much and it takes quite some time. However, in a team this would go way faster I believe. But also individually it is time well spent because in the end you developed multiple interesting directions, even directions that are outside of the context. Some parts could be explained a bit better during the whole process but that could be easily fixed with examples, to steer people in the right direction (or if you don't want to steer too much, you could also leave it open to interpretation but I think sometimes people could deviate too much from what is asked, and then it is nice to help them a bit to get back to what is asked by providing some sort of an example)

miro

Evaluation of workshop:
General feedback.

Templates
When looking at the search field when the starting point was written down we found that this was so broadly defined we used a horizontal more customer journey like process to map all the behaviour. So although the components from the templates are helpful it is easier to take the components and put them on a Miro board that allows for adaptation based on the specific case.

L. “The templates are maybe not that necessary here : it is nicer to just use the customer journey and work from there”

Zooming in & out
During the tool the student mentioned several times that when thinking about all the possibilities the ideas stay very abstract. However when the toolkit is used you are really forced to make decisions and that helps you with more clear idea directions.

L. “This tool really helps me to zoom in and zoom out” that works really motivating.”
L: “ You keep to much in helicopter view but now you can really zoom in. That’s handy because then you find new things. helps you to move further than this abstract level.”

L. “Nice to follow the steps, they are difficult steps but they do bring you to interesting insights.”
L: “This is really handy to think about these steps”

General value of the workshop:
In general there was some confusion while going through the workshop, when I gave some examples this was more clear and the process could continue. In general the process is perceived as valuable and leading to unexpected results.

L: “The overall process was quite intensive because there was so much to do, but it did lead to some

very promising directions that I would have never thought of out of the blue. The process lead you through the different ways of thinking which I found very helpful and eye-opening, because some of the steps I wouldn't have thought of myself."

L: "Some parts could be explained a bit better during the whole process but that could be easily fixed with examples"

Questionnaire insights & Observations

Phase 1. Map
In general the goal of the phase was clear but the final goal of the process is was not yet clear at the start. Also the components of experience, behaviour, location and context could be better explained with examples. In the beginning it helped to explain that we are looking for measurable behaviour because we are designing this behavioural profile. Also I noticed I had to withhold the student from starting to ideate in this phase.

"I understood the goal, but I'm also curious to see how the results of this step are going to develop. I don't yet see where this is going to end"

"The workshop cards did help to perform the task and gave a nice introduction about what to do and what the step is"

"The explanation helped, although an example would have maybe made things more clear from the start"

"I understood the yellow (behaviour) and blue (experience) post-its very well, the light blue (location) and the green (context) post-it's required a bit more explanation."

Phase 2.Evaluate

The student had similar issues with the axis as mentioned by the Ford employees, they are rather complex and not directly making the process easier. The cards were helpful, but complex and the student had to go back to the cards to read them again. Also when I elaborated the complex/personal by saying that it should be behaviour that we want to research and that we want to be able to then influence this behaviour with a product/service it became more clear.

" [..] the term complex was quite broad interpretable for me at first. However, after some explanation, it became more clear what is meant with this term (this was at the part of the axis personal/complex)"

" The workshop cards helped me perform the tasks, I did have to look them up very often because I kept forgetting the questions that were written on them."

Phase 3. Profile
In this phase, the goal of creating this research template with interesting parameters to research was not clear. With some explanation and examples it became clear and the student was able to start. When the goal was clear, making the profile went smoothly.

"The example was quite helpful, that was described underneath the cards, to get an idea of what you should write down, which was nice"

"I did understand the task, the profile part needed a bit more explanation, but after I was able to make them"

"I did understand the goal, and this step was nice to combine sensors with user behaviour. This went smoothly, the different tasks were quite intuitive and I could see the coherence"

Phase 4.

In general the ideation cards helped to create idea directions. Although some cards were slightly similar they did result in different ideas.

"The workshop cards were a nice help for ideation, sometimes I did not immediately see the link but this also enabled more out-of-the-box thinking"

2. Evaluating the toolkit with Ford employees
In order to evaluate the toolkit with the Ford employees, the toolkit is in detail discussed with the Ford company mentor and one of the Ford researchers. In this way the understanding of the toolkit and their perception on the value of implementation will be discussed. The toolkit will be discussed following the mentioned evaluation factors (metaphor, guidelines, perspectives) in a semi structured interview. Also the value of the process of measuring behaviour to create personalized services, will be discussed with the outcome of the workshop with the graduation student and the service concept that was developed with the team. Before the meeting the toolkit materials are send to the Ford employees for review.

For the interview an interview guide was used in a semi structured interview approach to guide the evaluation:

Intro
I hope you have read the components of the toolkit now. In this meeting I would like to discuss three components:

1. Evaluating the outcome of Laetitia's process
2. Understanding and evaluation of the toolkit

1. Laetitia's process:

Together with Laetitia we went through the four phases to imagine what behaviour might be interesting to research using the sensors available in in the vehicle or by placing new sensors.

Let's go through this process in the first 20 minutes so you really understand how the process works and what the outcome could be. Then we could go through the toolkit in detail and discuss the value of the other solutions.

0. Set the starting points : creating an intelligent ecosystem where the vehicle might adept to the

users situation/ behaviour. Maybe family trips, seatbelts, smart watch?
Gathering the insights from a first exploration Scenarios/use cases, segments, activities, experience factors, trends.

1. First phase Map: What is the behaviour, where is it happening, what is important there?

2. Second phase Evaluate: which behaviour is complex or personal?
Energy usage (eco mode etc) , charging/ refuelling during the trip, choosing where to pull over for a break, driving (settings, sound, steering, sensitivity, ambient lighting)

3. Third phase Profile
Detailing where to pull over for a break & what could be measured and how that might lead to an interesting profile.

4. Fourth phase:
Ideating with interesting profiles to find valuable directions for possible research.

Services based on a "driving tired profile" against driving drowsy to suggest stopping when you are tired.

Location/ stopping place suggestion based services (where most young families stop, where they stay longer, places they like etc.)

Users perspective on range anxiety in holiday trips. (how long do people wait to charge-up? Get the maximum? Or depending on busyness at the next stop?

Getting Feedback
How valuable/ new do you think these directions are?
Do you think this could help you in a similar way to "design" research proposals in this way?

2. Understanding for the toolkit

First let's discuss the general questions:

Do we understand where it is used?
Do we understand the phases in the process: Map, evaluate, profile, imagine? (do not go into detail)
Do we understand what the value is of the researching behaviour through a profile and creating services based on that?

Trainer metaphor:
Does the team understand the partnership role?
Does the team understand breaking the insights down in components?
Does the team understand their role is to identify important parameters?

Thinking guidelines
Does the team understand what an insightful profile is? (behaviour/co-create)
Does the team understand the need to create value instead of just researching?
Does the team understand the value of preparing for future use?
Different perspectives
Does the team think the different perspectives will help the team to be aware of where to apply which thinking?
Does the team agree with the changing perspectives in the process?
Going through the process in detail:
Does the team understand the steps?
Does the team understand the cards?
Does the team think the steps are helpful: First map the behaviour we would like to research, then find interesting directions by starting to create profiles and map the behaviour?

Interview insights
During the interview a more open approach was used, following mainly the two topics of discussing

the use of the toolkit in the workshop I went through with the other graduation student and discussing their perspective on the toolkit. For the meeting I did not give an additional presentation about the project for the involved researcher to see if the booklet was self-explanatory.

General value of the process

A. 13:18 I think it's very nice work, how you went through. And I think that's really helping to focus and to explore the view, that's really something I am thinking is very valuable.

A 40:00 I think you got this on the process you did with Laetitia is fabulous. But you have to put it in words that are understandable.

General insights on points of improvement:

1. Improve clarity of the goal of the tool and applicability of the tool early in the booklet
In general the feedback I got was to explain more clearly and briefly in the beginning what the approach is, where this tool can be used in that approach and what kind of data is used in this toolkit. The role of the profile, the outcome of this process etc. only became clear while reading the full booklet, this should made clear in the beginning.

14:00 A: The header of your booklet: Do you use data to come up with new ideas? This is what I was expecting. This is the data and this is how we analysed it and this is how we came up with new ideas. But this is not what you are aiming to do.

16:20 A make more clear in the document what I am aiming to deliver from the beginning. Because I am still confused, I'm still waiting where we match the data with the problem description and we do some magic and tell me about what kind of magic this is.

25:00 A: digital persona? I am puzzled about this? Is this a digital avatar? Is it a customer behaviour broken down into digital data? or is he aiming to analyse data you gathered in the customer journey? You read very long until you understand what is happening…

2. Give more clear definitions of the key components at the start of the booklet: experience factors, Context factors etc.
At the start of the booklet I could give a more clear list of definitions of the used terms.

26:00 "Imagine the engineer: they want definitions so tell them what to expect and what you are aiming to deliver: not only the digital persona, but also experience factors, then the context factors. I see myself already discussing where to put the post-its"

3. Perspectives, thinking guidelines & metaphor
The perspectives, thinking guidelines and the used metaphor were described as understandable and useful. However the researcher explained that the metaphor is actually already the way most researchers think because they are all the time measuring and optimizing situations. The designer did find the metaphor helpful but though it could be explained more clearly like in the green light presentation.

General comment on guidelines:

A: I was fine with everything until page six. And it was nice to see what I needed to be reminded of to start with the process."

Comments on the metaphor:

A: yeah I think it is more designer stuff. measuring things is my profession. I think you have to ask if they would help them. What do you think Nicole?

N: I like the metaphor! In the presentation and the report it was more concrete. I think when you

break it down in components and rotate the knobs there is where the trainer metaphor comes out really well. "

Detailed insights on the phases:

Phase 3: evaluate: Axis of personal and complex could be improved
In this phase it was not so clear how to choose a direction based on evaluating the behaviour, how personal or complex that behaviour is. It is not clear what the best area would be to start researching. The axis are not enough showing what is and what is not interesting to research. This is also because the goal of using the axis maybe needs to be more clear & defined differently. The question maybe should be more in the direction of: could we influence this behaviour, are there influential parameters. This also came up during the workshop.

28:00 You have this picture with the different axis: personal & complex how can personal decisions or moments not be complex?? How are they differentiating?

A: 36 So maybe then the factors are more: are these parameters influenceable? Can we actually do something about it with our data/vehicle.

37:00 N: but also the upper right corner looks like the best. But I think sometimes the easiest low hanging fruits are sometimes actually the best.

The cards could be more clear
The showed cards are sometimes ambiguous not giving a clear enough example of what to do.

40:00 A Imagine someone like Detlef [research engineer], like Nicole [designer], like me [researcher], and try to explain in very easy words, what we should do. And this should be written on the card.

Mixing different approaches:
During the evaluation it also became clear again that when this approach has been chosen, the designer needs to be aware of the limitations. Because when you as a designer are imagining a certain behaviour, you need to actually stick to the approach of making this behaviour digital through sensors. When the behaviour is mapped in a profile then, you could blend this data with user feedback to get a detailed explanation of the reasoning behind behaviour.

53:00 P: But I wouldn't advice to start thinking about other data sources because then the whole approach changes.

A: but what about user feedback that is also mentioned by yourself?

P: yeah but then it is user feedback based on the sensor data you have gathered.

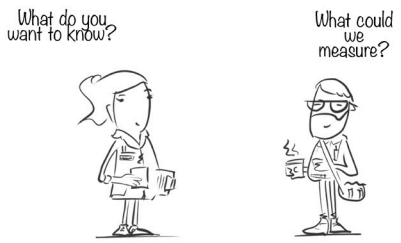
A: then this should be shown there!! If this is such an important recommendation from your side.

54:55 N. there is still a bit of a struggle between the thick user data and the thin sensor data when to use which.

Appendix C: Final tool-kit consisting of an information booklet, Cards and workshop templates.

Toolkit for designing data enabled behavioural profiles.

Bridging the gap between qualitative research and sensor data research, by aiding designers and researchers overcome different perspectives.



Introduction

Why should we use this approach?
This approach aids in the first step of the process to designing product-service systems that are based on users' behavioural data. This approach is valuable in product/service directions that are strongly depended on specific user behaviour. This approach is not suitable if the team only has a single validation question.

Sensor data is limited to the specific outcome of that sensor, this makes it difficult to find an interesting direction to start measuring without excluding directions or trying to measure behaviour with the wrong sensors. The difference in the design perspective and research perspective also complicates this process. This process helps to create a more solid foundation to build research proposals for data enabled prototyping and testing.

How should we use this approach?
This tool kit bridges the gap between the qualitative user research and imagining possible research directions. In four steps, the qualitative insights are evaluated to see what behaviour might be measurable, and if they are measured how they would result in changes in the product or service that allow the user to improve his experience. The process consists of four steps. Behaviour **mapping**, **evaluating** behaviour, **designing data profiles** and finally **imagining service directions** based on these profiles. In each stage a workshop takes between 2-3 hours.

What is the resulting data enabled persona?
When this process is done, the design team has an overview of the parameters that **could be used** in the data enabled persona. This is an overview of the important **parameters of the users behaviour** and the impact on **parameters indicate the experience**.

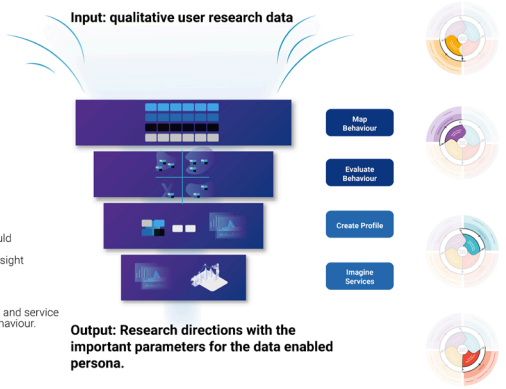
Input: qualitative user research data

Map: look at the qualitative insights and split them in **measurable behaviour, experience factors,** context factors **and locations.**

Evaluate: How different behaviour might influence the possibility to customize a product or service. Or behaviour that the user could be helped to change and improve.

Profile: choose which sensors could measure the behaviour and what parameters would give the most insight in the performance.

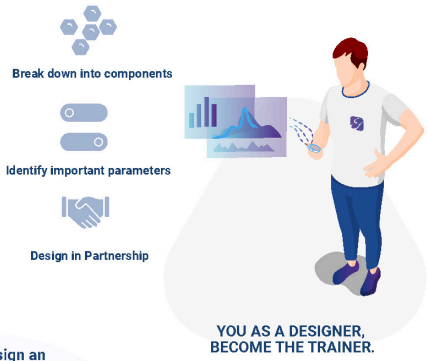
Imagine: possible product and service directions based on the behaviour.



Output: Research directions with the important parameters for the data enabled persona.

Practical guidelines to aid in creating persona's.

Why do we need guidelines?
When designing and imagining the persona's it could be difficult to choose sensors that actually lead to an insightful profile. Therefore the following guidelines help to stay focussed and start to gather relevant data. The role of the designer needs to become that of a trainer: you empathise with the user trough the qualitative research insights and define the important parameters that you want to analyse and improve.



Design an insightful profile

Focus on primarily behavioural data
In order to create insightful profiles that provide the user with insights in his own processes we need to focus on behavioural data. With real personal profiles, personalized services can be designed.

Co-create profile
In order to contextualize the collected sensor data the user needs to add additional information or preferences in the profile. The contextual user layer differs for each situation and is dependent on limitations of the sensors and your research objectives.

Create value do not surveill

Be transparent about gathered data
In order to take the role as this 'sports trainer' partner of the user and not fall into surveillance practices, the user must be aware of the gathered data and information. By creating an interactive profile the user will have access and ownership of his data.

Use the profile directly in the service to offer value for the user
Directly use the behavioural profile in the service. In this way the data does not only offer value for later personalization or research, but it becomes a functional aspect of the product and service.

Prepare for future use

Design for integrated ecosystems.
Ford wants to become a provider of integral solutions, therefore we need to understand how all the components connect and be able to link different influencing factors. For example, we want to know how a specific profession relates to specific amounts of material need in the vehicle and the needed battery capabilities.

Personify but keep anonymous
Create a "plummber" profile but do not make it PII. By creating an overview of behaviour of specific segments without going in such detail that the data becomes personally identifiable information.

Overview of the guidelines in the process

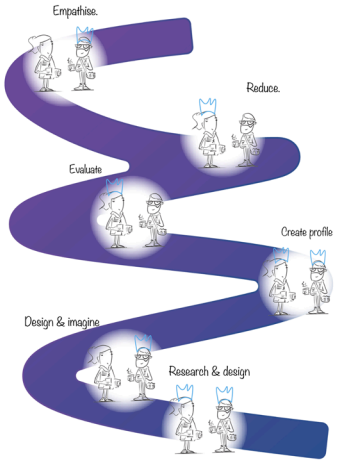
Different perspectives throughout the process

What is the challenge?
When using data to design, there are two perspectives valuable. The imaginative designer perspective and the more research oriented functional perspective. Being aware of these perspectives in different phases of the process can help the collaboration.

How can we be more aware?
By knowing the perspective we mostly use before the workshop and briefly agreeing on the perspective that should be dominant during this phase. Giving the responsibility for the result of that phase to a specific person that fits the perspective for that phase can.

Functional perspective
In this process it is necessary to first simplify the situation and find the measurable behaviour. By staying focussed in these phase it is easier to make decisions and take steps earlier in the process. Keep in mind here we are using the available data, not imagining or brainstorming possibilities.

Imaginative perspective
In the later stages of the process, when the profile is designed and the data is made meaningful we start using a more imaginative approach. At this stage more holistic thinking can be applied, taking a broader perspective of influencing factors into account. Keep in mind, in this perspective we look at all possibilities and give our mind the freedom to ideate.



Input: qualitative user research data

Map Behaviour

Evaluate Behaviour

Create Profile

Imagine Services

Output: Research directions with the important parameters for the data enabled persona.

RESEARCH ENGINEER

DESIGN RESEARCHER

DOMINANT ROLE

Phase 1.

Map Behaviour

Goal: Mapped behaviour, experience and context factors

Starting point: General qualitative insights e.g. context mapping results in shape of persona and/or customer journey.

How does it work?

In this phase we will map all the activities from a behavioural point of view. When everything is mapped we add the experience factors that shape the goal of the behaviour, and we map the context factors that indicate what might be boundary information. Finally, we map where the behaviour is happening.

Dominant perspective: Functional

In this phase we should use a more functional perspective, this means that we look at the insights we gathered in the context mapping activities and distil the answers from here.

Actions:

1. Break the insights into the different components by using the cards.

2. Write the components down on post its, discuss cluster to make a list.

Components

Functional behaviour

Functional behaviour are the insights that show what tasks users perform in order to get a job done.

Behavioural factors examples:

Planning the day

Counting stock

Grabbing materials

Location

The location indicates where the behaviour is happening and at what level of detail.

Location examples:

In the vehicle driver seat

In the trunk

Interaction across the city

Context factors

Contextual factors are the static details that are important to understand the situation.

Context factors example:

Governments regulations are moving towards a ban of ICE vehicles.

Experience factors

Experience factors are the insights that indicate what is important for the users in reaching their goals.

Experience factors examples:

For material usage: efficiency

For driving: sportiness/ comfort

For a calling: Clearness of sound

For vehicle: reliability

Phase 2.

Evaluate Behaviour

Goal: One selected behaviour

After you discussed the action cards you should be able to have chosen one behaviour. This could be for example in a day of a craftsman: organizing materials and tools in the van.

Starting point: Overview of all the measurable behaviour with the experience factors, context and locations.

How does it work?
In this phase we will pick a behaviour to focus on by evaluating how interesting this behaviour might be to further research. Interesting behaviour is behaviour on which we can change parameters of the (new) product or service, help the user change the behaviour or both. Each of the three areas are valuable to research, but result in different products and services.

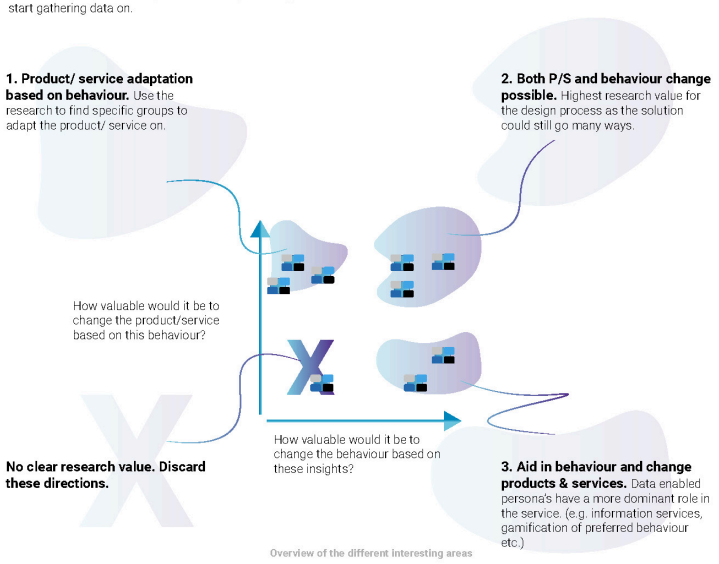
Dominant perspective: Functional
In this phase we look at each of the described situations and evaluate if and how they could be complex enough to start gathering data on.

Action:

1. Write down the behaviours from the previous phase.

2. Use the cards to evaluate each task of behaviour in detail and discuss.

3. Choose one type of behaviour from the three relevant quadrants: mainly product/service adaptation possible, mainly behaviour adaptation possible, both Behaviour and product/service adaptation possible.



Overview of the different interesting areas

Phase 4.

Imagine Services

Goal: Imagined possible service concepts

Starting point: One or directions for data profiles.

How does it work?
When we have created a data profile, we will start to imagine how we could help the user positively impact his experience factors. For example, if we create a profile of how often the user has to buy new materials, could we aid the user by researching the use and buy process and make this more efficient?

Use the cards to sensitize the team with solution directions.

Dominant perspective:
In this phase the more dominant perspective is imaginative.

Action:

1. Take a profile and use the cards to think of product and service directions that could result from this.

2. Repeat for different cards and profiles.

3. When ideas for new profiles come up, iterate the previous step.

Components

Every time we measure .... (this behaviour),

the product or service adapts by doing ..... for the user,

and we will be able to ..... (later research value)

Overview of the different phases in this process

Map

Evaluate the insights or situations, which can be described as **measurable behaviour?** These are actions like: taking out material from the vehicle, driving around a place for a parking spot, adjusting the temperature

Write down and discuss.
These are **behavioural factors.**

Map

Evaluate the tasks or behaviour components that you wrote down, **where** do these actions take place? In the vehicle? In the trunk, or outside of the vehicle.

Write down and discuss.
These are the **locations.**

Map

Evaluate the insights or situations, which insights do not lean towards behaviour or experience factors but are nevertheless something to **keep in mind** while designing? For example other conditions that need to be met: Gov. regulations forcing decreasing weight in the vehicle.

Write down and discuss, these are **context factors!**

Map

To evaluate the insights or situations, what factors would the user evaluate **bad or good solution** with?

Write down and discuss.
These are **experience factors.**

Map

Evaluate how different target groups might **behave differently**. Can you choose one already?

Write down and discuss. This is you **user segment**.

Evaluate

Can you imagine what differences in behaviour would impact the need for changing parameters in a product or service?

Try to write down what they would be and discuss. Does it look promising? Then it could be interesting **to research for adapting the product/service.**

Evaluate

Can you imagine differences in behaviour between different user groups or for one user for different moments in time?

Try to write down how these differences might impact the need for direct adjustment of the product or service. Are there interesting adaptation parameters? Then it could be interesting **to research for adapting the product/service.**

Evaluate

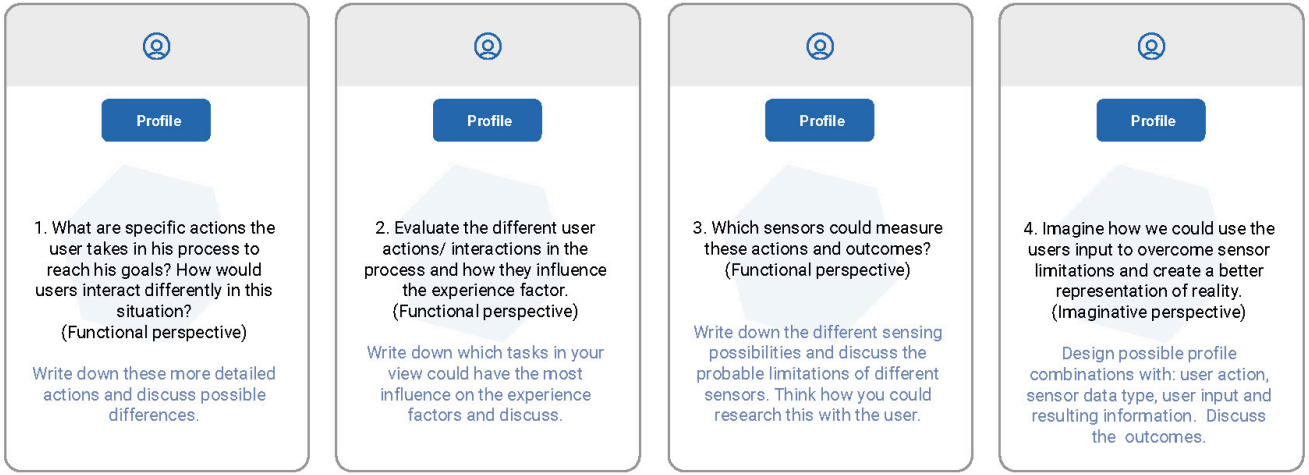
Could the users unawareness of his behaviour impact his ability to improve or change it?

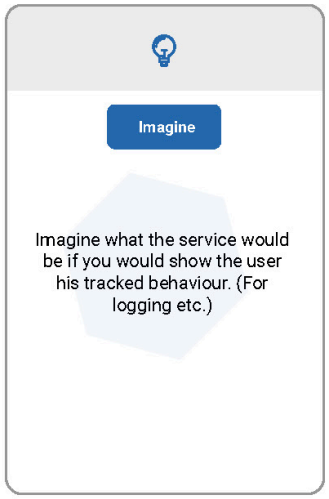
Write down why this could aid the user and discuss.
Are there assumptions why the user might not be fully aware of his own behaviour or relevant behaviour of others? Then it might be interesting to aid the user in aiding with/ **changing the behaviour.**

Evaluate

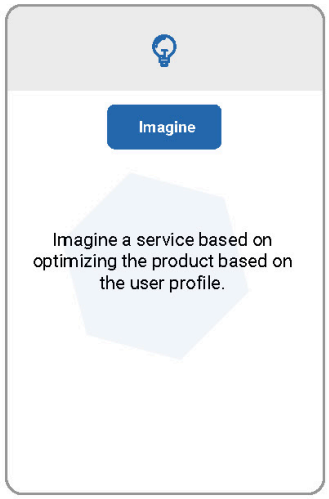
Could the users understanding of all the factors involved in the behaviour impact his ability to improve or change it?

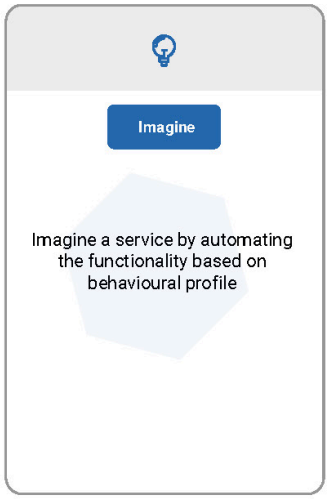
Write down which parts of the behaviour are still difficult to understand. Do we understand what sequence, how often, how actions impact each other, when behaviour is happening? If not, it might be interesting to aid the user in aiding with/ **changing the behaviour.**


Profile
1. What are specific actions the user takes in his process to reach his goals? How would users interact differently in this situation?
(Functional perspective)
Write down these more detailed actions and discuss possible differences.
Profile
2. Evaluate the different user actions/ interactions in the process and how they influence the experience factor.
(Functional perspective)
Write down which tasks in your view could have the most influence on the experience factors and discuss.
Profile
3. Which sensors could measure these actions and outcomes?
(Functional perspective)
Write down the different sensing possibilities and discuss the probable limitations of different sensors. Think how you could research this with the user.
Profile
4. Imagine how we could use the users input to overcome sensor limitations and create a better representation of reality.
(Imaginative perspective)
Design possible profile combinations with: user action, sensor data type, user input and resulting information. Discuss the outcomes.

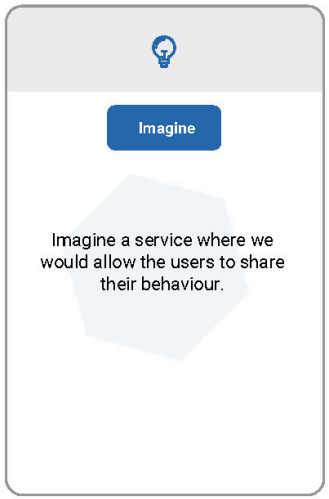

Imagine
Imagine what the service would be if you would show the user his tracked behaviour. (For logging etc.)

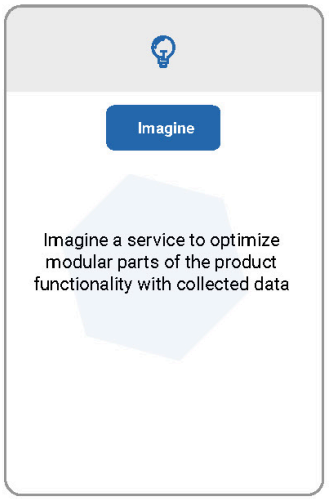

Imagine
Imagine a service based on controlling and adjusting preferences of products based on the profile.


Imagine
Imagine a service based on optimizing the product based on the user profile.

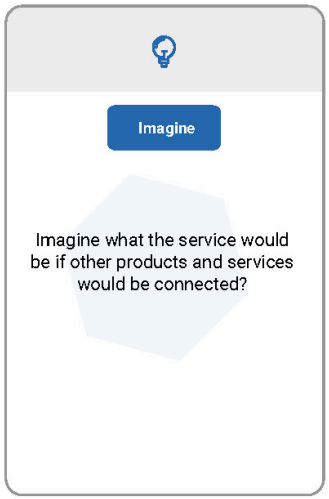

Imagine
Imagine a service by automating the functionality based on behavioural profile

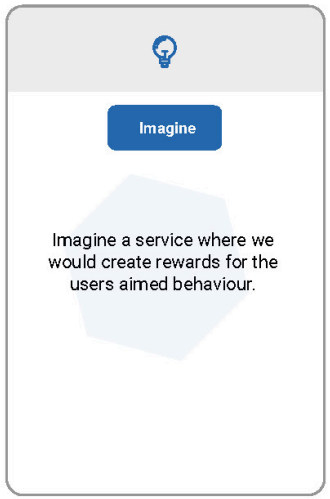

Imagine
Imagine a service where we would notify the user of his behaviour before it would happen.


Imagine
Imagine a service where we would allow the users to share their behaviour.


Imagine
Imagine a service to optimize modular parts of the product functionality with collected data


Imagine
Imagine a service based on allowing the user to automatically change the settings when he enters the situation


Imagine
Imagine what the service would be if other products and services would be connected?


Imagine
Imagine a service where we would create rewards for the users aimed behaviour.

Template 1: Map

Main goal user:

Example

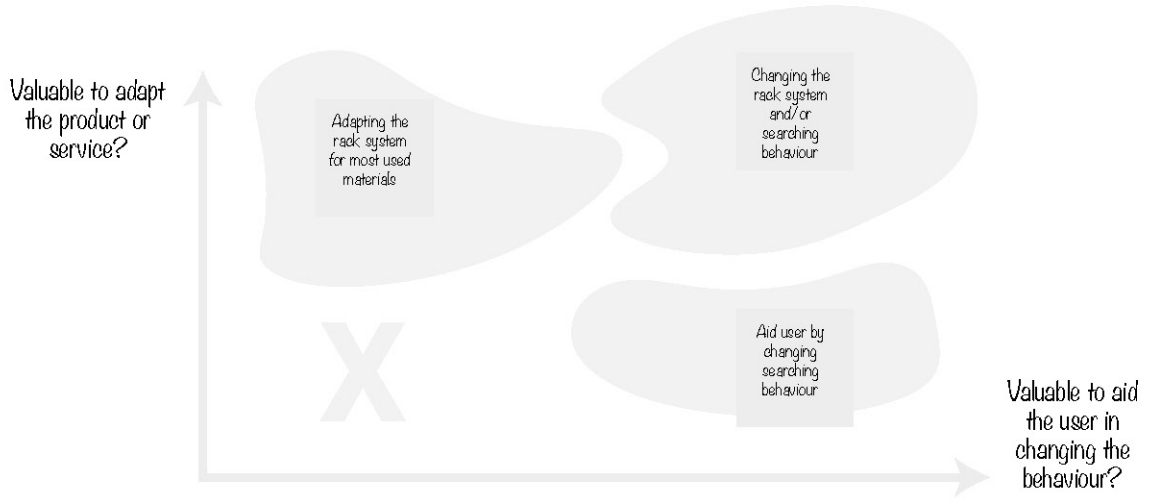
User journey	User in the back of the van preparing for work
Behaviour factor	User finding the right materials
Location	In the back of the van interacting with rack systems
Experience factor	Speed & certainty
Context factor	Most of the time the van is not cleaned up..

Template 2: Evaluate

Example

Main goal user:

User journey	User in the back of the van preparing for work
Behaviour factor	User taking out materials
Impact on product/service parameters	User that take out many different materials have more use for material indicators
Impact in the moment	Maybe users might need different materials at specific moments
User unaware of the behaviour	Maybe the user does not know he is much slower in finding materials in the morning.
User not fully understanding behaviour	Maybe he user uses specific combinations of materials always for specific jobs.



Template 3: Profile

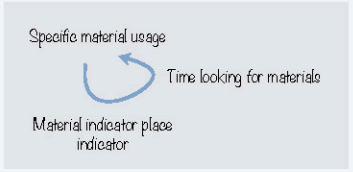
Main goal user:

Chosen behaviour

Experience factors in this behaviour

	Example				
			User in the back of the van preparing for work		
Different tasks	Taking out the right material				
How could we measure the user action?	Weight sensor in compartment				
How could we measure the possible outcome?	Time between entering van and taking out the right material				
What should the user add, to overcome limitations?	Explain why he does not find the right material/ why he likes this layout				

Possible profile



Possible profile

Possible profile

Template 4: Imagine

Chosen behaviour

User in the back of the van preparing for work

Main goal user:

Experience factors in this behaviour

Possible profile

Possible profile

Possible profile

Service concept directions

We measure which materials are used mostly together and when the user takes out one of these materials we indicate which others he possibly needs.

Every time we measure .... (this behaviour),

our service adapts by doing ..... for the user,

And we will be able to ..... (later research value)