Introducing a user-centered innovation
methodology for Ford mobility solutions
by creating a toolkit that helps to
structure the creation of valuable and
meaningful solutions for real people.

Ford
service
innovation /

Master thesis / Eduard de Jong /

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Introducing a user-centered innovation
methodology for Ford mobility solutions.

Summary

The context of mobility is changing rapidly and new mobility solutions are growing rapidly. Ford is expanding towards an auto and a mobility company and experiments with offering mobility solutions. These experiments should help Ford in discovering emerging opportunities. Traditional product development is not suitable for the creation, development and realisation of mobility solutions, so a different approach is needed. The Innovation Management and Mobility team within Research and Advanced Engineering in Aachen is seeking and learning to adopt new approaches to research and design. Service innovation is proposed as a user-centered design methodology to help the team develop mobility solutions. Within Ford, service innovation is a multi-disciplinary design approach focused on creating and developing mobility solutions from a holistic user perspective.

A multi-disciplinary design approach

Service innovation is a design approach in which designers facilitate rather than execute the process. It can help to bridge research, design and engineering by inviting all stakeholders in the process.

Creating mobility solutions

Service innovation is an approach that balances user, technology and business aspects of a concept to create a valuable and feasible solution.

A holistic perspective on users

To know what is valuable for the user, service innovation is a methodology helping to create a holistic user perspective. It is essential to create something of value for the user in their everyday live, so this methodology investigates (future) user needs and wants.
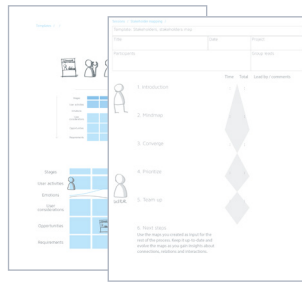
Method

Research is done to discover the specific needs of the team to be able to adopt the methodology to offer the most value to the team. After an internship period of sixteen weeks in which I was active participant, intervewer and observer I collected insights that informed the rest of the project.
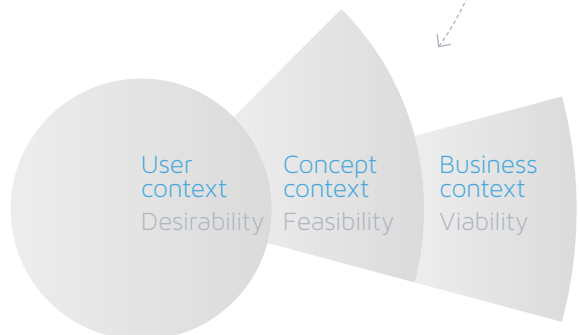
User
context
Desirability

Concept
context
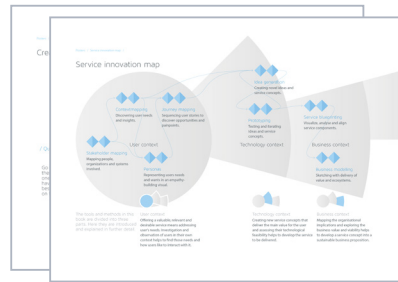Feasibility

Business
context
Viability

Service innovation toolkit

Ford service
innovation **manual**

Ford service
innovation **templates**

Ford service
innovation **posters**

Results

The results of this project can be grouped into three aspects.

A user-centered design methodology

The Mobility team was introduced to a user-centered design methodology through workshops from ID-Studiolab and application to specific projects by me.

Helping the team to apply it

In my internship I have helped the team to apply the methodology to specific projects and use the proposed methods and tools. This helped the team to put users more central in innovation efforts.

A service innovation toolkit

The created toolkit helps the team to structure the innovation process and apply the methodology in a diverse set of projects. A manual is designed as reference guide for the methodology, methods and tools and the templates and posters are designed to help facilitate the innovation process in specific projects. This helps Ford put users more central in their innovation efforts and create valuable and meaningful solutions for real people.

Recommendations

To further develop the user-centered mindset within Ford, I propose to introduce other departments to service innovation and the user-centered design methodology. A more strategic place for design in combination with research including user research, technology development and business model innovation would greatly benefit the development of mobility solutions. Investing in user-centered capabilities helps to facilitate the service innovation process.

For now, Service innovation and the service innovation toolkit help the team to create and develop mobility solutions by adopting a holistic perspective on users.

Glossary

Terminology

› **Innovation** is the implementation of a new or significantly improved product, process, marketing or organisation (OECD, 2017).

› **Ford service innovation** is a multi-disciplinary design approach focused on creating and delivering mobility services from a holistic user perspective (see page 33).

› **Service innovation** is a term used inside Ford to indicate innovation applied to services. The term 'service design' would be a more appropriate term from the design side, but in the automotive industry this is a confusing term, so in this document 'service innovation' is used.

› **Service design** see 'Service innovation'.

› **Design** is the conception, development and production of solutions for users. In the automotive industry design mostly only refers to the styling of vehicles in the development part of the process.

› **Users,** customers, humans or people are all terms used to identify the people that the organisation is designing for. In this document, the term users is used to indicate these people are more actively engaged in the process than customers and have a relationship with the organisation and their offered solutions.

Abbreviations

Mobility team	Innovation Management and Mobility team within R&A
R&A	Research and Advanced Engineering, a part of PD within Ford
PD	Product Development, a department within Ford
RIC	Research and Innovation Center
ID-Studiolab	Design research community within the TU Delft
RWTH (Aachen)	Rheinisch-Westfaelisch Technische Hochshule or Aachen University
KU (Leuven)	Katholieke Universiteit te Leuven or University of Leuven
TU (Delft)	Technische Universiteit Delft or Delft University of Technology
GTDS	Global Technology Development System, used within Ford to structure the development of new technologies.
GPDS	Global Product Development System, used within Ford to structure the development of new products.
IP	Intellectual Property
UX	User experience

Content

The appendix is provided upon request.

Introduction

This master thesis concludes a graduation project for the Ford Innovation Management and Mobility team (see figure 2). This team collaborates with ID-Studiolab in the 'Ford Service Innovation for Mobility' project (ID-Studiolab, 2016). This project aims to define the future of mobility services by developing a user-centered design methodology.

Context

Ford is broadening their scope and expanding from an automotive to an automotive and mobility company. They recognize that mobility solutions will increasingly integrate products and services which means the innovation process will need adaptations. A user-centered design methodology that takes a holistic perspective on users is part of that.

> Figure 1: Different inputs for developing a service inno-vation toolkit for Ford.
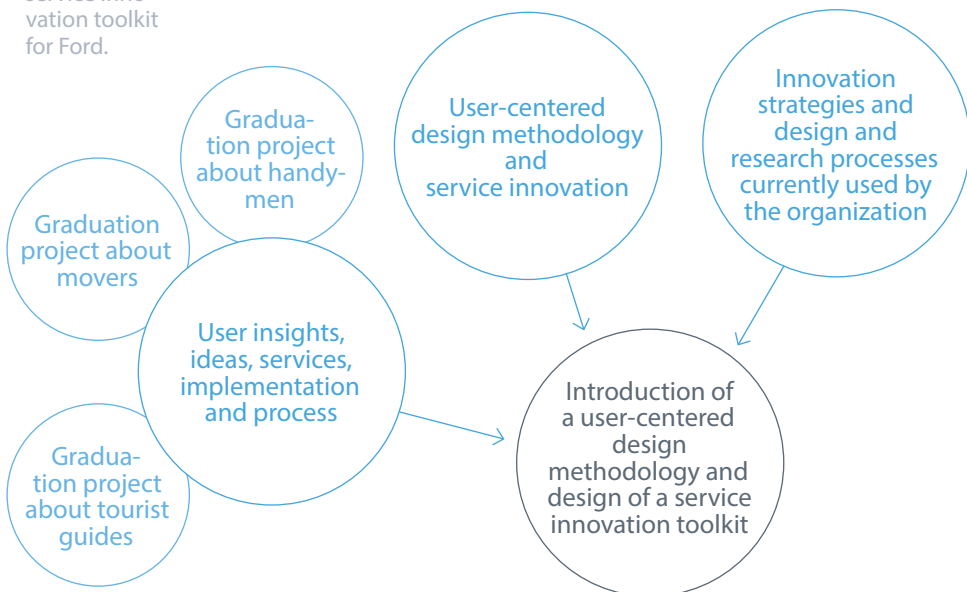
University of Technology Delft

ID-Studiolab is part of the faculty of Industrial Design Engineering within the TU Delft.

Ford Research & Innovation Center Aachen

The Innovation Management and Mobility team is part of Ford's Research and Advanced Engineering department located in Aachen.

> Figure 2: Location of the two main stakeholders.

Approach

Three graduation projects preceded this project. Xi Xu (2016), Sirui Li (2016) and Sofia Hnatiuk (2016) graduated with projects for light commercial vehicle users. These projects serve as example of what it means to design user-centered mobility solutions. As shown in figure 1, the methods they used and insights gathered can help the team to understand the methodology. An internship was done in which I could actively participate in the team to understand what the team needed and how they approached the innovation process. To help the team structure the innovation process, a toolkit was created that contains the most important user-centered design methods and tools.

Results

The outcome for the team is hands-on experience with a user-centered design methodology and mindset. Together with a toolkit developed by the author this helps the team to create a holistic perspective on users and structure the innovation process for mobility solutions. Distribution of the toolkit and user-centered mindset may help Ford grow into a more user-centered and design-driven organisation.

Research & Advanced Engineering

Ford Motor Company	Product Development	Research & Advanced Engineering	Innovation Management & Mobility
Ford Smart Mobility	Finance	Global Engine Engineering	
Ford Credit	Human Resources	Vehicle Engineering	
...	Manufacturing	...	
	Communications		
	...		
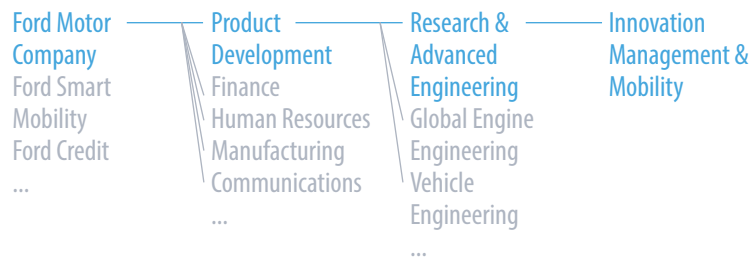
> Figure 3: Place of the Innovation Management and Mobility team within the organisation.

Introduction

To grow and expand, Ford develops new vehicles with Product Development (PD) and new technologies to implement in these vehicles with Research and Advanced Engineering (R&A). While PD is located across the globe, R&A is located in three Research and Innovation Centers (RIC) in Dearborn (USA), Palo Alto (USA) and Aachen (Germany) as shown in figure 4.

R&A in Aachen

The Research and Innovation Center in Aachen (Germany) was founded in 1994 and accommodates about three hundred employees. The R&A department connects to a proving ground in Lommel (Belgium) to test developed technologies

Dearborn, Michigan USA

Ford Motor Company Headquarters
Research and Advanced Engineering

Dunton, UK

Product Development

Köln, Germany

Ford of Europe Headquarters
Product Development

Palo Alto, California USA

Research and Advanced Engineering
Ford Smart Mobility LLC Headquarters

Aachen, Germany

Research & Advanced Engineering,
Innovation Management & Mobility

> Figure 4:
Locations of
Research and
Advanced
Engineering
and related
departments.

and connects to the PD department in Köln (Germany).
The mission of Ford R&A Europe is 'to create individual
mobility solutions that go hand in hand with environmental
considerations' (Ford, 2016).

The R&A team in Europe does research and development work
for Ford of Europe, but also for the global organisation. As
part of their activities, Ford Research and development center
in Aachen collaborates with several universities and research
institutes. Examples are the Aachen University (RWTH),
the University of Leuven (KU) and the Delft University of
Technology (TU). The 'Innovation Management and Mobility'
team within R&A as shown in figure 3 develops mobility
solutions for research and further development.

**"THE ONLY PURPOSE OF A COMPANY,
IS THAT OF SERVICE TO SOCIETY."
HENRY FORD**

Source: Ford (2013).

INNOVATION FOR MOBILITY SOLUTIONS

Organizing innovation for mobility solutions needs insight into the context of mobility and how innovation is currently organized within Ford. This informs an appropriate approach to design for this project.

The Ford Motor Company

> Figure 5: The tenth million Ford Model T on production line in 1924. Source: Ford (2013).

The Ford Motor Company is a global automotive and mobility company founded in 1903 and based in Dearborn, Michigan. With about 200,000 employees, it produces vehicles in 67 plants worldwide. It develops, produces, sells and distributes products in four categories: cars, crossovers & SUVs, trucks & vans and luxury vehicles (Lincoln).

History

Ford was the first to commoditize the automobile at a time at which it was still considered a luxury. The Model T (1908) was introduced accompanied by the integrated moving assembly line (1913) that reduced costs so that large amounts of people could afford it. The next step was building the River Rouge complex (1917); a vertically integrated production factory including a tire factory, steel mills and a glass factory. Ford has a long history of producing affordable cars targeting a large market. The identity of Ford as described by themselves is shown in figure 6.

"I will build a car for the great multitude"
Henry Ford

Slogan

Go Further

Promise

We go further so you can

Mission

To be global leaders in vehicle tech-
nology and smart mobility solutions
that are safe, sustainable, emotive,
and accessible to the masses.

Vision

Change how the world moves by
driving innovation throughout every
part of the business.

> Figure 6:
Fords identity
as described
by themselves.

Strategy

Ford announced recently it intends to expand towards an auto
and a mobility company to cope with the changing context of
mobility (Ford, 2016b). Ford splits its strategy to tailor them for
the 'core business' and the 'emerging opportunities'.

Strategy for the core business

The core business (the 'auto company') includes the design,
manufacturing, marketing and servicing of Ford and Lincoln
vehicles. The strategy is to fortify strengths and transform
underperforming parts. Priorities that contribute to strengthen
Ford are progressing towards a unified global enterprise,
delivering product excellence and driving innovation. For
the core business we can say Ford is focused on increased
efficiency and growing incrementally to evolve.

/ Emerging opportunities
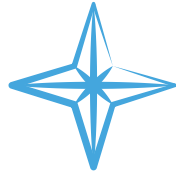
| Autonomous vehicles | Mobility | User Experience | Connectivity | Data and analytics |

> Figure 7: The emerging opportunities Ford pursues. Source: Ford (2016).

Strategy for emerging opportunities

Next to the core business, Ford is expanding towards a mobility company. To address developments in personal transportation, Ford identifies emerging opportunities in five categories as shown in figure 7: autonomous vehicles, mobility, user experience, connectivity and data and analytics. Two examples of what these opportunities could entail are:

› Connectivity: Onboard entertainment (Sync), Apple Car play and Android Auto integration;
› Mobility: The FordPass app, car sharing (GoDrive), multi-modal mobility solutions, mobility challenges (techstars).

To accelerate developments in these opportunities, Ford differentiates it strategy and installed a subsidiary called Ford Smart Mobility LLC. Its aim is to experiment with lots of different mobility solutions to develop them into mature business propositions. A subsidiary can contribute to different innovation tasks (Ghoshal & Bartlett, 1988). While an autonomous subsidiary can focus on emerging opportunities, communication between organisations is needed to exchange lessons learned and contribute to innovations. We can say that the strategy for emerging opportunities is opposite of that of the core business, focusing on effectiveness and radical innovation, tailoring organisation design to mobility solutions.
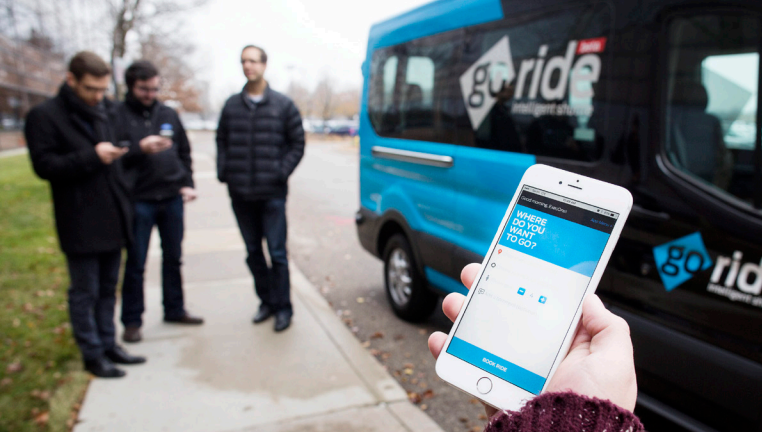
> Figure 8:
GoRide is an
experiment
as part of the
emerging
opportunities.
Source: Ford
(2015).

> Figure 9: Ford
Fiesta as intro-
duced in 2016.
Source: Ford
(2016).

This kind of innovation can trigger exponential growth and revolutionary breakthroughs if done well.

Relation core business and emerging opportunities

The core organisation and the subsidiary have different goals and activities and can focus on these. Ford proposes however that the core business and emerging opportunities feed into each other (Ford, 2016c) and thus have to communicate. Business, technology and user insights should be communicated between organisations and contribute to a more sustainable business. Innovations developed in the core organisation can be experimented with and developed in the subsidiary which in turn can scale mature innovations rapidly through the core business.

Conclusion

Ford is expanding towards an auto and a mobility company and differentiates strategy by installing a subsidiary to help develop business propositions by experimenting with mobility solutions. The next chapter presents several of these experiments and initiatives from competitors.

Mobility services

This chapter presents the changing context of mobility solutions and initiatives by Ford and other organisations.

Human mobility is increasingly dependent on the car and related vehicles. The trends and developments summarized in figure 10 show that the way mobility is used and provided is changing rapidly. A more elaborate trend analysis gathering demographic, economic, political, ecological, social and technological trends (Armstrong & Kotler, 2010) is done in appendix A.

The sustainability and livability of cities is under pressure with growing population, traffic and congestion

Regulation tries to stimulate electric and human powered transportation to improve air quality

Manufacturers are preparing to sell fewer vehicles by reducing fixed costs, mergers and sharing technologies

Sales of electric vehicles are increasing while battery technology and charging infrastructure is developing

Globalisation and e-commerce leads the logistics and delivery business to growth

Growing urban areas struggle to cope with personal and public transport and logistic services

Automated driving is developing with organisations testing vehicles globally

Automated driving is costly but it can drastically decrease vehicle idle times and occupancy

> Figure 10:
  Mobility
  trends and
  developments.

HANDLE ON MOBILITY
Dunton & Dearborn

PAINLESS PARKING
London

U.K. AUTODRIVE
United Kingdom

CAR SWAP
Dearborn

DYNAMIC SOCIAL SHUTTLE
London & New York

TRAFFIC TAMER
London

PERSONAL MOBILITY EXPERIENCE INNOVATION
Aachen

BIG DATA DRIVE
Dearborn

DATA DRIVEN INSURANCE
London

FORD CARSHARING
Germany

SUMURR GOLDEN HOUR
Delhi

MOBILITY INTEGRATION
Chongqing

INFO CYCLE
Dearborn & Palo Alto

FLEET INSIGHTS
Dearborn

PARKING SPOTTER
Atlanta

MONSOON APP DOWNPOUR
Mumbai

L.A. PARKING LOT 2.0
Los Angeles

RAPID RECHARGE & SHARE
Dearborn

CITY MOBILITY
Lisbon

CITY DRIVING ON-DEMAND
London

SHARE-CAR
Bangalore

SUMURR mHEALTH
Tamil Nadu

URBAN COMMUTER
Shanghai

REMOTE REPOSITIONING
Atlanta

DATA DRIVEN HEALTHCARE
The Gambia

ACCESSORY CHALLENGE
Johannesburg

PROPOSED AUSTRALIA ACCESSORY CHALLENGE
Australia

FUTURE OF MOBILITY
Argentina

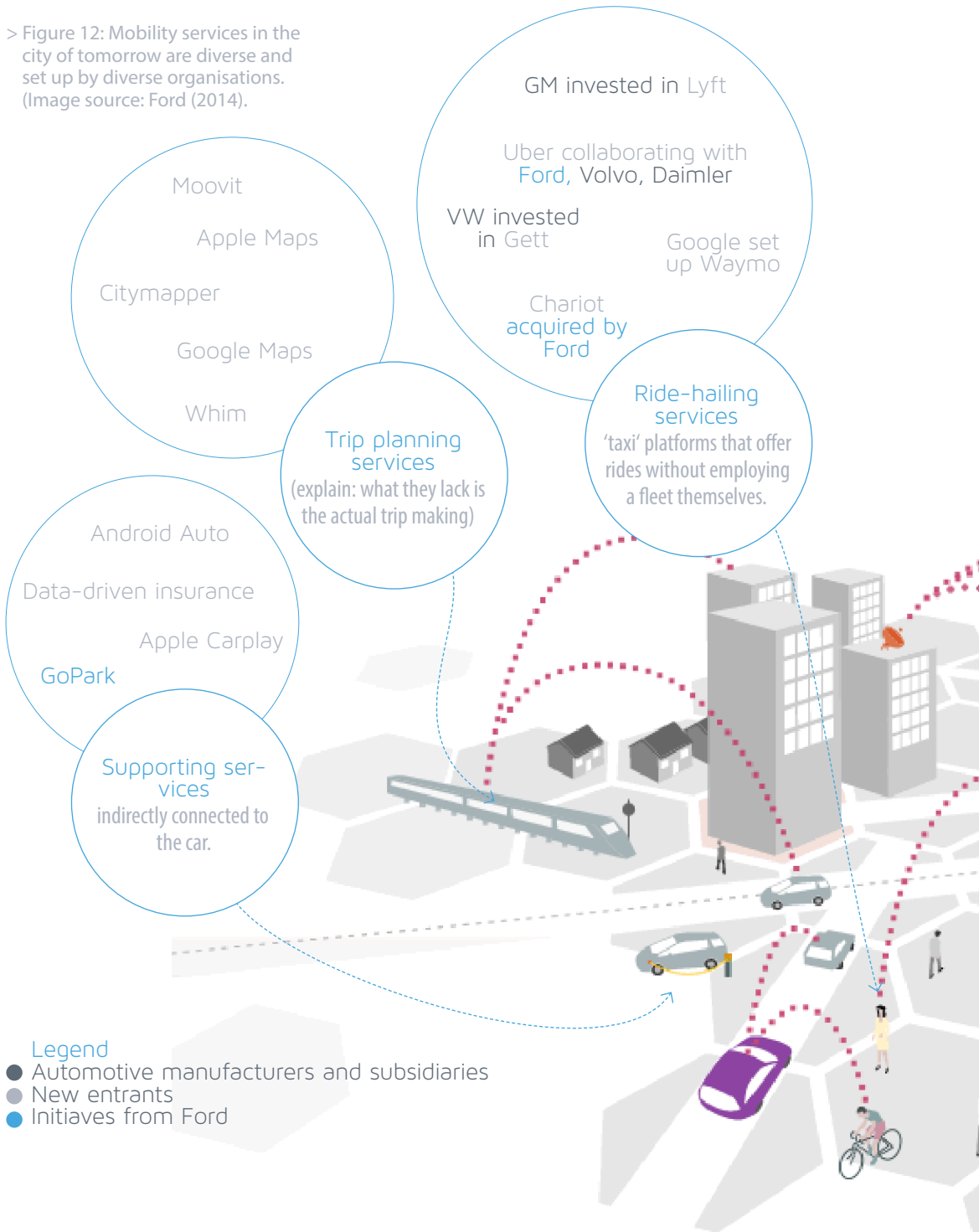> Figure 11: Experiments done by Ford globally. Source: Ford (2015).

Service-based solutions like the ones shown in figure 12 on page 20 and 21 are developing and gaining momentum with the potential to disrupt entire industries. If car manufacturers want to compete they will have to broaden their scope and expand towards service-based solutions.
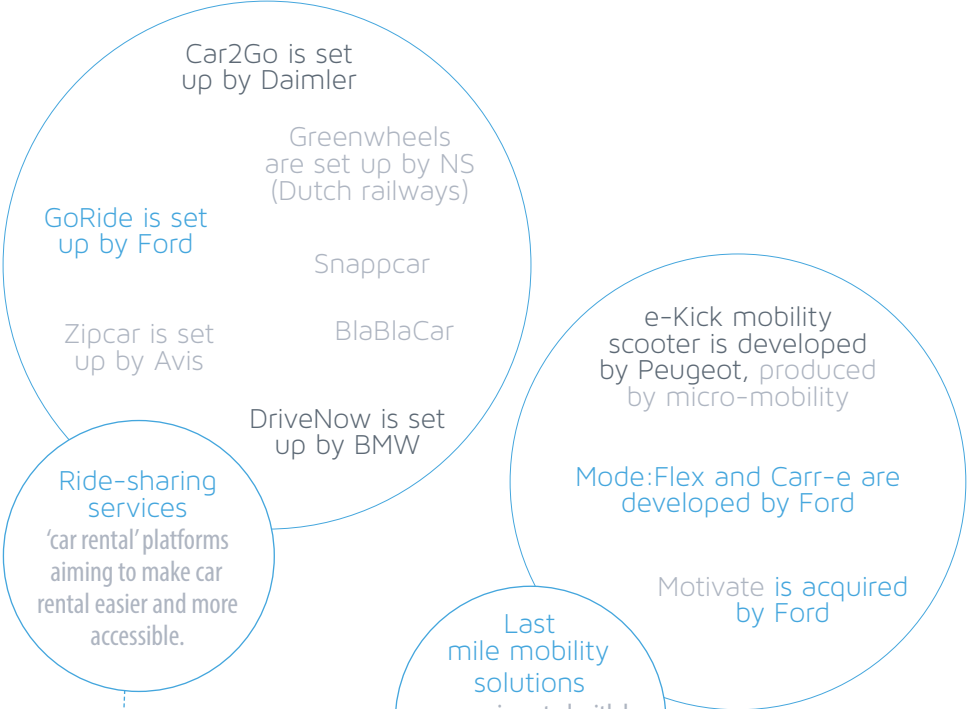
Automotive manufacturers seem to recognize the need for mobility solutions that complement their physical products. A lot of mergers and acquisitions show that most seem to find it difficult to act on this development appropriately. Car manufacturers still have a big advantage because they develop and produce the vehicle. Integrating services and other solutions to be offered with the vehicle and developing them together would help to fully utilize the potential of both a service and the vehicle to offer a complete solution.

Ford is experimenting with mobility solutions as shown in figure 11 as part of the emerging opportunities to discover new ways to offer mobility. The strategy is to experiment and learn quickly to develop solutions. Ford initiates experiments of their own like GoPark and GoDrive, but also invests and acquires other mobility companies like Chariot and Motivate.

Mobility services in the city of tomorrow

> Figure 12: Mobility services in the city of tomorrow are diverse and set up by diverse organisations. (Image source: Ford (2014).

GM invested in Lyft

Uber collaborating with Ford, Volvo, Daimler

VW invested in Gett

Google set up Waymo

Chariot acquired by Ford

Moovit

Apple Maps

Citymapper

Google Maps

Whim

Trip planning services
(explain: what they lack is the actual trip making)

Ride-hailing services
'taxi' platforms that offer rides without employing a fleet themselves.

Android Auto

Data-driven insurance

Apple Carplay

GoPark

Supporting ser-vices
indirectly connected to the car.

Legend
● Automotive manufacturers and subsidiaries
● New entrants
● Initiaves from Ford

Car2Go is set up by Daimler

Greenwheels are set up by NS (Dutch railways)

GoRide is set up by Ford

Snappcar

Zipcar is set up by Avis

BlaBlaCar

DriveNow is set up by BMW

e-Kick mobility scooter is developed by Peugeot, produced by micro-mobility

Mode:Flex and Carr-e are developed by Ford

Motivate is acquired by Ford

Ride-sharing services
'car rental' platforms aiming to make car rental easier and more accessible.

Last mile mobility solutions
are experimented with by automotive manufacturers to integrate them into vehicles

Private and corporate car leasing
offer a relatively care-free service and are growing more popular
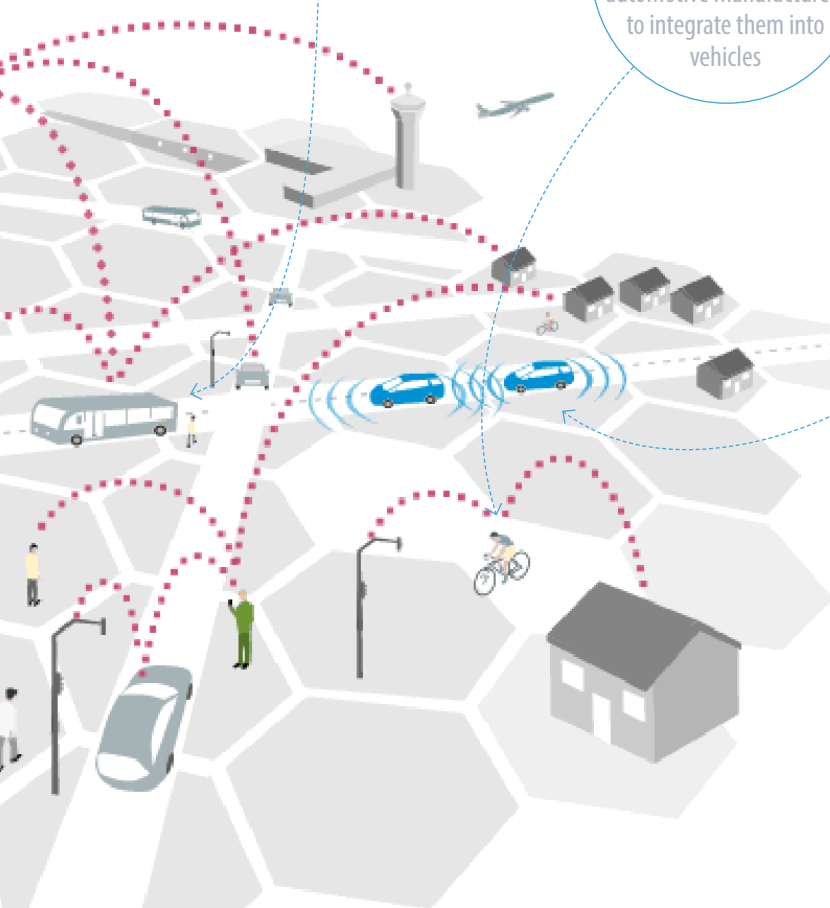
Ford mobility experiments

Ford is experimenting with mobility solutions as part of
the emerging opportunities to discover new ways to offer
mobility. The strategy is to experiment and learn quickly to
develop solutions. Ford initiates experiments of their own
like GoPark and GoDrive, but also invests and acquires other
mobility companies like Chariot and Motivate.

Source images: Ford (2015-2017).

Chariot dynamic shuttle

Chariot is a ride-hailing
service based in San Fransisco
which was acquired by Ford
(Ford, 2016d). It is comparable
with GoRide (figure 8).

Motivate / GoBike bike-sharing

GoBike is a continuation of
bike-sharing service Motivate
in San Francisco which was
acquired by Ford (Ford,
2016d).

GoPark

GoPark is a trial in Islington in London to identify and show available parking spaces (GoPark, 2016). Up to thirty percent of traffic in London is estimated to look for parking spaces (Stinson, 2016). Ford collaborates with app maker Ustwo and Livework to collect user insights.
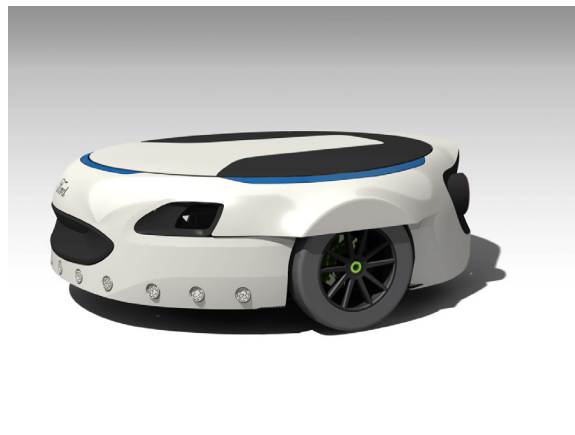
FordPass

FordPass is a mobile application designed as a platform for mobility solutions (Ford, 2016e).

E-bikes

As outcome of the first mobility challenge Ford organized, two E-bikes are proposed to supplement the car as mobility offering (Ford, 2015).

Carr-e

As outcome of the second mobility challenge Ford presented the Carr-e last-mile solution. It fits in the spare wheel space in cars (Kane, 2016).

Ford innovation strategies

In the previous section mobility experiments are presented Ford is involved in. This section presents the strategies Ford employs to innovate. This helps to place mobility solution innovation within the organisation appropriately. Ford takes diverse initiatives to stimulate innovation within the organisation.
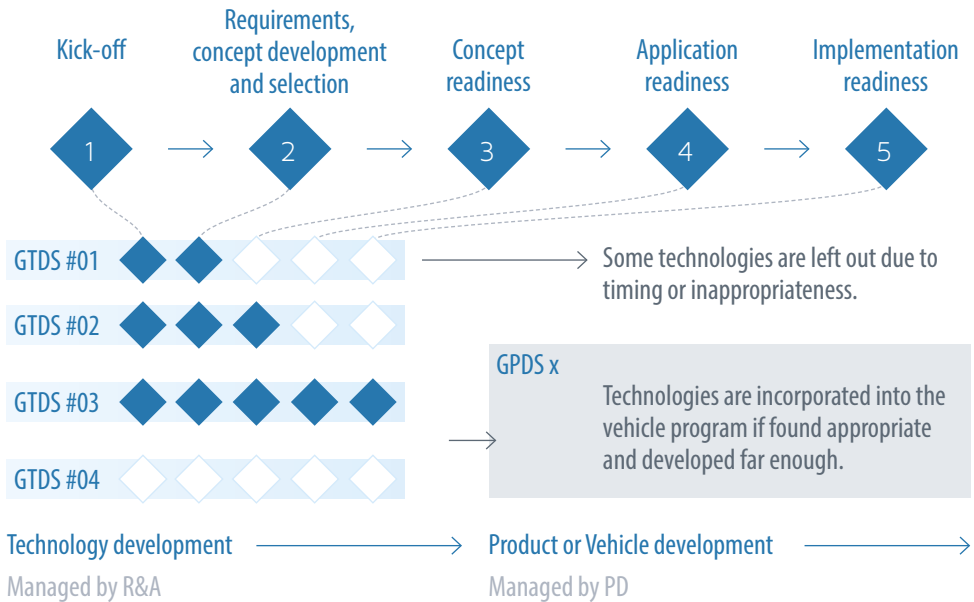
Product development process

Like most automotive manufacturers and indeed most production companies, Ford uses the Stage-Gate system for product development, derived from Cooper (1990). This system structures the manufacturing of complex products to manufacture and deliver them efficiently and free of faults. As shown in figure 13, Ford has two separate systems in place for the development of technology and products. These systems lean on Design for Six-Sigma (DFSS) to improve quality and are documented using Failure Mode and Effects Analysis (FMEA). They are focused on delivering technology and vehicles in a defect-free (robust) manner which means the product development within Ford is very much engineering-driven. Because the technology must be developed far enough to incorporate it into the product, the time-to-market may take up to seven years.

This development process might be regarded as too slow but it is hard to speed up significantly without organising it in a totally different way.

It leads to the manufacturing and marketing of products but is not suitable for the development of mobility solutions that combine product, service and system elements. Vehicles must

Kick-off — **1**

Requirements, concept development and selection — **2**

Concept readiness — **3**

Application readiness — **4**

Implementation readiness — **5**

GTDS #01 — Some technologies are left out due to timing or inappropriateness.

GTDS #02

GTDS #03

GTDS #04

GPDS x
Technologies are incorporated into the vehicle program if found appropriate and developed far enough.

Technology development →
Managed by R&A

Product or Vehicle development →
Managed by PD

> Figure 13: The Ford vehicle development process consists roughly of two stage-gate processes that link into each other.

be delivered fault-free and securely to meet quality, safety and environmental standards and the current production process is suitable to deliver this. The conception and development of new mobility solutions however requires a different approach.

Stage-Gate systems have proven very successful for large corporations to manufacture complex products that have to meet a lot of requirements and regulations. The downside is that it has almost grown into a separate entity and rapid innovation is hard. The system is slow and in nature consecutive. Innovation for these processes in most cases consist of evolutionary developments and little increments. The early phase of the process should accommodate quick adaptations and iterations, but execution is different. To counter this, Ford could incorporate agile development into the Stage-Gate (Cooper, 2014) for more flexibility and a quicker idea to launch. The product development process is further described in appendix B.
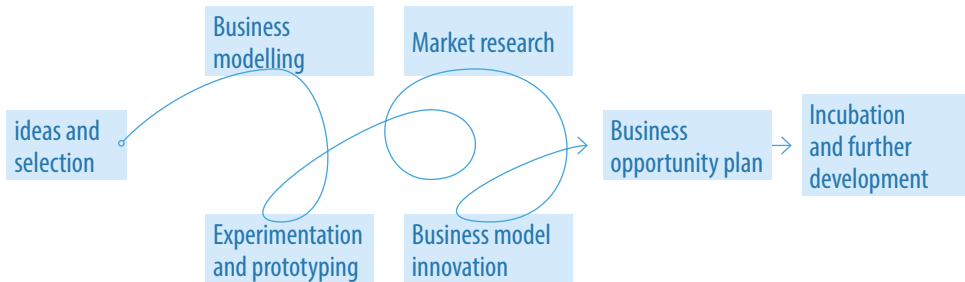
> Figure 14:
  Open innova-
  tion process
  within Ford.

Idea generation

To come up with innovations, idea generation (internally called 'ideation') sessions are organized to develop problem situations, ideas or opportunities into concepts and intellectual property (IP). While the concept should be leading, the goal of most sessions tends to be to generate technological IP. Intellectual property can be a source of competitive advantage, but innovation needs the integration of invention and user value.

Intellectual property

Successful companies find it hard to sustain their innovation performance (Pisano, 2015). To try and measure their innovation efforts, Ford measures attempts to file a patent called invention disclosures. It is successful in increasing their intellectual property (IP): in 2016 Ford filed 1500 US patents, a 25% increase from 2015 and the most of any car manufacturer (although it has to be said, most car manufacturers are not originally from the US). Ford set a key performance indicator on IP in this way and got credits for it (Overly, 2016). Although
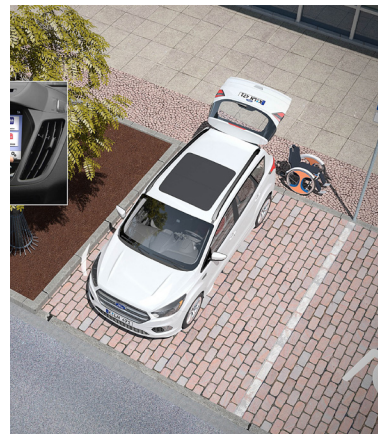
| Autolivery | Carr-e | TriCiti | Echair |

> Figure 15: Last mile mobility concepts as results from the most recent mobility challenge. Source: Ford (2016-2017.)

it is smart to try and measure innovation efforts, invention and innovation is not the same, and it is unclear how much IP contributes to the competitive advantage or user value. Measuring this quantatively in mobility solutions may be tough, but it is worth to see how this can be measured appropriately.

Global innovation challenges

Ford organized two open innovation processes under the name global innovation challenge. The first about e-bikes was organized in the USA, the second by the Mobility team about last-mile mobility. In these challenges, the whole organisation is invited to take part and submit ideas within the theme. The process is shown in figure 14. Outcomes of the second challenge were for example Carr-e, TriCiti, eChair and Autolivery as shown in figure 15 (Ford, 2016f). The aim of the challenge was to increase innovative thinking, raise awareness about expansion into the mobility area and encourage collaboration between departments.

Subsidiary

As described on page 16, Ford set up a subsidiary called 'Ford Smart Mobility'. Ford recognized that the mobility scene is so different from the current activities they thought it best to start a subsidiary. On one hand a separate company can be designed for the new aim, build to fit the goals and focus on developing new solutions. On the other hand it can be difficult to organize communication, information and new ventures between the two entities.

Collaboration with start-ups

Ford organizes and invests in Techstars Mobility, a start-up incubator and accelerator, to collaborate with start-ups (Ford, 2016g; Ford, 2016h). In this way Ford actively seeks collaboration with entrepreneurs and hopes to tap into promising initiatives. Some of these initiatives are already acquired and merged into existing activities.

Learning and development

Ford has a 'Learning and Development' department to stimulate professional development. This is divided into professional development for all employees, leadership development for formal leaders and functional and technical development for skill teams.

User research

Ford collects user insights on their own but also in collaboration with for example design agency Ideo. Ford is experienced in quantitative customer research focused on specific interactions. It perceives the type of user research Ideo does as a knowledge or skill gap within the organisation so it is outsourced. It seems like user research based on motivations and observations are a weakness with most car manufacturers.

Conclusion

Ford undertakes diverse initiatives to expand into the mobility area and to stimulate innovation within the organisation.

The GTDS (technology development) and GPDS (vehicle development) are not equipped for developing services. These gateway-driven processes are suitable for delivering robust technologies and fault-free vehicles, but the development of services requires a more open, user-centered, iterative and creative approach.

Through a subsidiary, collaborations and processes inside the organisation Ford bets on outcomes from different perspectives. Multiple initiatives focus on technology development but a user-centered design approach is still developing.

User-centered innovation

In the previous chapter, Ford's innovation initiatives are presented. Although the development processes are diverse, most are not suitable for the development of mobility solutions. In this chapter, a user-centered design methodology tailored to the development of mobility solutions is presented. This will help to discover future user needs and requirements and design solutions to address them.

Products and services

Henry Ford believed 'business only exists to serve people'. Serving someone means helping them to achieve their goals or fulfil their needs (Oxford, 2017). Intangible services are often positioned against physical goods (Vargo & Lusch, 2004). While these two extremities exist, most solutions combine tangible and intangible aspects of products and services. The solution is leading for users, not the means to achieve them. For example: users do not necessarily want to own a car, but they do need some kind of transport. That is where the main value is for them. It is thus only logical for Ford to explore new opportunities to develop and offer mobility solutions that integrate the components of products and services to complement the current offerings.

Solutions

The success of service solutions relies on experience and emotions people have when using them (Sleeswijk Visser, 2013). This means that to create and develop services, experience and emotions are crucial to investigate and

Service in the automotive industry

Henry Ford was famously quoted saying that his customers could choose any colour they like, as long as it is black. The application of only one colour in the production process saved time, complexity and thus money. It is also a perfect example of thinking from the perspective of the production process and the company. You could also argue that this is a human-centred idea, because the needs at the time were for a cheap vehicle most of all; customization was available at the time but only for the rich.

Despite (or maybe because of) more than a hundred years of innovation and development in the automotive industry, car manufacturers are still focused on offering the product. It produces a vehicle they think is right and then try to sell it. And hope the customer is content enough to buy it again.

This model of distribution and exchange of produced goods has driven business modelling and decision making in the automotive industry for the last century.

This also shows in how the automotive industry perceives services: In most cases in the automotive industry, services are referred to as maintenance of the vehicle after purchase. In recent years, services also refer to value-adding non-tangibles that are incorporated in a vehicle or vehicle purchase, such as financing, mobile applications and navigation devices. Here is a big opportunity: service innovation can build on the relationships users have with the manufacturer and their services and build on them towards a relationship. This service innovation does however require looking at the whole chain of experiences for the user.

address. It is thus crucial to observe how people use services and products in their context when these experiences are perceived and emotions felt. For automotive manufacturers like Ford it means adopting a more user-centered mindset; the physical product is one piece in a chain of experiences. Industrial design has broadened its scope to designing product-service-systems and organisations and fitting it all together. Design is most effective when all aspects fit; new products may influence the supporting systems or organisation (Sleeswijk Visser, 2013).

Ford's approach to user experience (UX) up till now is to uncover users' pain points and explore what they need to solve or diminish them. This is usually done for one interaction at a time and as figure 16 shows, the whole chain of interactions needs to be taken into account. A user-centered design methodology can help to look at the whole chain of interactions and experiences users go through and design for them coherently. Adopting a more user-centered approach is a huge chance to differentiate within the automotive world because most car manufacturers struggle with this.

Interaction
with a vehicle

Typical user journey

Interactions
with a vehicle

Parts of the user journey user experience focuses on

USER

Service innovation aims to take the whole journey into account.
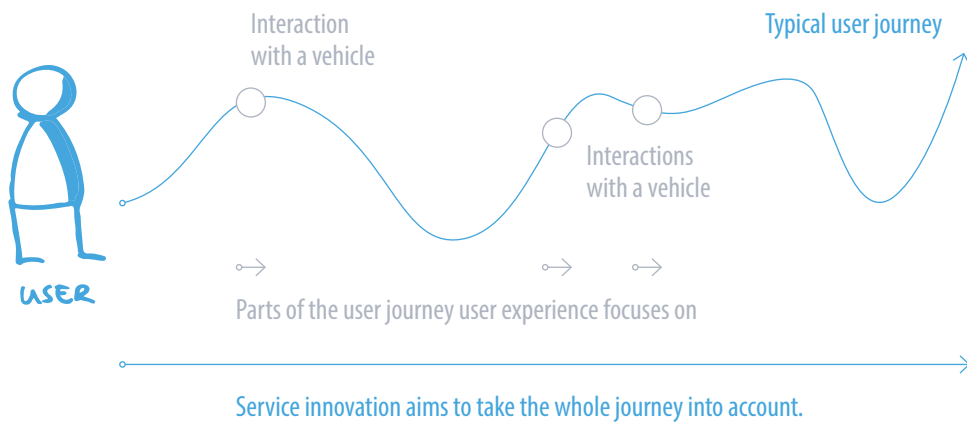
> Figure 16:
  Service inno-
  vation designs
  for a chain of
  interactions.

Service innovation

As described, there is a need for a holistic view on users in
their context, and a methodology to discover their (future)
needs. There is also a need for an approach to develop total
mobility solutions in contrast to improvements in parts of
a user's journey. Service design is an approach to design
that sets out to implement these aspects. As described on
page 6, this document uses the term service innovation.
Service innovation is relatively new and connects to different
perspectives and professions (Sleeswijk Visser, 2013) and does
not have a single definition. Most agree it brings together and
integrates different elements:

› It takes a holistic perspective on the everyday life of users
  (Sleeswijk Visser, 2013; Sanders & Stappers, 2012);
› It integrates products and services to create a holistic user
  experience (in this case mobility solution) over different
  interactions (van Boeijen et al., 2014; Reason, Lavrans &
  Brand Flu, 2015);
› It is multi-disciplinary, complex and involves multiple users
  and stakeholders over time (Sleeswijk Visser, 2013; Stickdorn
  et al., 2011; Moritz, 2005).

Within Ford, service innovation is a multi-disciplinary design approach focused on creating and developing mobility solutions from a holistic user perspective.

Concluding we can describe service innovation within Ford as a multi-disciplinary design approach focused on creating and developing mobility solutions from a holistic user perspective. This is shortly elaborated below:

A multi-disciplinary design approach

Service innovation is a design approach in which designers facilitate the process of creating concepts in a multi-disciplinary team. It helps to bridge research, design and engineering by inviting all stakeholders in the process.

Creating and developing mobility solutions

Because service innovation implies a different perspective on people and the services they use, it needs a different design process than traditional product development. Service innovation is a methodology that balances user, technology and business aspects of a concept to create a valuable and feasible solution.

A holistic user perspective

To know what is valuable for the user, service innovation is a methodology that helps to create a holistic user perspective. It is essential to create something of value for the user in their everyday live, so this methodology investigates (future) user needs and wants in their context.

User
context
Desirability

Concept
context
Feasibility

Business
context
Viability
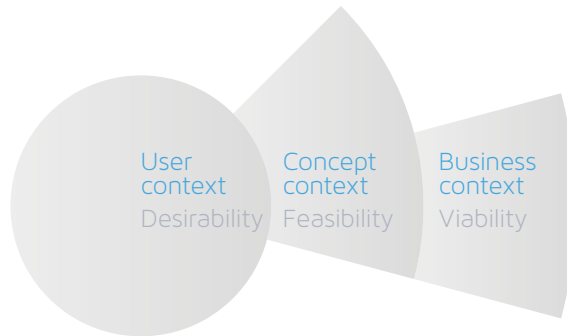
> Figure 17: The
proposed
design process
flows from the
user context
to concept
context to
the business
context.

Design process

To structure the service innovation process, an approach
is proposed that integrates models and approaches by
Roozenburg & Eekels (1995), Buijs & van der Meer (2013),
Brown (2008), Roskam Abbing (2010), Osterwalder et al.
(2014) and Stickdorn et al. (2011) as shown in appendix C.
The proposed Ford service innovation process is simplified in
three stages as shown in figure 17. Service innovation starts
with investigating (future) user needs and wants and creating
something of value for them. In the concept context the ideas
are developed into mobility solutions. The business context
represents finding a fit between the current organisation to
leverage their assets or propose to develop specific assets. The
stages are presented to reflect some order but also flexibility
of the process to adapt quickly. When these three stages are
passed it should result into the design of a service concept.

Service concepts

Creating mobility solutions and presenting them can be done
by developing service concepts. These present the concept in
three aspects as shown in figure 18: the user value, business
value and roadmap (Sleeswijk Visser, 2013; Fitzsimmons &
Fitzsimmons, 1999). The user story focuses on the value of the

Service concept elements

User value	Business value	Roadmap
› What is the main value for the user?	› Why should Ford do this, what is the main value for Ford?	› What systems and partners do you need to offer this service?
› How does the user interact with the solution?	› What assets make Ford potentially the best stakeholder to offer this solution?	› What products and services support the final solution?

> Figure 18: Service concept elements include value for the user and business and an implementation roadmap.

concept for the user, the business value should present value for the organisation and what assets Ford can use to deliver this value. The roadmap is an implementation plan that should point out how the concept can be implemented and delivered. This should give a sense of feasibility, viability and desirability (Kimbell, 2011).

Conclusion

This chapter proposes service innovation as design methodology to develop mobility solutions. Service innovation is a multi-disciplinary design approach focused on creating and developing mobility solutions from a holistic user perspective. The process can be structured into the user context, concept context and business context to develop service concepts. These concepts are presented by user value, business value and roadmap. A user-centered design methodology like this aims to create more valuable solutions for people by putting them central in investigation and evaluation parts of the process.

"THE IMPORTANT THING IS NOT TO STOP
QUESTIONING; CURIOSITY HAS ITS
OWN REASON FOR EXISTING."
ALBERT EINSTEIN

Source: Ford (2016).

DESIGN OF AN INNOVATION TOOLKIT

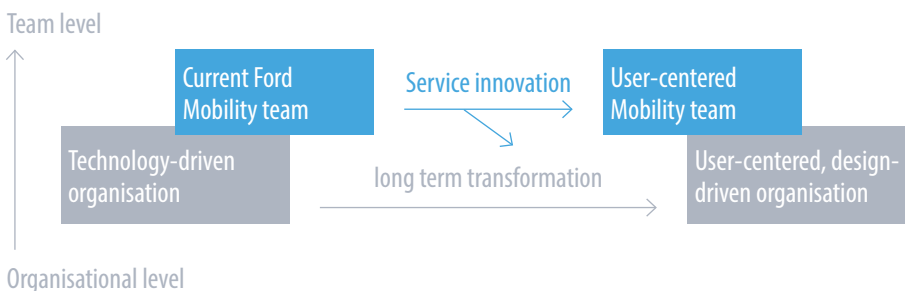After investigating the context of this project, in this part the design of a solution takes shape.
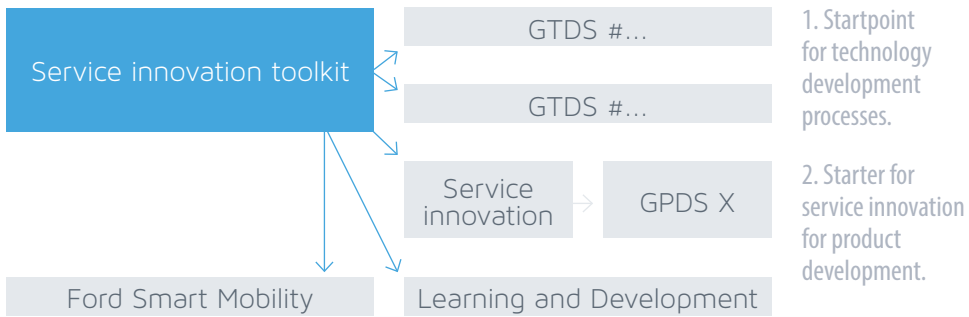
Place within the organisation

In the previous chapter service innovation is introduced and proposed as methodology to develop mobility solutions. This chapter presents it as part of a more extensive organisational transformation.

Developing mobility services is an emerging opportunity for Ford, but the early stages of innovation in the development processes is still mainly focused on technological advances. A user-centered design approach will help to innovate for services build to address user needs, offering these users value. Technologies that will help address these user needs will then follow.

On a team level this project should help the Mobility team to discover, learn and apply a user-centered design methodology that helps them to develop ideas into service concepts and feed them into the current product development systems.

> Figure 19: Pro-
  posed trans-
  formation on
  the team and
  organisational
  level.

Team level

| Current Ford Mobility team | Service innovation | User-centered Mobility team |

| Technology-driven organisation | long term transformation | User-centered, design-driven organisation |

Organisational level

Service innovation toolkit

GTDS #...

GTDS #...

Service innovation → GPDS X

Ford Smart Mobility

Learning and Development

1. Startpoint for technology development processes.

2. Starter for service innovation for product development.

3. Pick up by Ford Smart Mobility and Learning and Development, helping a more extensive organisational transformation.

> Figure 20: Three routes the service innovation toolkit could take into the organisation.

This project will also be a small step towards transforming Ford from a more technology driven organisation towards a user-centered and design-driven organisation, as shown in figure 19. In the short term this will not be observable. It is also not the focus of this project.

Place in the organisation

The service innovation toolkit hopes to find its way into the organisation via three routes as shown in figure 20. The service innovation toolkit should create new possibilities to start GTDS projects and inform GPDS projects. These are the first and second route. The service innovation process should then be able to communicate with GTDS and GPDS to adjust to new insights and developments. If a service concept implies modifications to vehicle or technology, it must communicate with the GTDS and GPDS in time to be able to deliver the service or solution. This also applies the other way around. This communication also means part of the organisation is introduced to service innovation via the GTDS and GPDS. The third route as shown in figure 20 is introduction of service innovation within parts of the organisation not directly involved in product development, like Learning and Development and Ford Smart Mobility.

Defining the problem

The previous chapter places service innovation within the organisation. This chapter investigates what is needed to successfully implement service innovation within the team and the organisation.

Scope

This project focuses on the early stages of the development process of mobility solutions. It helps the Mobility team to create and develop mobility solutions by introducing them to the service innovation process and help them to apply it to diverse projects. Whether or not and how service innovation is introduced further into the organisation is taken into account but not the focus of this project.

Problem

To investigate what is needed to implement service innovation in the team, user research is set up to observe the team in their innovation efforts. Differences between the current innovation process and the envisioned process are investigated to discover where the biggest differences and similarities are. Difficulties within the rest of the organisation to implement a user-centered design methodology are also investigated.

User research

After setting the scope, user research is presented that investigates the innovation process within the team. These are clustered to reveal insights in different aspects of the innovation process. Small iterations of offering a solution are incorporated. These small actions and reactions give direction to the solution to be found by discovering user needs within

the team. These are presented in the form of a journey the team goes through when developing a service concept.

Methods

User research is set up to observe the team and discover their needs. In this project it consists of active participation, workshops, interviews and observations. First the activities are described and then the results are presented in clusters.

Active participation

To help the team develop their user-centered capabilities, I was part of the team for sixteen weeks. In this period I helped the team and investigated how they are used to create and develop mobility solutions. Activities included:

› Participation in two workshops ID-Studiolab organised in which the design methodology was introduced and put in practice;
› Five hours of interviews with members of the team;
› Active participation in more than thirty hours of sessions, meetings and presentations;
› Helping to organise ten hours of meetings and (idea generation) sessions.
› Facilitated two hours of journey mapping;
› Presented one twenty-minute user story while sketching it live and facilitated ten minutes of idea generation in addition;
› Creation of user journeys, sensitizing booklets, personas for forty hours;
› About 550 hours of being part of the team.

Workshops

In the workshops organised by ID-Studiolab I was active participant, but I also observed the team in how they reacted to the methods and tools they were introduced to. This helped me greatly to choose and tailor the methods and tools to offer the greatest value to the team.

Interviews

Approximately five hours of semi-structural interviews were conducted with four team members. These members were in more or less extent involved in the innovation processes and have different backgrounds which give a broad perspective on the team and their needs. Two team members who were most involved in the selection and application of methods and tools were interviewed to create a perspective on how these were deployed.

The aim of these interviews was to gain insight into the goals, ambitions and plans of the team regarding service innovation. Questions were for example:
› What are the ambitions of you and this team, and why?
› What plans are in place to accomplish this?
› What do you regard as services?
› What place do services have within Ford?
› How is innovation sorted to develop now?

After these interviews, several stimuli are presented in the form of service innovation tools. An empty and several examples of filled-in tools are shown to discuss the supposed benefits and limitations of these tools and to what extent they would help to innovate.

Observations

Observations were done in the duration of the internship. This includes the activities described earlier. Some observations resulted from active participation, following the workshops, executing interviews and conversations with the team. A few idea generation sessions were (partly) facilitated by the author. Research questions for observation were:

› How does the team interact with each other?
  · What are topics of discussion?
› What is the general approach to innovation?
  · How are creative sessions structured, facilitated and participated in?
› What is the innovation process used for mobility solutions?
  · How does the team alter their approach to tailor the process to develop solutions instead of technologies?

Results

The results of observations and interviews are clustered into topics on the following pages. After that the results are summarized into a process journey and shortly concluded on page 48-51. To gain more insight into the process this team goes through it is journey mapped. This is compared to an 'ideal' journey map for the innovation process.

By taking time to investigate the problem, the chance that the solution will actually solve it increases. The need for problem investigation was recognized and further incorporated in other projects.
In the last session everyone was invited to draw and write ideas and take notes on post-its, which greatly increased visualisation of the team and others. One remark of a participant was that sketching was unnatural but by showing and him noting "it does not all have to be perfect" it helped the participant to sketch and generate ideas. While some hesitation remains about writing and drawing, the team started to sketch more and more. Sketching to help others sketch for themselves helped greatly.

Insight 1: Creativity is partly encouraged

The creative attitude inside the team is changing. Progressive insights meant that three creativity aspects changed gradually during this project: the time between diverging and converging, the time for problem investigation and the visualisation of problems and solutions.

Project management was experimenting with Microsoft OneNote for a scrum / agile type of management. What remained was the need for a more visual or graphical tool and a tool that moderates discussion about the process. There seems to be a need for an online tool that everyone can access, something that is neat and orderly, while keeping room for creativity;

Insight 2: Tools and software are not optimal

The software used is less than optimal and does not make it easy to share project work. Employees are used to this and know they cannot use online cloud-based tools but this does not fully support them in innovation.

Some time has to be taken to explain the process of a session and the creative rules to establish what the session entails. The critical, analysing hat (De Bono, 1999) has its use and time, but it should be taken off for the diverging parts of the session. Creative sessions would improve if the facilitation is more focused on the process and when the team can fully focus on the content.

A clear structure helped the productivity of a session; maybe because engineers like structure and thrive on a constructive basis. Participation in sessions increased when they got more interactive. it may be better to plan a longer session and first create something to discuss and move on, not discuss for too long what you are creating.

Insight 3: Creative facilitation is not used to full potential

Facilitation and leading of workshops, idea generation sessions and other meetings can be improved by a more structured process and a more interactive nature.

The building is spacious, clean and ordered. Once posters or canvases were used they were stored; there was no space to hang them to evaluate later. This decreases interest to use them again, or even to make

something that will be stored and not used again anyway. There is enough room for computers and desks but not much interaction over the day with other departments.

Insight 4: The environment only partly encourages interaction and collaboration

More interaction within the building, more room for project overviews and space for visuals like posters and canvases would be beneficial for the creative atmosphere. Discussion helps develop ideas, but now there is no direct trigger to discuss something.

Some user-centered design methods were known, but most were not applied. Contextmapping was taught during my presence, and the sensitizing part for one project was still done by me and with employees. Interviews and observations were not structurally executed. Personas were known but not used. When setting up personas the team recognized its worth and the need for a rich combination of information. Customer journeys are known and used, but more focused on technology than on the user. Business modelling was well-known and well-used; quick business model sketching was less known but quickly picked up. Open innovation is used, showing engineers how to handle the user perspective. A user journey was recognized to work well.

Insight 5: Methods could be used more intently

Overall the tools and methods were used in a different way or not known, but the team acquainted themselves with the methods once introduced and seemed enthusiastic about most of them. Overall the team is very eager to learn and apply new design tools and methods.

"if you are not careful, your week is completely full with meetings". This decreases the time the team could develop their initiatives, ideas and concepts. While all information is strictly confidential, the culture and interpersonal relationships are informal and friendly. Collaboration is encouraged but oriented extremely to the inside; user research is done with employees.

Insight 6: The organisation of innovation is not designed for user-centered design

The team does not have enough time for developing their ideas. Blocking time slots for team projects is hard but will increase involvement from all team members.

The team did not really make efforts to do user research with a broad range of mobility users; the assumption seemed to be that automotive engineers are mobility users anyway and that confidential information might be unsafe working with users from outside the organisation. The team did take action to investigate current mobility solutions and tried to collect and share personal experiences with them. The first journeys made focused on the vehicle, but gradually turned into more user-centered ones. Changing from making personal journeys ('homework') towards creating a shared and collaborative document was also positive. Some user stories were used. There is a need for methods to gather future user requirements.

Insight 7: user-centeredness is not put to practice

Setting users central in the process of innovation for mobility services seemed difficult. The organisation is focused on technology and business, so the user is more easily set aside. The team needs methods and tools to help them focus on users and keep considering them.

Rapid prototyping is outsourced by the Rapid Technology Center in Merkenich (Germany) or university facilities because the team does not have direct access to such facilities or even simple prototyping materials for creating quick prototypes. It is unclear if low-fidelity prototypes are tested with users. High-fidelity prototypes are tested with users and seemed popular in the organisation.

Insight 8: prototyping is outsourced

Prototyping is outsourced; the team is not encouraged to build prototypes and no facilities are in place to develop prototypes quickly through iterations. Only high-fidelity fully working prototypes are really tested.

To summarize, the team develops ideas and projects but lacks a user-centered design approach that structurally helps them develop ideas into tested concepts with a high user value. To start with what the team is used to, figure 21 shows a model of how technology innovation is structured in a process.
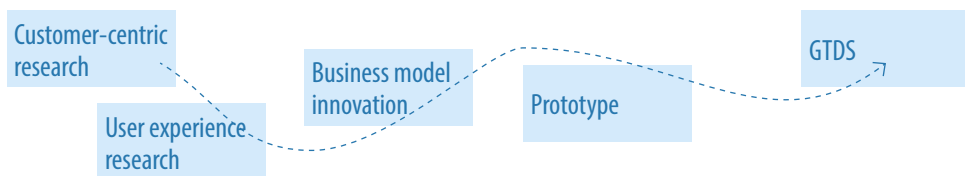
Technology innovation process

| Opportunity | → | Idea generation | → | Intellectual Property (IP) | → | GTDS (technology) | → | GPDS (vehicle integration) |
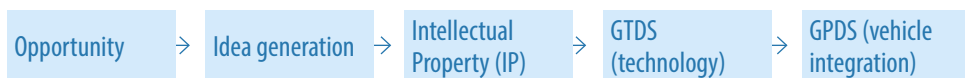
For more user-centered innovation processes, the organisation works with different departments to collect user insights and develop concepts. This is not yet structured well enough, so it looks a bit like in figure 22.

User innovation process

Customer-centric research

User experience research

Business model innovation

Prototype

GTDS

In figure 23 I describe my concerns with this process.

User innovation process

Customer-centric research	User experience research	Business-model innovation	Prototype	GTDS
	› This seems to be focused on quantitative methods to score on specific moments.	› This should come earlier in low fidelity because this can be a very time-consuming step.	› This should also be done earlier to incorporate test insights in the design.	› The team has access to the technology development but it has to be formalized and planned before the discovery phase.

> Figure 23:
Concerns with the current process.

As illustrated in figure 23, the integration of departments working on several different user experience projects falls short; a lot of work is done but no real coordination and clear structure of a process is put in place. This is ineffective so the team put a different process in place for a specific innovation project. It would imply involvement from several other departments, so to keep them engaged and manage the project, the process model applies is presented in figure 24.

Development process for a specific innovation

Mindmap all aspects involved	Define constraints	Journey map for an overview	Involve departments for input	Meetings in all departments
› come up with ideas for a solution;	› discover the problem; definition of constraints	› set up a journey to keep an overview	› involve people from all technical departments for input and give them requirements	› get involved / set up meetings in all departments for their specific area of expertise

> Figure 24:
Innovation process for one specific innovation.

Ideal innovation process

| User research | → | Idea generation | → | Prototyping | → | Business modelling | → | Implementation |

> Figure 25: Proposal for an ideal innovation process.

An ideal user-centered innovation process would look like figure 25. To encourage the team to iterate with the ideas and prototypes, these two phases are put together in a single phase in which the concept can be developed. This would lead to a model shown in figure 26.

Ford service innovation

| User context | → | Concept context | → | Business context | → | Realisation |
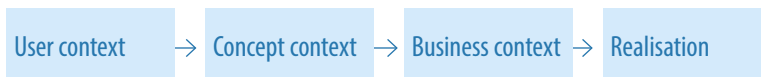
> Figure 26: Structure of the innovation process for Ford.

Because the realisation phase depends a lot on the type of innovation developed and can only be entered after elaboration and decisions from outside the team, this phase is not incorporated in the manual and string of creative sessions. A different graphic interpretation is presented in figure 27.

User context
Desirability

Concept context
Feasibility

Business context
Viability
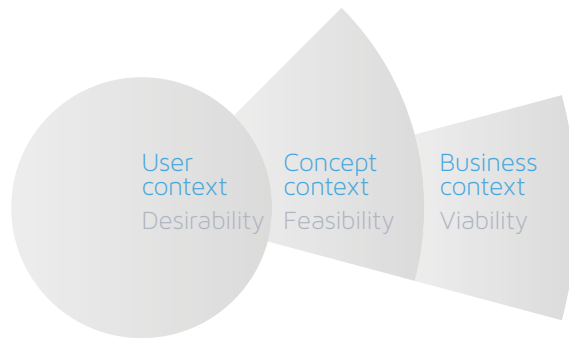
> Figure 27: The Ford service innovation process structured.

Conclusion

Based on the participation and organisation of workshops, creative sessions and interviews with different team members I conclude the team is developing their user-centered skills but also misses hands-on tools and methods and practical experience with user research. Encouraging and fostering creative ideas to develop concepts from user insights and incorporating service elements is still difficult.

While the context of mobility is changing rapidly into a multi-stakeholder, multi-modal user-centred service environment, Ford is still a technology-driven organisation. The emerging opportunities Ford is expanding towards do not fit very well with the current innovation processes. The innovation and product development process is focused on applying technological inventions while the development of services should focus on user insights and develop them via business opportunities into service concepts.

While the consumer experience is becoming increasingly important, user-centered design is not deployed thoroughly by the core business or research departments. It would be a strategic decision to transform this. A service innovation process would help this specific team with service development.

Designing a solution

As discussed in the previous chapter, research was done into the organisation, the team and into the way mobility solutions are developed. It seems that the team is developing user-centered skills but misses hands-on tools and clear methods. A valuable solution for the team in this project should address the following issues:

› The solution helps the (multi-disciplinary) team to incorporate service innovation over the next three years;
› The solution helps the team to create mobility solutions addressing future user needs and translating them into valuable and feasible solutions;
› The methods and tools offered have to be applied to diverse design problems and tailored to diverse projects that can feed into the current Stage-Gate systems;
› The solution helps to structure the innovation process and develop in iterations, fostering creativity and new ideas and unexpected solutions.
› The solution is able to spread service innovation within Ford contributing to a transformation towards a design-driven organisation.

To address these issues a service innovation methodology is offered to the team and implemented the following solution is created for the team.

Introducing service innovation

I have helped the team in the sixteen weeks I was part of them to introduce them to service innovation, together with the workshops ID-Studiolab gave to them.

Approach

The workshops and active participation meant that I was able to develop and tailor the methods to the team in small and quick iterations. These iterations mean the used methods will be suited for the team to develop mobility solutions.

Methodology

To further help the team implement service innovation as a user-centered methodology a reference document is set up. It can serve as:
› reference to the methods used and service innovation in general;
› help with setting up creative sessions and projects in which user requirements and considerations need to be addressed;
› reference to anyone within the organisation that wants to introduce service innovation in their teams or projects.

The result is the design of a toolkit which meets these three considerations. It is designed purposefully for the Innovation Management and Mobility team within the Research and Innovation Center in Aachen. Additionally, anyone who is unfamiliar with the methodology and the methods should be able to introduce and use them easily.

Culture
Mindset
Methodologies
Methods
Tools

Cultural change

Culture
Mindset
Methodologies
Methods
Tools
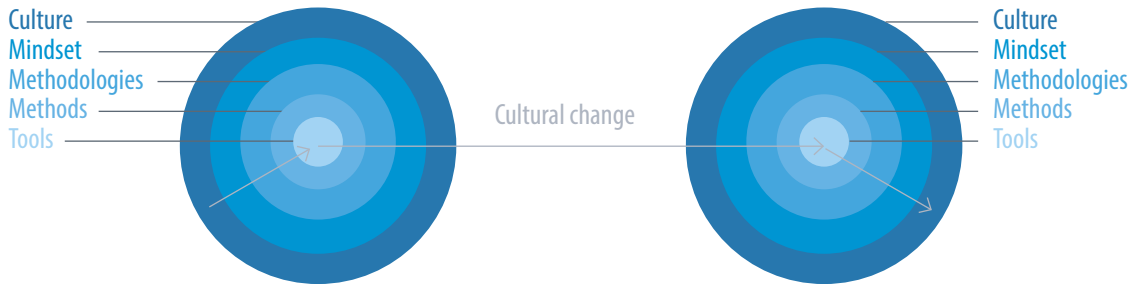
> Figure 28:
Cultural
change via
methods and
tools (Sanders
and Stappers,
2012).

The toolkit should thus offer simplicity and depth; simplicity is offered by clear and visual explanations and examples and depth is offered by referring to further reading and an adaptable format. The tone of the document is positive and open for discussion, inviting criticism and improvements to be done.

This way of introducing change in an organisation follows the contextual layers of cultural change as shown in figure 28 (Sanders and Stappers, 2012, p. 277). From an envisioned culture change, the mindset up until the tools are determined and with that perspective, the change can be initiated from the inside out. Keeping this change in perspective is useful to evaluate the tools in their ability to change the methods up until the culture.

The result of developing the toolkit is a manual with additional documents as shown in figure 29. They are not fully incorporated but presented additionally, but here a few pages are presented to give an idea of what it entails and what it looks like.

Service innovation toolkit

Ford service
innovation **manual**

Ford service
innovation **templates**

Ford service
innovation **posters**

examples of spreads

> Figure 29: The
service
innovation
toolkit consists
of a manual,
templates and
posters.

Toolkit structure

As presented in the previous chapter and figure 30, the toolkit is structured like a manual with tools and methods in it, together with posters and templates to give every process the same look for consistency. Quick recognition will help the speed of the sessions.

Ford service
innovation manual

Service innovation manual

An introduction to service innovation

The service innovation project and methodology is described. This is also useful for readers in other parts of the organisation who do not know what service innovation is. Because service innovation is a new concept for most people reading the manual, an explanation is given about why service innovation is needed and how it connects to Ford. This part is presented in interview style to enable readers to quickly scan through it to see where their specific questions are answered.

Service innovation principles

After this the principles of service innovation are presented. Because the process and way of working is different from the regular development processes, it is important to point out what service innovation is implying to the way people work with it.

Service innovation map

To give an overview of all methods and how they interact with each other, the service innovation map is presented. The tools and methods are structured here and it should help to decide which methods to use (next). A short description per phase is also given.

Service innovation toolkit

Ford service
innovation **manual**

Ford service
innovation **templates**

Ford service
innovation **posters**

> Figure 30: The
service
innovation
toolkit consists
of a manual,
templates and
posters.

Creative sessions and facilitation

The facilitation of these sessions is important and different from the current facilitation of sessions. Next to that the people reading the manual should know how to facilitate their colleagues in the process of developing service concepts. How they can do this is explained in this chapter.

Methods in stages

Here the order and structure is presented of the methods used. Because the methods belong to a certain stage, they are grouped in the process visual as part of the user context, concept context or business context shown in figure 31.

> Figure 31: The
stages of ser-
vice innova-
tion.

User
context

Concept
context

Business
context

Structure per method

Each method included in the toolkit is shortly described. To be able to quickly discover them two pages are used to give examples, an idea of the purpose and outcomes of the method and some further reading to encourage them to dive deeper into the method. The outcomes are presented in iterations to show that the method can be used differently in different project stages and to encourage the team to begin using the method, get results quickly and then iterate in later stages. Each method contains a visual overview of the process and an example of how such a session could be organized. It can be used right away, adjusted along the way or adjusted before organizing a session, which will be preferable to get the best results and tailor a session to the specific project.

To encourage the organizer of the session to separate the diverging and converging phase, the diamond shape is used. Most creative sessions and design processes rely in some way on the double diamond, consisting of the stages discover, define, develop, deliver (Design Council, 2010, also see figure 32). Buijs & van der Meer (2013) and Tassoul (2005) add clustering between the diverging and converging stage, which can be incorporated but is left out to keep it simpler. All tools and methods in the manual are structured like this. The example sessions are all based on a two-and-a-half-hour time slot. This is realizable but still gives enough time to develop an idea or concept. A proposal is done on how to divide the timeslot into the activities. The entire session is scalable into bigger or smaller timeslots but this gives an idea of how it could be organized.
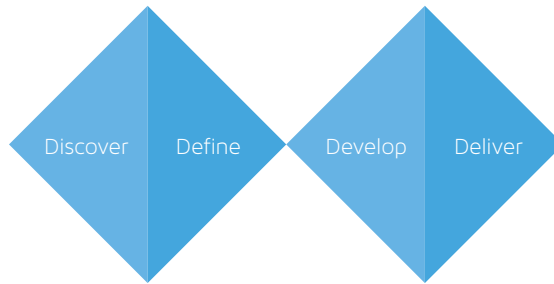
Going Further

Very briefly realisation or implementation are discussed.
No detailed pointers are given because they would largely
depend on the type of project. Where it goes from there
will also largely depend on the situation and management
decisions. For vehicle and technology development, there is
a highly coordinated product development process which is
also necessary to develop safe and robust products.

Further reading

To inspire the team and motivate them to read further on a
certain topic, reading materials are proposed in categories. The
books, tools and methods shown are for a great part also used
to design the toolkit, so they are also roughly the bibliography
of this thesis.
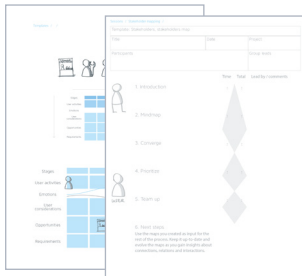
Ford service
innovation templates

Facilitating sessions with templates

To be able to organize the sessions, another document
provides templates, session outlines and posters to use in the
creative sessions and the user-centered process in general.

Facilitating sessions with Posters

To help facilitate the sessions around service concepts, posters
are provided that show the methods, stages and trigger
questions to improve and alter (parts of) concepts.
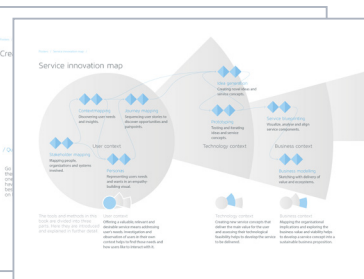
Ford service
innovation posters

Toolkit methods

Most service innovation models focus on the end user and to act on that contain a set of methods. This chapter argues why certain methods are incorporated.

Toolkit size

Several service innovation models use a range of methods and tools to help create solutions. Some models propose using only a few methods and some offer an extensive set to select from. Here a set of maximum ten methods is incorporated to keep the process manageable and encourage the users to start using these methods.

Adaptation

All service innovation tools incorporated should be appropriate to use within the Mobility team and fit or adapted to develop mobility services. They also carry the Delft design methodology to use best practice in user-centered design.

User context

In the user context, user research is done which inspires new ideas and innovations for the user.

Stakeholder mapping

Stakeholder mapping gives a holistic overview of the relationships between stakeholders. This reveals insights about the user(s) or helps finding opportunities for the organisation. This method is incorporated because it is a relatively short step in the process and visualizes involved stakeholders and is used in the other methods. Stakeholder mapping helps to put the user central in the process by presenting the user perspective and their role in a new innovation. Because service innovation implies many different stakeholders and relations between them, it is useful to create an overview of these and choose which ones are most important or crucial to the successful completion of the project. An overview of the different stakeholders and their relationships also helps finding opportunities for the organisation to make an impact.

Context mapping

Contextmapping is used by Xi Xu, Sirui Li and Sofia Hnatiuk in their graduation projects for Ford. In these projects, it investigated the real needs in the everyday work of van users and tries to view their activities holistically to gain deep user insights and develop them into solutions that make an impact. Contextmapping creates a holistic overview of the everyday lives of people and uses generative techniques to uncover latent needs and helps to create user insights. It is incorporated because it inspires designers to create something of user value (see figure 18) and helps to create ideas in several directions. The outcomes might be much broader than Ford's current activities, but fit perfectly in the emerging opportunities. Exploring technological and market opportunities is already in Ford's portfolio of methods. Exploring the context of use and users informs the team how and why the product is used, and creates a much broader view of the offered service. This is incorporated into the design process and will inspire ideas that explore several different directions.

Personas

Personas are used to build empathy with the user(s) and to present user insights. Personas are incorporated to use further in the process. All three contextmapping projects acknowledge the importance of personas by incorporating them.

Customer journey mapping

Customer journey maps present the user story and visualize information about the journey clearly and shortly. It can be used as presentation of a current service or for a proposed service. The latter may be harder to map because there is no existing data or research, but a user story helps to create an overview of what the service is about and how it works. It can also inform requirements for different parts of the journey. Because the user story is important but also more difficult to deviate from to disrupt and create novel ideas, trigger questions are included to create alternative stories and actions, inspiring more diverse ideas.

Concept context

In the concept context, ideas are generated to serve the user and developed in iterations of several prototypes into a service concept.

Idea generation

Idea generation is incorporated because it needs a structural approach. The team is already experienced in idea generation but the execution can be more effective. The idea generation is fed by all steps before it, so the session and the quality of the ideas depend on these steps. To structure and adapt the sessions some diverging and converging tools are presented.

Diverging methods

Diverging methods are presented that are easy to explain and use.

Converging methods

Four converging methods are incorporated. Two of them are used for choosing from a lot of ideas quickly, and two others are used to evaluate three to five concepts that are further developed.

Service prototyping

Prototyping is essential for the generated ideas to explore, evaluate and develop different directions. While the team has experience with physical prototyping, some methods are presented to explore and test service prototypes, which can be a challenge because they are less tangible and harder to test. This is why service prototyping is also incorporated. Because the (kind of) prototype is dependent on the exploration or test to do, a few prototyping methods are presented to give the team an idea of what they can use in their specific situation.

One prototyping tool that is especially well-suited for services is presented. Scenes (Detken, 2016) is a method to quickly create storyboards that visualise design solutions.

Business context

In the business context, ideas are converted into business opportunities. While business modelling is already experience, having used business models extensively, two methods are incorporated for service innovation.

Service blueprinting

To map the implications of a service and the system that supports the service concept, service blueprinting is incorporated. It is a technical lay-out of the design of the system that is needed to deliver the service, and creates an overview of the parties involved. It connects the front end to the back end of the service.

Business sketching

A business model is a representation of a company's underlying logic (Shafer et al, 2005) and a representation of how a company creates, delivers and captures value based on its strategic choices (Osterwalder & Pigneur, 2010). It can also be described as a revenue model is the system design by which a business monetizes its services.

While business models are extensively used by the team, creating ideas for the business model and quickly creating alternatives for it is less used. This is why business sketching is incorporated. It uses the Business model toolkit and Business model canvas to give pointers to the elaborate business modelling process.

It helps to create business models tailored to the offered service and sketches and defines the relationships between stakeholders, and what kind of value is exchanged between them.

To help create alternatives quickly, trigger questions are given that should inspire creative thinking.

Evaluation

After introducing service innovation to the Mobility team and designing a service innovation toolkit for them, the results of these efforts can be regarded as positive. A first impression of results are given and a proposal of how an evaluation could be done in the future.

First impression

A first impression is that service innovation is being used more intently and extensively than before the start of the project. The team reacted positively towards using this user-centered design methodology, and most reactions to the workshops and facilitated sessions are positive and acknowledge that applying service innovation to design mobility solutions is valuable.

Research proposal

To fully understand the results of this project, the team should be analysed over a period of time as shown in figure 33. This gives the team time to implement the methodology in their routine. This research should include evaluating the introduction of a user-centered design methodology and the design of a service innovation toolkit. After a period of at least one year, a user test could be executed that takes into account the use of the service innovation toolkit in several projects.

Earlier graduation projects

Periods of evaluation

The current project

Transformation of implementing a user-centered design methodology to design mobility solutions
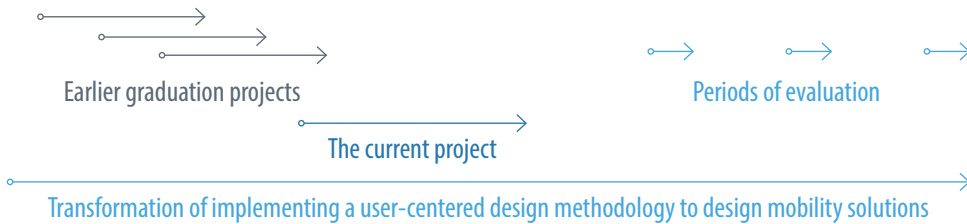
> Figure 33: Periods of evaluation after the current project.

The research could consist of the following questions:
› Is it clear what service innovation means and implies?
› Does the service innovation methodology help to discover (future) user needs?
› Does service innovation help to design appropriate mobility solutions?
› Are other teams implementing or interested in service innovation?
› Does the application of this methodology help Ford transform into a more user-centered organisation?

The results should lead to further recommendations of how to use and implement a user-centered design methodology, adaptations to the approach and further measures to help the team design for mobility solutions. In more general terms, the research should help to understand how teams can best implement service innovation within a manufacturing organisation, and how service innovation interventions help an organisation become more user-centered.

Conclusion

On first impression, service innovation is being applied in the team and helps to design mobility solutions. First signs are that the team reacts positively on the methods used and sees the value in applying service innovation as methodology to connect and balance user, business and technology aspects. To further investigate the results of this project, the team should be researched after a period of at least a year. The next project is already in place which means the team is further developing and implementing service innovation.

"HOWEVER BEAUTIFUL THE STRATEGY,
YOU SHOULD OCCASIONALLY
LOOK AT THE RESULTS."

WINSTON CHURCHILL

Source: Ford (2016).

GOING FURTHER

After presenting the context and proposing a solution, results are discussed and recommendations are done to develop the solution further.

Results

The results of this project can be grouped into three aspects. The first is introducing the team to service innovation, the second is helping the team to apply it and the third is the creation of a service innovation toolkit.

A user-centered design methodology

The Mobility team was introduced to service innovation as a user-centered design methodology through the workshops from ID-Studiolab which was further applied by me to specific projects the team was working on in conversations, several meetings and idea generation sessions.

Helping the Mobility team to apply it

To help the team to apply service innovation, an internship is done in which I could help the team to apply the methods and tools of a user-centered design methodology. In conversations and organisation of some meetings I could apply the methods that help to put users central in the process and to create a more holistic perspective on them. The next intern is attracted to help the team further in their efforts.

Service innovation toolkit
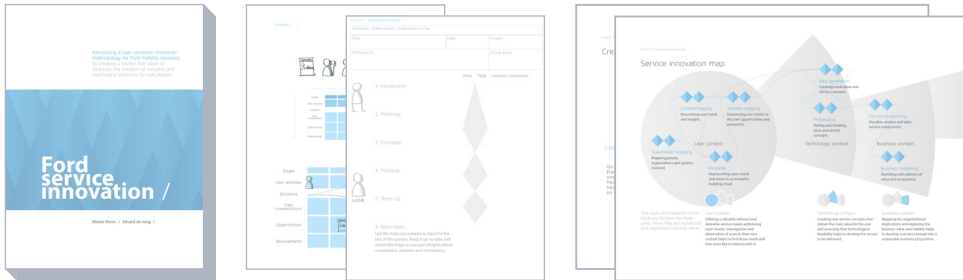
Ford service
innovation **manual**

Ford service
innovation **templates**

Ford service
innovation **posters**

> Figure 34: The
> service
> innovation
> toolkit consists
> of a manual,
> templates and
> posters.

Creation of a service innovation toolkit

The created toolkit as shown in figure 34 helps the Mobility team to structure the design process for innovative mobility solutions. The manual is designed as reference guide for the methodology and the used methods and tools, and the templates and posters are designed to help facilitate the innovation process in specific projects.

Conclusion

In conclusion, the results are threefold. The Mobility team did not only receive information about service innovation but experienced the methods hands-on, received training and guidance in their efforts to develop mobility solutions. The toolkit helps the team to structure the innovation process and apply the methodology in a diverse set of projects.

Recommendations

Based on the results described earlier, I recommend the team to take this project a few steps further. These are described below.

Service innovation in the organisation

To help the organisation to expand towards an automotive and mobility company, the Mobility team could introduce other departments to the user-centered design methodology presented in this document. The toolkit could be presented as a set of methods that help to identify opportunities for 'technological' development. The methods and tools are also useful for the early stages of the current product development system. One way to engage other departments is inviting them in service innovation projects. Another way is to present the methodology to for example the Learning and Development department or Ford Smart Mobility Llc.

Research for mobility solutions

Ford is expanding into an auto and mobility company. Research and concept development is already in place for the 'auto' part of the organisation, but less in the 'mobility' part of the organisation. While Ford Smart Mobility is set up to disrupt and create new concepts and innovations for Ford, it is also important that this feeds back into the technological and vehicle development organisation. Creating a few teams that help the mobility part forward but keep a foot in the original organisation to function as bridge would be key to keep the company and knowledge within it connected.

Mobility solutions are best developed when there is fit between user, technology and business aspects. These aspects need to be tailored to each other and thus need an innovation process that develops them together. This is also why business model innovation and user research have to be involved with the R&A department. Going through the service innovation stages will help achieve this.

Make it strategic

To create a more strategic place for design, it can be presented as part of research. Because these two aspects are equally important to create mobility solutions, they should be implemented in the same parts of the organisation.
R&A already designs technology by doing research, so it is appropriate to develop these technologies by using design methods.

Invest in user-centered capabilities

To facilitate the service innovation process, the multi-disciplinary team could benefit from attracting designers. It could also benefit from attracting a diverse set of other perspectives to create concepts from a broad perspective, helping to think more holistically about the developed concepts. This could also be done by involving students, student teams and other Ford departments in the service innovation projects.

To develop ideas into service concepts prototyping is needed. These can fuel iterations between idea generation and concept development and offer quick learnings when done appropriately. Other capabilities could also benefit service innovation projects, some depending on the specific projects. Capabilities include: visualisation, storytelling, creativity, software and hardware prototyping, facilitation, systems thinking, entrepreneurial skills, psychology, business modelling.

Let mobility solutions feed into GTDS and GPDS

The toolkit can be used to create service concepts that inform the GTDS and GPDS and feed their discovery stages. Creating these routes helps the acceptability of using these methods within a technology research department. By evaluating ideas early on user and business value, the chances of successful integration into GTDS and GPDS should increase. To reduce time-to-market it is not recommendable to keep the service innovation process in front of the GTDS and GPDS.

Measuring innovation

To help Ford transform into a user-centered organisation, propose to measure innovation not only on the quantity of IP, but also on the value for the user of a specific IP. Due to the complexities of services and overall solutions this is a challenge, but a suggestion could be to collect user reactions and evaluate user acceptance and user satisfaction (Hart et al., 2003).

Apply service innovation to the organisation

Another recommendation is to apply the user-centered methods to the organisation itself. Who is the user and what is the value for them? What is the value for the business? Map the transformation of Ford towards a user-centered mobility organisation. What effect does it have on work streams and capabilities? What assets can be leveraged and what needs to expand or change?

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Introducing a user-centered innovation
methodology for Ford mobility solutions.

This master thesis discusses a user-centered innovation methodology for Ford mobility solutions. A toolkit is created to help the Innovation Management and Mobility team to structure the creation and development of valuable and meaningful solutions for real people. The methods and tools help to create a holistic perspective on users and the way they experience services.

Ford
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