Data fuelling Scania's future business

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Acknowledgements

With this report I finalize my master thesis in Strategic product design. Over the past months I have been able to work on this project for and in collaboration with Scania. This allowed to dive into an industry that was new to me and is undergoing the largest transformation since the invention of the combustion engine. I am grateful for having had that experience.

On the side of Scania I would like to thank Sarah, Robert and Johan for supporting me on this project, being valuable sparring partners, showing me the way around in Sweden and your flexibility during unprecedented times.

Secondly I would like to thank Lianne and Bart, my supervisory team of the university for your advice, enthusiasm and involvement with the project. And additionally thank you for the support around the unanticipated, early return to the Netherlands.

Lastly I wish to thank my family, friends and others that have contributed to the process of this project in every way imaginable.

Enjoy reading,

Winand van Hasselt
August 2020

List of used abbreviations

AV	Autonomous vehicle
BEV	Battery electric vehicle
Cold Chain	Cooled transport
DC	Distribution Center
DaaS	Data as a Service
ECCI	Connected intelligence team in R&D
EDI	Electronic Data Interchange
ERP	Enterprise resource system
ETA	Estimated time of arrival
EV	Electric Vehicle
FMP	Fleet management portal
FMS	Fleet management system
IOT	nternet Of Things
ITRL	Integrated Transport Research Lab
KSAC	Business development team connected services
LSP	Logistics service provider
LaaS	Logistics as a Service
MaaS	Mobility as a Service
OEM	Original Equipment Manufacturer
R&D	Research and development
Reefer	Refrigerated container
TCO	Total cost of ownership
TMS	Transport management system
TaaS	Transport as a Service
VaaS	Vehicles as a Service
WMS	Warehouse management systems

Executive summary

Scania is a Swedish manufacturer of trucks, busses and marine engines. With more than a hundred years of manufacturing experience Scania has built a track record of highly reliable and energy efficient trucks. Over the years Scania has been expanding their offering with maintenance services and later with data driven services to assist their clients in their daily operations. This thesis proposes an innovation strategy and service proposition for building on these data driven services.

The transport system is currently undergoing a transformation, led by trends like electrification, digitalization and connectivity. These trends have effects on how the value network of transport and logistics is organised and offer space for new business models. For Scania this means that there are opportunities to rethink favourable positioning in the value chain and develop business models, related to data driven services. To explore these potential new business models and positioning, this thesis aims to create a strategy, captured in a roadmap, supported by a new service proposition captured in a use case.

To create an according strategy and service proposition the internal environment and customers, value network, consumer context, market trends, technologies were analysed. These aspects formed the foundation for defining a strategic direction and future vision on data driven services. With this project the decision was made to narrow down to one specific application of transport to be able to provide more focus and in depth contextualisation. The chosen application was cooled transport for grocers, due to the perishable nature goods and transformation towards e-commerce. The future vision that was developed based on the insight gathered is: “Providing carefree cooled logistics.”

With this future vision a new service concept was developed that supports grocers in operating their logistics operations carefree by enhancing trust, increasing transparency and operational efficiency. This is accomplished by a combination of load sharing and secured data sharing, in which blockchain technology plays a key role. The concept was captured in a service blueprint and further illustrated in a use case.

Finally the concept has been captured in a roadmap, to build a pathway towards reaching the designated vision of providing carefree cooled logistics. Although the service concept and roadmap are targeted at cooled transport for grocers, some needs and principles are transferable to other applications of transport, creating further opportunities for service development for other applications of transport.

Content

01. Introduction

This chapter serves to set the stage for this thesis project. The chapter starts by outlining the context of the project. Furthermore the problem definition will be discussed and the approach of the project will be explained.

1.1 Project context

Road freight is the leading form of freight transport in Europe, accounting for 70% of freight transport. (Roland Berger 2018). The overall freight transport volumes are expected to increase and will in the end be coherent with economic growth. (McKinsey 2016 & Roland Berger 2018). Up until recently the transport industry has not changed a lot, yet today the industry faces several challenges it needs to adapt to. These challenges are caused by changing consumer behaviour, global trends, technological developments and new logistics concepts that are emerging. Within the changing context, inefficiencies in the industry are being exposed and that is where new logistics concepts emerge and new business models start to thrive. This creates both opportunities and threats.

For OEM's this means that they will have to rethink how to create value. Up to now they predominantly live off the sales of capital goods. This has a consequence that their customers are full owners of trucks. Although the ownership of vehicles enables them to carry out the job they have to fulfill, ownership of vehicles is not the job to be done itself. The actual job to be done is providing profitable and sustainable transport and logistics services. The discrepancy between the sales of trucks and providing transport and logistics services creates a pool of opportunities to assist their customers into delivering upon these transport and logistics services. Over the years Scania has reacted to this by shifting it's business logic and riding the wave of servitization through offering maintenance services, that assist customers in uptime of vehicles and later on equipping trucks with telematics devices to assist in managing fleets and other data driven services.

At the same time they have been investing in electrification, autonomous vehicles, connectivity and digitalization as Scania believes that these technology domains are essential to to drive the shift towards a sustainable transport system and being able to assist their customers in running profitable operations. However what business logic will be applied and which new revenue pools will be tapped into remains open.
This thesis therefore seeks to contextualize the future landscape of the transport industry and accordingly develop a strategy to create new service propositions with regards to data as a service.

Connected services
This project is being done cross functionally from both the department of connected intelligence (ECCI), which is a part of R&D and connected services business development (KSAC) which is a part of Sales and Marketing. ECCI mainly works on building the technology infrastructure and building connectivity solutions that enable data analytics. KSAC focuses mainly on developing and rolling out connected services to their customers. One of the challenges for this assignment is to create material that assists in creating a more parallel data driven service development process. To build the right capabilities and technology infrastructure ECCI needs to know how new services will work and look like. The other way around KSAC needs to know, when developing services upon customer insights, what is technologically feasible. A more parallel approach makes service development cycles shorter and creates a strategy that is built more customer centric.

1.2 Problem definition

With the landscape of the transport industry new technologies and market development are changing the way business has been rattling on in the past decades. Traditionally the business models for OEM's in the industry were based on the sales of capital goods. Today many OEM's have adopted some degree of servitization, providing revenue from service offerings or digital offerings. These digital offerings from the OEM perspective rely on providing data as a Service. Therefore

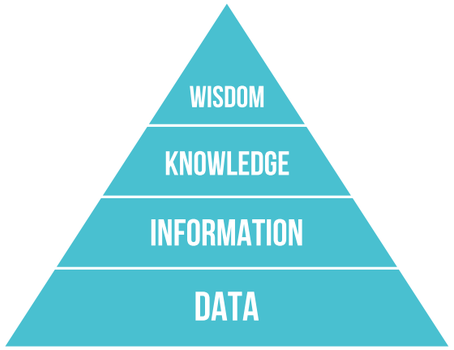


Fig.1: DIKW pyramid.

data as a service has become a substantial part of Scania's business. The question then becomes: 'How to expand Scania's business from data as a service within this future context and what are new service propositions in there?'

In order to answer that question fully, two other research questions need to be identified: Who is Scania's future customer? What is Scania's desired future position?

As mentioned in the introduction one of the challenges of this assignment is creating a parallel service development process. In figure 2 the value of data at different places in Scania is represented according to the DIKW framework as described in Rowley 2007. As seen in figure 1, Scania's connected vehicles send out data. This raw data does not carry any value at itself as in reality it is a set of unorganized numbers at this state. It becomes valuable when it is given context and makes it interpretable. When given context and being interpreted it can be classified as information. More value is added when information is being organised and patterns

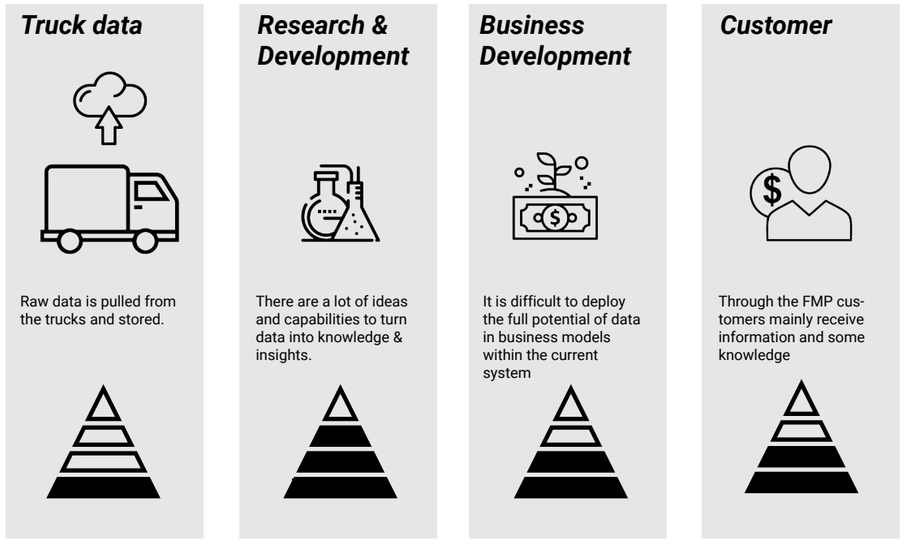


Fig.2: Obeservation on processing at Scania

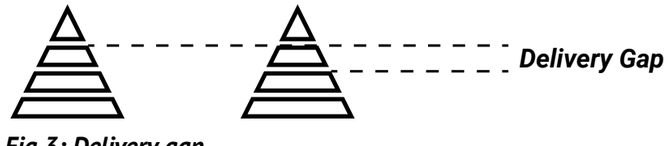


Fig.3: Delivery gap

start to emerge. Then it becomes knowledge according to the DIKW framework. The final step is when that knowledge is being used to forecast future probabilities and understanding why this happens. Then it is called wisdom. These different levels of value are being captured in the DIKW pyramid. (figure 1)
Looking back at the process, it shows that Research and Development (EC) is able to give meaning and context to data through the infrastructure and the solutions it has and can build, climbing the level of the DIKW pyramid. However when in reality services are being developed and deployed in the market by Sales and Marketing (KS) tend to be on a lower level on the pyramid than is technically feasible. That difference is what is illustrated by in figure 3 and is visualised as the delivery gap. The difference between the potential and what is actually realised today has to do with uncertainties about new business models, a software architecture that is slowing deployment down (KS employee and Program Area Leader ITRL) and with a predominantly sequential service development rather than parallel., figure 4(KS business development)

The assignment therefore also seeks to provide an answer on how to close this delivery gap and align the process of connected service development more.

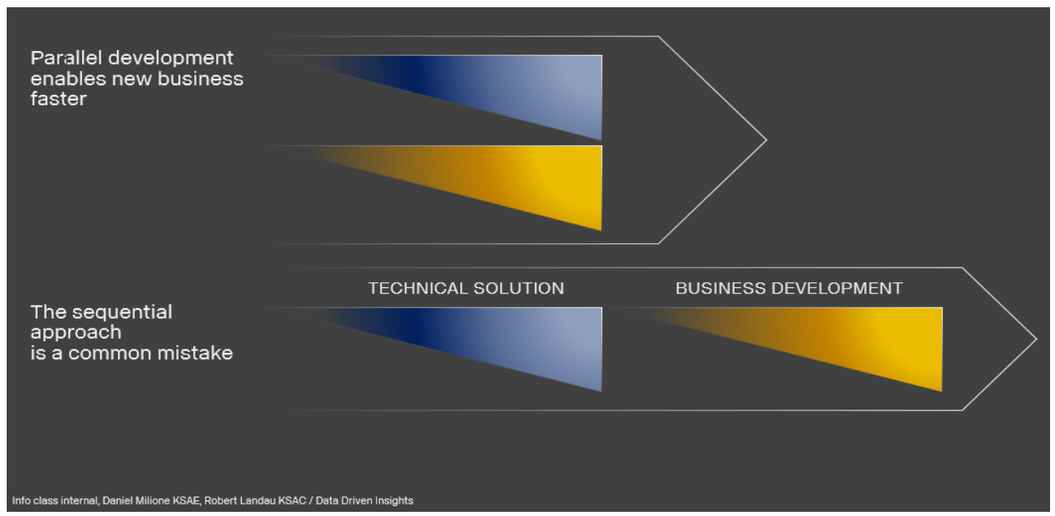


Fig.4: Parallel versus sequential business development

1.3 Approach

For this project the double diamond process (Design council 2015) was chosen as a general outline for the project. This is characterised by two consecutive diverging and converging phases which form the two diamonds. Within this outline elements and principles of several different methods were applied. These were service design, ViP, Roadmapping and a use case have been applied.
Within the project elements of service design were adopted to create user centric and holistic service solutions. A part of the contextualisation was performed based on ViP principles as it allowed me to merge my personal vision and beliefs into the project (Hekkert & van Dijk 2011). Further the roadmapping was applied to create a future oriented strategy that balances market pull with technology push(Simonse 2018). Lastly to make the service fully become a live, the proposed service was illustrated in a use case. A visual representation of the process can be seen in figure 5.

Discover
In the discovery phase the internal and external context of Scania are being explored. This phase started off with a literature study into servitization, connected products and digitalization. Furthermore internally and externally context is being explored based on interviews with various Scania employees, several industry experts and customers. On the internal part the interviews in combination with observations and desk research are used to analyse Scania's business model, strategy and portfolio. On the external side customer and expert interviews combined with desk research assisted to contextualize customers needs, the value chain, trends and industry developments. Insights of this phase were used to construct a future context.

Define
Within the define phase insights will be combined to assess what the consequences are for the future context of Scania. After mapping those insights in the discovery phase, a strategic direction and future vision for scania on data as a service are created. This will assist in creating a design direction so that a meaningful service can be developed. For setting up the strategic direction the impacts on the customers and value network were discussed in the form of the future customers and future value network. Combining possible scenarios with Scania's strategy led to the creation of the strategic direction. For the creation of the future vision a value mapping session was held to formulate value drivers. This was combined with several individual iterations. Together the future vision and strategic direction gave input to the design brief, which served to guide the development of a new service concept that is supporting the future vision.

Develop
In the develop phase, the new service concept is being created. The goal is to create a concept that supports this in the long term. At the same time it will be targeted at a very specific application of transport yet in a way that it is scalable and wider applicable as a concept. The development phase was built mainly on individual idea generation with some sparring sessions with peers (as the covid-19 pandemic made it more difficult to plan a creative session.) In the development phase service blueprinting, business modelling and use case were applied. The use case here specifically was chosen to detail the concept more, illustrate it and make it lively and more relatable.

Deliver
The deliver phase is about creating a pathway towards the developed concept. This was done in the form of a tactical roadmap to communicate what is necessary on the service development side to create this new service and serves to illustrate how to do that for more potential services. The roadmap splits up this pathway into several horizons which have distinct service propositions, business models, data sources and technologies supporting them. This way a consistent evolution of the service proposition towards the desired future vision can be generated.

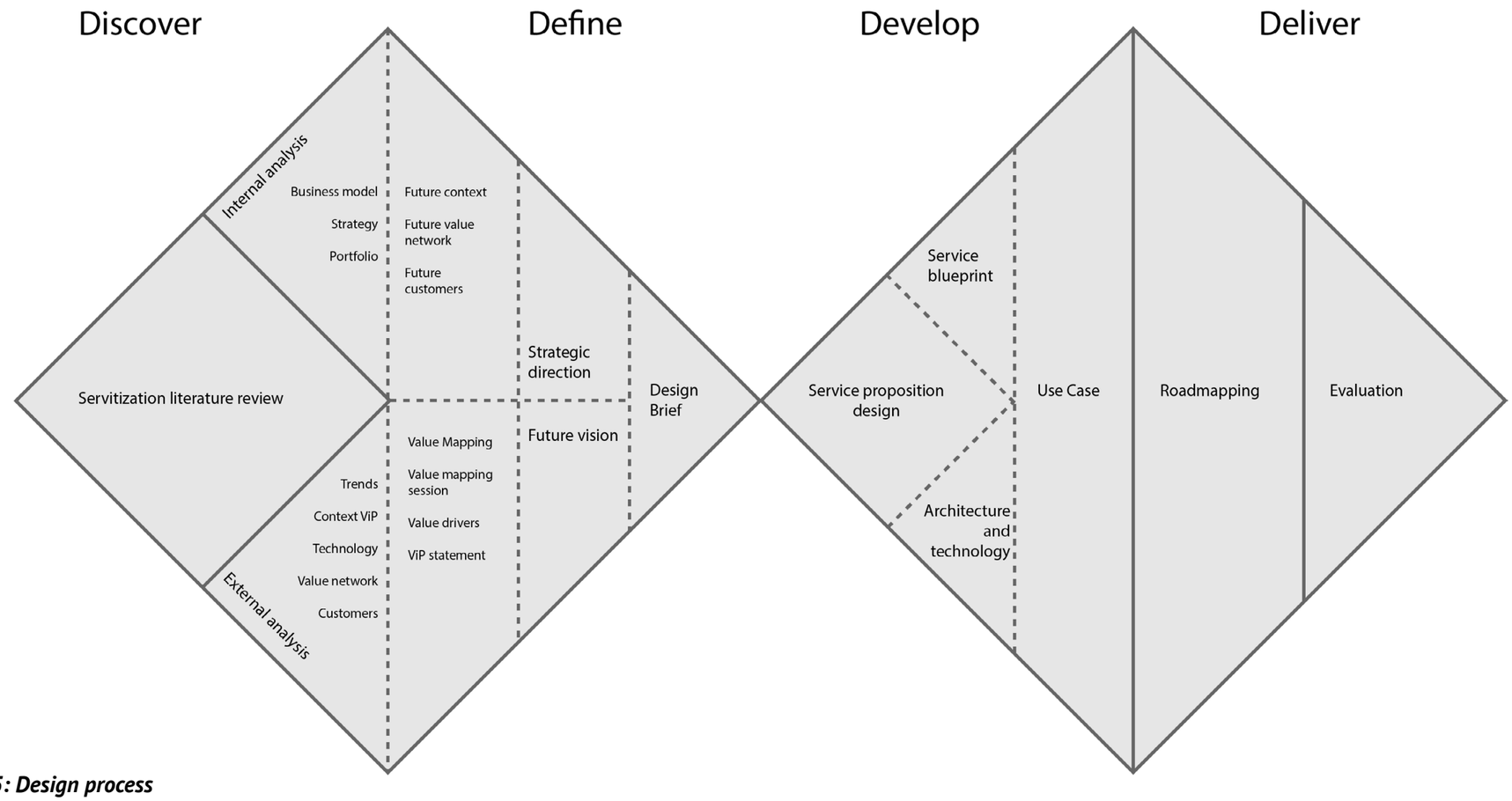


Fig.5: Design process

02. Servitization

In this chapter literature research on servitization and digitalization are discussed. The aim of this is to create an understanding of what servitization implies for the development of new data driven services. Therefore insights gained from this chapter aid in the construction of the strategic directions and future vision on data as a service for scania

2.1 Servitization for manufacturers

The definition of servitization according to (Kowalkowski et al. 2016) is" the transformational processes whereby a company shifts from a product-centric to a service-centric business model and logic". As servitization here is mentioned as a transformational process, one can sense that in the case of large established product centric companies this process does not happen overnight and brings some challenges. So why are many large product centric companies servitization? Although servitization is mostly customer driven, reasons for companies differ (Vandermerwe & Rada 1988). For some it comes natural to progress into services, some identify it as new opportunities and for others it is used as a tool to differentiate and extend the lifecycle of products and keep revenue flowing in with that. The overarching reason here is of competitive nature.

2.2 Advantages

Over the years numerous studies have pointed out advantages of servitization for manufacturers. One of the advantages is that it creates a stable source of income with the recurring revenue streams services generate (Wilkinson et al. 2009.) Furthermore it locks customers in by creating dependency (Vandermerwe & Rada 1988). Thirdly it increases the customer satisfaction (Mathieu 2001) And that in turn contributes to creating loyalty. (Penttinen & Palmer 2007).

In the process of servatization, according to Vandermerwerde & Rada originally three stages were identified ranging from stage 1; delivering goods or services, stage 2; delivering goods and services to stage 3; delivering goods, services, support, knowledge and self service. In this last stage 'bundles' are mentioned by Vandermerwerde & Rada, which essentially are whole solutions being delivered to customers. By going through these stages or further companies are switching their business logics from a product dominant logic one to a service dominant logic. This means that the value is no longer created in capacity but in situated use. The offer then also moves from product first with assisting services towards offering solutions with products that assist in the solution. (Lindhult 2018) With that also the innovation orientation changes form an inside out orientation for a product dominant logic to an outside-in orientation of innovation based in customer context.

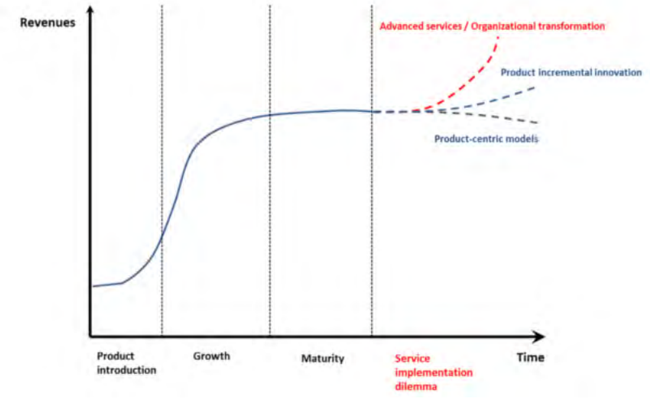


Fig.6: Service implementation dilemma (Bustina et al. 2017)

2.3 Challenges

As hinted before, this process does not come without challenges. Once service infusion leads to the creation of more advanced services the companies face a dilemma that this requires change on how the company is organized. (Bustina 2017). The challenges that servatizing companies will face are: the organizational structure, the business model, development process, customer management and risk management. (Bustinza et al. 2017). Adding to that Lindhult identifies that with the adoption of new business logic service traps, which in the case of a service dominant logic is failing to truly understand the customer context. This stresses the importance in internalising an outside-in innovation process while servitizing.

2.4 Adding connected vehicles and digitalization

Currently a large part of Scania's service offerings is being created with connected vehicles, to manage these vehicles smartly on a distance. These so called smart connected products unlock opportunities that cross traditional product boundaries, moving from solely focussing on the asset or product itself towards the product system it is functioning in. (Heppleman & Porter 2014). With the creation of the digital services around connected products, a third business logic can be adopted; virtual based value logic. (Lindhult 2018)The value is then created in virtual, distributed intelligence and the offer in the form of embedding the intelligence in both product and service. Similarly the risk for a service gap is present. In this case that happens if information is presented too complex, unspecified or incorrect for the users to make judgements they need to make. This also highlights the importance of a user-centred approach for the creation of digital tools, to create a true understanding of the users and what they actually need.

Blurring system boundaries

In the end the potential for smart connected products can also lead to the blurring of system boundaries meaning that connected products will be interacting with other products within different product systems. (figure 8) When products are interacting in multiple systems, the competition for these products also changes leading to a business logic; system based value logic. Value is then created between enabling and use of different contexts. The offer then goes beyond product of service specification and requires a co-innovation process. Here the trap is that relational complexities between actors can lead to a sense of unequal distribution between the delivering value and the sharing of value. This can lead to actors refraining from contributing to these services. (Lindhult 2018) Consistently with these findings (Pernestal 2019) identified several scenarios for how digitalization will change freight transport, in which one of the uncertainties was the dominating organisational structure. Depending on the willingness to share information outside organisations more of a network based logic can be adopted and a more open and platform based environment can be created. Where ITRL argues that it is an uncertainty, Heppleman argues that closed approaches will become more challenging to sustain over time as technologies spread and customers resist being limited in their choices. With regards to that, it seems that this uncertainty is dependent on the capability of organisations to create the right incentive for sharing and creating mutual service synergy.

While riding the wave of digitalization and servitization for many organizations it is a challenge to link the external ecosystem in which they are operating to their internal organisation, software platforms, architecture and processes. (Bosch 2014). Rather than intentionally adjusting their internal ecosystem to how they engage with the external ecosystem, often this happens more based on convenience for the organisation. This

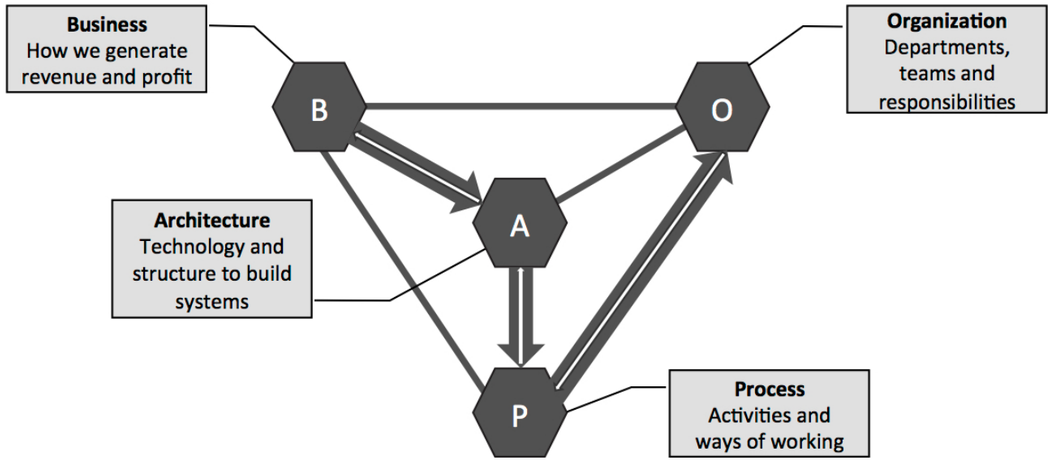


Fig.7: BAPO-model (Bosch, J. 2014)

ideal scenario is captured in the BAPO model, figure 7. (PWC 2016) affirms this for the transport and logistics industry and points out that the largest challenge at the moment is the lack of a digital culture and digital training.

2.5 Conclusion

Though it is evident that servitization and digitalization offer many opportunities for OEM's, creating the right setting to capture that value has quite a consequence for their organisation, as different business logics will be required. Though different logics are not mutually exclusive within an organisation (Bustina et a.l 2017) different logics require other organisational processes and structures and a different interaction with customers and other stakeholders. This implies that on an organisational level Scania will be able to exist on the sales of capital goods whilst new service and digital oriented business models are being matured through building new service propositions and platforms. Over time this can lead to a change in business logic for the entire organisation, yet in the near future it seems unlikely due to the current established revenue model of the organisation that this will happen soon. It therefore seems more likely that different business models within the organisation will co-exist, where new more service and digital oriented models are being grown on the side to assist in getting the job done for customers. From the literature that was reviewed it seems that the following steps can be useful for Scania to generate value in the wave of servitization for service development as described in this assignment.

Adopting a holistic and overarching view

The opportunity for scania to expand data driven services is highly reliant contextualizing customers needs and exploring relations with other actors in their playing field. For next steps in the wave of servitization and digitalization this means adopting a more holistic view of the transport system, where also is being looked at logistics.
For the development of a strategy and propositions on data as a service and service this overarching and holistic view means offering solutions further downstream in the value network. Scania for instance currently assists hauliers in having a high uptime through offering maintenance services yet a step further downstream the buyer of transport just needs transport and does not care about uptime. Cooperating with haulier in delivering transport therefore are possible areas to look into for service development.

Focussing on the specific and situated use

Secondly as contextualization is essential for a service and virtual dominant logic, targeting at very specific use of Scania's trucks leverages the added value in service creation. For data as a service within Scania that means and understanding customers operational context truely to specify how to aggregate data and add value to customers based on their specific use.

Experimenting with multidimensionality of business models and overcoming relational complexities.

With the blurring of industry boundaries, aggregating data of customers for instance can offer value to another actor in the value network. With this, new dimensions in the business models can be explored. Yet this comes with a relational challenge that the reciprocity of value needs to be clear to create an incentive to cooperate in new dimensions of business models. An example of this reciprocity is that when a stakeholder is asked to share a certain information it wants to know what value that will deliver to the system or potentially that it gets something in return. As mentioned before it seems unlikely that these types of models will become main business for Scania as an organisation as it is an immature and underexplored area with uncertainties. Yet trialling in this area can lead to creating and capturing new value within the value network.

Within the transport context of current customers there might be more parties that overlap in context but are no customers of Scania. However they might benefit from certain data aggregations provided by Scania. An example could be road authorities that want to maintain roads and could potentially measure the quality of the road surfaces based on accelerometers in trucks. This is an example of what multidimensional business models could be for the further development of data as a service within Scania.

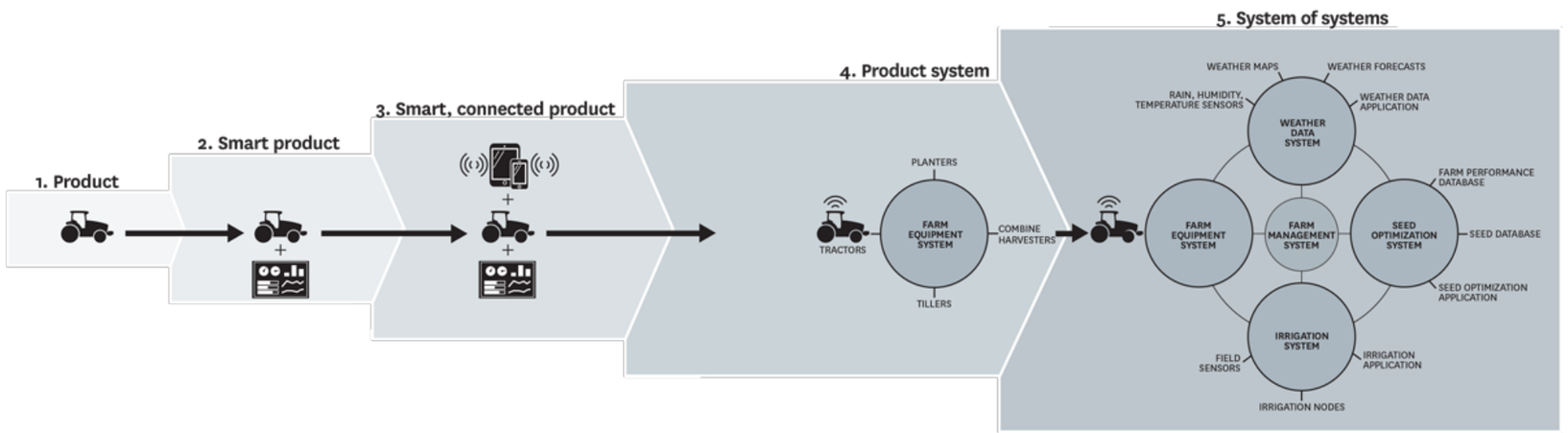


Fig.8: Redefining industry boundaries (Porter & Heppleman 2014)

03. Discover

This chapter describes the discovery phase of the design process. In this phase the context will be explored through both an internal and external perspective. The chapter starts off with an analysis of the internal part by going over the business model, strategy and current portfolio and related businesses. This analysis is based in both desk research, observations during several events at Scania, informal conversations and semi structured interviews. An overview of the interviews can be seen in table 1 and an overview of observations in table 2. After the internal part, the chapter dives into the customers of Scania and elaborates on the specific choice of the customer domain. Further the value network in which Scania operates is being analysed and the implications of trends and technologies reforming this landscape are discussed.

Overview of interviews

Internal interviews:

Head of central operations and digitalization Lots, Sweden
-the strategy of lots, future collaboration with scania, towards autonomous.

Business roadmap manager connected services, Sweden
-context on the service roadmap, future scenarios for Scania

Transport lab coordinator, Sweden
-Gain insight on logistics needs

Product owner KS, Sweden
-To gain insights into data assets and standards of connected services

Venture business manager city solutions, Sweden
-Gain insights on future business models for city transport and logistics.

Product manager applications, Sweden
-Get background on cold chain transport and how Scania is dealing with their customers there.

Developer R&D, Sweden
-Insights into Scania's development strategy, projects at data intelligence department

Business Developer New Technology, Sweden
-The role of Blockchain for scania, how blockchain creates value for logistics.

Senior Research Manager Transport Systems, Sweden
-Get insight into future context of transport systems.The strategic direction for Scania and the strengths and weaknesses of scania.

External interviews:

Program area manager ITRL, Sweden
-Background on digi goods project, future of transport system and business logics

Head of ITRL, Sweden
-Background on the ITRL research, future scenarios of transport industry

Former director & co-founder PicNic, The Netherlands
-Context of grocers and their needs, value drivers and business models.

Head of international logistics of Spar, The Netherlands
-Context on how logistics are organised for grocers and pains & gains. Future scenarios for grocers

Table 1: overview of interviews

Observations
During my time at Scania I experienced some of the working culture of Scania. Being aware of the organisational implications of servitization, I kept my eyes and ears open to observe what was going on at Scania with regards to how the company is evolving on the workfloor. The main events that were of input for my observations are listed below:

Innovation factory 5th december 2019 and 13th of january 2020.
-A series of events to stimulate entrepreneurship and innovation amongst Scania employees. The set-up was a combination of talks of Scania employees, related companies and workshops aimed at having employees forming multidisciplinary teams to tackle challenges and potentially building start-ups out of that.

Scania Hackathon 2019
-A hackathon that was organised to work on sent-in problems and opportunities by the participants that aimed mainly at making scania more data driven. This event was also held to stimulate some degrees of entrepreneurship amongst employees and start working on opportunities they identified in their daily work.

Group and section meetings
-During my time at Scania I attended several group and section meetings. By being present in some I got a feeling for how group and section interactions and dynamics are within Scania.

Table 2: overview of observations

3.1 Internal analysis

In this part the current business model, strategy, Scania's data driven portfolio and associated subsidiaries are being explored.

Scania is a Swedish OEM that produces trucks, buses and marine engines. They date back to 1891 and are rooted in the engineering culture that flourished in Sweden. Currently Scania is one of the market leaders in the long haulage industry and is known for reliable and energy efficient heavy long haulage trucks. Next to offering trucks they also offer product related services. Combining both they offer tailormade solutions for 36 different applications of transport such as long haul, urban, mining, construction and agriculture.

3.1.1 Scania business model

Scania's largest source of income is the sales of capital goods, including trucks busses and marine engines. Next to that about 19% of their operating income is generated through their service offerings which include repair & maintenance carried out through the network of roughly 1600 workshops associated with them worldwide, driver training, finance and insurance and. Furthermore another 6% is generated through reselling used trucks.

Value creation
Scania creates most value to their customers by assisting them creating more revenue on the one hand and saving them on costs on the other hand. For instance energy efficient vehicles assist customers to save costs but also driver training assists in driving more energy efficient transport. Furthermore effi-

ciently operated repair and maintenance services assist in the vehicle uptime enabling more revenue for their customers. In organising those types of services connectivity and digitalization have become key enablers to make the process smart and transport safe.

3.1.2 Scania's strategy

Scania's vision is to drive the shift towards a sustainable transport system, creating a world of mobility that is better for business, society and the environment. (Scania annual and sustainability report 2018)

Several trends are changing the ecosystem of transport and logistics fast. With digitalization new business models rise and thrive, making the business of manufacturing becoming more of a commodity. Electrification will in the end lead to losing out on the strength of Scania's combustion engines. Autonomous vehicles lead to a way sensor and software oriented business. In order to be a leader for sustainable transport, Scania needs to selectively abandon the past. This strategy to create a sustainable transport system relies on a three pillar approach that includes: energy efficiency, alternative fuels & electrification and smart & safe transport.

Traton & Volkswagen

Scania is part of Traton which is a subsidiary of Volkswagen group and is accounting for the long haul and trucking segment of Volkswagen. Along with Scania, MAN, Volkswagen Caminhos and Rio are part of Traton. Through this strategic collaboration Traton group strives to create a leading position in the transport and transport services industry. The collaboration is mainly focussed on supporting each other on technological level and therefore boosting innovation, cost efficiency and at the same time speeds up the time to market of innovations. (Scania annual report 2018)

Fig.9: Business model components Scania (Scania annual report 2018)

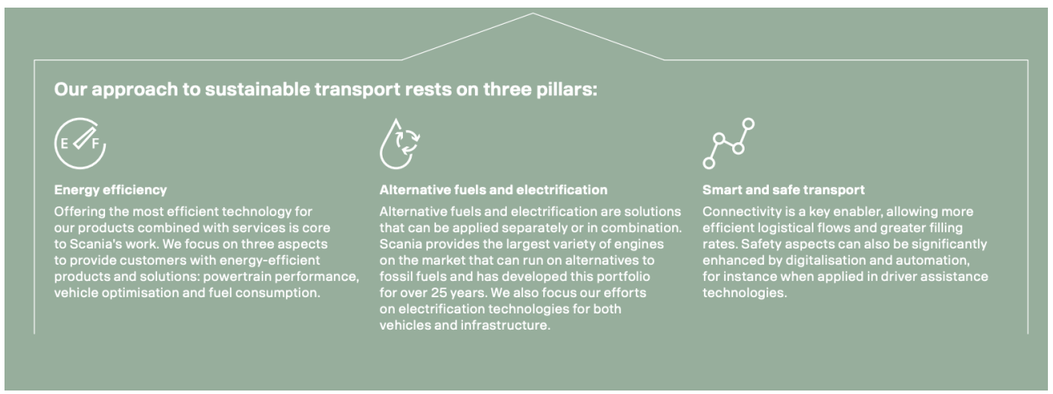


Fig.10: Pillars of sustainable approach (Scania annual report 2018)

3.1.3 Scania data driven Portfolio

Since the 90's Scania has been putting connected vehicles on the road. Up until today that led to close to 500000 connectected vehicles. They all carry a telematics device that sends out data that is accessible through a cloud server in the form of applications to fleet owners. This includes tachograph data, vehicle data and driver data. To support fleet operators in their operations Scania has created several data driven services out of this.

Fleet management system

This is one of the core digital services Scania offers to its customers. It is aimed at making operation more cost-efficient and safe. It is offered in the form of a digital portal through which operators have access to numerous functionalities with regards to managing their fleet in one place. Functionalities in this system are for instance the fleet positioning, scheduling of maintenance, vehicle performance and driver performance.

Tachograph services

Tachograph services are about direct insight into the vehicle usage. This includes its location, speed, driving time and rest period of the driver etc. This also helps safeguard that drivers stick to local rules and drive safely. Furthermore it assists in tracking down potential delays etc.

Driver services

Within the driver services the drivers behavior is monitored and analysed. This dat is being kept track to help operators gain insight in their drivers behavior to help them operate more safely and energy efficiently. As follow-up to the driving behavior additional coaching and training can be organised.

Scania Zone

Scania Zone helps drivers stick to local regulations through geofencing. When a hybrid EV truck enters an urban area where a no-emission policy is held, the truck and driver get notified and switch to electric.

Trailer and Asset control

This allows customers to connect trailers and other assets to their system and therefore manage and control those remotely.

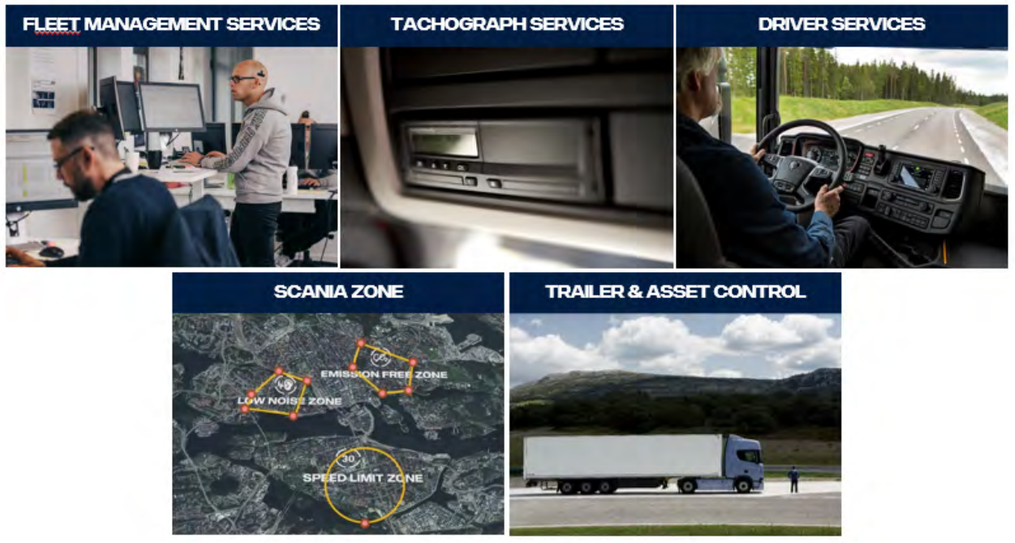


Fig.11: Scania data driven services

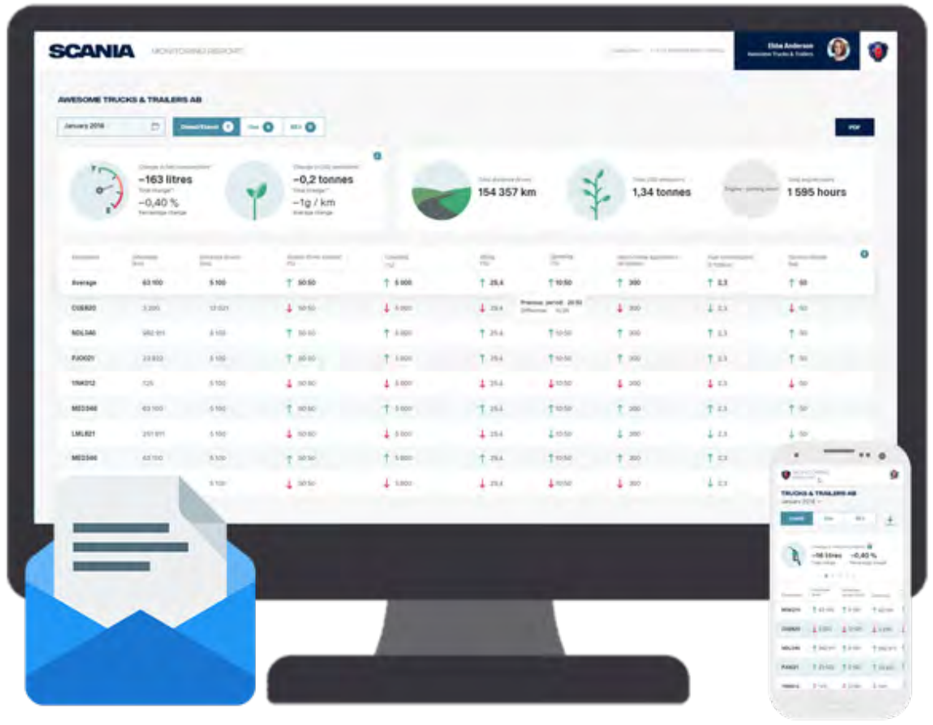


Fig.12: FMS Dashboard overview

3.1.4 subsidiaries

Lately Scania has been investing some resources outside of its own organisation. Two major investments Scania has made are in Sennder and Lots.

Sennder is a digital freight forwarder that matches small hauliers with shipments through a platform. In doing so they remove a lot of the manual labor involved in the administration processes that used to be and are still present in many logistics companies. Further they create a higher vehicle utilization. For accomplishing they are highly reliant on data and are here to make freight forwarding a lot more efficient. Sennder collaborates closely with Scania and offers tools that have roots in Scania's fleet management services.

Lots is a company that was setup by Scania to apply Scania's lean manufacturing philosophy to transport, as Lots stands for lean optimised transport system. Their main focus area is the mining and agricultural industry where Lots operates the entire transport systems of those organisations. Lots does this with their own fleet as they claim that owning the system equals control and through control they are able to optimize those transport systems. In doing so they work based on a profit sharing model with their clients to create incentive to continue working with them. A reason for Scania to set this company up separately was that they didn't have to rely only on internal Scania resources and were for instance able to outsource a lot more or buy software instead of having to wait for it to be built.

3.1.5 Conclusion on strategy, business model and current portfolio

Scania has put it high on their agenda to become leading in the shift towards a sustainable transport system. Some partnerships have been made and investments done heavily on technological development. Also numerous data driven services have been developed that assist their customers in making their operations more safe and efficient. However more value can be uncovered from these data driven services, based on analytics and building out more towards smart connected product systems and in the end more system of system service innovations. Scania also expressed the importance of collaborations and partnerships in their annual report. Collaborations and partnerships are being set up yet in relation to these system of system innovations a lot can be gained.
Furthermore parts of a sustainable transport system can be realised by improving emission levels on product (truck) level, which they are heavily invested in. However many currently untouched opportunities in the area of developing a sustainable transport system require the adoption of a more system based logic.

3.2 Customer

3.2.1 Customer domain

Scania's customers have a wide range of applications for transport. (Scania distinguishes 36 themselves.) In order to come up with a valuable solution in the develop phase, in this project it was decided to target one customer segment specifically. By doing this the solutions space for this customer can be contextualised more in depth, aiming to overcome the service gap mentioned in chapter two. The principle of contextualisation could later on be applied to other applications and niche solutions to scale the creation of value added services across the entire range of customers.

One domain that also is growing rapidly with e-commerce is online grocery shopping(Business insider 2020, Grocerydive 2019). From this rise in demand for online groceries, and especially now with the covid-19 crisis, new challenges and opportunities rise for grocers. Serving consumers online means rethinking the supply chain as illustrated in figure xx (Seidel 2016). Secondly what makes this sector interesting is the perishable aspect of the goods that are being carried. In fact roughly 65% of goods handled by traditional grocers are perishables (Bain & Co. 2019). These products have a limited time in which they can be consumed safely and have to be kept under certain circumstances.

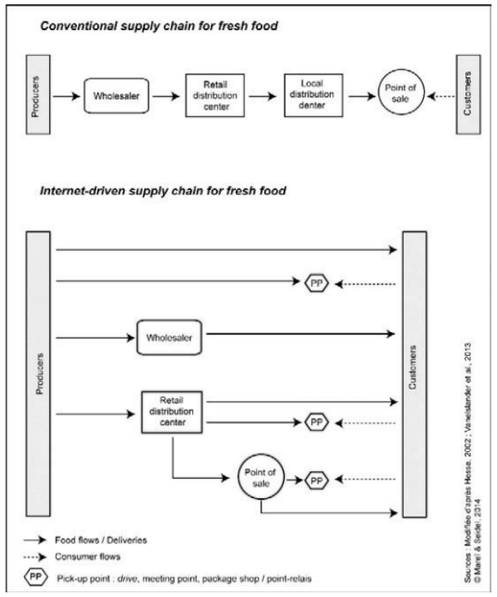


Fig.14: From conventional supply chain to internet-driven supply chain for fresh food (Seidel et al. 2015)

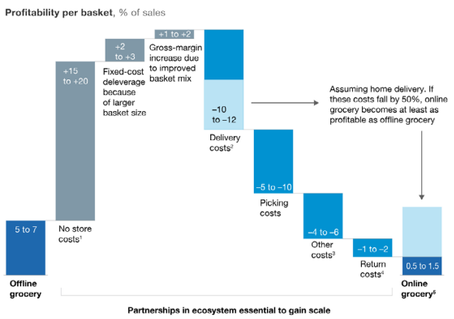


Fig.13: Profitability per basket for grocers (McKinsey 2018)

Within this assignment therefore the decision was made to target grocers as Scania's customers. In the logistics operations grocers work with cooled transport and need to operate on long, short haul and distribution, in high volumes and with time sensitivity. Many traditional grocers have therefore been owning a large part of their distribution chain, which includes a fleet of long haul vehicles, last-mile vehicles, stores and distribution networks. As from the interview with the head of international logistics of a european grocer, owning and therefore controlling as much of the chain as possible was the strategy up until recently for grocers however with developments in the ecosystem grocers strategies are changing.

3.2.2Cold chain background

In this section background on cooled transport is provided. Within the industry this is also referred to as the cold chain. That is when spoken of the whole logistics chain from production to consumption, meaning that the cooling in distribution centres and retailers are also accounted for. In figure 15 and overview of the cold chain product journey is provided. This was based on an interview with the product manager of applications of transport, IIR and cold chain desk research.

The journey shows that there are numerous steps that the goods undergo before consumption and that load is handled by various different parties. This means that also refrigeration is being accounted for by different parties which all have to comply with food and beverage safety regulations. (ECLSA) Within that process regulations are enforcing minimum insulation standards and storing products colder than necessary to increase cold chain integrity in case of failure of equipment. The question remains then whether all these different parties comply during all these steps. This is something that is difficult to confirm. One external inter-

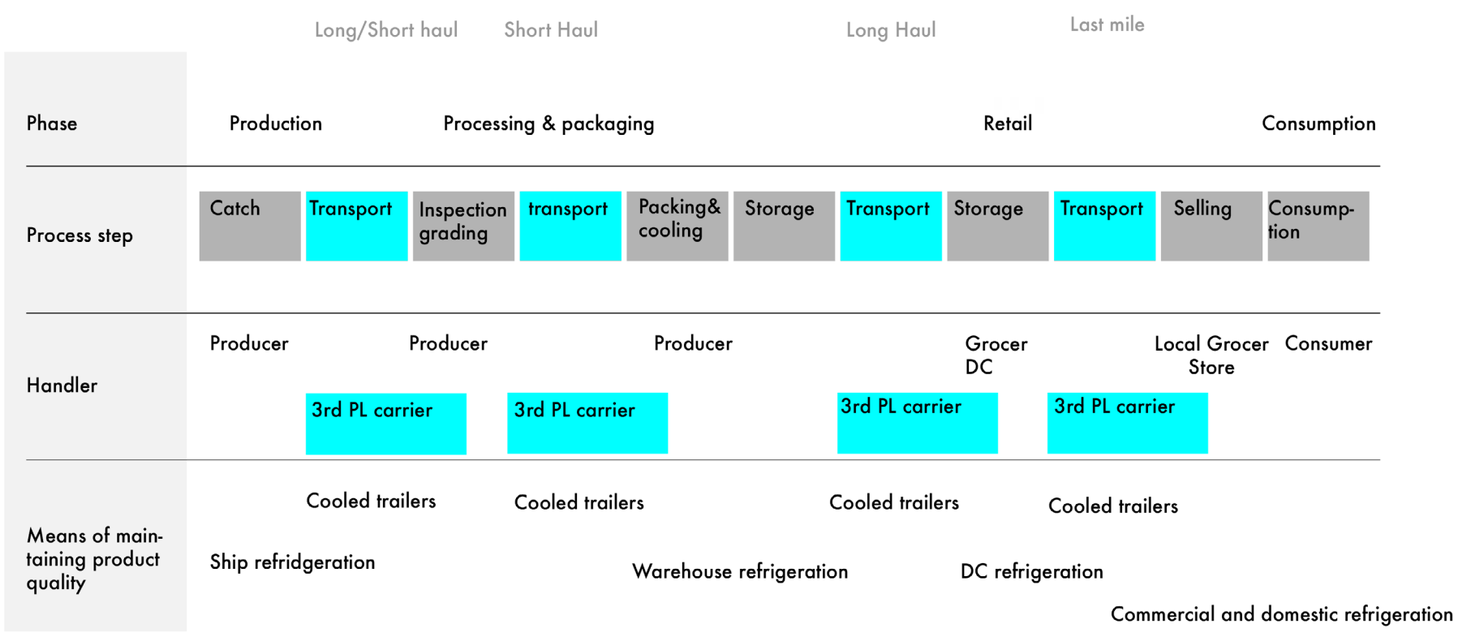


Fig.15: Cooled logistics flow

viewee mentioned that some incidents have occured where subcontractors temporarily shut off refrigeration to save on energy costs, only to switch it back on just before arrival. This has a significant impact on food safety and quality.

Cooled trailers

A key player in cooled transport is the supplier of the cooling installations. A company that is worked with often and has a high market adoption is Thermo King. They offer cooling solutions for road, marine and rail freight. For road transport they offer either cooled trailers set at one temperature or trailers with different temperature zones. The energy provided for the cooling installation is harvested by running a generator off the drivetrain of the trucks. Furthermore Thermo King has some connectivity features which allow for the owner of the trailers to monitor at which temperature trailers have been set. However depending on the size of the trailer and the distribution of the load actual temperature differences occur in the trailers. This means that set temperature is not always guaranteed that the actual temperature is corresponding in every area of the trailer.

3.2.3 Customer needs

In this section the needs of cold chain customers are discussed. Input was mainly based on interviews with the head of international logistics of SPAR, former director of PicNic and product manager of applications at Scania and several industry reports..

Value creation

On a high level, value creation of grocers basically is dependent on their customer experience and on the other hand cost efficient operations. The implications of this are that grocers on the one hand need to be very attractive to customers to shop within a hypercompetitive environment and on the other hand make their business healthy by being able to reduce as much costs on operations as possible. For Scania assisting on cutting the cost of operations there are a lot opportunities for the perspective of moving further down the value chain as an OEM. In the following part three main needs in operations of grocers transport are being discussed.

Flexible capacity

For grocers it used to be the case that most of the fleet was owned by them in an attempt to make logistics operations as efficiently organised as possible. However grocers are more and more outsourcing their logistics operations as the ownership of fleet means having a fixed capacity, where in reality the demand for capacity shifts. In that sense grocers have a need for flexible capacity as either they would have vehicles standing still or have a shortage and are switching to the use more 3rd PL carriers.

Data privacy

With the switching to 3rd Pl carriers also opportunities for load sharing emerge. However this is currently not being done as some privacy issues with data sharing occur. For instance, if two competitors share the same trailer, those organisations don't want each other to know their operational data. This causes a conflict when tracing the location of the truck that is carrying their order, as it could reveal that the transport is also used to stop at a competitor. Operators therefore want to keep their operational private. Furthermore there are also GDPR regulations to comply with.

Maintaining cold chain integrity

One of the reasons for owning the fleet was to have control over vehicles and the drivers as they are handling perishable goods. When transport is outsourced very limited information about the transport is available, let alone live data about the cooling units. Cases have been known where hauliers drive off with the cooling unit set to the right temperature and then switch it off during transport to save fuel, only to turn on the cooling unit half an hour before arrival so that the load arrives cooled. It seems safe yet is often not possible to trace at the moment and if it is traceable at all then adjusting it remotely. Further some equipment failures occur, causing temperature fluctuations and human errors, caused by drivers setting the cooling installation at an incorrect value, and causing risks to food safety and quality.

Fig.16: Cooling unit on trailer

3.3 Value network analysis

Scania operates in a network with many different actors that all have smaller or larger roles in the freight logistics network. To clarify what values exchanged between which parties, this set of exchanges was captured in a value network. This can be seen in figure 17 This is a visual representation of what transactions occur between parties.

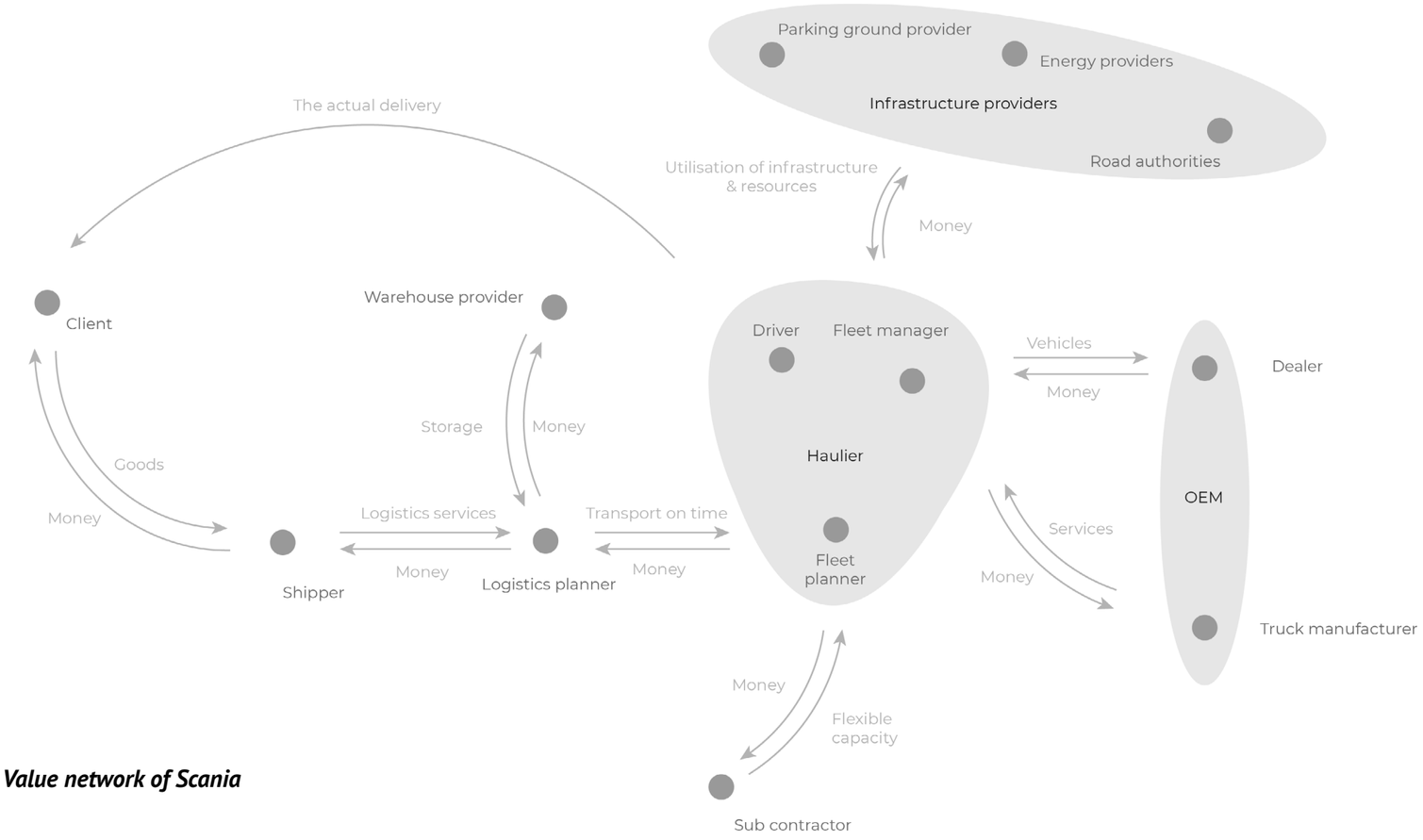


Fig.17: Value network of Scania

OEM

OEM stands for Original Equipment Manufacturer. In the value network of the freight industry this are companies like Scania, Volvo trucks, MAN and Mercedes-Benz. Their main role has traditionally been to manufacture trucks and sell them through their associated dealers. These dealers can be OEM-owned, independant or individual sales agents. Next to that they also provide repairs and maintenance. This is being done through the OEM workshops that they have distributed across their market area. Then also other types of services like the data driven services etc. are being delivered. These services assist in reducing the cost of ownership of vehicles and running the operations for their customers more efficiently.

Haulier

Central in this figure is the haulier. The reason in this figure for that is because in currently is the customer of Scania. The Haulier is the party that executes the actual transport. They take in orders and deliver the transport as a service to their customers. In the current value network they are the parties that own the actual trucks. It is in their interest to reduce the total cost of ownership as much as possible and therefore manage their fleets as efficiently as possible. Therefore having uptime and a high utilization are important for them. Within the market roughly 35% hauliers have smaller sized fleets of 2-20 vehicles (Roland berger 2018) and therefore cause a high fragmentation of capacity within the value network. Companies like Sennder jump into these inefficiencies. This where consolidation occurs.

Planner

Fleet Planners are the person responsible for planning the received orders and assigning staff, material and routes to it. They make sure that operations run smoothly and involved parties know what they are up to. Unfortunately a pain is that today still a lot of manual administration happens in keeping track of bookings. Secondly when planners run out of capacity for their own fleet they subcontract transport with other hauliers. Who in their turn sometimes sub contract that again. This causes for unclarities about orders. The role of fleet planners is essential in running operations smoothly. The head of international logistics for SPAR said: 'Good transport planners are like gold".

Fleetmanager

The fleet manager is the one that is responsible for managing the fleet in the sense of making sure that vehicles are getting their repairs and maintenance done, executing small repairs, purchasing new material and reselling old material. The fleet manager uses the fleet management software to assist him in doing his job. Therefore he also monitors the driving behavior of drivers to make sure that they drive safely and fuel efficient. Another key point is to schedule maintenance smartly so that daily operations are not hindered.

Driver

The driver is responsible for driving the trucks therefore also in control when it comes to rerouting when hiccups or traffic jams occur. Often still deviations or ETA's are manually being updated by drivers. Also drivers need to comply with strict rules regarding how long they can drive and have to take rest.

LSP

Logistics service providers or third party logistics providers are outsourced parties that orchestrate and arrange the full logis-

tics process from warehousing, to transport to distribution. Examples of companies like these are DHL or DB-schenker. In this chain they often own warehouses but little to no fleet. In most cases they outsource the transport to hauliers.

Logistics planner
Within the LSP's one of the main actors are the logistics planners. It is their responsibility to coordinate operations. This mainly includes ordering of transport, warehousing and distribution and making sure that this happens cost-efficiently and smoothly. Consolidation of their network and digitalization are assisting them in planning more cost-efficiently and dynamically, being able to account for hiccups and unexpected deviations more easily.

Warehouse provider
Warehouses are critical in providing temporary storage to be able to keep stock and plan transport efficiently. Digitalization, the adoption of advanced robotics and artificial intelligence have created huge efficiency improvements in warehouse management and operations. Though as logistics become planned more dynamically the storage role will decrease and the distribution and hub function will increase. The distribution and hub function will be critical factors in contributing to the efficiency of logistics on the aspect of switching between transport modes, such as from long haul to last mile city distribution.

Shippers
The shippers of cargo are manufacturers, producers, retailers or wholesalers, depending on the specified industry. They are the ones that book transport after receiving an order for goods. Shippers currently use EDI software to transfer data about shipments to LSP's ERP systems.

Infrastructure providers
Furthermore in this landscape there is a set of infrastructure providers that are essential to keep the transport running. Amongst this are road authorities, energy providers and parking ground providers. These parties have a background role in daily operations as the infrastructure their offer is perceived as a commodity. However in the transitional process the current ecosystem is undergoing these parties will have a critical role. For electrification for instance the role of energy providers is crucial for setting up charingin locations. Furthermore the road authorities play a key role in the roll out and development of autonomous solutions, reducing pollution and creating silent zones etc. Where the transport system is dependent on them for executing regular operations, infrastructure providers are reliant on transport and road use data for maintaining and improving their infrastructure.

Conclusion
The number of small sized carriers causes a high fragmentation of trucks, making them inefficient in use. In order to create more efficient use of resources digital platforms are jumping to this gap. This leads to consolidation, where on the one hand digital booking platforms create large network structures and on the other hand companies like DHL and Amazon grow by recruiting smaller hauliers to drive for them.

Within the value network many different systems co-exist that have evolved through digitizing the manual processes of individual actors separately. Communication between actors and their digitized systems still happens relatively primitively. There are opportunities to integrate the communication between these systems to make the process more efficient and operate smoothly. This efficiency is also something digital booking platforms are trying to tap into, however that is mainly from the perspective of matching cargo with capacity. There are other unexploited opportunities where the key is integration and interoperability.

From a servitization perspective there some elements are present as from the OEM goods, maintenance services and data driven services are offered to their customers. These are delivered directly to their customers. On the other hand, what was found in the value network, is that often their customers are working in network structures for larger LSP's. This also results in the LSP's being indirectly involved in fleet management, for managing their logistics operations. Currently Scania has little interaction further downstream the the value network than with their direct customer. With the digitalization within the network opportunities are emerging to start delivering value more downstream in the value network for OEM's. Therefore Scania should reconsider what their position will be given the developments in the industry.

3.4 Trends & context factors

Within this part trends and context factors are explored. The aim of this was to uncover future drivers for Scania's customers. This was done based on desk research and several expert interviews. Within the chapter some consumer, market and technology trends are explored. This was done to generate a view on developments that are pulling on the end of the value, yet similarly directly at the developments Scania's customers are involved in and lastly to discover the possibilities from a technological point of view. The context factors refer to an element of the vision in product methodology which was applied here. However as experienced along the project it worked less intuitively for a business to business market and felt like there was an incomplete exploration by solely relying on context factors. Therefore context factors were used as guidance but additional trends research was done.

3.4.1 Trends

The pressure for decarbonisation. (industry)
On the one hand regulations drive the pressure for de-carbonation like those that followed from the paris-agreements. On the other hand consumers are way more aware and feel a sense of urgency to tackle climate change. Examples to support this are the rise of topics such as flight-shame, public figures as Gretha Thunberg, the huge demand for meat replacement products and the success of consumer EV-sales. Furthermore the realisation is there that in many cases 'doing good is good for business' when it comes to tackling sustainability issues. (Fjord 2019) Als a value for grocers this means also cutting down on emissions.

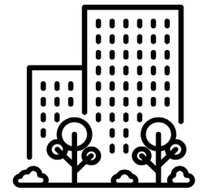
Mindful consumers (consumer)
Today more consumers attempt to balance egoistic with altruistics motivations. (Birch et al. 2018) They don't want to purchase necessarily at the best price anymore but buy their products and services in a guilt-free way. They are more and more aware of inhumane and environmental unfriendly processes in the creation products. Examples of this are refusing to buy commodity products that have to be shipped from far away or are created with child labor or under extortion. Consumers feel responsible and react by buying locally or fair trade products for example. As consumers feel this way, for companies this means they have to run their operations in an environmentally responsible manner.

Mental obesity (consumer)
Currently consumers are aided by digital technologies which could lead to a state of mental obesity, where we lose our ability to think critically about decisions as everything has been pre-digested by virtual assistants. As a reaction to that we might see mind-gyms to practice our decision making/critical thinking skills. (Ericsson 2019) This highlights that customers prefer easy and intuitive flows when it comes to ordering etc. When these require effort customers will quickly bail out. Customer experience is key here.

Minimal touch consumption (consumer)
Consumers don't want to be bothered anymore by commodity shopping. We don't enjoy the actual grocery shopping for the things we know and would need anyways. These could automatically be kept in stock by a combination of virtual assistants and delivery services. At the same time grocery shopping will be more about experiencing new things.(Ericsson 2019) For the industry this means that customer experience is a very important value for e-commerce and e-grocers. Not catering towards expectations means consumers will switch stores, missing out on revenue.

Digital distrust (consumer & industry)
Since the a number of privacy scandals in the digital industry we realize that we leave a digital trace everywhere that can be tracked by digital companies. Therefore we distrust digital privacy and have created a skeptical attitude towards 'free' digital services. Similarly people have the idea that Facebook and Instagram are tapping our microphones as ads seem to be unlikely precise in their targeting. This makes the state of consumers skeptical towards the use of free digital services. (Fjord 2019) This trend highlights the urgency of creating trust and transparency within the digital industry.

Urbanization (consumer)
As urbanization continues, it stresses cities in terms of space and resources yet on the other hand it has its societal and economical benefits. Sharing business models for instance can thrive in the denser populated areas due to the network effect potentials. On the other hand density of people causes congestion and scarcity of space, causing house prices to skyrocket in central areas. For grocers this has the consequence of creating a very efficient last-mile delivery strategy.



Driver shortage (industry)
Within the transport industry there has been a driver shortage. The main factor of this is the high average age of drivers which means that they have to be replaced quite soon as annually a lot retire. Secondly the industry growth is a reason for the shortage.(American Trucking Association 2019) This shortage causes a demand for more efficient use of drivers and numerous systems to have drivers operate safely. In the end this will pull the market towards the adoption of autonomous solutions.(Roland Berger 2018)
This trend contributes to the value driver of efficiency.

Sharing business models (industry)
Within the logistics industry new entrants rise with sharing business models (PWC 2018). These companies have little to no assets and use digital technologies to match supply and demand, giving them the advantage that they can scale quickly compared to more traditional asset heavy logistics service providers. Next to that the average "digital fitness" of the industry as PWC refers to is poor compared to these new entrants, making it even harder for others to keep up. For grocers this assists in their operational efficiency.

New Logistics (Industry)
This refers to the adoption of digitalization and the rise of new business models with that, creating new entrants that thrive and therefore change the way logistics traditionally has been dealt with. An example of one of the companies is Sennder (which Scania is invested in). This is a digital freight forwarder that uses digitalization to streamline the freight forwarding process and therefore create a platform that matches transport capacity with transport demand. This is an example of a new player that has risen and grown and owns no assets. On the other end of the spectrum there is a very asset-heavy operator that streamline their processes with the adopting of similar principles but then within their organisation. This creates consolidation, leaving little room for smaller players to be competitive on cost-level when it comes to commodity transport.

Electrification (Tech)
The rate of electrification in the industry is mainly driven by policy. Especially in urban environments local regulations are putting strict limits on emission levels. (Amsterdam fossil free 2030, Stockholm by 2050) At the same EU wide new and stricter emission reduction regulations have been enforced. Internally Scania wants to be ahead of the 'Carbon law' of Johan Rockstrom 2017, going for a 50% decrease in emissions every decade. According to Bain & Company 2018, 40% of fleet owners consider purchasing (hybrid) electric powered drive trains. Though at the same time there are open ends towards the infrastructure for charging and the needed grid capacity for that. (Earl, T. et al. 2018).

From this perspective it seems to be that developments are happening yet the main incentive for clients is policy driven. This can partly be explained by weaknesses and insecurities in the infrastructure for long haul electric vehicles at the moment as these still require investments. However once these investments once have been made it also seems that the TCO for BEV's is better than traditional diesel trucks. (As seen in figure xx, McKinsey 2018) One side note for Scania on BEV's is that the good reputation Scania has for the reliability and energy efficiency of the combustion engines they produce is a strength they can not naturally leverage anymore when going in that direction when it comes to branding.

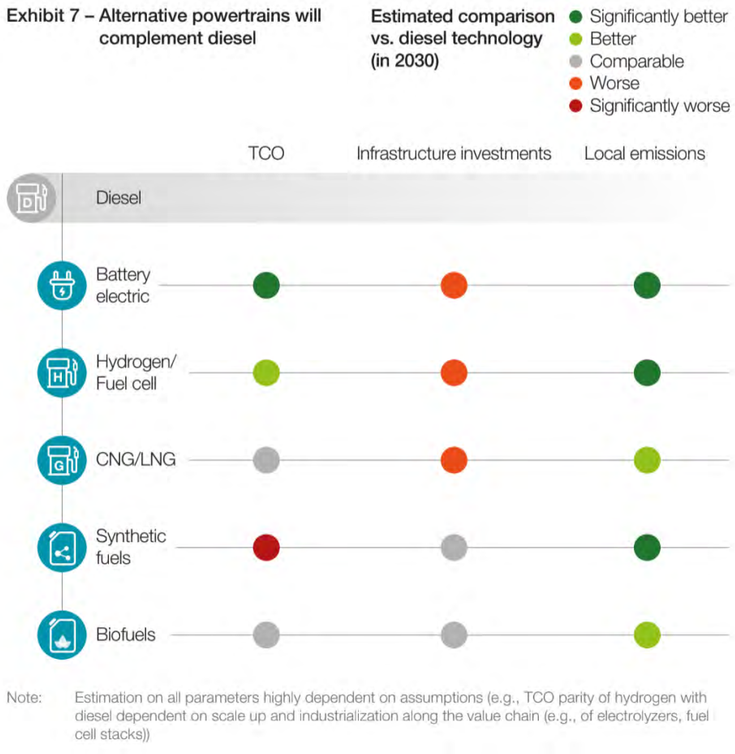


Fig.18: Comparison between type of powertrain. (Mckinsey 2018)

Autonomous (Tech)
This is a highly debated topic within the automotive industry as many OEM's including Scania have the development of autonomous vehicles high on their R&D agenda. Current applications of autonomous have led to level trials with level 3 to 4 automation. Similarly Scania has several trucks adapted to drive autonomous within enclosed mining areas in Australia. (Business manager autonomous solutions) From a technology perspective still a lot of development needs to go into sensors to get them up to automotive grade for open areas, according to Allan Hall, Spokesman of Argo AI, a subsidiary self driving platform of Ford.

At the same time autonomous technology is ready for roll out in enclosed zones such as mining, ports and construction sites. (McKinsey, 2018 Distraction or disruption)
The main benefits of autonomous seem to be on the operation costs of the actual transport itself. Yet according to McKinsey 2018, it will take quite some time for those benefits to be realised. Also to current calculation the investment in AV's will be up to 1.5 times that of regular vehicles.

From a business model it seems to make more sense for OEM's to go more into a VaaS model with the production of AV's as it will be more about assembly of trucks that consist of high-tech components and have been created outside of Scania. Therefore ensuring uptime of autonomous vehicles would become the main business model for Scania, rather than manufacturing engines. Attributing that as initial investments are higher, smaller carriers and LSP's would benefit from a VaaS model within an autonomous scenario, with little initial capital required. Yet according to (Roland Berger 2018, trucking industry) consolidation in the industry is inevitable as the investment for the autonomous systems are too expensive for smaller operators anyways. Causing larger LSP's and carriers to grow and smaller once to join digital freight forwarding platforms. Yet in the case of VaaS it is not attractive to OEM's to own these vehicles at a large scale. This raises the question who will own the actual fleets, especially when moving towards AV's as the function of carriers will be no longer to organise transport, as the AV does this with the help of digital freight forwarding platforms.

At the same time there are hybrid applications of autonomous vehicles that could lead to some initial benefits, mainly on energy consumption for transport such as platooning. By connecting multiple trucks, they can safely drive in each other's slipstream reducing drag. This would require the trucks to have the exact same destination and therefore is mainly suited for hub to hub transport. This saves out on the costs of the drivers in the following trucks and on total energy consumption for the entire convoy. However the uncertainties remain about the practical implications of platooning such as cars switching lanes and therefore breaking the convoy or the conditions of the transport under which it becomes viable. Mercedes

Benz for instance concluded that currently there is no business case for platooning and is moving away from its focus on platooning trials. (Commercial fleet, 2019)

In the end there are clear benefits in terms of cost-efficiency for autonomous (cost of operation per km are estimated to drop from 0.96 USD to 0.52 USD for driverless vehicles , Roland Berger 2018),yet there are a lot of open ends with regards to implementation. First implementations will be in industries that work with more enclosed areas. It will take time for commercialization on hub to hub transport and especially urban transport. The more complex the surrounding the later implementation.

From Scania's perspective, autonomous is something they are really invested in yet the manufacturing of autonomous vehicles will be a different process and according to a venture business developer at Scania more of an assembly style of working. Autonomous technology for a large part comes down to sensors. These sensors are currently being supplied by a few producers, which also deliver to other OEMs such as Volvo and Mercedes Benz. A vehicle will then more become a computer on wheels and with that it seems likely that the advantage of having a good reputation for craftsmanship and engineering will fade.

As a value for customers autonomous mainly brings cost-efficiency. However this is still speculative as adoption is going slow which

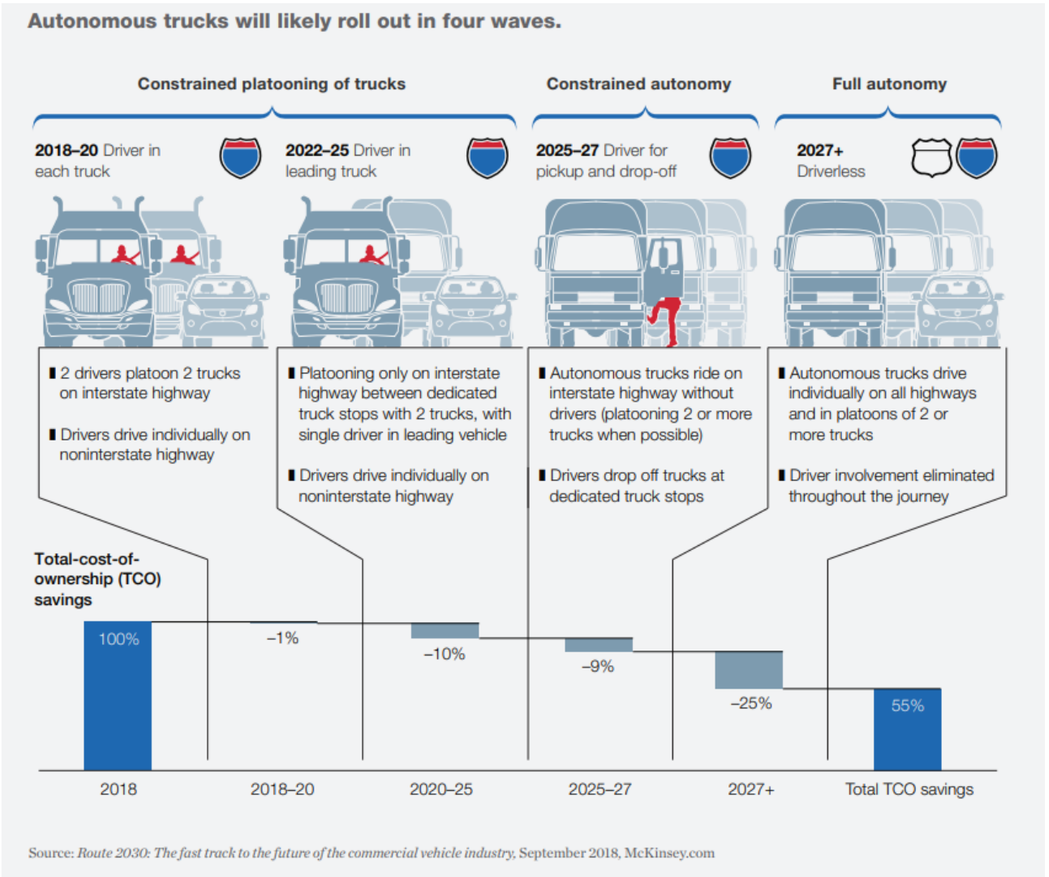


Fig.19: Roll out of AV. (McKinsey 2018)

means that it will take years before autonomous vehicles will actually become profitable for commercial applications.

Connectivity (Tech)
Currently the industry standard for long haulage trucks is to have telematics devices on board that can send out data about the truck. This can be retrieved by the client upon request. Over the years OEM's have been giving the data more meaning by developing API's that tell specific information about the vehicles. In other words OEM's have been working on making connectivity intelligent.

One of the challenges for connectivity is that most fleets are mixed and don't own a single brand of trucks. This means that fleet operators have to read out data of different brands of truck who all have their own API's. Then if these operators would have the same brand of trucks they often are so small that through consolidation pressure they are connected to a platform or larger LSP who then has to read out the data of all these different trucks. There are initiatives that try to create industry wide standards for the way this data is being processed. The first initiative in this was rFMS1.0, short for "remote fleet management software". Currently there is a version 2.1.1. Although this solves a part of that issue. Still a number of issues remain as data is not necessarily provided in the same metrics or with the same intervals, making it difficult to truly compare. (Product Owner at KS and Data Scientist at R&D) The question is whether industry wide set standards are the solution. According to a Business model designer at KS this is not the case, coming from the IT industry where history has shown that it has been about proprietary software and patents. Creating standards is a slow process.

Furthermore, alongside Scania's effort to create connected trucks, more and more products and assets are being connected, creating the internet of things. With the increased density of connected products and assets, the potential for data driven services and logistics becomes huge. As also connections between different systems can be made, connecting trucks with warehouses and pallets for instance in order to interact and smoothen operations. Connectivity contributes to efficient use of resources and transparency within the value chain.

Blockchain (Tech)
Although not dominantly present within Scania a potential key technology within the future transport and logistics system is blockchain. One of the reasons that makes blockchain technology very interesting is that it provides a very safe way of facilitating digital transactions. The principle of the technology is that transaction data is stored decentralised in blocks. Every time a transaction is made new blocks, containing current and previous transaction data, will be added and cross checked on those decentralised computers. This makes the process very resistant to fraudulent transactions as more than decentralised assets need to be hacked at the same time.
For the transport industry this could take over a lot of manual administration to verify transactions and at the same time create more trust in the system. Currently the most well known applications of blockchain, are mainly transaction based. However the true value for the transport industry lies the development of smart contracts. These are contracts that are stored distributedly and they automatically are able to automate the execution of contracts. Blockchain has the potential to enforce trust and transparency for grocers as value.

Based on these trends, trend cards were made for the value mapping session that is described in chapter 4. The trend cards can be found in appendixxx.

3.4.2 Context factors

The process of finding the context factors was based on some elements of the ViP process (van Dijk & Hekkert 2011). Like design roadmapping this is also a future oriented design method, however with the ViP process there is space for the designer to add some personal viewpoints. An overview of these context factors generated based on this process can be found in appendix xx. As an outcome of these context factors and trends from the consumers side a statement was created to give guidance in the design process. The statement is a following: "Cater for a seamless and touchless delivery of goods, with respect for privacy and execute that in an societal and environmental responsible manner"

Within the project the experience with the ViP methodology was that factors can be found rather intuitively within close relation to the end consumer rather than factors that are closer in relation to other actors. For creating a vision that helps in the creation of delivering more overarching services this made sense but did not feel complete. As in this case the methodology was also used to infuse some personal views or beliefs the vision statement that was created in the process was used more as reflective guidance when making decisions. Therefore it also has been input for the creation of the future vision.

04. Define

In this chapter insights gained in the discover phase will be collated into a strategic direction, a future vision on data as a service. These will lead to formulating a design brief to use as boundaries for developing the concept in the develop phase. Setting the strategic direction is based on combining what the consequences of the industry, consumer and technological developments and trends will be on the future value network, what their customers will look like and their own capabilities. By assessing these different elements a desired position within the future for scania will be established. For creating a future vision on data as a service input from chapter three was used along with a value mapping session. This led to the creation of a vision statement, which will serve as the endpoint of the roadmap.

4.1Strategic direction

4.1.1 Future value network

As mentioned in the value network analysis the structure on the network will be affected through external developments. The effects of these developments will be discussed here to outline a future scenario for the value network to be able to position Scania in that network.

With the increasing density of connectivity, the possibilities for smart connected products grow endlessly. Opportunities and therefore also competition will be crossing traditional industry boundaries. (Porter & Heppleman 2014)

Digital business models

With the adoption of connectivity and digitalization, new asset light business models rise that focus on matching supply and demand of transport as efficiently as possible and creating other optimizations in terms of routing etc. This leads to the rise of platforms that are taking a substantial market share. The rise of these booking and optimization platforms also shifts profit pools away from the traditional freight forwarders.

Consolidation & logistics specialisation

Large fleets have a competitive advantage over smaller fleets on an individual level. This leads to more growth of the larger fleets. As a reaction to this smaller fleets join those new digital freight forwarding platforms. This leads to consolidation in the industry where there is an increasing number of large hauliers versus networks of smaller hauliers. Then next to those groups there are numerous specialized hauliers that offer very niche transport. These will leverage their transport specific and in depth understanding of certain supply chains.

Business logic uncertainty

ITRL described a business logic uncertainty between an open one based on network structure and open development versus closed one with partnership structures and proprietary software. With regards to (Porter & heppleman 2014) it seems that it will only be a matter of time for the open and platform based business logic will be adopted as a closed approach limits customers options and locks them in. What explains a part of this uncertainty is the relational complexity as described by Lindult, E. in a system logic and also safely sharing data as PWC 2016 points out that this is a challenge for the logistics industry.

More than financial profit

Within the industry a sense of urgency has risen about the effects of global warming. Players in this field recognise their responsibility in this. And although still incentive to act is partly created through regulations, companies are acting more on their own initiative as for in Scania's annual report is being stated that there is a strong correlation between profitability and sustainability. Furthermore the program area manager of ITRL pointed out that gradually this sustainability thinking will be adopted more and more in the industry. For existing companies this might be more in the sense of using profits to work on sustainable solutions and on the other hand there will probably be new entrants that have no infrastructure from the past that's hindering them from rolling out these solutions.

Niche solutions

From the MaaS debate ITRL has found that where there was a hype around it and many actors saw it as the one-size-fits-all solution for mobility, they learned that in practise that didn't work. Actors showed an awaiting position as the risk of large scale implementations was high and it wasn't clear who would gain what profits and bear which risks. In the end MaaS solutions rolled more in the form of niche solutions like arranging mobility services for one specific neighbourhood or arranging a small scale car sharing concept for new construction projects. The head of ITRL therefore expects to see similar things happening within the transport and logistics industry, creating more niche solutions. For Scania this will mean a close collaboration with customers and other actors within the system.

Conclusion

Although some uncertainties remain, research suggests that these developments will form the value chain more and more into a digital platform ecosystem in the transport and logistics industry. In which there are sets of enablers and sets of users which interact with each other through a digital platform. The degree of openness can vary, yet from the perspective of offerings towards customers open structures will be able to add a lot of value to the system in the long run. This allows specialists to create niche solutions for applications of transport that then become widely available generating a new revenue pool through creating availability of new applications. In the case of cooled transport this means that solutions can be tailored around the specific situations of customers. On the contrary there is the industrial logic which protects current revenue pools by using proprietary software and services. The industrial logic would hinder the developments of these niche solutions. In the case of cooled transport, that would make the tailored solutions exclusive to larger customers on a partnership base.

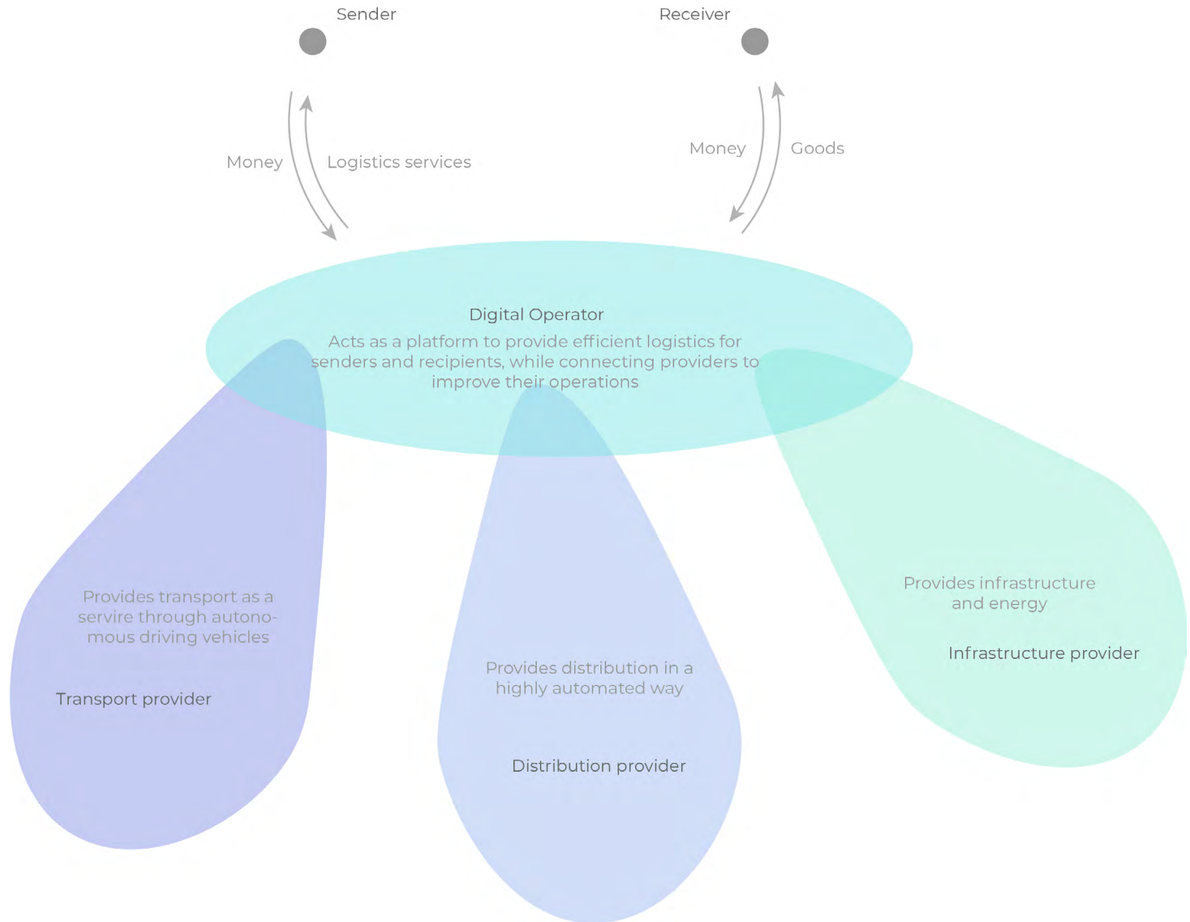


Fig.20: Future value network

4.1.2 Future customers

When looking at the grocers market, it was believed that efficiency is created by ownership of the chain as it provides for control. (McKinsey 2018, six imperatives) By in-sourcing, resources can be used in efficient and cost-effective ways. However with the growing e-commerce for groceries as well, the supply chain for grocers is moving towards a more dynamic and direct demand driven model. Making grocers having to deal with more fluctuations in orders and the logistics hassle of the last mile. For the long haul this implies that the volume goes up in general and that orders are less static then in with off-line retail. Therefore grocers like spar are working more with 3rd party hauliers to create flexible capacity, letting go of 'owning' the whole chain.

For Scania it could be an opportunity to assist in this shift with optimizing organisation of these logistics systems and connecting the necessary data around it. In a similar way Lots, a Scania owned company, already does this for the mining, agriculture and forestry industry based on a profit sharing model. The place for Scania would be to initiate several collaborations to use assets in the ecosystem more efficiently. This means that Scania's customers will not only be the grocers themselves but also various other actors in the value network that handle the goods that were ordered, such as producers, distribution centres and subcontractors etc.

4.1.3 Direction

In this part the strategic direction of the project is being discussed. At first the general direction of Scania will be outlined and secondly the direction for the focus of the project will be discussed to frame in what direction the solution space will be.

Transformation

Within the future context, Scania on an organisational level probably has a hybrid business model which partly consists of sales of trucks and partly from logistics services. The value of manufacturing in OEM's will diminish over time as the industry shifts more towards assembly with the adoption of AV's (Scania venture business developer) yet leading up to that scenario, manufacturing remains a key revenue pool for Scania , which also contributes to scania's strategic priorities of maintaining high profitability. This profitability can be used to create the necessary space for adopting the service, virtual and system based value logics. Looking at the value network and its development there are two ways to leverage service potential.

1) Transforming from sales of trucks towards, providing transport as a service and eventually progressing into logistics as a service.

2) Stick to the sales of capital goods yet at the same time initiate collaborations and build or invest or acquire digital service providers to be more involved in logistics.
Offering transport as a Service

The first option allows for a lot of control by having ownership, yet also risk in financial terms as risk of that it takes time to conquer these markets. Where on the other side potentially asset light digital companies might disrupt markets, making Scania miss out on opportunities. Also there is the awkward situation of competing with your own customers by skipping the hauliers. Though it is a step that based on current capabilities, is relatively easy to roll out it doesn't seem that attractive in the long run.

Sales of capital goods + LSP

The second option focuses more on getting closer involvement to the consumers of logistics services(Senders and Receivers) while at the same time monetizing on the current business model through the sales of capital goods to hauliers. However by being involved more to the end consumers there is the possibility to link more sources of data and provide more value there and start applying more of a system based logic.

Based on conversations with various people within the company it seems that the second option is the more realistic and a more profitable strategy in the long run. One of the major reasons being that the risk of owning so many assets is very high and accounting for the initial cash flow loss has an enormous impact on the business. Adding to that, progressing further downstream in the value network through the first route is a slow process with the risk that opportunities are missed out upon as time passes. Furthermore taking the step of offering transport as a service will mean creating some form of competition with your own clients. By going for a hybrid model of becoming a service provider in combination with being a manufacturer, value can be created further downstream in the value network without competing with own customers.

For this project that means that in the future Scania is seen as an organisation that partly has a manufacturing role and partly provides logistics services. For building on data driven services that means that value will be added mainly from a service provider perspective and therefore assisting other parties in the value network with getting the job done, being the link between assets and digital operations. For the specific case of cooled transport this means that providing the integration between the truck and operating systems around it. Within every specific use, needs may vary and therefore an open approach can assist in tailoring services.

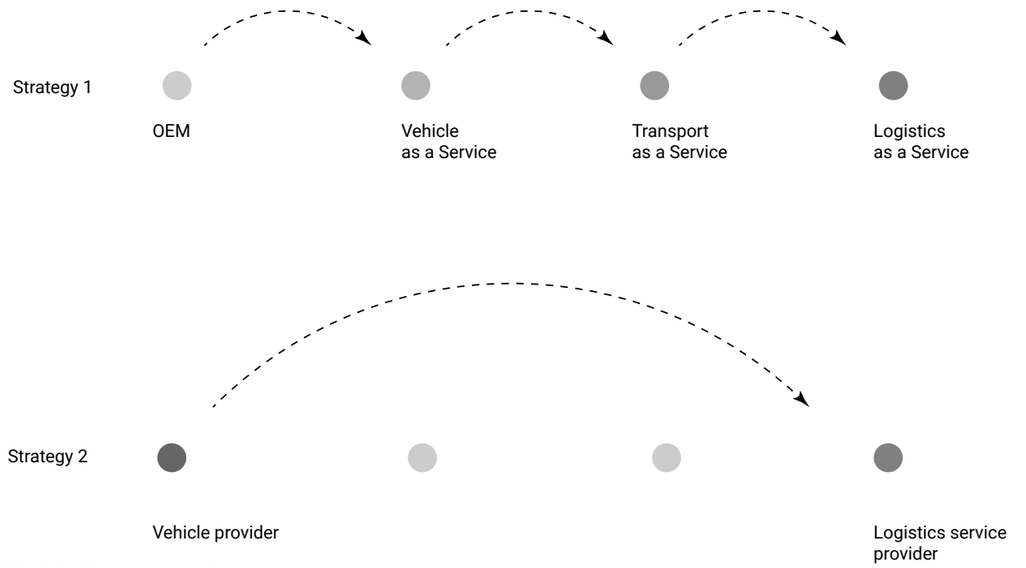


Fig.21: Two strategies

4.2 Future vision

In this part the creation of the future vision on data as a service is described. The purpose of the future vision is to establish the destination of the roadmap. The vision was derived from context research performed in chapter three and value drivers. These value drivers were created with the help of a value mapping session as follows in the part about value mapping. Furthermore in the process of value mapping the statement that was created based on mapping the context factors of the ViP methodology served as guidance. Especially the value mapping process in practise worked out differently than plan up front. Adding to that the statement assists in representing the drivers and movements downstream in the value network and closer to the end consumers.

4.2.1 Value mapping

In order to establish the future vision two value mapping sessions were held. These sessions were based on the value mapping session as described in Design Roadmapping (Simonse 2018) Four people from both connected intelligence and connected services attended the session and provided their input. The session started by updating the participants on some conclusions that were made based on context research and insights into Scania. Trend cards were also presented which led to a lot of input on value opportunities. These cards concisely described several movements and pattern-shifts that are going on within the context of scania's business and are based in trend research of chapter 3. They can be found in appendix xx. Furthermore discussion was facilitated on 1) scania's future position in the value network. 2) Scania's future customers and 3) Scania's value for future customers.

Fig.22: Value mapping session at Scania

Due to time constraints the sessions had to be squeezed into two short blocks being unable to formulate value drivers completely within the session. Therefore the final formulation was done individually with taking input of the session into account and performing a bit more research and the statement derived from the context factors..

Outcome of the session

At the end of the session we left with a set of clusters of value desires and value wishes that were related to the trends cards, reflections on the presentation and other ideas that were top of mind for the participants. Although clusters were not perfectly arranged yet, some patterns had emerged and the session left an impression of what sensitivities or points of interest were.

4.2.2 Value drivers

Although the value mapping session gave input on the creation of the value drivers, some iterations have gone over the value drivers as interviews with some industry experts in the domain of grocers happened after the value mapping session. Therefore the value drivers have been adjusted as they are focussed precisely on grocers as a target group, where in the session it was more generic towards scania's customers. The value drivers that were formulated after this are as following:

Consumer convenience

This drives food and beverage logistics companies indirectly as the market asks them to deliver in these convenient ways. This means being able to provide home delivery at the desired time slots or even in fridge delivery when consumers are not at home. All these services are delivered with zero effort on the consumer side while at the same time more and more of them are demanding to know the impact of and be able to choose environmentally friendlier forms of transport. This consumer convenience puts stress on reliability of operations, dealing with unexpected events and managing customers' experience.

Operational efficiency

The business model of grocers is very sensitive to operational efficiency. Where grocers can, they streamline their logistics operations as much as possible through optimizing load efficiency, routing and minimizing food waste etc. Grocers operate in a high volume, low margin industry where competition is fierce and grocers are battling price-wars to lure consumers into their retail industry.

Maintaining food quality & safety

As grocers are carrying sensitive and perishable loads that need to be kept at certain conditions, maintaining the quality of that load during transport is important to them. Currently, working with various subcontractors they have often not got full control or insight over how their load is being handled. In those cases grocers have to blindly trust that transport has been executed accordingly however some incidents have occurred with subcontractors that switched off cooling units to save on energy costs.

Enforcing digital privacy

Grocers value the privacy of their operations. This is on the one hand protecting data of their consumers, which has been gaining a lot of attention in recent years with GDPR-laws etc and on the other hand the competitiveness between grocers makes them protective over how they run their operations. In a collaborative environment (for instance in the case of load sharing) it therefore is important for grocers to create a secure digital environment where they are guaranteed their privacy.

Environmental responsibility

Though partly policy driven, many grocers strive to reduce their carbon footprint drastically based on their own strategy. Today the zeitgeist has evolved into a state where consumers are very aware of the environmental impacts of the products and services they

consume, making them demand more environmentally friendly and ethically responsible alternatives. Slowly but surely this makes grocers adapt and cater to those needs.

4.2.3 Vision statement

The future vision statement on data as a service has been derived from the combination of value drivers and context research. In that the strategy of Scania has been taken into account. These factors all-together have led to the following vision statement.:

“Providing carefree logistics solutions to our customers.”

The keyword in this vision is ‘carefree’. This hints at making operations easier, more profitable while not giving in on any prerequisites such as digital privacy and sticking to food safety regulations etc. “Logistics solutions” refers here to Scania’s transition from adding value in the transport industry towards adding value through collaboration within the logistics industry. In this creating integration of different systems is key and for that new collaborations are essential. The customers in this assignment are grocers, as this allows to create specific and niche value yet in the end to all different types of customers niche value can be created that makes their logistics carefree when contextualizing their operations.

In relation to Scania’s servitization journey the statement hints at offering more complete and integrated solutions for the logistics industry, as described in chapter two through the three different stages of servitization and adopting different business logics. For offering these integrated solutions collaborations in the value chain are key. By working together with current carriers for instance and digital parties, value can be added further downstream in the value chain. To efficiently organise that, sharing data is important yet assorted with safety and privacy issues. Overcoming those issues is key for creating value.

4.3 Design brief

In this section the design brief following from the future vision and strategic direction is discussed. The design brief will elaborate under what conditions the service that leads to reaching the future vision needs to be designed.

The strategic direction is to become a Logistics service provider and manufacturer. In this specific case the service is aimed at creating value for grocers based on the specific needs. With that a more in niche concept can be developed, strengthening supply chain specialization.

The business model of grocers is very sensitive to operational efficiency. Yet some current ways that would enable that for regular transport, don’t apply for grocers as food quality needs to be safeguarded. Therefore the question to solve for the concept becomes:

How can Scania enable more efficient transport for grocers, while maintaining load integrity?

In that are sub questions:

How to make transport efficient?
How to keep the load safe throughout the cold chain?
How to share data safely?

Scalable to other applications of transport
As mentioned in the future vision, this assignment is aimed at grocers yet of course for every different user, niche services can be built based on contextualisation of their operations and environment. To be able to make this project tangible it was chosen to select this application of transport as an example. In this concept it will be taken into consideration that it has to be scalable towards other applications of transport. In that sense some underlying elements of value drivers for grocers are transferable to other customers. The two main elements that are transferable to other customers are operational efficiency and digital privacy. These two elements were taken into account for creating a scalable solution.

Format & scope
The scope of this project is the long haul transport of cooled goods for grocers. This will be made more tangible by applying a use case and be captured in a service blueprint. A use case was chosen as means of delimiting the scope for the design. Furthermore the use case makes the blueprint become more alive and relatable. The Blueprint provides a chronological representation of different processes and interactions that occur on the customer and backend side.

05. Develop

After having defined the strategic direction, future vision and design brief the develop phase can be initiated. The goal of this phase is to develop a service concept, supporting the future vision of the roadmap and securing the strategic direction. In this chapter the process is briefly discussed and then the outcome is discussed in the form of a value proposition service blueprint, some technological elements, the business model and necessary partnerships. Later on in chapter 6 the concept will be illustrated and specified with a use case. The choice for the combination of a service blueprint and use case was made to make the concept become more lively and relatable

5.1 Concepting proces

For the concept process originally there was a plan for a creative session on the topic of the design brief however due to the consequences of the covid-19 pandemic this was left behind. In the end the concepting process became an iterative process in which brainstorming on ideas was done mainly individually and then several sparring sessions with peers where set up to change and iterate on the concept. These session were done intuitively and in informal context.

5.2 Value proposition

From the future vision and based on the brief a value proposition pyramid was derived to show the relation between what the service should solve on a functional level to deliver on the vision. This pyramid is protrayed in figure 23. On the functional level the values that are delivered by the concept are delivering a secured way of data sharing and an automated way of handling logistics. This takes away the hassle of safeguarding their digital privacy and safeguarding load integrity. Furthermore the automated way of handling logistics provides them with more efficiency. On a emotional level for the for the grocers this makes them trust the operations and feel in control as they have access to their load data in the logistics process. Through providing control and trust this in the end lead to the self expressive benefit of enabling carefree logistics. operations.

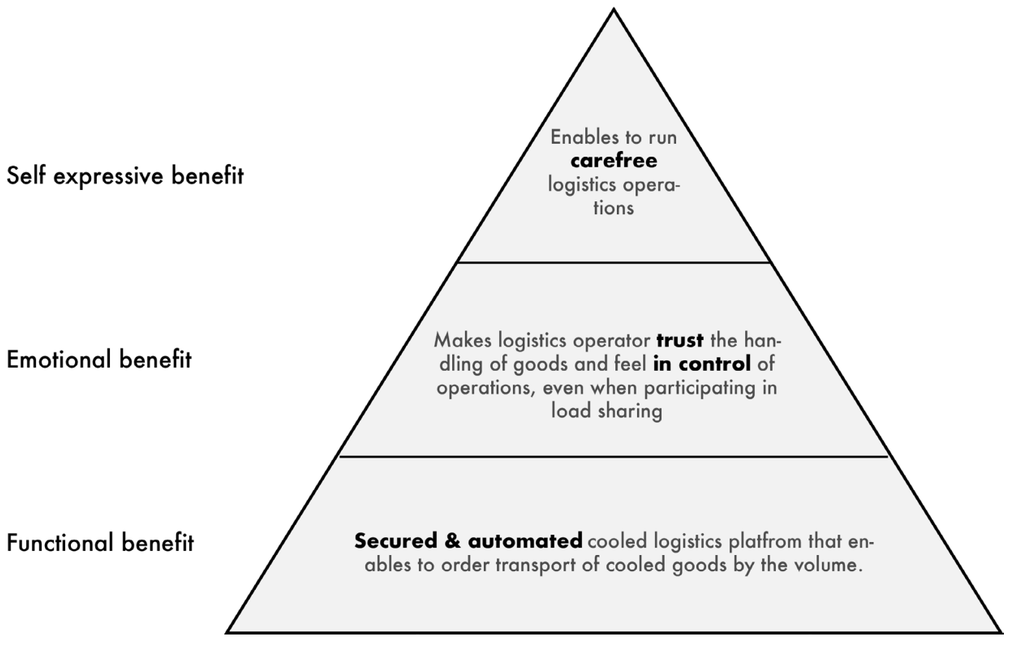


Fig.23: Cooled logistics value pyramid

5.3 A smart contract based logistics platform

Now are these values ensured? For that based on a iterative process a concept for a logistics platform was developed. The key element of this logistics platform is that all actors and users are able to share data safely, based in a smart contract structure. By applying smart contracts the right data and API's can be granted access to the right party and leave out excess data whilst verifying that it is corresponding to the correct load and unfrauded. Smart contracts are based on blockchain technology. IBM currently runs a blockchain program for creating trust in the supply chain, therefore they are a recommended partner in the creation of the smart contracts for this application and furthermore building a platform to scale these these niche smart contracts for other applications.

5.4 Blueprint

To illustrate the chronological order of the new service proposition and what is required on a data level a service blueprint was made. This service blueprint can be found in figure 24. The chronological series of events is divided into five phases: 1) order placement and scheduling 2) pick-up 3) transport 4) drop off 5) processing.

Order placement and scheduling

At this phase the order is being placed and with that a smart contract is being created for handling the order. This contract captures all necessary data for for processing the order and creates a protocol for which parties can see what data. Data that is being taken in here is the order data, availability data of trucks, trailers and drivers, load specific instructions, truck GPS, trailer GPS, pallet temperature, trailer temperature, reefer temperature setting, routing and matching order data. The contract then is composed as available trucks, trailers, drivers and other orders are matched with this order based on routing, type of load and it's specific handling requirements.

Pick-up

Once being scheduled the pick-up is arranged. At this moment live traffic, weather and road data are necessary to pick-up as accurately and energy efficiently. From the first pick-up multiple other pickups can follow. Here again it is essentials to do deliver as accurately upon schedule as possible and where necessary in the moment adjust the scheduling of resources. Like when a truck will be late for instance, this will be communicated with the staff and resources at pick-up spot to not have them wait. In this phase a lot of live data and processing is necessary. As the truck is already on it's way pallet temperature data, trailer temperature dat and reefer temperature setting are thoroughly being monitored. However at this point gps and routing data are being kept secretive to the ordering parties.

Transport

During transport major factors are maintaining the load integrity in terms of temperature and dynamic routing and proactive communication with that. For maintaining the integrity of load temperature data of individual pallets, order data, load instructions, trailer temperature and reefer temperature setting are essential. This data will also be shared live with the owners of the load through smart contract with a remote control option to sign the system in case of exceeding limits or other issues. Of course each load owner will be restricted to their load solely. Furthermore the road and traffic conditions can cause deviations of the schedule. Therefore live routing is important to stay as close to the schedule as possible. However to make delays less costly value can be offered by automatically and proactively communicating these deviations so that staff and other warehouse resources etc will be booked for the right moment and are not waiting.

Drop off
As the drop of can consist of multiple stops the this also means that gps data is restricted here and only visible to the asset owners. Yet in the smart contract it is verified with te the load data and temperature data to secure that it all load specific information is corresponding to the right order. For a smooth drop-off it is crucial that the correct load can be identified and preferably the other load stays anonymous to the crew and machines that are off loading them. For this order data and pallet identification are important. Furthermore the interoperability is key here so integration in the transition of these parties is as smooth as possible.

Processing
As the order has been unloaded the sender and receiver, receive a report of the full trip that illustrated if there were any anomalies and therefore can prove that the load has been treated according to instructions and is safe. This again is being stored as distributed information in a smart contract, that no dispute can be about it afterwards, creating more transparency in the value chain whilst maintaining operational privacy. In this stage the route of the truck, order data, and pallet data are being taking into account.

Evidence	Place order	Pick- up	Transport	Drop-off	Processing at DC
Journey of buyer of transport	Place order on platform	Live insight & remote control of cooling			Review report & Approve load for further distribution
Front-end action	Confirm order and update on scheduling	Receive notification of pick-up	Push updates of scheduling	Receive report of handling	
Back-end action data	1)Match order with other orders for load sharing. 2) Assign available driver, truck and trailer. 3) Create route and schedule.	Regulate temperature. Start sharing temperature data with buyer of transport.	Auto adjust routing and scheduling based on traffic information Share temperature data of specific load with buyer of transport	Communicate load identifaction to distribution center	Process data for optimizations
Support	Create smart contract for order and assign data acces to granted parties	Log data in smart contract		Share report	

Fig.24: Service Blueprint: Carefree cooled logistics

5.5 Software architecture

In figure 25 the architecture of the platform is portrayed. On the top half the users are portrayed and on the bottom half the enablers. The users in that sense use the platform to assist in their logistics. In this case the grocer has two roles; the one of being the logistics operator and the receiver at the same time. (In the case of different industries these two can be different parties.) From the operations a the order is placed for the supplier. The supplier has a user role in the sense that logistics will be planned and executed with the platform. At the same time the supplier has the role of sharing handling data of the goods. On the enabler side there are a freight forwarder that matches transport orders with capacity and routes. Furthermore there are scania as provider of the trucks and truck data, thermoking as provider of cooling and cooling data and GeoPallet as provider of connected pallets, pallet data and load data. Then lastly there is the carrier that is providing the driver and sharing availability of their fleet.

In the middle the platform itself which is facilitating these interactions and transactions. The enabler of that platform is IBM, as they have capabilities on blockchain for the supply chain. Therefore they can build a smart contract structure that is necessary for ensuring data security and integrity. The reason also that this is a seperate company is because they are not involved in the actual logistics operations themselves making them not having an interest with certain data and therefore and independent party on the operational side. This creates a higher degree of trust ensuring a reciprocity in sharing of data to enable the system dominant logic as described by (Lindhult,E. 2015) and the network based business logic as mentioned by ITRL 2019.

Accessibility scheme.

In figure 26 a representation is shown of how different parties have access to which data. It serves to illustrate the different flows of data and the integration. In the bottom layer there are the suppliers of the different data sources and on the top there are the users of the data sources. Note that users of the data sources differ slightly as hauliers are

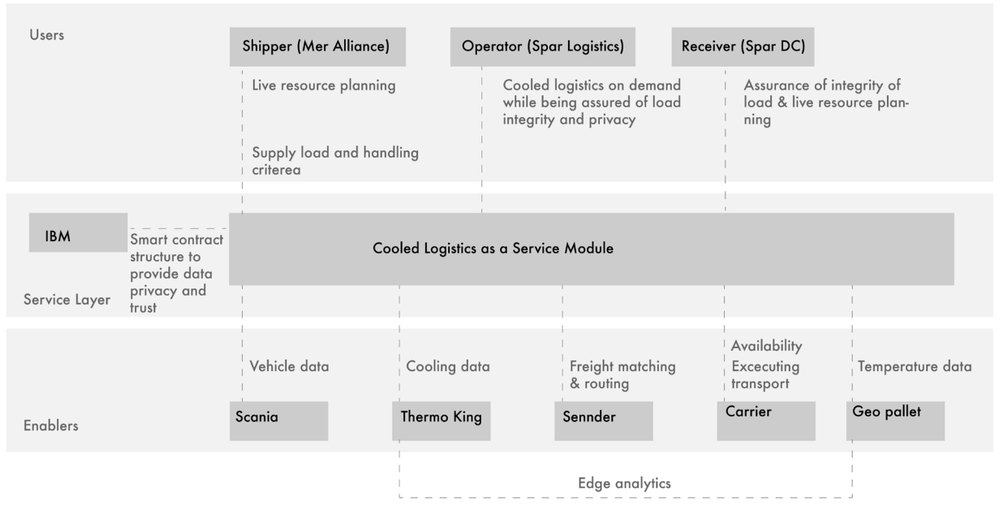


Fig.25: Platform structure

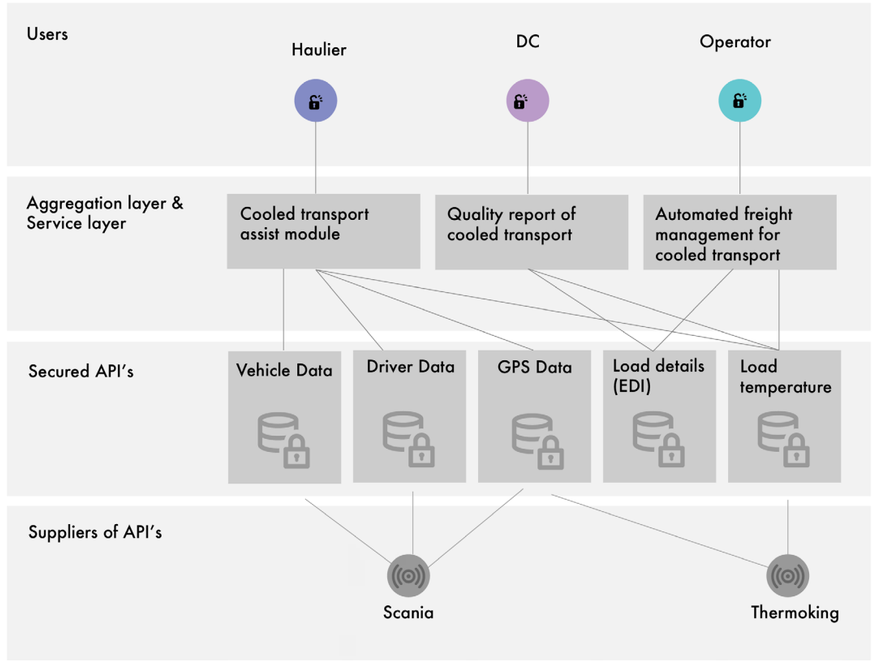


Fig.26: Accesibility scheme

seen here as user of data sources but are enablers of the transport. In the layer with secured api's on the platform the different data sets are validated with each other through the smart contract. Then in the aggregation & service layer for each actor the data they need is pulled from the secured api layer and portrayed in a interface and aggregation they need. For the haulier this is the cooled transport assist module, for the receiver this is quality report of the cooled transport and for the operator this automated cooled logistics management module. For parties that would need access plugins can be installed for various actors. In this the smart contract safeguards that no information is leaked.

Securing technology

On the technology side smart contracts based in blockchain have to be developed. A smart contract is basically a protocol or set of agreements that is stored in blockchain and automatically enforces the set of agreements. By storing it on blockchain any falsifications or conflicts will be detected quickly and can be identified easily. The main point of the blockchain here is to ensure trust between the collaborating parties. This means that for the grocers and the haulier the data of the load corresponds with each other at all times. Furthermore it makes it possible to automate in a protocol which party has access to what data whilst being able to verify to each party that the data they are pulling is correct.

5.6 business model

To generate revenue for this platform the buyer of transport is being charged with a all in one price for the specialised transport per transport order. In that sense this is a pay per use business model, giving customers freedom and flexibility. With freedom and flexibility of course comes the risk of churn. Therefore to bind their customers and create incentive to share data for optimizing their transport a profit sharing structure will be adopted as well, meaning in this case that working often with this platform and ordering consistently allows the transports to be arranged more efficiently on the platform.

Adding to that the more data of transport is generated the better it can be analysed and optimized. This way it becomes more attractive for customers to keep coming back to the platform. Secondly repetitive and recurring data streams cater for optimizations which also lead to profit for Scania. This is similar like Lots does, however with a more flexible character in the sense that it is paid per order and not by taking over the entire logistics operations permanently. Charging for enabling connectivity of vehicles here is a second source of revenue that will continue to exist within this service.

5.7 partnerships

For building this platform several partnerships are necessary. For establishing the based of the platform and the smart contracts IBM is a recommend partner. This is as they currently run a blockchain program for creating trust in the food chain. Secondly, they are operationally neutral which helps in creating a security layer that is trusted through various actors. Thirdly, on Volkswagen level there are already some collaborations on the field of blockchain within value chains of heavy industries.

For building the product system of being able to optimize, control and automate the temperature of loads a partnership needs to be established with Thermo King, the supplier of cooling units and secondly a manufacturer of connected pallets. A plausible player for this last one is Ahrma group. Both parties have some connectivity features which need to be integrated into the platform. The data that needs to be connected on the side of thermoking is the cooling data and temperature data of the trailer. (Currently they have some telematics solutions for their fleet owners.) From Ahrma group temperature data and identification of the pallet is needed. Furthermore for planning and forwarding the transport a collaboration with Sennder as digital freight forwarder is needed. The reason to choose for Sennder is the already close collaboration with Scania.

5.8 Concept conclusion

The proposed service concept of 'carefree cooled logistics' creates a higher degree of trust amongst parties involved in the logistics operations of cooled transport by sharing data through the smart contracts. Next to that it creates opportunities to organise cooled transport more efficiently. Thirdly it contributes to a higher cold chain integrity. Though the cold chain integrity is a very application specific benefit of the concept, creating more efficiency and securing data are transferable benefits. That makes the concept scalable towards other applications of transport. Which in their turn leads to other application specific benefits. Specific modules can be created by contextualising those specific needs. Those needs can be contextualised and formed into specific modules through setting up open collaborations in the field with both technology partners and clients. Just to name an example; the transport of medicine. This also an industry where conditions of the transport need to be monitored closely and the chain has to have a high integrity.

06. Use Case

During the concepting process I noticed that some elements of the concept were rather dry to explain and therefore difficult to grasp. To illustrate the values more explicitly in the concept and make more lively, a use case was applied to the concept. Secondly this allowed for the design to be even more specific and niche, as the most value for customers can be created by tailoring to their exact use. In this chapter the setting of the use case is discussed and the blueprint for this specific case. The use-case is fictive and serves to illustrate the concept and contextualise and detail the specific use. The case was constructed based on insights gained from several interviews (including with Spar, former director of PicNic, ITRL, product application manager at Scania and others with touched upon the cold chain) t and desk research towards how grocers organise their supply chain.

6.1 Focus area

The cooled logistics chain is a complex chain with many different handlers. By zooming on one particular part of the process value can be made more explicit. In this case it was chosen to focus on the area as illustrated in figure 27. In this part of the process products are being shipped from The grocer in this case is the orderer of the transport yet the producer that responsible for shipping itself. When the goods are being shipped they will be transferred from owner and handler with that. From the moment that the goods leave the producers warehouse, being able to monitor the temperature of the products becomes essential as this is where ownership of the load shifts. That was why this specific area was chosen to focus.

Chosen type of transport
In this use case the goods ordered by the grocers were fish products. This choice was made as the transport of fresh fish and fish related product requires cooled transport that is quite strict. The difference between storing fish frozen at minus 20 degrees celsius versus minus 15 degrees celcius makes the difference between a shelf life of respectively 8 months to 1 month. (Madden 2018) Let alone when stored in regular refrigeration (4-7 degrees celsius) most seafood lasts 2 days safely. (Seafood health facts) The effects of potential swinging of temperature during transport can have massive impacts on how long products can be sold safely. Keeping integrity off cooling units and knowing how the load has been handled therefore is very important for grocers to be able to sell these goods.

Sharing the same producer.
Secondly what is important to mention for this use-case is that many grocers share the same suppliers when it comes to the products they sell. In this is two grocers also have the same white label supplier for their products. This makes load sharing a very promising way to create a higher filling rate of cooled transport. Next to that sharing the same supplier is not a necessity to share loads. If in some other way two orders share roughly the same route the principle of load sharing could be applied. Through analysing the transport data, common routes can be identified for which load sharing is economically beneficial.

Privacy
As in this case the two grocers are competitors of each other their shipment data and whereabouts need to be kept secret. This however collides with being able to monitoring their goods currently. By encrypting and sharing operational data based on a smart contract live insight can be created yet with little risk of losing operational privacy to the competing party.

Producer and grocers.
For the case one producer was selected and two grocers and a haulier on the user side. On the producer side MerAlliance was selected; a producer, processor and whitelabel packer of fish, located in Quimper, France. MerAlliance are a part of Thai Union which is global seafood leader and supplies to numerous Dutch supermarkets including Albert Heijn. As grocers both Spar and Jumbo chosen as their distribution centres are relatively close to each other making a shared transport viable for them. One note to be made is that the use case is hypothetical yet plausible based interviews and the research done. The point of the use case is to provide more detail and sketch a first initial collaboration. On the client side stakeholder in reality might differ depending on the products and grocers being worked with. Secondly the proposed service is modular in set-up and therefore can be used in different settings. Creating detail in a specific scenario adds value to illustrate the concept.

Platform enablers
Tielbeke is a carrier that operates in the cold chain and works closely with Scania. Thermoking is a company that builds cooling equipment and therefore is needed as a partner to integrate data of their cooling equipment with truck and logistics data. Furthermore Geo Pallet is a company that supplies connected pallets and therefore is

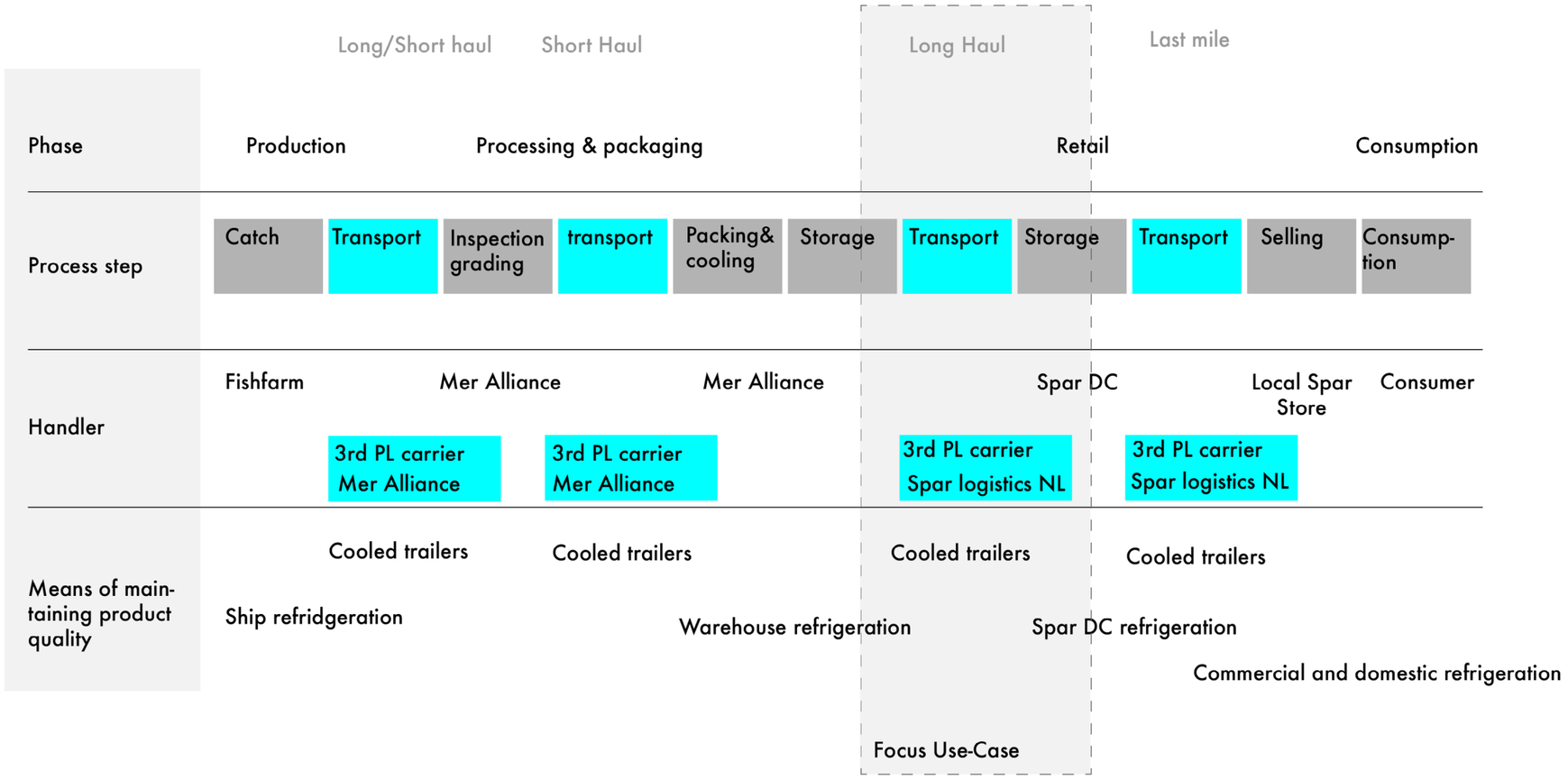


Fig.27: Focus area use-case within cooled logisitcs flow

able to measure temperature on load level. Sennder is a digital freight forwarder that is responsible of matching orders of transport with transport capacity. IBM is the recommended partner that ensures trust within the system by encrypting truck and load data and distributing it through the means of smart contracts.

Transport

The details of the transport can be seen in figure 30. For the transport both SPAR and Jumbo order seafood with their supplier MerAlliance. These orders for transport are booked through the platform with the help of Sennder. As both parties order a less than full truckload (8 Pallet for SPAR and 12 Pallets for Jumbo) this is combined as an order making them share load. (Full truckload of 40 foot container is 21 Euro Pallets.(FMG pallets))

the whole transport takes about 20 hours, included resting time of the driver. During these whole 20 hours the integrity of the cooling installation has to guaranteed. Yet at the same time operational privacy needs to be kept.

Pain Points & Pain relievers

On a functional level therefore the platform caters to the needs of flexible capacity as both parties don't order full truckloads. Next to that load and cooling data is being shared safely so the operational privacy can safeguarded and that cold chain integrity can be monitored.

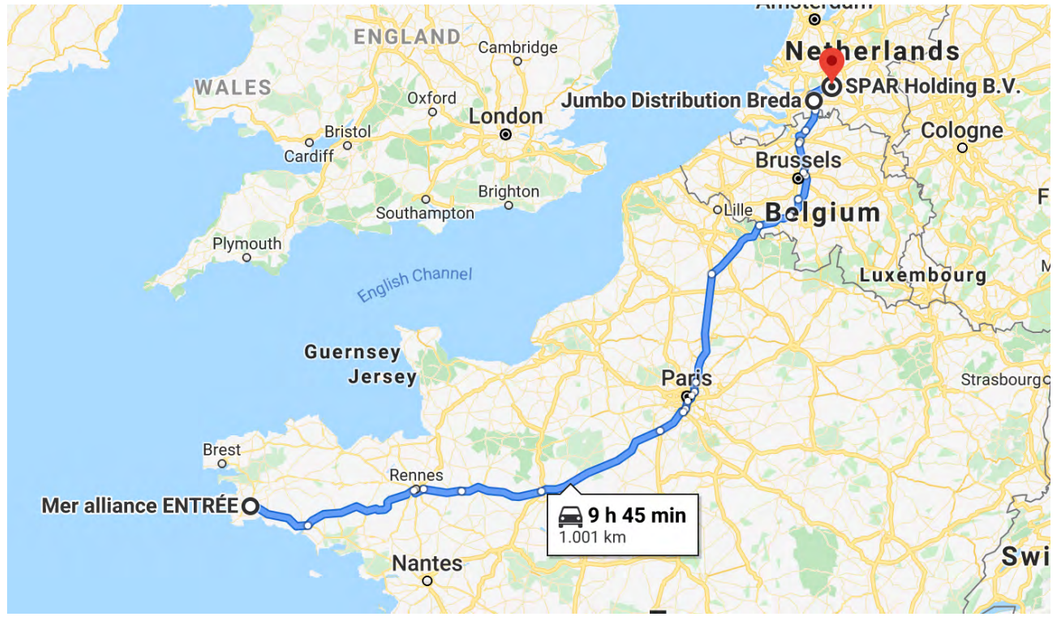


Fig.29: Transport

THERMO KING

Supplier of cooling equipment and cooling data. Partner on truck application level.

SCANIA

Supplier of trucks, truck data & api's. Initiator of transport solution to create more value for customers.

IBM

Strategic partner on integrating different data sources in a secured and in a scalable way.

SPAR

Grocer, taking care of logistics operations and distribution center

JUMBO supermarkten

Dutch grocer, taking care of logistics operations and distribution center

MerAlliance

White-label breeder and producer of fish and fish products.

sennder

Freight broker, matching cargo with transport

tielbeke

Carrier, executing refrigerated transport

Fig.28: Stakeholders Use Case

Order data

Orders:
8 Pallets Spar NL
12 Pallets for Jumbo NL

Pick-up location:
Mer Alliance, Quimper, France

Drop off location 1:
Jumbo DC Breda, NL

Drop off location 2:
Spar DC Waalwijk, NL

Load instructions:
keep at 3 to 7 degrees

Fig.30: Order details

6.2 Use case blueprint

The Use-Case was captured in a blueprint as seen in figure 31. On the left column all stakeholders are captured. Then the transport follows six consecutive steps; Placing the order, load the goods, transport, first stop, second stop and processing.
In the first step both Supermarkets place an order with MerAlliance. At that moment MerAlliance automatically forwards their two orders to Sennder, including the how the orders should be handled in terms of temperature. Sennder identifies the opportunities for load sharing and assigns a truck of Tielbeke to the transport. Furthermore the platform learns which routes could be combined more and more to optimize load sharing.

In the next phase, loading the goods, the truck of Tielbeke drives to MerAlliance and picks up both loads. Just before arrival, MerAlliance is notified automatically so that their warehousing staff can arrange the pick-up smoothly. At this moment the pallets, on which the orders are placed, leave the refrigeration zone of MerAlliance at which moment they are assigned to send out temperature data. The pallets are from this moment on, communicating to the refrigeration unit of the truck and sending out data which is safely logged and distributed through the smart contract. The logistics operators of Jumbo and SPAR receive a notification at this moment that their load is now leaving MerAlliance and live giving them the temperature through the connected pallets and insight into the handling criteria.

During the actual transport grocers are able to live monitor the load data. Through the automatic communication between the refrigeration unit and the load will be kept at the right temperature. Through edge analytics, the trailer will learn how to distribute load better for optimizing energy efficiency on cooling. Furthermore if grocers see something strange in the data they are able to notify the cooling unit and the driver. Also shortly in advance of the first stop, the plat-

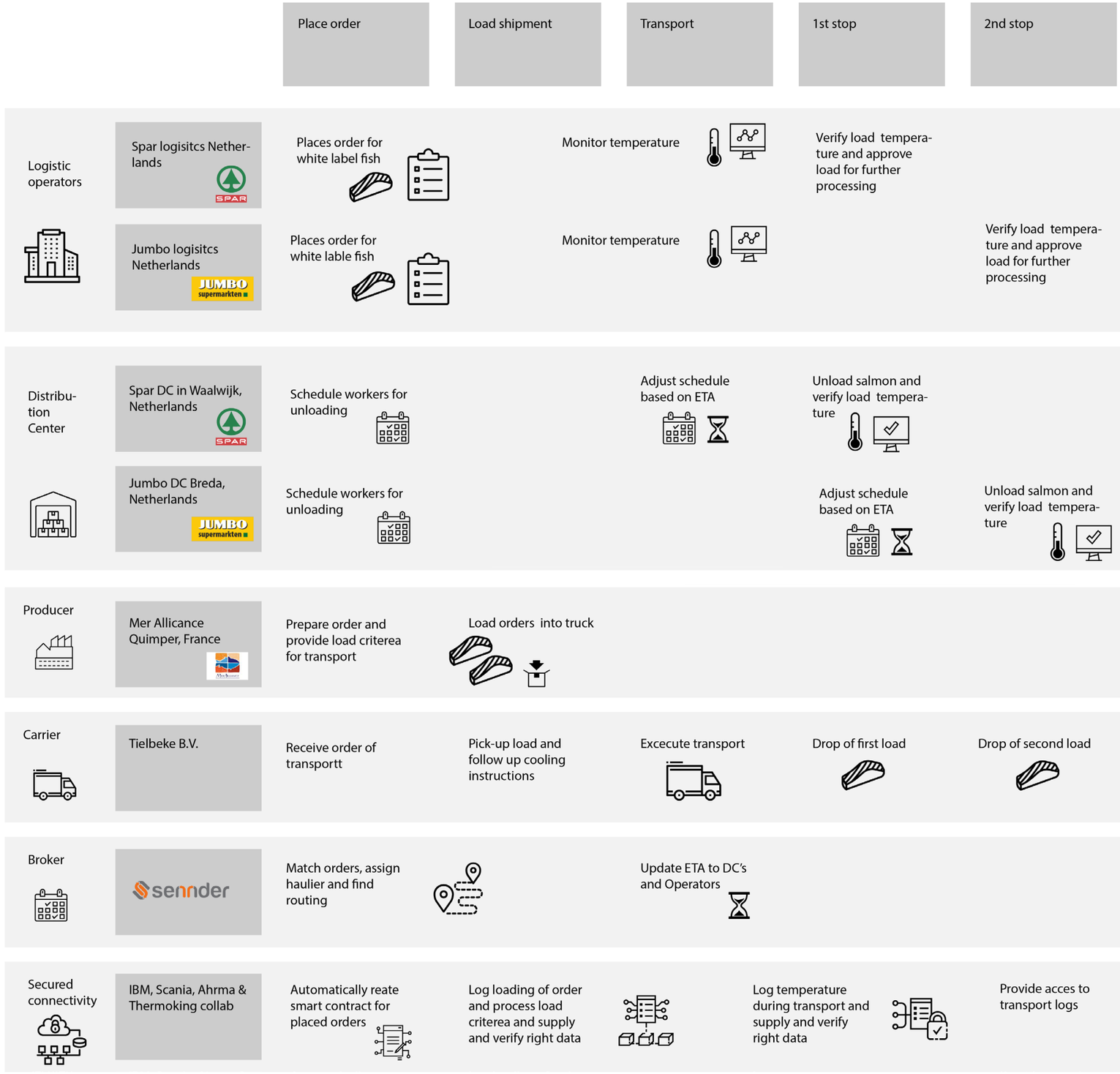


Fig.31: Service blueprint of use Case

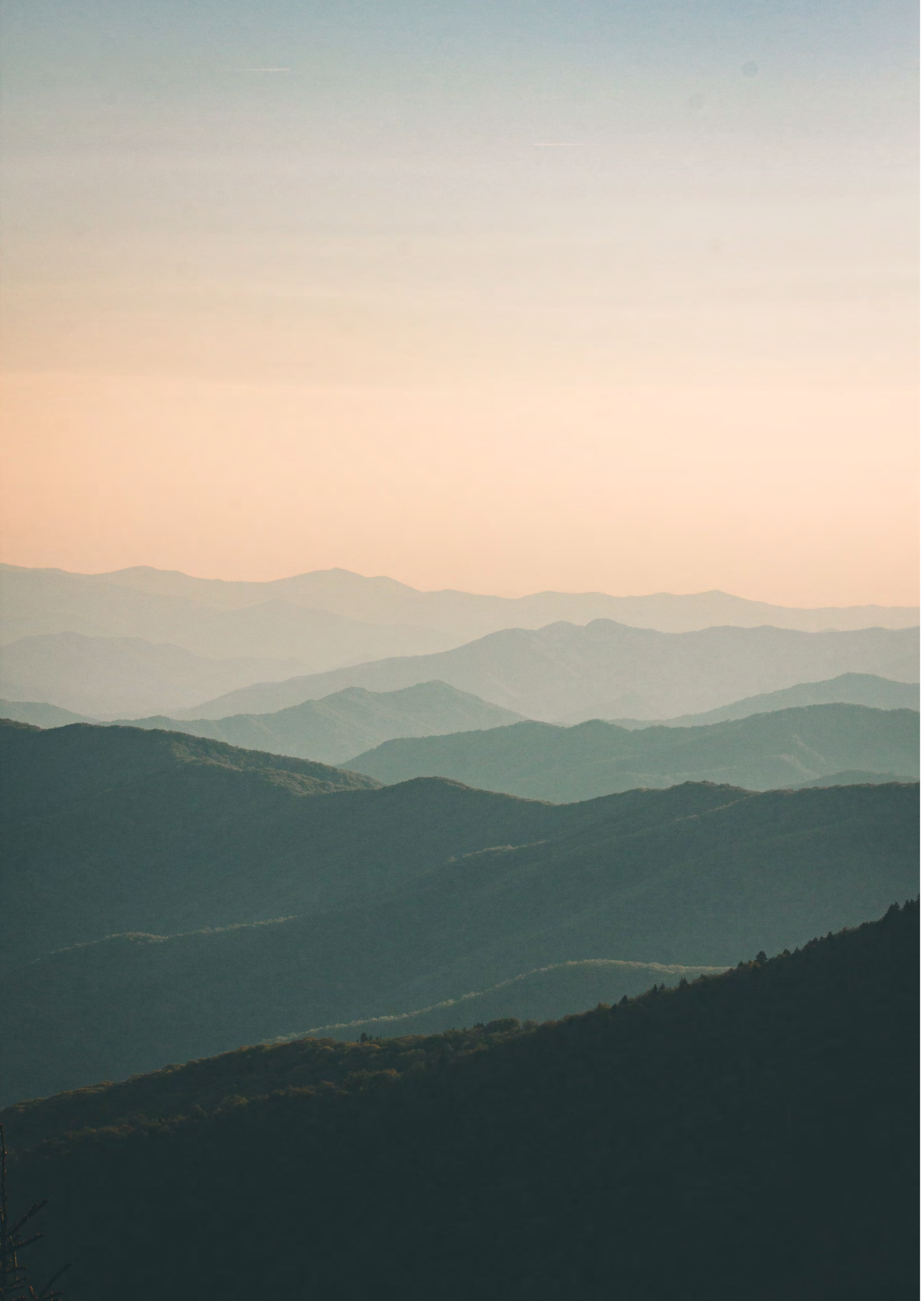
form notifies the the distribution centres of their ETA for a smooth handling.

For the first stop, driverless vehicles are able to communicate with the connected pallets and the trailer so that it can automatically unloads the right load. Now the operator receives a notification that load is been transferred into the distribution centre. In communication between the pallets and driverless warehouse vehicle the identity of the load of the competitor is being kept secret. The second stop follows the same steps but then for the other grocer.

When processing the orders both grocers get notified of their successful cooled transports and are able to see the logs and identify whether any anomalies have occured. Furthermore the verification of the integrity gets labeled on the EDI of the order. Making it traceable back to items on shelf, increasing transparency on handling in the chain.

Conclusion.

What can be concluded from the use case is that it offers a the possibility for grocers to organise their logistics in a flexible and more on demand way. At the same time to make best use of the carefree logistics platform the integration of different parties is key. Once one party is unable to cooperate, this will impact the efficiency directly. To enable that set-up for working with the platform has to be quick and intuitive as this allows true flexibility when working with many different suppliers, hauliers and other actors. This in the end is necessary for the scalability of the platform as then the user base can grow organically when working with new parties spreads the platform amongst different potential users. Furthermore when using less manual workforces and more autonomously operated vehicles the interoperability becomes more and more important. Autonomously operating vehicles here also refer to unload and offloading vehicles at automated warehouses and producers etc.



07. Deliver

After having developed the concept that is supporting the future vision, the roadmap to get there will be illustrated in this chapter. The roadmap is characterised by three sequential horizons which represent new innovation cycles. Though these cycles are sequential in order, they partly exist in parallel. The chapter starts with an introduction on roadmapping and a time pacing strategy for executing these horizons. Then characteristics of these different horizons will be elaborated upon the service proposition, business model, data sources, technologies, partnerships, supporting activities and developments. Lastly the whole roadmap will be discussed.

7.1 Horizons & time pacing

For the time pacing strategy of this project the strategic life cycles model of three (Simonse & Hultink 2017) was used. In that model three overlapping cycles of innovation follow up each other chronologically. These are aimed at design value enhancement in the first horizon, user centred design in the second cycle and value proposition creation in the third and final horizon. For the time pacing itself both the internal innovation rhythm of Scania are taken into account and the external developments.

7.2 Horizon one

Connected cold chain

The value proposition in the first horizon is 'connected cooling'. With that the focus lays at creating a connecting the trailer data to the truck data to enhance the current systems. For this horizon therefore the connected cooling module is created as an extended functionality of the FMS, where it provides more the specific user of the FMS with more added value. Secondly a secured API to share the temperature data and settings of the refrigeration with their clients will be provided, to the grocers. Therefore clients can lively monitor the operations of the transport. This however is still in the case of a client that orders a full truckload and is cloud based. This horizon therefore matures the current value of the data driven services that are offered by scania through adding more application specific value and caters for being more transparent by being able to share data easily with clients.

Service features

The service features that are offering this horizon are a connected cooling module on the current FMS. This module can be activated by cold chain customers. Furthermore the module comes with an secured API to share the cooling data with the operators. This way the operators can monitor live conditions of their goods.

Technology

In this horizon the service is cloud based and works with secured API's. This is building forward on the existing system that is there yet adding on cooled transport applications with new functionalities in the FMP for hauliers and the ability to share temperature data with their clients through an API.

Data sources

To enable these features several sources of data need to be tapped into. The main data that is needed in this horizon is truck data, trailer data and load data (EDI). This is necessary for synchronising the load instructions with the setting for the trailer so that both the haulier and operator can see whether the right criteria are being met.

Business model

The revenue model is in this case a subscription to hauliers per month for the aggregation of the cooling and truck data and the possibility to enable live data sharing with their clients which are the grocers. This basically builds forward on the current revenue model of charging for enabling connectivity of vehicles..

Architecture

The architecture for the horzion as shown in figure 33, is enabled through a cloud based system that is powered by scania. For this to happen a collaboration between Scania and Thermoking needs to be set up. Furthermore the haulier is in full control of distributing the data and is able to forward the load data through an API to the grocers.

Partnerships

The partnerships that are necessary to set up in this horizon are one with IBM and with Thermo King. As thermoking is the supplier of cooling installations they are in a similar type of manufacturing position in the value chain like Scania. Their cooperation is essential for offering integrated connectivity between trucks and cooling units. Furthermore

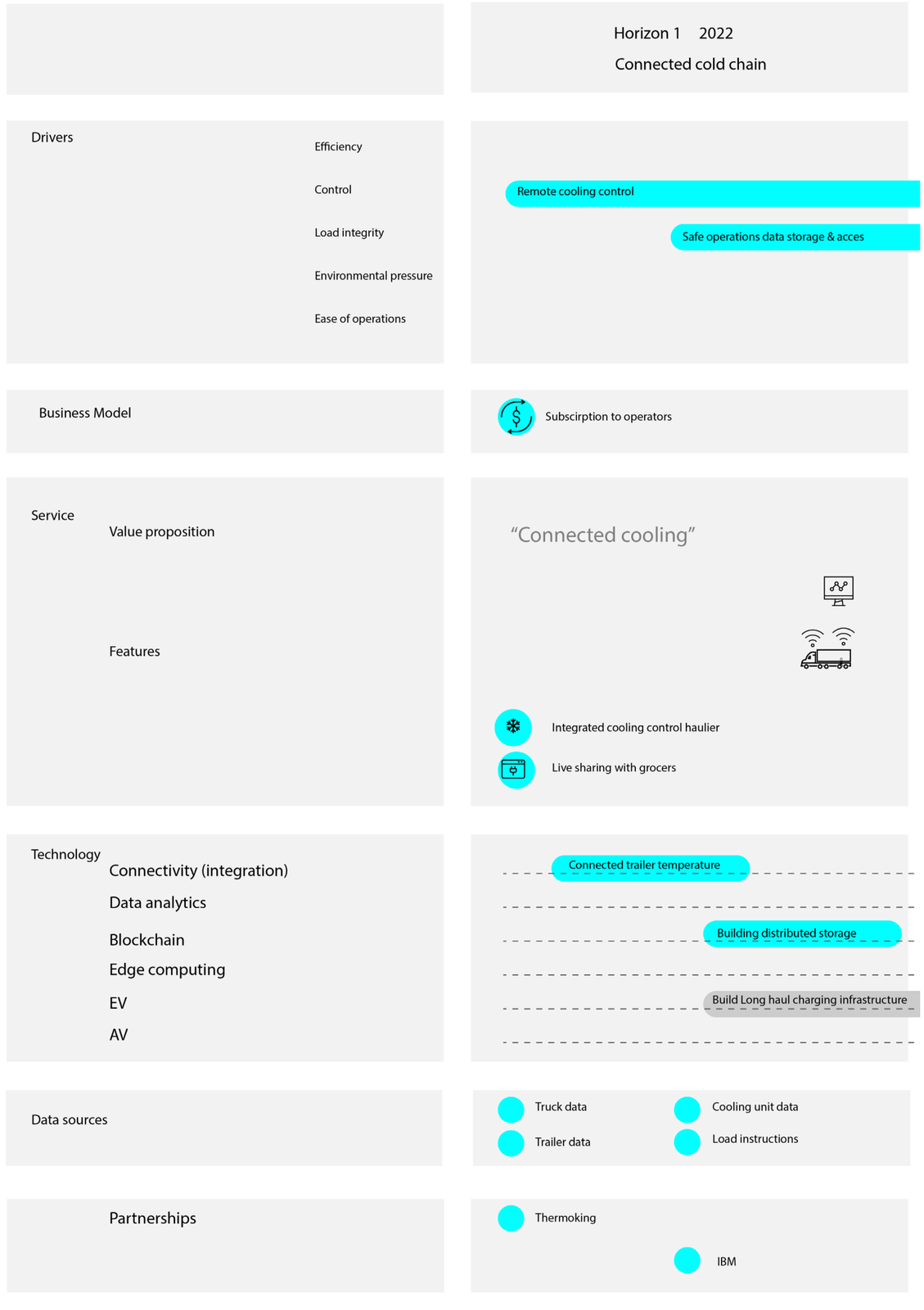


Fig.32: Horizon one of roadmap

together they can offer solutions further downstream in the value network. IBM will be a partner on the side of assisting in building blockchain and smart contract capabilities for the platform. As however in this horizon the service is not yet offered based on a smart contract structure, the capabilities will need to be built some time in advance.

Working on:
In this horizon the problem of creating load integrity is partially solved by sharing data directly to the operator from the haulier. Yet at this stage, if the haulier was to carry different loads of different suppliers, privacy regulations would be infringed once the haulier forwards the load data. In order for that to happen a smart contract structure needs to be developed so that the temperature of different loads can be identified separately yet verified with the actual transport. To do that collaboration with IBM has to be initiated here.

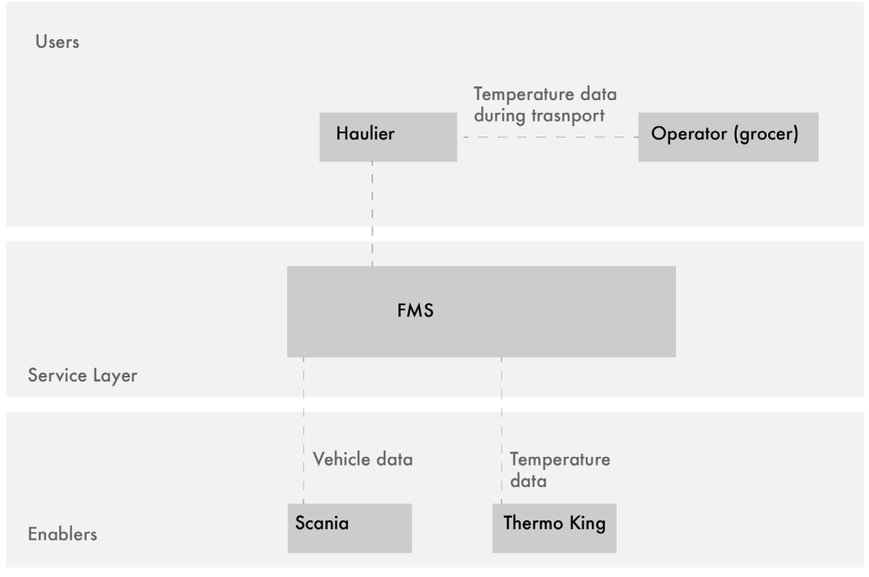


Fig.33: Service structure horizon one

7.3 Horizon two

Safe load sharing
In the second horizon value creation is focused at the buyers of the transport, in this case the grocers. Their main values of creating operational efficiency whilst maintaining load integrity and privacy are addressed with the service. The value of efficiency is being addressed by enabling load-sharing. Load sharing allows multiple parties to share load on the same trailer resulting in less empty miles, a higher filling rate and therefore in the end lower costs on transportation. When outsourcing transport and especially when participating in load sharing grocers have less control over the load integrity. This especially accounts for perishable and sensitive cargo. Therefore maintaining load integrity is another value being accounted for in this horizon. This is being done by sharing the temperature of the load with the operators during transport and storing it safely. Lastly when sharing loads, grocers don't know who they are sharing load with. This for instance and like in the use case, can be competitors. Therefore it is important that operational privacy is being safeguarded. This is being done by capturing the protocol for sharing data in a smart contract so that the entitled party receives the temperature data of their load while not seeing the data of other loads. Adding to that for instance data like positioning becomes sensitive as this indicates which other grocers or operators are having goods on the same trailer when it stops or passes by. The smart contract structure can verify that its temperature data is actually corresponding to the truck and trailer the load is on, as it is stored distributedly. That makes any changes on the pairing between the contract that was created for the order of transport create a conflict between the different versions of the smart contract.

The service offering in this horizon therefore is the 'safe cooled transport on demand'. For this service a different set-up is necessary where the key element is that all data is shared and stored based on smart contracts. This ensures that data of individual loads can be shared without breaking privacy laws. Secondly data will be more difficult to fraud and hack, increasing the trust between the different actors around the platform. Furthermore in this horizon a partnership with Ahrma is engaged, as they supply connected pallets. This is essential in being able to regulate and trace on load level.

Service features
In this horizon the service is being run on a smart contract based transport platform. On this platform the full process from ordering to execution is being hosted. The grocer places it's order for the goods to be transported and then the platform matches the truck, trailer, driver, other load and routes with the integration of Sennder. Next to the platform itself, which is targeted at the grocers, a connected cooling module is being offered to the haulier to enable hauliers to work with the platform. This one is similar to the module of horizon one, mainly with the difference that data that is exchanged with the grocers, is exchanged through a smart contract.

Technology
The enabling technology to safeguard operational privacy while being able to share temperature data are smart contracts. These are self executing contracts which are stored distributedly on a blockchain. These contracts will automatically follow a certain set of rules and boundaries such as the minimum and maximum temperature for a set of goods within a certain order. This also includes sharing data to assigned parties whilst keeping other data secret. At the same time it can verify that data for instance temperature data of a certain load corresponds with the right truck and trailer that the transport was booked whilst their location data remains hidden. Adding to that as smart contracts store information distributedly it becomes very difficult to fraud any information. It has to be hacked at multiple locations

at the same time otherwise once hacked at one location, the information stored in the same smart contract is not corresponding and manifests itself as an error.

Data sources.
Next to the truck, trailer and load data also pallet temperature data is needed, the availability of hauliers resources needs to be shared and lastly other order will be visible in the platform for matching. With the pallet temperature data the temperature of individual loads can be kept track of. This is also important as temperature level can fluctuate within a trailer. Furthermore sharing the availability of resources is important to efficiently book drivers, trucks, trailers and combine them with the right loads for the most optimum use of resources and least empty miles and standby hours. Next to that to organise live routing, road and traffic conditions are needed.

Business model
By targeting the grocers a more holistic approach towards transport is created then when targeting hauliers as it is further downstream in the value chain of logistics operations . Therefore the revenue model changes here to a state where grocers pay per transport to utilize this platform. On the other hand hauliers pay a subscription for being connected to this platform. For Thermo King the same applies for the cooling units, which are owned by the haulier and similar to Ahrma who are the supplier of connected pallets. Thermo King has a similar role in enabling connectivity as a service and with that support the efficient ownership of cooling units. Ahrma either offers connectivity as a service on top of the sales of pallets or pallets as a service at itself. This depends a bit on the ownership structure, where currently producers own pallets, but this might be different within a future context where Ahrma can be an enabler directly towards the platform. With the services offered on this platform and industry collaboration Scania adds value more down the value stream and is becoming more of a logistics company.

Architecture
In figure 34 the architecture that is needed for this platform is portrayed. The platform structure has a set of users and a set of enablers. Yet within sharing information there is a multidimensionality as the producer is both a user and an enabler in the sense that they also need to provide the platform with the correct handling data of the load.

Partnerships
The two partners that will be collaborated with for delivering upon safe load sharing are Sennder and Ahrma. Sennder of course as a company Scania invested in is already working together closely with scania. Here however the collaboration is about integrating booking and routing into a one-stop shop for placing transport orders. Further Ahrma is a producer of connected pallets which are needed to identify and monitor the conditions of individual loads.

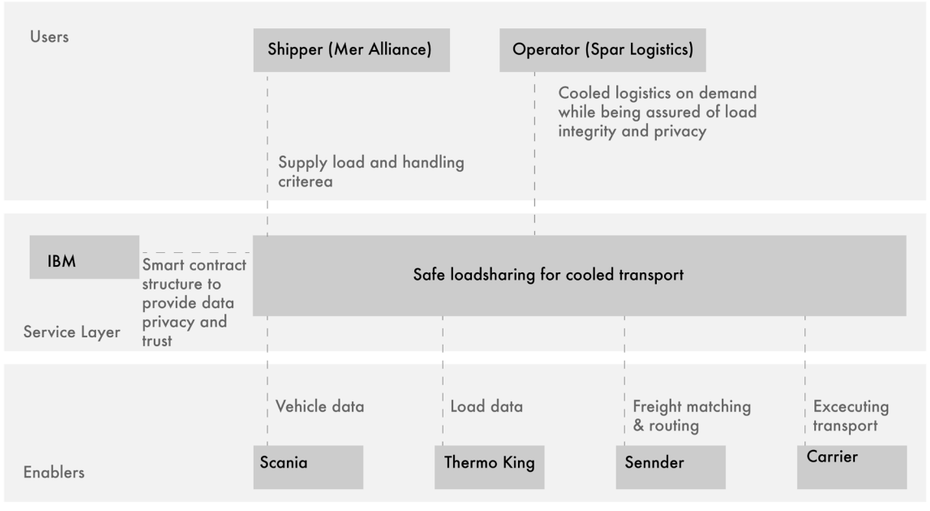


Fig.34: Service structure Horizon two

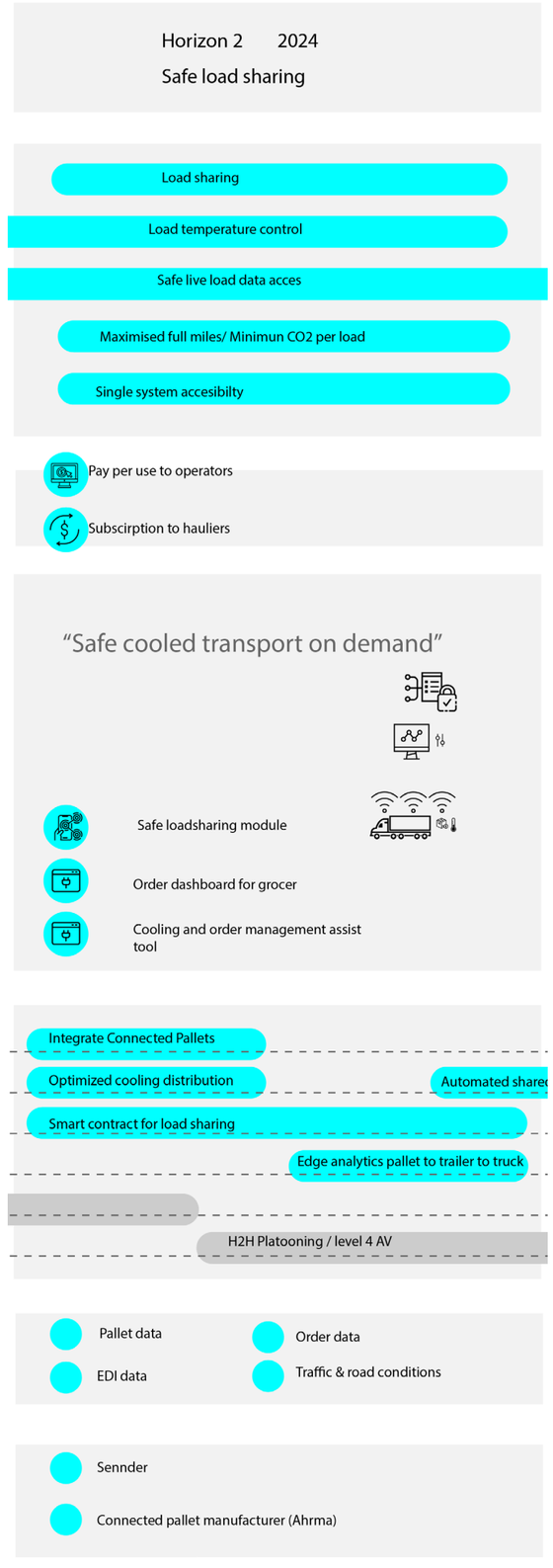


Fig.35: Horizon two of roadmap

7.4 Horizon three

Carefree and integrated cooled logistics
Horizon three is all about the creation of the value proposition and therefore delivering 'carefree cooled logistics'. In this horizon the full concept as described in chapter 5 is deployed. The multidimensionality of data sharing is even more present here as also the transfer at production and distribution are taken into account, and with that shifting towards participation in a system of systems. These parties have interest in automating and smoothening the process and therefore need a good interoperability between their connected assets and the connected cooling system (truck, trailer and pallets).

As on a value proposition level it is about delivering carefree cooled logistics this means that with the use of the platform all hassles of logistics operation are being taken away. This builds on the horizon two where grocers place their orders with the platform and then have it delivered to their desired location. For grocers, carefree goes a few steps further in the sense that actions of unloading and offloading go happen autonomously. To enable that there is direct communication between connected pallets, truck, trailer and driverless forklifts. This is done with Edge computing. For instance a company like PicNic is currently building a fully autonomous distribution center with practically no humans involved in the operations. These transitions between transport and distribution then become the next step to making the supply chain of grocers more efficient. Adding to that, through gathering operational data over time with the use of the platform logistics operations can be finetuned, which is beneficial for grocers and enablers. This means that the more grocers work with the platform the more efficient operations will be. However without being binded to solely making use of the platform as means of organising logistics as opposed to how Lots works.

Secondly the platform also makes managing logistics operations hassle free for the enablers as their assets are being used optimally and there is a high traceability and transparency in the value network assisting in managing their assets efficiently.

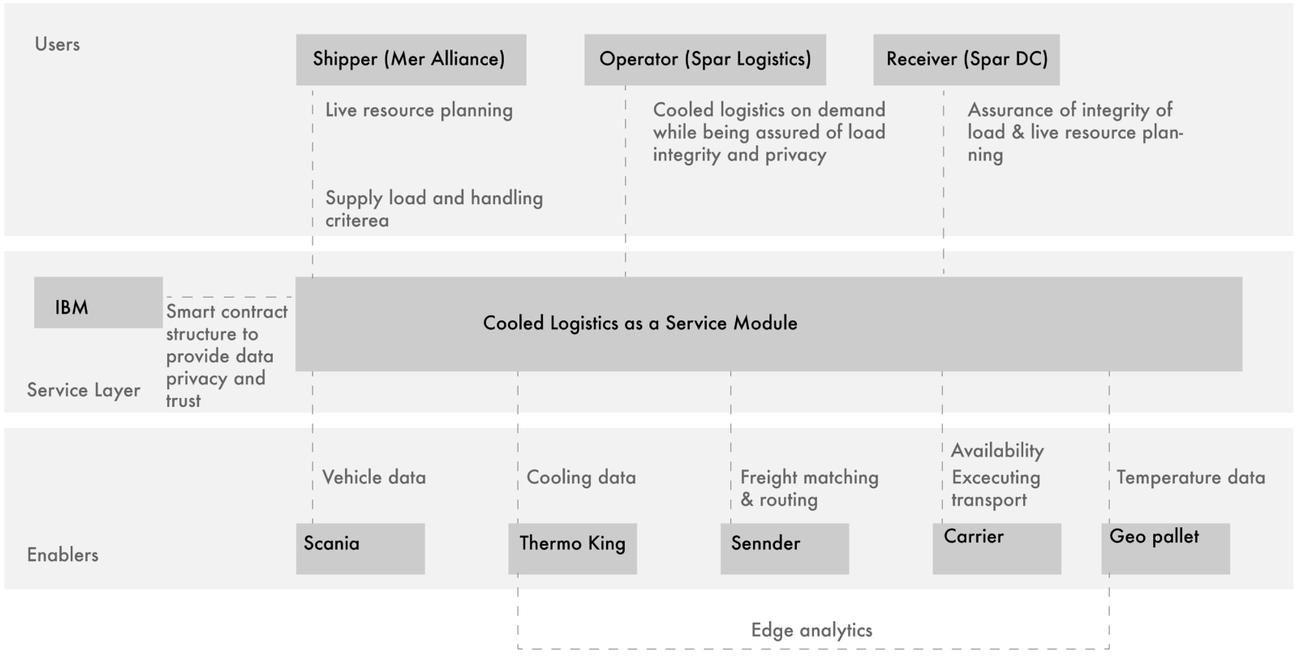


Fig.36: Service structure Horizon three

Service features
The features of the service in this horizon consist of a Carefree cooled logistics platform where bookings can be made by grocers and logistics operations are arranged. Adding to that for the hauliers there still is a connected cooling module that allows them to participate on the platform. This module builds on the module of horizon two, where now the main difference is that this supports the truck in edge communication with other connected assets in the value chain. Furthermore both an API for the producer and the distribution center are offered which enable a smooth interoperability with the platform and enable edge communication between autonomous forklift and pallets, trailers and trucks.

Technology
In this horizon the platform is built out based on the smart contract structure of horizon two. However for a smoother integration and interoperability edge communication between pallets, trailers, trucks and distribution centres is being used. Furthermore on local level edge analytics can help optimizing the interactions between these assets. This accounts for positioning of loads, temperature distribution during loading, transport and unloading etc.

Data sources
In the third and final horizon an extra source is edge data of the autonomous forklifts and other assets of distribution centres and producers. Furthermore the same data sources as in horizon two have been tapped into. However as time has passed a lot of optimization has been gained by analysing operational data.

Business model.
In this third horizon the solution provided to the grocers is providing carefree logistics. This means that per order everything from ordering until unloading into their distribution centres is included. Therefore they pay per use as a total sum of all these operations.

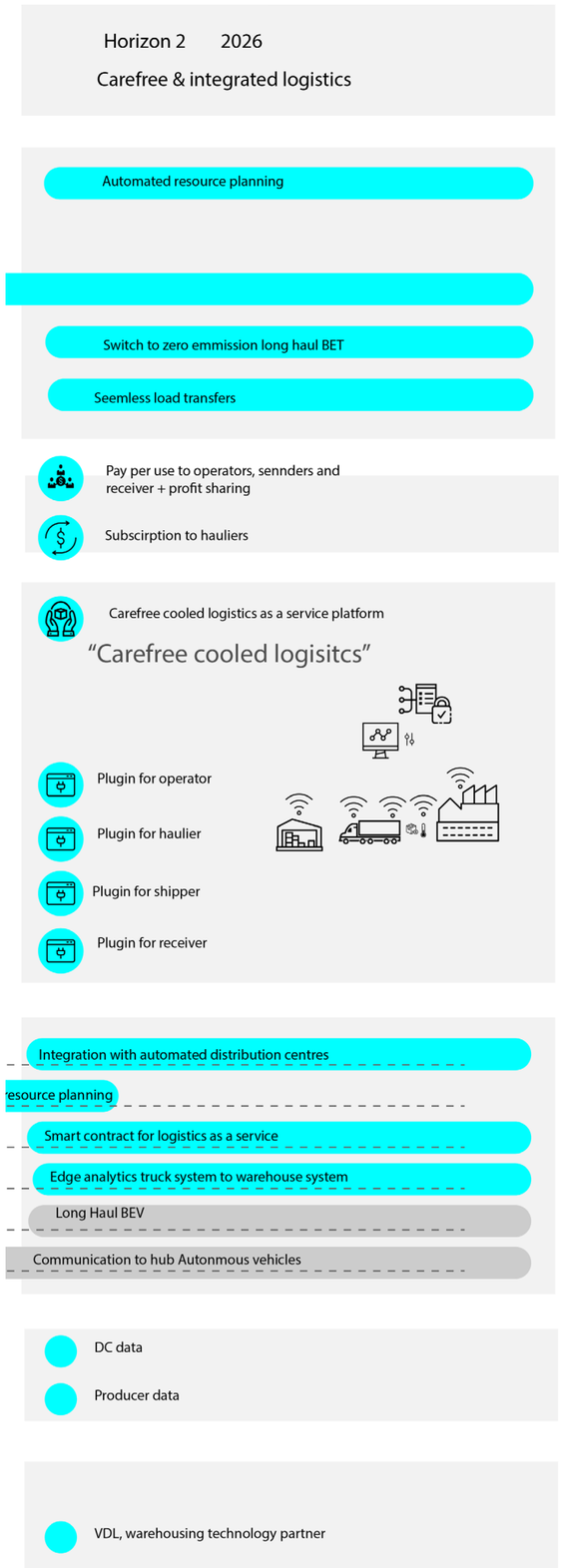


Fig.37: Horizon three of roadmap

However when ordering often and consistently, the operations that need to be carried out can be optimized more and more through analytics. This creates a gain in operational efficiency on the platform side, where the platform benefits financially. By outsourcing transport and ordering it on demand, grocers already have made an efficiency gain through diminishing overhead costs and ordering by volume instead of truck loads. To create an incentive to work more with this platform the profits on the backend will be shared with the grocers. This way the more the platform is used, the cheaper it gets for grocers. This is creating the mutual synergy of service value as described by Lindhult.

Architecture

On architecture level as shown in figure 36 the structure of the platform has stayed similar yet some multi dimensionalities have been added that create smarter and more efficiently organised operating platforms. Furthermore the adoption of edge analytics for some of these processes will take place, like the interaction between the cooling unit and the pallets and the interaction of the connected pallets and the driverless vehicles of the distribution centres.

Partnerships

In the third horizon the focus for partnerships is on creating seamless transitions between loading, transport and unloading. Therefore partnerships have to be made with companies that are involved in highly automated warehousing technologies. A company that can be key in this is for instance Vanderlande.

7.5 Roadmap

These three horizons and future vision lead to the creation of the following roadmap(figure 38). In the road map the value propositions, value drivers, business model, service features, partnerships and technology and data sources come together and are plotted on a timeline from horizon one to horizon three.

7.6 Scalability beyond the cold chain.

As mentioned before,this project was zoomed in on one particular application of transport to give context. With this roadmap a specific service proposal was developed yet in a structure that is scalable to other applications of transport. With respect to that this is a road map for cooled logistics yet could be used as a framework to contextualize those different applications. In that the smart contract structure forms the base for creating trust in data sharing. That way through open collaborations many specific and niche modules on the platform can be created leading to carefree logistics solutions for various situations. An example of a set-up like that is the shopify model as explained in Appendix C in ‘a note on platforms’.

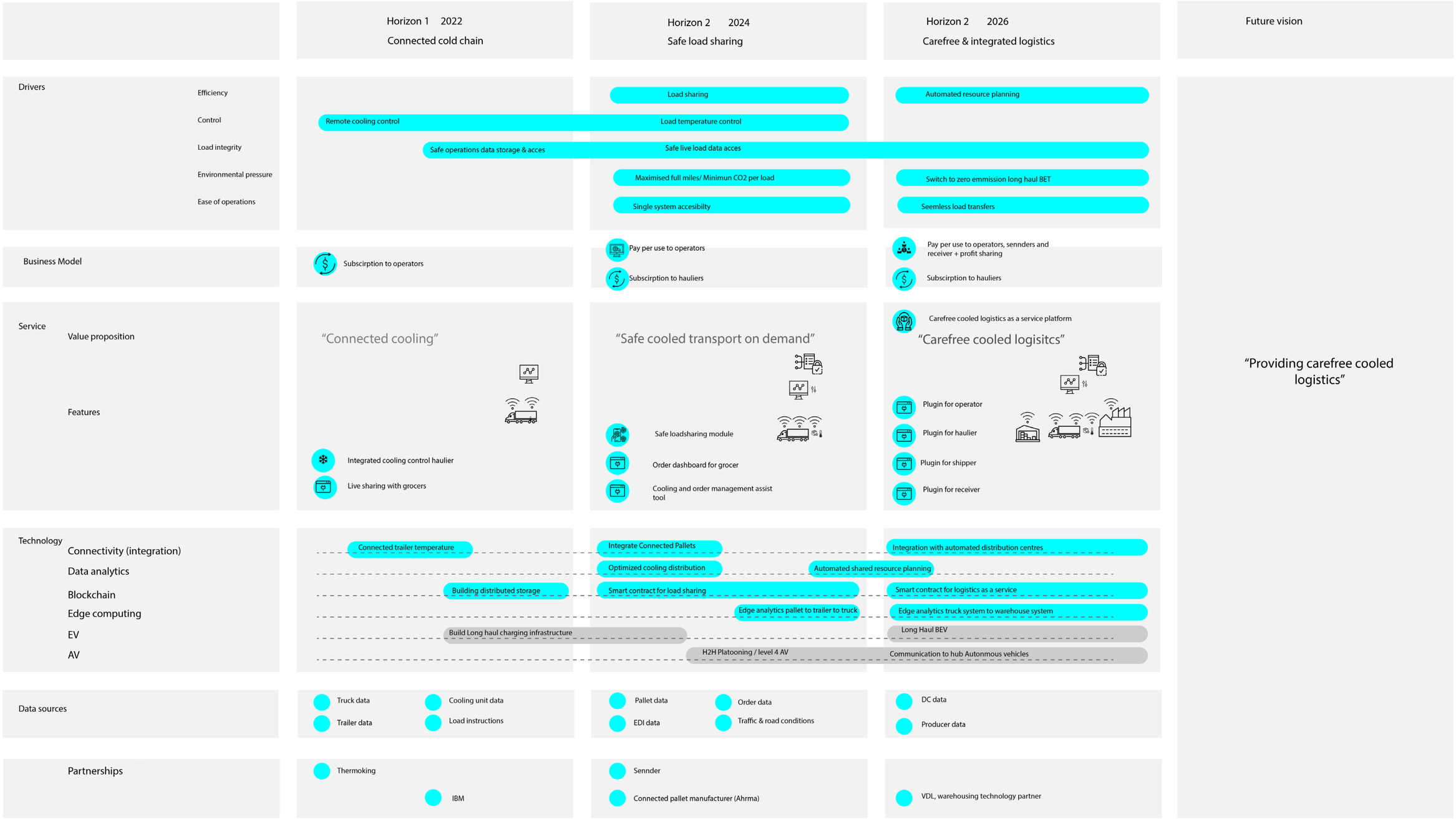


Fig.38: Roadmap of data as a service for Scania

08. Discussion

After having delivered a roadmap and service concept upon the problem definition of this project, this chapter will focus on evaluating the project and drawing final conclusions on the research questions that were posed in chapter one and doing some final recommendations for Scania. In the evaluation I look back on the project. Unfortunately due to the timing of summer holiday it was difficult to fully validate the final outcome of the project with potential customers, Scania employees and other stakeholders. For the conclusions input of all subchapters and personal observations during the project were used. Finally based on the evaluation and conclusion, some recommendations to Scania are being done towards delivering upon the future of this project.

8.1 Evaluation

A common belief amongst design practitioners like IDEO is that the sweet spot for innovation is reached at the intersection of desirability, feasibility and viability. For the project I will assess the contribution of the proposed solution based on these themes.

Desirablility

Based on several interviews the need for creating a certain level of trust and transparency throughout the value chains is present. In that aspect the proposed service platform provides value. However the exact interactions between stakeholders can be contextualised more precisely. Now that these stakeholders are defined for each of them a whole journey could be defined. In retrospect the process of development started off by focussing on grocers and building from their needs which led to a service proposition that led to selecting the stakeholder for enabling the service proposition. This formed a new service ecosystem . To improve desirability of the entire platform, needs and journey of the enablers such as Thermoking and Ahrma should be further defined for a more holistic approach. That in turn balances the reciprocity of value, as described in chapter two, contributing to adopting a system based business logic and therefor more desirable innovations on system level.

Although here was focused specifically on grocers, the principle of creating trust and transparency with the structure of this smart contract based platform is transferable to other applications. Concerning cold chain, the medicine industry for instance is an industry that could benefit from this. Furthermore Ahrma's pallets are also able to monitor humidity weight and shock level, meaning that along with the same supplier of connected pallets these opportunities spread to various other applications of transport. The base principle of the proposed solution therefore with the right contextualisations, has a potential in adding value to various other applications of transport.

What furthermore will be important is interoperability (feedback Scania empolyee) to make the platform being adopted easily and provide scalability. For this a degree of openness in software is key as this allows for quick customisations depending on the situated use. An argument in that of course is that openness in software leads to business risks where others might copy and repeat the trick. Depending on the degree of openness this is a real risk. However as long as this specific value chain collaboration is still an untapped revenue pool the market first needs to be created. In that case scaling fast seems to make more sense than protecting a market that is still small.
Adding to that, an intuitive and easy way of setting up software form a human centred perspective will contribute to scaling. Therefore ux and service design for the development of this platform will be key to creating flows that are adopted quickly by enablers and customers.

Feasibility

From a technology perspective, the base principle of blockchain based smart contract is feasible for the intention of the proposed platform according to a business developer for new technology. One comment though is that for this type of application the distributed storage of data is limited to the involved stakeholders. This is a so-called private blockchain. A consequence of this is indeed that it is less resilient against hacking than a public blockchain with many more entities where data is stored. However the advantage still is that if on the side of one stakeholder an alteration of data within the smart contract occurs this will stand out against the others. This makes it traceable when a problem occurs and who is responsible.

Viability

From a viability perspective little can be confirmed with interviews yet drawing the line from the desirability perspective it seems that scaling quickly is important. Hauliers, operators and other stakeholders need to be attracted to the platform to make it work and from there a network effect has to be created to make the platform profitable. There are of course several growth strategies that can be thought of. Yet getting the reciprocity of values and interactions through digital interfaces right is the first step in getting traction. For this a small scale pilot or trialling in a live-in lab setting could be a good starting point. Also referring back to an interview with ITRL, lessons learnt from MaaS were that small scale and niche implementations turned out the most viable and beneficial to stakeholders. Using that lesson, trialling on very specific and niche applications would make sense to start with. Key in that is a modular architecture which is easily adaptable towards different niches.

8.2 Conclusions

For final conclusions on this master this the research questions of chapter one are being reviewed. The main question in this was: "How to expand Scania's business from data processing within this future context and what are new service propositions in there?" This led to two additional research questions as mentioned and discussed upon below.

Who is Scania's future customer?

Throughout the project it becomes clear that, when moving to a more digitally intertwined transport and logistics system traditional lines will blurr between customers, business partners and enablers. For scania this creates opportunities further down the value chain. However when moving further down the value chain it is not a one-man show but requires collaborations. For those collaborations the reciprocity of value between stakeholders is important, so that ultimately these collaborations thrive in a more system of systems approach.

What is Scania's desired future position?

Within the project a future position within the landscape of transport and logistics was proposed where Scania has a hybrid role of supplying trucks and being a logistics service provider. Moving a step up the value chain by being involved in providing logistics services strengthens Scania's position for the future, yet manufacturing remains a core business for now. Although on the long term, with foresight towards mainstream adoption of long haul BEV and AV, the role of manufacturing might shift more towards an assembly focus. With the proposed solution a step would be placed towards obtaining more of a service providing role.

Secondly to answer this question the project has generated a proposition for a platform that gives Scania a position here. Although from the perspective of this project Scania has a dominant role in it, the reality is that for the development of data driven services, Scania has control over data for the assets they produce, the trucks. In the transport and logistics system trucks are a link in a much larger chain. Taking initiative in setting up this platform and collaborations is then what makes the role of Scania stronger present within the proposed service solutions. That initiative is something that can be found in Scania's own mission to be driving the shift towards a sustainable transport system.

Closing the delivery gap

In the introduction another secondary research question was posed: "The assignment therefore also seeks to provide an answer on how to close this delivery gap and align the process of connected service development more."

When looking at the final horizon, the service proposition relies on a degree of automation in the use of data as a service, mainly making the application of data smarter in the sense of how it is combined with. With regards to the delivery gap as identified in chapter one (and in the above research question), the output towards customers has reached more value on a data and therefore demonstrated a potential pathway towards developing and bringing new data driven services to market.

From a business development perspective, this pathway requires an adoption of a more system based business logic. On a high level the service proposition and roadmap overcome relational complexity as foreseen in chapter 2 with adopting more digital and systems based business logics by using principles like profit sharing for different stakeholders to engage equally. On a more detailed level these relational complexities need to be given more context, depending on the specific application and therefore the specific interests or conflicts of interest. This means that it does not only require a customer centric approach but also carefully considers other stakeholders. Also as the difference between customers and partners will blur with these kinds of collaborations. For instance service design principles can be used to further define and establish the relations and transactions with other stakeholders in the business development of specific applications of transport. Furthermore small scale pilots or live-in lab settings can add value into bringing these concepts into practise.

Contribution to Scania

With this project a pathway was laid out for scania to develop a new service proposition. With regards to the narrow scope of the proposition, this of course serves a part of Scania's potential customers. However some base principles and needs which I uncovered during the project are transferable to other applications of transport. This creates potentially a lot different new service propositions once efforts are put in contextualising the specific and situated use. However more important than the actual outcome of the project itself is that this project portrays a process that is valuable to Scania.

8.3 Recommendations

After having evaluated the concept and drawn final conclusions, in this part some recommendations for further research and implementation of the proposed concept are done. These recommendations are based partly on what could be improved on the concept and observations and experiences during my time at Scania.

Contextualising other stakeholder interactions

Within this project I mainly focussed on the needs of the grocers yet for a more holistic view and complete concept contextualising the needs of other stakeholders and their journeys can be done more extensively.

Attention to the entire transport journey.

Within this thesis the situated use of transport for grocers is being explored from an outside-in perspective, however there is still a focus around long haul road transport and within the use-case an even more specific line of transport. Looking at the entire chain would add value for grocers as they also deal with a lot of issues around the last mile. The (urban) last mile is not an area where Scania from a vehicle perspective is not a focus area, however there might be possibilities by collaborating with manufacturers that do or fleet owners that focus on the urban last mile. This could assist in creating an integrated and smooth journey of transport.

Transfers of transport and integration

Furthermore essential points within the logistics process are the transfers from modes of transport or transport to distribution or storage.These points are addressed in the concept briefly but more can be researched on strategies to create a smooth interoperability. In that a partly-open source software can assist in creating this integration.

Role of data and need for collaboration

As data has a large role in this thesis it is important to note that as Scania it is difficult to leverage potential of data without collaborations with other stakeholders, as trucks are only a link in the transport and logistics system. Therefore Adopting a system based logic developing long term collaborations in the value network are key to offer value further downstream.

Expanding towards other applications of transport.

As within this concept some basic principles are transferable, there is an opportunity to expand towards other applications of transport. For this the right contextualization needs to be done depending on the situated use but for business development this for instance might be interesting for the medicine industry also due to the perishable nature of the load and strict regulations. Furthermore by creating selective transparency early on, this might be beneficial in terms of rolling out autonomous transport systems where customers need to have faith in the vehicles.

Internalising strategic design practises

During my thesis I experienced the different views of people within Scania and think that strategic design practices can be very valuable to channel these views for the development of services within Scania within the digitalization and servitization of Scania. Projects like these of course are valuable to get acquainted with some of the practises, yet for maturing I think that creating a larger audience by training employees in the methodology through (experienced) professionals is the way forward. Although I have facilitated some workshops in a previous internship and course, organising a value mapping session within this context for instance in this case was something new to me and didn't go as successfully as planned. Experimentation in that area probably is very valuable for the adoption of strategic design practises amongst employees and in turn internalising that in the way of working.

8.4 Reflection

During this project I have learned a lot on a personal level and professionally. Of course the journey was a little altered by the arrival of covid-19. That has had its impact and has refined my knowledge on my internal mechanisms and motivations. Furthermore as one of my objectives was; I got to experience what it is like to work with a large corporate, compared to a relatively small agency and as a bonus was able to observe some differences between Swedish working, business and overall culture compared to the Netherlands. Besides all these personal notes I want to make a few learnings explicit:

Narrowing down sooner and stricter

During the project I experienced that in the new-to-me context of Scania it took me quite some time to narrow down enough to a bite-sized chunk that was ready to build upon. I felt that due to being in a place abroad and a totally new environment surrounded by people that were less acquainted with the same style of working we get thought in the faculty, I had to take them along in my ideas about narrowing down. This slowed me down in making those decisions. Having gained experience in this in the future I will be able to do this quicker and with more rigor.

VIP is felt less suitable for this context

Furthermore I planned to use the VIP methodology partly for my contextualisation. However I experienced that 1) using that method only partly doesn't create as rich insights as expected. beforehand. and 2) Applying it in a business to business context makes it less intuitive. I relied a lot on the end-consumer side for finding context factors as also that is where as a design you can involve your own vision on the design(Using your beliefs etc.). Although for overarching servitization it is of course important to use some of these insights, you'll need more insights on the market context of Scania itself. That is an area that is less intuitive to find and use your personal vision in if you are not that familiar with the topic yet. Once I experienced this, I chose to use ViP not as a leading methodology for my contextualisation but use the statement as background guidance .

Value mapping sessions

As mentioned in the recommendations I had some experiences in facilitating and feel rel-

atively comfortable with the basics. However facilitating a value mapping session was different to me than expected. It did not entirely go as planned and heavily underestimated in the time needed for it. Secondly what I noticed quite some differences with sessions I had done so far; these were mainly journey mapping and ideation sessions based on consumer insights, picked from interviews of which often the transcripts were in the same room to refer back to. During value mapping sessions some of the is about having participants share what their views and priorities are. Of course trend cards are on the wall supporting in focussing the insights for value drivers yet you need to be prepared for more opinions of people. That takes quite a lot of time and energy.

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Appendix A

Context factors

Environmental
Paris agreements https://ec.europa.eu/clima/policies/international/negotiations/paris_en

Stockholm fossilfree by 2050 https://international.stockholm.se/globalassets/rapporter/strategy-for-a-fossil-fuel-free-stockholm-by-2040.pdf

Amsterdam fossilfree by 2030 https://

www.amsterdam.nl/en/policy/sustainability/clean-air/

Nitrogen crisis https://www.bbc.com/news/world-europe-50396037
Consumer behavior
Trend: Paying CO2 offset https://www.nationalgeographic.com/science/2019/12/what-are-carbon-offsets/
State: Vliegschaamte /Flug... https://www.

bbc.com/worklife/article/20190718-flygskam

Houding naar schaamte: we moeten ons vooral bewust zijn en het meest valt te behalen op de zakelijke vluchten https://

nos.nl/artikel/2278009-vliegschaamte-is-die-wel-terecht.html

A lot of mainstream attention for veganism with movies like https://gamechangersmovie.com/

The success of meat replacements https://www.theguardian.com/business/2018/

dec/19/unilever-joins-meat-free-revolution-after-buying-the-vegetarian-butcher

Beyond meat hits stock market very succesfully; an indication of the appeal of these type of products.https://www.

beyondmeat.com/products/the-beyond-burger/

Hype around cooking and cooking shows, inspiring people to put effort into meals.
Greta Thunberg and public attention for the urgency of environmental issues.
Urbanisation / Expansion of urban areas causing more strains on cities.

Gepland hedonisme; De tijd van het geplande geluk.

More attention for mental well-being. (Series tycho in de psychiatrie etc.)

Work life balance being discussed even further: Finland trialling with a 4 day/30 hr workweek.
Minimalism as a counter movement to 'mindless consumerism.'
Digital trust is tech's new currency (State Frog design 2020 report)
Technological
Delivery when you are away https://www.

wsj.com/articles/delivery-service-brings-groceries-to-your-fridge-when-youre-away-1464627114

Delivery to your fridge https://www.delish.com/food-news/a27841171/walmart-in-home-fridge-delivery-service/ https://

www.ica.se/infridge/infridge-in-english/
Economical

Within city housing is getting un-affordable for normal people.and starters.

Teachers etc. move out of cities which results in high pressure on schools within cities.
Expats marketshare in renting is high

Counter movements to make cities available for the 'citizens' again

Stricter regulations on landlords to prevent exploitation of housing

Financially NW Europe is doing well.

Low interest rate. Saving is no longer favourable.

Generation y has got less to spend than their parents
Coronavirus causes huge fall in markets as a pandemic is being feared. Pandemics

can have positive effect of grocery delivery, yet negative effects on production

Political
Brexit and more potential exits
NOx crisis NL. These type of crisis's affect entire industries with economical damage as a result.

Pressure from EU-environmental regulations on politics that leads to difficult dilemma's on where to spread attention to.

Factors in format
Principle, Cultural: Switch to organizing life more structured often takes place when people get kids.
State, Psychological: We distrust 'free' online services (where we have to enter personal data)
Principle, Psychological: The paradox of

choice. In cases of having too many options we don't move forward and cannot

pick.
Development, Cultural: Working from home is more and more accepted.

State, Sociological: We live in a highly individualistic society

State, Psychological: We suffer from mental obesity. We don't want to make choices, they should be made for us. We want

to be served.

State, Cultural: Our awareness of the impact of consumerism grows, yet we find it

hard to adapt.
Principle, Psychological: Changing habits takes time. For people to act upon long term habits to diminish impact it will take a lot of time to develop those.

State, Psychological: We are easily distracted. With the current amount of digital tools sending notifications we have

created a society with very snappy attention-spans.

Development, Psychological: In masses we have turned to meditation and yoga etc. to calm our minds down in overly stimulated societies.

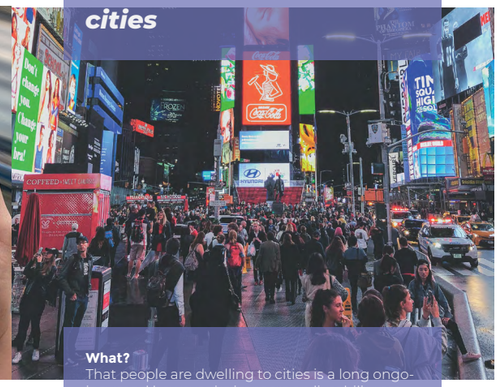
Appendix B

New digital players disrupt logistics industry

What?
Where large asset-heavy organization have difficulty with changing along with markets, new digital asset-light companies step into the gaps, reforming the ecosystem and affecting business as usual.

Think of...
companies like Sennder or Nimber

Urbanization stresses cities



What?
That people are dwelling to cities is a long ongoing trend however its impacts on liveability are becoming more and more visible. At the same time governments are pushing to expand urban areas to keep up with housing demands yet they are facing boundaries.

Think of..
Amsterdam, Stockholm, London

Emission policies drive the rate of

What?
The awareness of the impact of our consumption continues to grow. As a result people start to consume more mindfully and be more intentional about their purchases. We see it in a lot of different aspects such as the growth of meat replacements, slow fashion movements or when traveling being able to pay CO2 offset or even the invention of the word 'flygskam'.

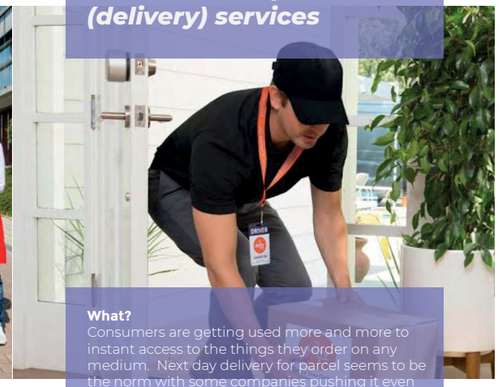
Growing importance of creating digital trust

What?
Privacy of data is becoming more and more regulated. For instance GDPR 2.0 is on it's way. At the same time many consumers express the feeling of being spied by apps and are becoming sceptical to 'free' online services where business models are relying on the user data.

The rise of modular solutions for urban

What?
Shipping containers have been the norm for long haul however with a growing volume, cost pressure and need for flexibility.

Frictionless expectations (delivery) services



What?
Consumers are getting used more and more to instant access to the things they order on any medium. Next day delivery for parcel seems to be the norm with some companies pushing it even further. At the same time everything in the ordering process has to be as frictionless as possible and we don't want to be bored with commodity shopping. (Zero-touch consumption) Think of rapid mobile transactions, parcels being delivered when you are away and automatic re-ordering and restocking of your groceries.

The era of mindful consumerism

What?
The awareness of the impact of our consumption continues to grow. As a result people start to consume more mindfully and be more intentional about their purchases. We see it in a lot of different aspects such as the growth of meat replacements, slow fashion movements or when traveling being able to pay CO2 offset or even the invention of the word 'flygskam'.

Sharing economy reaches B2B segement

What?
The sharing economy has been a hot topic mainly on a consumer level yet there are a lot of opportunities in the B2B segment. Within logistics one of those examples is load sharing which could increase load capacity and minimize costs.

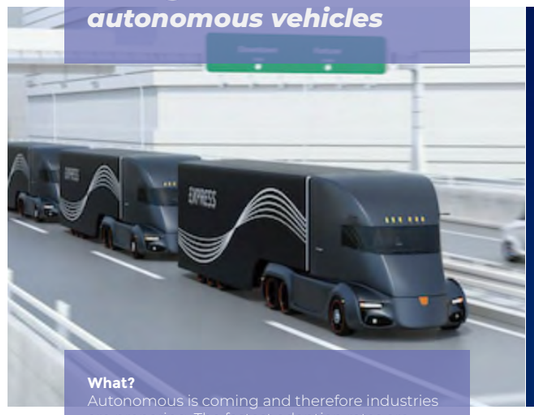
Data driven optimization of logistics management

What?
The logistics chain is being optimized more and more based on data analytics and artificial intelligence. This impacts efficiency and is providing input to pave the way for autonomous transport. An example of this is the so called 'control towers'.

Connectivity is everywhere

What?
IoT has had a lot of attention yet more and more products are being connected and therefore are able to interact with each other in cleverer ways, when combined with data processing. Within the logistics industry this are for instance warehouses, goods, pallets, hubs, trucks and parts of the infrastructure. This is providing insights to logistics companies throughout the entire value

Paving the road for autonomous vehicles



What?
Autonomous is coming and therefore industries are preparing. The fastest adoption rates are seen in industries that have less human interaction and that work more with enclosed zones. Also at hub to hub transport, hybrid solutions such as platooning are being tested.

Integration of systems

What?
In order to step away from incremental innovations but radically influence the processes, data will be integrated from various sources across different systems to create more data insights for the operations of transport and logistics.

Appendix C

A note on building digital platform ecosystems.

For a platform to thrive, the platform has to serve needs for all involved parties (Reid Hoffman, Masters of Scale). Otherwise the enabling parties on the platforms will drive an unhealthy competition, bidding on assignments for unsustainable prices, leading to an unhealthy system. An example of this is Uber where, in order to increase their pay some drivers work way too long and consecutive hours, having resulted in numerous accidents. Tobi Lutke, founder of shopify and Reid Hoffman argue that a specific challenge with platforms is that they need to be clear and cater to a specific need, yet need to be set up in a way that others can contribute. A risk of not solving just one specific need is creating distraction and confusion. Reid Hoffman refers to this as the phenomenon of a 'feature creep'. References to an early age of digital interface design that had too many features making those interfaces very unintuitive. In doing so, platforms that have no singular value proposition fail to hook users, leading to high churn rates. This seems to be consistent with the findings of the challenges complexity traps within virtual logic and system logic for service innovation. Taking Shopify as a successful example, it demonstrates a clean and simple value proposition: "Sell online with shopify" yet there are a lot of plugins available that can be used for specific needs that specific online stores would need. (Different payment integrations, help with logistics etc.) This is kind of comparable with the appstore on your iphone. This form of open innovation draws developers to the platform because of opportunities to create plugins based on the specialised knowledge and capabilities they have and vice versa draws users there in fulfilling their specific needs that have been created on a niche level.