



Creating value from mobility-driven big data

Exploring the possibilities of value creation in big data for an actor with mobility supporting solutions as their main product

Master's thesis in Management and Economics of Innovation

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Gothenburg, Sweden 2017

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Cover: The aim of the project illustrated through letters formed as a mobility
supporting solution.

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Abstract

In a world where the amount of data produced from connected products is increasing rapidly, there is a great possibility for a company to get insights and create value from this data. The aim with this thesis was therefore to create value models for companies within mobility-driven solutions in handling their mobility-driven big data. The narrowing into mobility-driven big data was to understand the movement and actions made by the user and the effect on the movement on the product. The term mobility-driven big data is defined in this thesis as:

Mobility-driven big data is collected from mobility supporting solutions such as cars, busses, trains, airplanes or other forms of transportation. On top of this, there is a demand for large volume, variety and velocity of data that requires new innovative ways to analyze the information available in order to answer the specific questions in a real time setting.

Through a broad theory review, interviews with knowledgeable actors as well as a deep dive into a case at a company pursuing this endeavour - five important axes were identified to answer two highly relevant questions to answer in creating value from mobility-driven big data. The first question is “How do we collect data, and what data are we interested in collecting ourselves?” and the second question is “Why is this data relevant, and what possibilities and consequences does this create?” The overlaying axes is that of data policy and the implications of not having a static application. The two frameworks that came from the other four axes were analyzed on the basis of a SWOT analysis and patterns of behaviour and possibilities were identified - where it is important to note that the shift on an action between fields is of great interest.

Through analysing the frameworks we came to the conclusion that to make use of mobility-driven big data and gain value from it there needs to be a more open data policy in place. Many companies today apply a relatively closed data policy in order to protect itself from the competition. This is in our opinion a mistake and the companies in question need to adopt a more dynamic policy which adapts itself to the situation at hand instead of being static. Allowing access to a system and sharing data will in turn lead to more beneficial partnerships with multiple co-dependencies which would be inhibited by static policies. This in turn will create opportunities and maximize the value of the data at hand by allowing external sources to create unexpected and innovative ways of using the data. As Alan Turing would put it:

“Sometimes it is the people no one imagines anything of who do the things no one can imagine.” - Alan Turing (Grossman and Tyldum, 2014)

Keywords: big data, mobility driven, mobility driven big data, mobility solutions, value model, value creation.

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1

Introduction

Realizing how to create value from mobility-driven big data is not an easy task. It takes a clear understanding of the background, the objectives and the limitations of big data, of a company and of the environment at hand to even start an attempt of it. In this chapter we start by introducing the background, the objectives and the limitations for us in performing this analysis and continually writing this thesis to later present the same for any company moving into a mobility supporting solution.

1.1 Background

We are currently entering an era of increased connectivity and not just through mobile phones and computers. Virtually all electronic devices are being connected to us, each other and to third parties, but what happens with all the data that is generated by these connected devices that collect and sometimes store data in the form of pictures, gps location, text messages and much more? By using this technology we can use a surveillance camera to look inside our fridge to see what we need while we are in the store, we can start our robotics vacuum cleaner or even washers remotely. There is no real limit to what can be done as long as one has access to an internet connection which is something that many people today take for granted.

However, the data generated is accessible by the service providers that we use everyday and the possibilities for that data is endless. According to Ohlhurst(2013), the amount of data being generated yearly is only increasing and is today measured in exabytes (10^{18} bytes). In an interview with Google, Ohlhurst(2013) was told that in the last few years from 2003 we had doubled the data created before this date (since the beginning of history). Moore's law, which says that the amount of transistors possible to fit on a chip doubles every 18-24 months, is applicable on storage requirements as well (Moore, 1965; Ohlhurst, 2013). This means that in the not too distant future we will be doubling the amount of data produced since the beginning of time yearly. This data is commonly known as big data and has had many ever changing definitions over time. One such definition is: a situation in which data sets have grown to such enormous sizes that conventional information technologies can no longer effectively handle either the size of the data set or the scale and growth of the data set (Ohlhurst, 2013; Boyd and Crawford, 2011).

One can only speculate what the data available can be used for but some speculations might include infrastructure planning for cities if they have access to gps data, a grocery store might be able to plan their deliveries after what is missing in people fridges if they know what their usual customers buy frequently or marketing companies can better map the interests of certain groups through age, location, previous buys and similar interests. All of this might be possible and new possibilities seems to pop up everyday in the form of new apps, products and services.

The problem in other words is not in attaining the data which seems to be a relatively simple process for some providers. If they do not create the data themselves there are ways to acquire it by purchasing or by mining it from the web. The question is what data is useful in what situations and who is interested in this data? Is there a need for the data to be packaged or filtered in a certain way for it to be of value or do companies prefer raw data? These are some of the questions that have led to this particular thesis where there was an attempt to understand the value of this data usually referred to as big data.

1.2 Research question

In an environment where there is so much data created by users, the obstacles in creating value from it is limited in referring to it as simply “big data”. In looking instead at user patterns related to mobility-driven big data we hope to assess the possibilities in logistical planning, infrastructural reliability etc. Our research question is therefore:

“Can we, by using existing literature and learnings from industries, identify and evaluate possible value models related to mobility-driven big data with the aim of increasing profitability and obtaining a greater competitive advantage?”

To make this process easier we needed to define what mobility-driven big data is and we define it as the following:

Mobility-driven big data is collected from mobility supporting solutions such as cars, busses, trains, airplanes or other forms of transportation. On top of this, there is a demand for large volume, variety and velocity of data that demands new innovative ways to analyze the information available in order to answer the specific questions in a real time setting.

Also, to better understand the market certain benchmarks is needed to be identified from the literature as well as from the industry to be better able to make a recommendation. We believe there are many actors that are interested in the data, as long as it is packaged in an appropriate way. Identifying these actors is a challenge for many companies who handle big data and so is determining the value of the data. In doing this master’s thesis we hope to create a value model which can be used as a tool to help companies to evaluate their data and increase profits through indirect means.

1.3 Objectives and demarcations

There are many things involved in the evaluation of possible value models for mobility-driven big data. Some of these are of major influence, while some are smaller sidenotes. The objective that we believe to be of most interest is:

- Understand the possibilities in the current industry of data as a source of value.
- Understand the most relevant limitations in the industry in question. Both when it comes to specific stances but also general regulations.
- Understand how a relevant actor might approach such an environment.
- Evaluate the possibilities for mobility-driven big data to act as both a tool for decisions/strategy and sales planning, but also as a product for sale.

There are many things to take into consideration, but also many to exclude from the discussion. We did not consider the following:

- The possibilities from actors not producing data through mobility supporting solutions - i.e from computers, home electronics etc.
- The actual pricing of data and potential profit.
- What the long term consequences associated with specific decisions regarding big data might have for a specific company.
- The ownership of the data separate from actually advising on data distribution.
- Extensive legal considerations and potential future legal actions.
- How different actors use the data (from an ethical perspective).
- Terms of data usage.

1.4 Company cooperation

This thesis is written with support the of NEVS, a mobility solutions provider that produces electric cars and are on the verge of releasing an electric car for use in China. The first model is based on the SAAB 9-3 model and they actively work towards a sustainable mobility model which is not just about the cars but also about the surrounding services (NEVS, 2017). They do not believe that just because you buy an electric car it means that you should have to make compromises with things such as quality or comfort (NEVS, 2017).

2

Big data

Understanding big data is not an easy task since the concept is still evolving. In the following section there is an attempt to define and introduce the width of the concept as well as to introduce the importance of understanding how the data can be used and analyzed.

2.1 Defining the concept

There are several definitions of what big data is, such as:

- “Big data is high-volume, high-velocity and high-variety information assets that demand cost-effective, innovative forms of information processing for enhanced insight and decision making” (Loshin, 2013:1-9).
- “Big data is when data sets have grown to such enormous sizes that conventional information technologies no longer effectively can handle either the size of the data set or the scale and growth of the data set” (Ohlhurst, 2013:1).

Some other definitions try to deviate from this and adds other parameters such as value or variability (Loshin, 2013). The common thread is in that it is described with words such as enormous and high-volume - which implies that the broadest definition of big data is by its size. Another aspect is that data comes at such a pace, and differs enough from other data, that it demands new methods of handling it. Keeping with these learnings, the definition of big data in this thesis is:

Big data demands volume, variety and velocity in a sufficiently large amount that demands new innovative ways to analyze the information available to answer specific questions in a real time setting.

The concept of what is large will continue to change over time and exabytes which were mentioned earlier will seem small in the future as our tools and skills develop to handle the increasing amount of data. There are three types of data available - structured, semi-structured and unstructured. 80% of all data is unstructured (Ohlhurst, 2013) and this is where most of the value is even if historically it was thought that only the structured data contained any value. Two other things to consider is that the data can be wrongly interpreted or other errors might occur and that the data is time sensitive. In order to make the most of it and to be able to

take action quickly new tools and skills must be developed.

Big data is usually analyzed and gathered through five different technologies and concepts listed by Ohlhurst(2013). These are data modelling, data mining, predictive analysis, statistical applications and business intelligence. Business intelligence entails a massive amount of techniques and technologies that help companies store, analyze and gather data. Data mining is analysis and summarization of data already gathered from different perspectives, in order to get more useful data (Ohlhurst, 2013). Statistical applications use algorithms based on statistical principles to study data sets such as polls, census etc. and are used for predictive analysis, estimations and testing. Predictive analysis is a subset of statistical applications where predictions are made based on trends and information found in the data sets (Ohlhurst, 2013). Data modeling is a conceptual application of analytics in which multiple “what-if” scenarios are applied via algorithms to multiple data sets (Ohlhurst, 2013).

2.2 Understanding the usage

Big data is quite simply dependent on the data that can potentially be collected and that which already exists in databases. By gathering a large amount of data - it is possible for it to be analyzed with behavioural analytics. By using the patterns that arise, one can identify the factors that lead to decisions (Ohlhurst, 2013).

By using the knowledge of these actions/decisions one can influence the decisions to get a better sales process leading to more sales. This is where the value is - but it is also where the danger is for most things to go wrong (Ohlhurst, 2013). To make this type of analysis there is a need for an enormous amount of data - which first needs to be analyzed with the tools and techniques mentioned above. Then there needs to be one or more steps to make sure that the interpretation is correct, since a faulty interpretation leads to the same end as faulty or insufficient data, which is an inaccurate result which contains little or no value.

A business case for big data analytics has five factors associated with it (Ohlhurst, 2013). These begin with a complete background of the project - which includes all the drivers for the project; the goal, how competitors are using big data and what other business processes big data will align with. Secondly, a benefit analysis is needed to find the goal or the expected outcome through analyzing sales trends.

The options concerning storing data, and how to analyze it is not simple decisions and the financial and security implications of how the data is stored is of utmost importance. Scope and costs comes next - and is all about resources such as who and when. Lastly, a risk analysis needs to be conducted - taking into account the risk of doing nothing, security implications, disruption of business processes, compatibility and integration issues and much more (Ohlhurst, 2013).

By doing a full analysis - a package of information that is valuable both internally and externally is made available. However, many companies do not have the capabilities to analyze this type of information, or lack the capabilities to distribute it within the company (Loshin, 2013).

3

Method

A few different methods was used throughout the research. Largely the emphasis was on on performing a sufficient industry analysis - so a thorough theory review to create understanding for this was of key. Setting up and performing a select number of interviews - and complementing these with an in depth case study is then the base for the analysis. When looking at the aim at hand, the approach was a combination between these type of methods as the mix is appropriate for such a problem. There is both influences of comparative data that gives the point of what are the consensus, and subjective data that answers the question of how it is applied in a specific environment (Easterby-Smith et.al, 2015).

3.1 Review of relevant theory

A broad theory review was performed, covering a couple of main areas are of key importance in understanding the theory. These are further knowledge into disruptive technology, multi-sided platform and managing services.

3.2 Gaining contextual understanding

To get a better understanding of the climate in question for a company interested in pursuing the avenue of value creation through mobility-driven big data two different methods was used. These methods were interviews with knowledgeable actors and a deeper case study of an actor with data as a potential source of value.

3.2.1 Interviews with knowledgeable actors

A couple of semi-structured interviews was performed with knowledgeable actors to support the knowledge gathered from theory. These actors are relevant because of their innovative actions in the usage and understanding of big data - and in some regards how this relates to business models. The direction of the semi-structured interviews was to cover three main areas of interest; “Internal Policy”, “Operations” and “Business Strategy”. There are a couple of main questions that was part of these three areas, but since the aim is to understand how it is applied specifically in the case of the company in question, there was also room for follow-ups. The questions asked can be found in Appendix 1.

Initially the aim was to interview a broad variety of parties involved in mobility providing solutions and big data analysis, but after continued contact with the parties in question most backed out due to for us unknown circumstances. The knowledgeable actors that was interviewed can be seen in Table 3.1.

Table 3.1: A table describing the context surrounding the interviewed knowledgeable actors

Interviewee	Job title	Company information
KA1	Project manager	Shaping tomorrows public transportation
KA2	Business analyst	Mobility-data provider through open-source project
KA3	CEO	Creator of intelligent transport solutions

3.2.2 Case study of actor with data as a potential source of value

Alongside the interviews, a thorough case study on a company that which to pursue data as a potential source of value, and are therefore an entrant into the mobility-driven big data environment, was performed. The next move of the company was analyzed with the data accessed through interviews and validated through a workshop with employees in many different levels of influence. Primarily the focus of the conversations was on their stance on the strategic issues at hand when talking about data collection and third party interest.

The questions we asked at the interviews were:

- What does big data (mobility services) mean to you?
- What is your part in the context?
- What do you specifically work with?
- How will your work tasks be affected by further adoption of big data?
- How much of your own work tasks, and the movement of the company in regards to your competence - can you influence?
- What is your thought on where the company is going in regards to big data?

The employees interviewed were within different levels of responsibility and within a wide range of different specialties, such as specialists within certain technologies, market strategists and business analysts. This to get a broader image of the issues at hand.

3.3 Designing the framework

After a broad theory review, interviews with knowledgeable actors, as well as a case study for an entry on the market - we continued to pursue a broader framework that is applicable to all actors with mobility-driven data as a possible source of value. A few key elements, or axis, was identified through the knowledge gathered, and through scenario planning we compared the possibilities we came up with in a multitude of ways to identify the interesting oppositions and areas to pursue. This process led to two main frameworks, with an overlaying theme and this was tested in a validation session in the shape of a workshop at NEVS, with the focus being on questioning the assumptions made. Lastly, this was all analyzed with a couple of key analysis models in mind such as SWOT.

4

Theory

This chapter offers a wide variety of information that contributes to the complete picture of what the benefits and deterrents associated with all forms of big data are as well as tools in analyzing the situation. The chapter covers such topics as disruptive technologies, multi-sided platforms and how service firms handle different service offerings and economic models such as SWOT, Porters' five forces and scenario planning. There is much more to take into consideration when dealing with specific cases of big data and how to analyze it, but these chosen pieces gives a foundation that makes the transition into this type of technology easier by preparing the organization for potential challenges that lay ahead.

4.1 Disruptive technology

Schumpeter(1943) talks about creative destruction where an old era of must give way to new technologies and new ways of thinking. The old ways eventually dies to make way for the new ways due to a revolutionary change which makes the old practices obsolete even if they were as efficient as was possible. He goes on to state that competition of price is not the primary concern today since competition in quality, new technology and new ways of production is a much more effective way to strike the core of the competition. By finding new revenue streams and new ways to improve existing products it moves the competition away partially from the price point. By having too many companies competing for a smaller and smaller customer base as new competitors enter the market (Schumpeter, 1943).

The concept of hypercompetition is a present phenomenon where competitors make intense and rapid moves in an attempt to gain a competitive advantage (Grant, 2016). This is as much to minimize the advantage of the competition as well as to increase one's own competitive advantage. Inventions such as the automobile, the computer or the telephone which all radically changed the way we live today do not appear everyday, but when these inventions do appear they might completely replace old technologies and bankrupt gigantic corporations who do not adapt to the new standards (Grant, 2016). Some well known examples are the digital camera which left Kodak bankrupt and the automobile which changed our way of transportation so that horses became more of a luxury than a necessity.

4.2 Two-sided and multi-sided platforms

According to Hagiu (2014), there are two characteristics that make platform providers different from product providers or resellers.

- All sides are customers of the platform in some meaningful way (Hagiu, 2014).
- A multi-sided platform enables direct interactions between the sides (Hagiu, 2014).

A product platform violates this by not selling directly to the intended consumer while a reseller violates these requirements by not allowing direct contact between the sides (Hagiu, 2014).

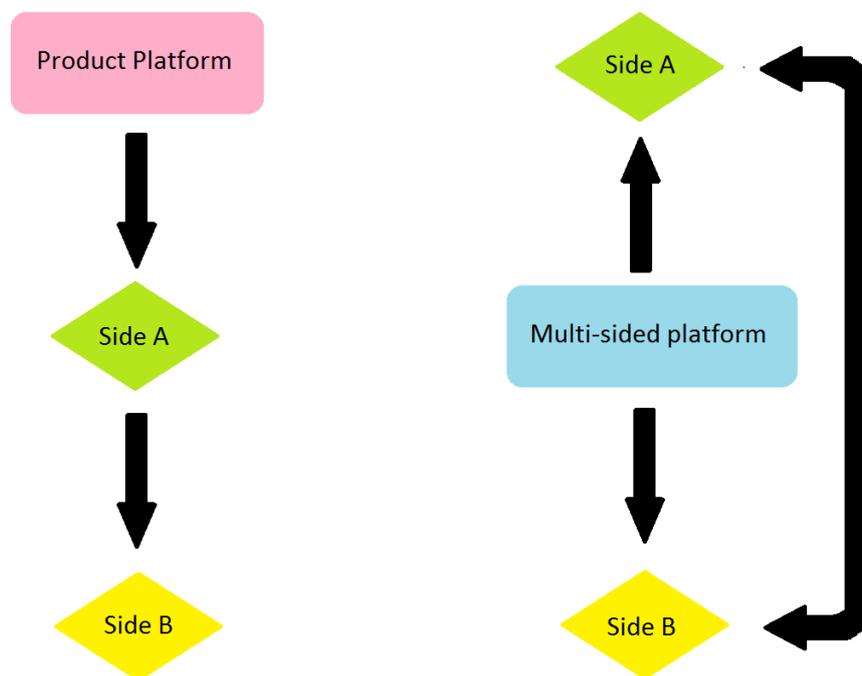


Figure 4.1: An illustration of the difference between a product platform and a multi-sided platform. Based on a figure by Rysman (2009).

Haigus statement makes it seem that this is an either or situation. However, Rysman(2009) argues that there are levels of two-sided markets and one-sided markets and it is not always clear where the line is. In essence, a two-sided market is a party who sells both to the end consumer and the companies say a master card or a playstation console. A user pays to have the card/console and both the consumer and the retailer pays to have the product or payment method. The two most important strategies that a potential platform firm chooses is the price level and the level of openness (Rysman, 2009).

Pricing is a very confusing subject according to Rysman(2009) since in some cases, such as credit cards, the end user is payed to use the card through reward systems. On the other hand, supermarkets and other attractive service providers may get

lower costs as an incentive in order to gain access to their large customer base (Rysman, 2009). This makes pricing somewhat fluid since it depends on the general good created by the deal between all three parties. A deal which could be that one or more parties do not pay or only pay a marginal cost to have access to the system in order to gain more users.

This view is in part shared by Hagiu(2014) who proposes three rules to help determine a price for different parties.

- The first one is to charge the side which is less price sensitive a higher price (Hagiu, 2014).
- The second rule is “if there is no priced transaction between the sides then charge the side(s) that stands to benefit more from the transaction” (Hagiu, 2014:76).
- Lastly, Hagiu(2014:76) says that “if there is a priced transaction between two sides then charge more to the side which obtains the most value from the transaction”.

The first rule is based on the idea that each side should be treated independently and that the price should be considered when faced with substitutes or the bargaining power that the sides has over different groups. The second rule can most easily be explained by an example that was supplied by Haigu(2014). At a speaker conferences the speaker is not charged anything, but the attendees are charged admission. The last rule is used to balance the power between sides so that the weaker party does not leave the platform due to the value they can obtain from it is too low. The following table shows some examples of how to price different sides in multi-sided platforms.

MULTI-SIDED PLATFORM	LOSS-LEADER SIDE	PROFIT-MAKING SIDE
Advertising-supported media (newspapers, Google, Facebook etc.)	Users	Advertisers
E-commerce sites (eBay, Amazon, Aliababa etc.)	Buyers	Sellers
Ticket sales (Ticketmaster, Ticnet, LiveNation etc.)	Venues/Organizers	Users
Payment systems (Visa, Mastercard, PayPal etc.)	Users	Merchants
Video game consoles (X-box, Playstation, WiiU etc.)	Users	Game developers
Operating systems (Windows, Mac, Linux etc.)	Application developers	Users
Entertainment applications (Netflix, Spotify, Hulu)	Movie and music labels	Users, advertisers

Figure 4.2: A brief comparison of who benefits from different multi-sided transactions. Based on a figure by Rysman (2009).

When it comes to the level of openness Rysman(2009) mentions two different strategic issues that needs to be answered. The first is the number of sides to pursue. A platform can be one-sided, two-sided or multi-sided. The second issue is how to relate to a competing platform: they may seek to be incompatible, compatibility or some level of integration (Rysman, 2009). These considerations are not always obvious but a common occurrence is that the platform which is most adaptable survives competition.

An excellent example by Rysman(2009) is the competition between Apple and Microsoft where both are suppliers of operating systems, but Microsoft only supplies the operating system while Apple also supplies the parts. This makes Microsoft a more open 3-sided platform since they target the part providers, application providers and the end client. Apple however, is only a 2-sided platform since they provide the parts themselves making them more closed but this does not make them less adaptable necessarily.

4.3 Managing service offerings

The aim with this section is to clarify some questions that might arise when a producer of goods wants to move into service offerings. Two frameworks are presented and one shows the need for the decision making organizations within the company to have a clear chain of decision making based on the strategic level of the question at hand. While the other presents how a producer of goods can transition into service offerings over time.

4.3.1 Intellectual property and professional firms

A professional service firms has three distinct characteristics in common and which in some ways sets them apart from a normal firm: knowledge intensity, low capital intensity, and a professionalized workforce (von Nordenflycht, 2010). Knowledge intensity refers to the knowledge embodied in individuals as opposed to the knowledge residing in databases within the firm. Low capital intensity signifies that most of the assets in the firm is made up of intangible goods. The professionalized workforce is a both a problem and a strength for a firm since they are independent and does not always fit into conventional hierarchies. However, a side effect of the workforce being independent is the need for professionalism which means that they adhere to strong ethical codes and are mostly self regulating and governed by an association which certifies members in different forms to better understand the quality of the work done by different members (von Nordenflycht, 2010).

It is not always easy for outsiders to understand what a professional service firm contributes to a set situation and this creates a strange opaque quality to the work the firm has done or is doing (von Nordenflycht, 2010). To be better able to understand the quality of the work made certain mechanisms are applied to make the process easier for the parties. Bonding mechanisms are such mechanisms that guarantee penalties to poor or low quality work. Reputation is another signal used especially when the quality is very opaque then the reputation becomes increasingly important. Appearance which is very similar to reputation but is more focused on the social and personal characteristics of the firm's employees. Lastly, the ethical codes are a way for the experts to swear to uphold a code of conduct whose purpose is to uphold the client's goals (von Nordenflycht, 2010).

There are in general five types of intellectual property rights: patents, copyright, trademarks, design rights and trade secrets (Granstrand, 2004). These have different rules and expiration dates based on the type of “product” being protected by the particular right. These products can include, but are not limited to, brand names, car parts, medicine, databases, paintings, music and shapes/colors when used in a distinctive way. Trade secrets which are as the name implies secrets and in some ways they lack protection which means that firms do not want to share or part with their secrets without sufficient incentive. One of these is price but the pricing of an intangible good is not always easy especially when there is no sure way to know it is going to have for the customer.

However, there are some factors to consider when determining the value of a product one wishes to license out. These are presented by Granstrand (2004) and are: Strategic value, level of protection of the technology, risk premium, scope of Intellectual property rights, potential markets, competitive position, cost and time for R&D, potential margins and revenues in exploiting the license, potential learning effects, impact on other license deals and opportunity costs.

In today’s market there are many unknown factors present that govern the pricing of IP. Granstrand(2004) presents a strategy ladder with steps which can be used to bridge the gaps in knowledge with an iterative process which can start at different layers of the organization.

1. **Corporate strategies** for resources and business - In terms of profit, specialization, growth, diversification, internationalization, integration and capital structure (Granstrand, 2004:211).
2. **Innovation/imitation strategies** - In terms of product/market/competitive/resource positions, directions, timing, profiles, quality, cost, resource acquisitions, exploitations etc (Granstrand, 2004:211).
3. **Technology acquisitions (sourcing) strategies** - Acquisitions of technologies or firms, joint technology ventures etc (Granstrand, 2004:211).
4. **Technology exploitation strategies** - Joint ventures, internal exploitation of products/ processes, spin-off of technology firms or ventures, technology selling etc (Granstrand, 2004:211).
5. **Product commercialization strategies (Internal exploitation)** - Patenting, secrecy, market lead time, superior production, superior marketing, switching costs (Granstrand, 2004:211).
6. **IP Strategies** - For patents and other IPRs (Granstrand, 2004).
7. **Competitive outcome, and economic performance, foresight and signaling**(Granstrand, 2004:211).

After the seventh step reiterate and enter at any step then go down (Granstrand, 2004).

4.3.2 Service Contract Management

“Management literature is almost unanimous in suggesting to product manufacturers to integrate services into their core product offerings” (Rogelio and Kallenberg, 2003:160). Services have better margins and are less sensitive to market changes which means they are a more stable source of income (Rogelio and Kallenberg, 2003).

Rogelio and Kallenberg (2003) mentions that there are usually three successive hurdles to overcome in making such a transition. First, firms might not believe in the economic potential of the service component for their product. Second, although a firm might realize the service market potential, it may decide that providing services is beyond the scope of their competencies. Finally, a firm might realize the service market potential, decide to enter that market, but fail in deploying a successful service strategy (e.g. Ford Motor Co.’s attempt to enter post-sales services was blocked by its network of independent dealerships) (Rogelio and Kallenberg, 2003).

Summary of how to go from manufacturer to service provider

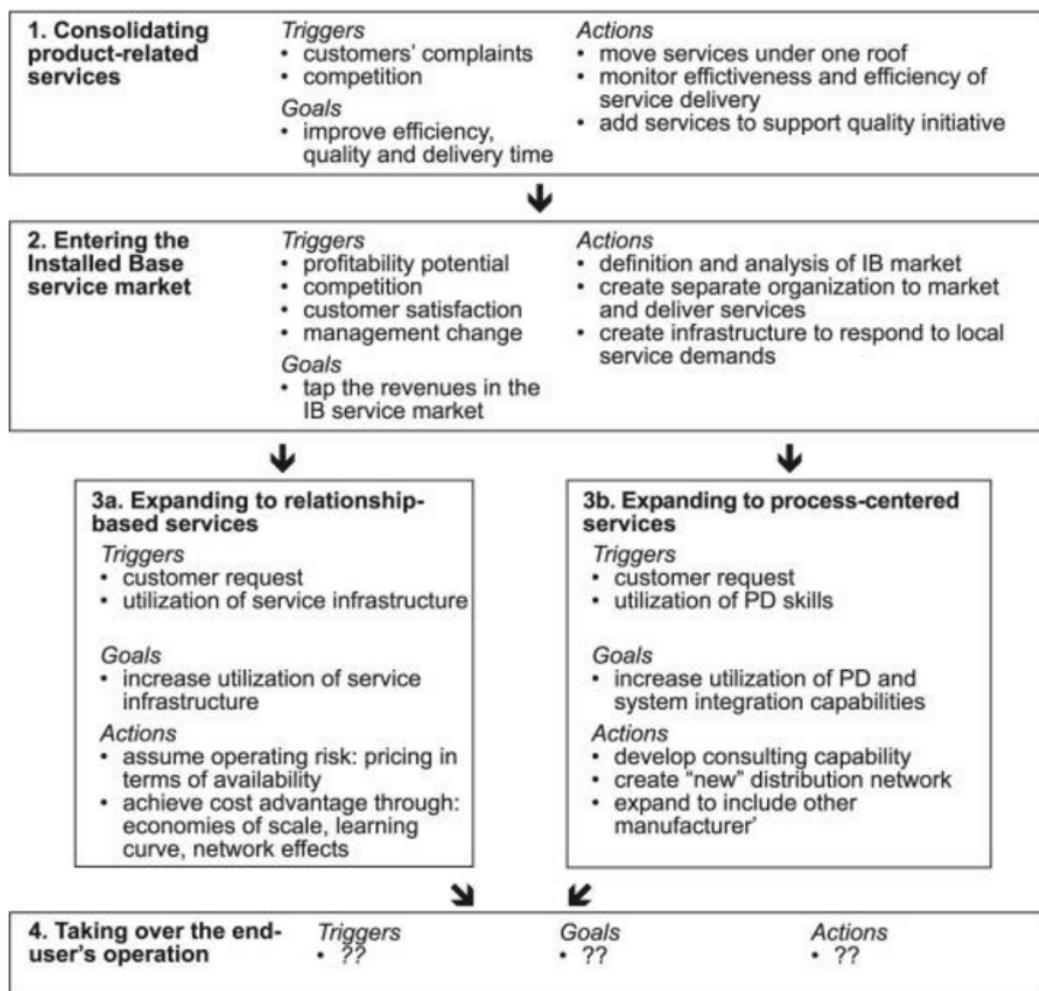


Figure 4.3: The process of transitioning into service offerings (Rogelio and Kallenberg, 2003:165).

4.4 Analytical tools for big data strategy application

The studies into appropriate analysis tools that suits every scenario is ongoing, and there are almost an infinite number of models available to analyze a given scenario with. In this chapter a few established ones with appropriate analytical properties are introduced. These are Porter's five forces, SWOT and Scenario planning.

4.5 Porters' five forces

Porter's five forces of competition is one of the frameworks most commonly used when analyzing the competition within a specific environment (Grant, 2016). The framework is built around the concept of understanding the five key elements that will influence the stance in the specified industry. These five key elements are introduced in Figure 6.1.1. The elements can be divided into two smaller groups according to Grant(2016), where on of the groups, consisting of "Threat of new entrants", "Threat of substitute products or services" and "Rivalry among existing competitors", is focused on the industry actors, whereas the second group, consisting of "Bargaining power of suppliers" and "Bargaining power of buyers", is focused on the relationships of the actor in question.

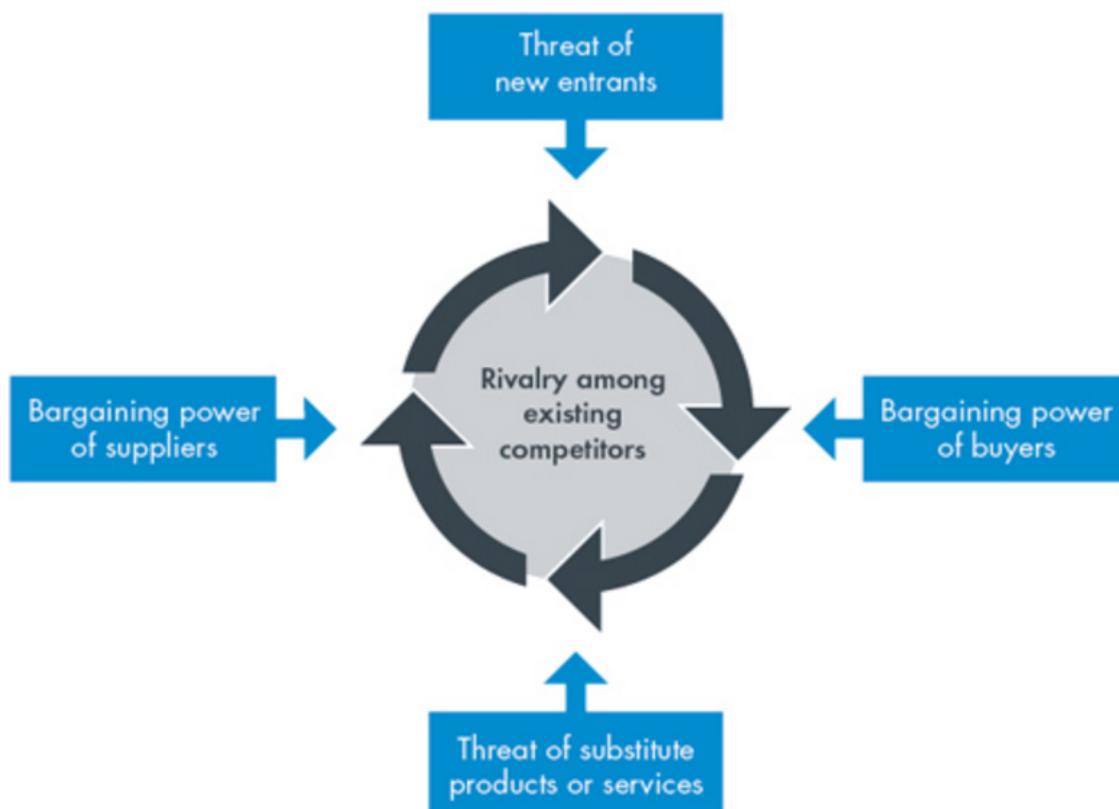


Figure 4.4: A simple layout of Porter's' five forces (CGMA, 2013)

The five key elements can play a larger or smaller role in the success of an actor - wholly dependent on the impact the specific element in the environment. To determine this you have to look deeper into each of the five elements to understand the environment in question (Grant, 2016). For “Bargaining power of suppliers” this involves understanding the power, and therefore possible impact, of the suppliers needed for a specific product. In the case of “Bargaining power of buyers” the focus is on understanding the possible buyers group, and the options available to them.

As for “Threat of substitute products or services” there is often a need to understand such concepts as “switching costs”, for if there is many available substitutes of a product, there is instead a need to create loyalty with the customer. In “Threat of new entrants” the possibility of entrance by other actors is key, where industries that demand high initial capital and/or where economies of scale play a large role, the threat is lower. Lastly, the “Rivalry among existing competitors” showcase the current climate and the possibility and limitations (Porter, 2008). A sixth force was eventually added that involve the “Complimentary products” - where the possibility and threat of compliments are of key.

4.6 SWOT-analysis

A SWOT analysis is built on four blocks of either internal or external origin. The internal blocks are the strengths and weaknesses of the actor in question, and the external blocks are the opportunities and threats to/from the environment (Law, 2016). According to the author, a SWOT analysis is appropriate when examining the possibilities of new opportunities for the actor. The task at hand is to identify the key characteristics of the actors in each of these blocks. The strengths and weaknesses could for instance be the resources, or lack thereof, and the opportunities and threats could for instance be the challengers in the environment, or lack thereof. All these characteristics are then mapped out according to Figure 6.2 to balance the opportunity for the actor.

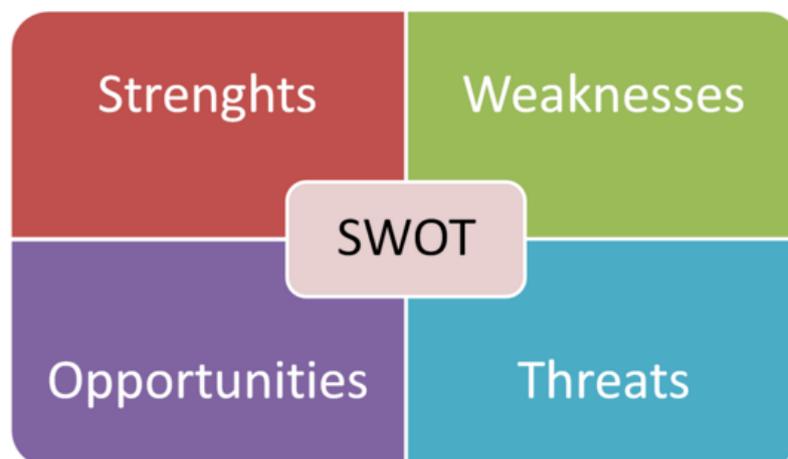


Figure 4.5: A layout of a SWOT analysis (Research Methodology, 2016)

4.7 Scenario planning

When approaching a situation where some understanding of the future is necessary for strategic decisions - there are a few possible routes to go in defining the uncertain. Scenario planning is generally useful in a set, but perhaps uncertain environment, and also works well when defining and generating ideas where there are many possibilities to evaluate to move forward in selecting a few key situations of use (Alänge and Lundqvist, 2014).

The main steps of scenario planning, put forward by Alänge and Lundqvist (2014), consists of the steps seen in Figure 4.6:

1. Define the issue.
2. Identify and involve the major stakeholders.
3. Define what the future will look like.
4. What will be the main forces impacting on 3? Create a list.
5. Rank and combine the forces in 4.
6. Tabulate the forces by rank, number and predictability.
7. Using post-it notes, map out the forces on a white board.
8. Re-group the post-it notes together by potential scenario and trend (predictability and importance).
9. Select the most important key uncertainties and plot them on a scenario matrix.
10. Sense-check internally with the group for plausibility (re-do, if necessary).
11. Script the scenarios into a storyline and present internally.
12. Act on the scenario analysis.

Figure 4.6: The 12 steps to follow in performing a scenario planning (Alänge and Lundqvist, 2014)

The start of defining the issue includes understanding the scope, the technological and political domains surrounding the environment and the economical policies. In the next step the focus is in involving the right individuals in the process and understanding their perspective. The next steps involves creating and formalizing the future in some way and understand the driving forces for this future. These forces are then evaluated on the basis of predictability and importance and mapped out on the basis of possible scenarios - where the importance lies in understanding the important issues that are unpredictable. When this is done the forces should be reformulated to questions, and mapped out yet again in a matrix where the climates in the matrix is based on the environment moving forward. Lastly this needs to be validated with the individuals involved to check for plausibility and presented to interested parties (Alänge and Lundqvist, 2014).

5

Gaining contextual understanding

The following chapter presents lessons learned from the industry. It begins by listing lessons learned from actors already in different stages of using or gathering mobility-driven big data. The second part is a short description of the case study of an actor that is evaluating the potential value of mobility-driven big data and sheds light on many of the questions that comes with the territory.

5.1 Interviews with knowledgeable actors

Three separate interviews were conducted with knowledgeable actors in a few different fields and specialities. The first person (KA1 in Table 3.1) represented a public transportation initiative where the purpose is to inspire creativity through sharing the raw data and making it available for interested parties in an open source format. The second (KA2 in Table 3.1) had a couple of different experiences with open innovation as well, but was more involved with the functional requirements of creating big data solutions for infrastructural purposes. Lastly, the third person (KA3 in Table 3.1) was driving a company specializing in data analysis and strategy support for mainly companies in the transportation industries - separate from data collection.

The goal of the first representative was to create a complete travel solution for customers that needed several different connections to complete their daily travel. All options such as cars, buses, trams, trains, boats and airplanes are a possibility for the final solution. To reach their goal that incorporates several forms of transportation into their solution they are developing a multi-sided platform that can be extended when other service providers join with a variety of products. To make this undertaking run more smoothly there is a need to create a simple data sharing platform where the contributors can upload their data in a standardized form that the other actors can take part of. In other words there is a need for a more open data policy than what has been available in the past. This is also the most interesting part of their organization from our context since they enable a free sharing of data between providers and developers.

The second representative talked about that data is readily available in a myriad of places and that the barriers of entry are relatively low if one wants to start collecting data. The most important part, according to him, when working with data is that developers and producers usually work with different cycle times. A producer of goods might look at product cycle times that are several years into the future while

developers of software generally do not look further than a year into the future. He believes, however, that the most challenging part at this moment in time is to process the data in real time to extract maximal value from the data and avoid delays in situations that demand immediate action. To do this we have learned from Ohlhurst(2013) and Granstrand(2004) that there are five technologies that can be used, business intelligence, data mining, statistical applications, predictive analysis and data modelling, to accomplish this goal and that strategies are in place for who needs to be notified when certain decisions needs to be made. These together forms a process that can shave the delay before the company reacts to the new information.

The final representative is the founder of a professional service firm and has experience with buying and selling data as well as processing raw data into a more valuable form. He speculated that about 50% of all companies collect data in some form today, but that only about 5% know what that data can be used for. These numbers are shocking and makes it apparent that there is still a massive amount of untapped value available within the data, much like Ohlhurst(2013) mentioned that 80% of all data is unstructured and demands new innovative ways to be managed. Another thing mentioned was that there are no good economic models, that can be used to put a value on data, available today.

5.2 Case study of actor with data as a potential source of value

After individual meetings with a total of eight different individuals at the company with a broad variety of responsibilities, a couple of key concepts stood out as important to address. Connected cars gather a vast amount of data and the question most actors seem to be asking themselves is what is the potential of this data. In the future one can speculate that even more data will be available and with a larger amount comes a larger potential.

How to handle this data is a much larger dilemma than just collecting it. Support functions for analyzing, selling or storing data needs to exist to make the best use of what was gathered. There are several questions of how the data should be delivered and distributed as well as who has access. The important part about these questions is not what the final answer is or what policy to adopt since many alternatives seems just as feasible as the others. The important part is that they are asked and that there is a company wide understanding that enables possibilities for the data instead of just collecting it and never using it.

There are ethical issues as well as a market wide mindset which might create some opposition to some innovative solutions. It is in these authors opinion that big data is in itself not a disruptive technology, but that the possibilities that the data can lead to has the potential to create disruptive inventions which might change the way reality is viewed. Some well known examples is the smartphone, the trains, busses and cars or other mobility supporting solutions who all have changed the way we

do things. By keeping the data to oneself there might be an opportunity slow the progression of a disruptive technology which might replace an older technology, but there is also a chance to capitalize on the information available. However, the chance to slow this progression is only possible if all other companies with similar data does not make use or share their data as well. If they do not then one might be overtaken abruptly and will immediately have to begin catching up so that this change is not fatal to the company.

By sharing data one opens up for possibilities to be apart of the changing process. No one company can foresee all the possibilities of the data they have, but there is a possibility to get some insight from what others want to do with the data. By building a business model which allows for integration of potential services in an platform connected to the company products has the potential to be very lucrative for the ones controlling the platform, similar to what the first outside representative was trying to create. A gateway controlling the interaction between service providers and clients such as a credit or tram card or an application platform such as a infotainment system where a small percentage of the transactions are kept. The providers are rewarded by a large majority of the revenue and the clients are rewarded through offers in order to make them loyal returning customers.

There are of course other internal values for the data. It can be used for diagnostic purposes and through this be used ensure the quality and further developed the core product. If it is known that a door, that is opened and closed by a variety of people - with varying heights and strength, breaks due to a weakness in some component then there is the possibility to make a change and ensure the quality of the product. If it can be learned that a battery needs to be charged every so often or that tires needs to be changed after a certain number of rotations it can make the surrounding service process, related to car ownership, run much more smoothly.

6

Framework

As a result of gaining contextual understanding as well as a broad theoretical understanding from the theory review - a key set of axes were identified as highly interesting in understanding the strategic decisions necessary in creating value from mobility-driven big data. The axes in a set of combinations continue to describe the possibilities in each possible climate in relation to current examples.

6.1 Five identified axes

The theory review as well as the case study and interviews created a setting where it was possible to approach what axes that would be relevant to understand the complexity of both strategic decisions towards specific data collection as well as purely seeing the possibility in value creation through data. Through looking at the many possibilities of NEVS, and more generally any actor approaching this climate - the axes represent the interesting aspects to decide upon for these many possibilities.

As seen in Figure 6.1 there are two main questions that stands as background for the axes. How - referring to the way in which to pursue mobility-driven big data, and Why - referring to the purpose of pursuing mobility-driven big data. The surrounding axis, or environment, is the data policy which is directly linked with the full picture at hand. All five of these axes is further described in this chapter, as well as continuously discussed later on in the thesis.

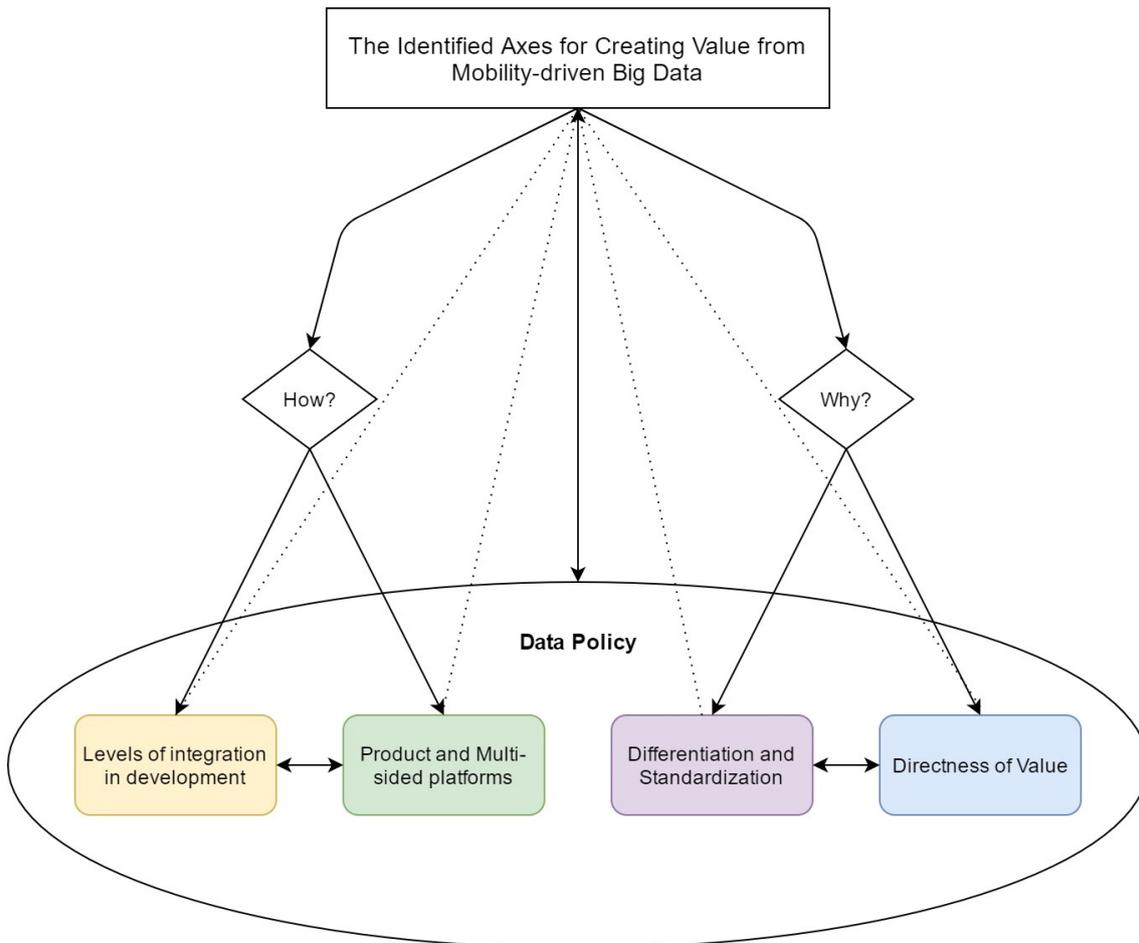


Figure 6.1: The identified axes for creating value from mobility-driven big data and their relations with one another.

6.1.1 Levels of integration in development

One of the aspects that became instantly clear, through both the interviews with knowledgeable actors as well as the case study, was that before approaching how to create value from big data there needs to be a structure in place for what data is collected and what objectives the company have. The decisions might be to create resources to support internal data analytics or outsource it, to share datanalysis with other companies or let other companies produce the analysis out of the raw data, or even import the data to analyze. There is an entire industry focused on these complexities, for instance one of the companies interviewed had as its sole business data analytics and strategic support.

The axis of levels of integration is based on this complexity - where the spectrum is from an integrated development where all things are kept internally in the company in questions, to a disintegrated development where at an extreme all things are outsourced or distributed to external parties.

6.1.2 Product- and multi-sided platforms

The reasons for having a product platform as an opposite to a multi-sided platform are not always set in stone but there are some factors that make them quite different. A product platform is usually where a producer does not sell directly to the end customer but instead to a reseller who has the contact towards the customer. In a multi-sided platform all sides are customers and the use of a reseller violates this. However, there are levels of product platforms and multi-sided platforms which makes it an obvious axis with a flow in between them. A producer might in one market be a pure multi-sided platform while it makes use of resellers in other markets due to different reasons such as well established customer bases, local legislation or other barriers of entry.

Microsoft is a typical example of a multi-sided platform where they create the operating system which can be installed on any computer. Others can manufacture the computer, they can create applications that can be used on that operating system and make sure that the end user gets the product. Facebook on the other hand targets users and advertisers. By doing this they supply a channel in which the parties can interact with one another. However a producer of food sells the supply to a grocer who the resells it to the end user but in some cases farmers also sell to locals directly making them a bit fluid on the axis.

6.1.3 Directness of value

The concept of direct value as opposite of indirect value is constantly changing. Traditionally, people payed for products and the producers received money in return causing a direct value transaction between the parties. These transactions such as buying milk from a farmer does not create large switching costs from one farmer to another but if one farmer delivers the milk home and the other do not, it creates an indirect value which might create a significant advantage for one party. Realizing the value of both direct and indirect values can create a potential selling point which might tip the scale in one suppliers favor.

There are several factors that determines a buyer's mindset when it comes to a new purchase. It is important to look at the strengths and weaknesses as well other actors to better understand the market. The amount of complements might also affect a final decision as well as other aspects which might play on the emotions of the buyer. Services and support are among some of the things a seller might use to gain additional advantages towards the competition. Another positive side of using services as a selling point is that they usually have a greater margin than most products in today's market which means that a subscription based service can be a lucrative business in the end.

6.1.4 Differentiation and standardization

A key point for any actor in a fast changing environment is to understand the underlying importance of understanding the climate which the main mobility supporting solution is in. Standardization in this context is therefore either the current need-to-have, meaning the essentials, or the communal work towards a certain standard. Differentiation is instead what is nice-to-have, meaning the extras that are setting the solution apart from similar ones, or the individual work towards a new and disruptive setting.

6.1.5 Data policy

A completely open data policy is not something one comes across very often in everyday life. Many prefer not to share what data they have or what it is used for due to the possibility that others might gain an advantage from the very same data. In other words there is a value in data that is not being utilized due to that it is not being shared. However, there is a spectrum in between a completely open or a completely closed data policy that gives some leeway for corporations to sell data, share it with partners or let employees take part of data to create additional value for the company. The possibility that data can trigger an unexpected, disruptive, change which might be the death of the company is a fear that make some reason that it is better to do nothing than take a chance.

There are also an aspect where if you release data but keep control of it through agreements, contracts, or policies it opens up for interesting possibilities of increasing the value of the data itself. There are several corporations today who make a living on selling data such as Facebook. This has proven that there is a value in data, but that value cannot be utilized if a company adopts a completely closed data policy.

6.2 Possibilities with the frameworks

In the following section the axes of levels of integration in development is intersected with the product and multi-sided platform which is exciting since it provides insight into the possibilities with a more or less integrated view on the different platforms. The other intersection which is differentiation/standardization and direct or indirect value. This framework shows the possibilities on how to maximize value with different end users in mind.

6.2.1 Framework for business integration

The first of the frameworks covers the theoretical context from the stance of business integration. The axes in this case is levels of integration in development and product and multi-sided platforms. These two axes are comparable due to the fact that a change in one affects the possibilities in the other. It is also very apparent that the governing data policy creates an environment with limits for this framework. The

names of the axes are taken from the literature and applied on mobility-driven big data while keeping in mind both services and classical production.



Figure 6.2: The framework for business integration that compares product and multi-sided platforms with level of integration in development.

The product platform combined with an integrated development policy, also called “do one thing, and do it well”, is where traditional production and core R&D takes place. The strength of this is that there is an almost complete control over production and research, but at the cost of being limited to the possibilities within the company. This is good if one applies a closed data policy and do not have an intent to share any or little data. Also, it is only a good choice if all the needed skillsets are available in-house since it could be very expensive both in terms of time and in money to evaluate potential opportunities. The lack of partners to work with also limits the amount of opportunities that can be pursued at one time even if they have been perceived ahead of time. Meaning that when something revolutionary or disruptive comes along there is a need to chase this technology and catch up in a premature fashion where costs might escalate. The threats on the other hand are that larger organizations with more experience and manpower/partners will have more opportunities than a company which is lacking in these aspects.

In the top right corner we find “be part of something big” which is the complete opposite of “do one thing, and do it well”. This is where a platform is created to allow companies to interact with the users much like Google Play or App Store. The plus side in this climate is that due to disintegration there will be a large amount of external actors - which will lead to a never ending wave of new ideas of mobility supporting solutions. These solutions can be simple things such as payment for road tolls or more advanced solutions such as a restaurant reservation system with an integrated menu and pre-order system for restaurants close by. This never ending wave can contribute to large revenues which the platform owner can get a percentage from as a service fee.

However, the negative side is that these ideas need to be filtered to maintain trust from the end customers. Also, a significant amount of money needs to be spent on advertizing in order to attract consumers. The opportunity in this area is that by stimulating and attracting new end users and companies there is no real lack of new products, services or solutions. This in turn means that the platform owner can focus on creating supporting functions and applications that are need to have and leave the more innovative and time consuming work to others. The threats appear when there are similar solutions on the market which steals the client base. With a weaker client base there will be companies who exit the platform to pursue similar solutions in other places. Another weakness/threat is that this type of system needs a more open data policy, but at the same time there is a risk that the platform will die if a others are not allowed to take part of the data gathered.

The same type of reasoning can be applied to the top left corner which is called “do it together” and is more of an environment where specific products are ordered from a different company and assembled in house. The strengths of this side is that products can be ordered for specialized producers instead of making everything inhouse. Generally this means that more specialized goods can be obtained to a lower price and a greater quality. However, it does result in a longer assembly process and in some cases there are concerns with the quality of what is delivered which creates a need to monitor the deliveries being made. The opportunities here lie in the possibility to find specialized suppliers and partners who can provide the producer with products which complement their own with a greater quality and flexibility than what could have been attained otherwise.

The same type of thinking can be used on both physical products such as gps transceivers or more infotainment based programs such guidance functions or roadside assistance. The threats are a problem only when these suppliers prioritize other customers, causing delays or lack of commitment to a contract. This is usually not a problem due to a variety of different reasons such as breach of contract clauses or the relationship itself between companies being a driving factor.

The bottom right called “build a surrounding environment” is a similar platform as the top right but here all the products communicated through the platform is made at the discretion of the company. A big strength here is that the company controls and owns the whole product. It also gives the possibility to offer the customer a variety of products that do not always follow the company’s primary goal. Once again the need to come up with all the ideas within the company causes a lot of potential ideas to be missed. Since ideas are missed there is a great opportunity to create new ideas and products. However, this demands that the company continually follow market trends and has the constant development of new products in mind at all times. If this focus is lost it will inevitably lead to consumers finding new more flexible platforms to get their apps, products or solutions from.

6.2.2 Framework for strengthening user experience

The second of the frameworks covers an application context with the end-user in focus. The axes that are in the framework are the directness of value - going from indirect to direct value - and the standardization and differentiation - going from standardization to differentiation. These two axes are relevant in comparison in an applicatory way to understand the possibilities and limitations in specific actions. The directness of value will be of main business interest, while the standardization and differentiation has more of an impact on strategy. Understanding that they are highly intertwined is something that came from the theory read, the interviews conducted and the case study performed.

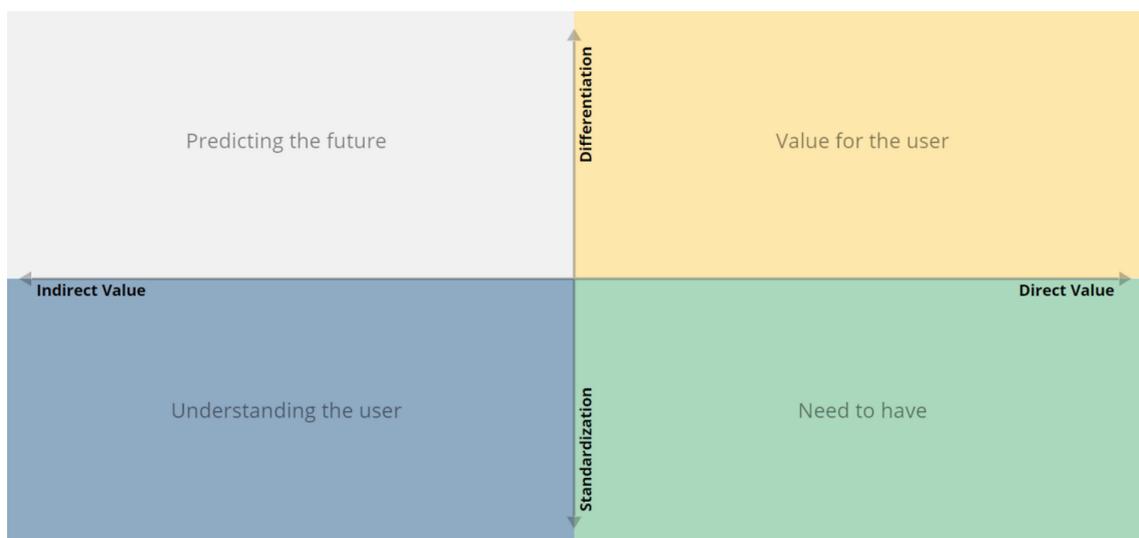


Figure 6.3: The framework for strengthening user experience that compares differentiation and standardization with directness of value.

In the framework there are four different key climates, although there is many layers to each possible element in the climate.

Firstly, and most interestingly, is the top right climate - “value for the user” - which is when there is both direct value and a differentiating product. In this climate there is room to make direct profits and due to the differentiation, the user has a much clearer choice. A typical example of this is such large services as Facebook or Microsoft - where their products have grown through differentiation and are now large enough to face little to no competition. The user could opt out, but that would also in the instance of Facebook create negative social effect in most social circles. While not using Windows on your computer limits one in the way that all applications are not available.

The strength of this climate is the possibility to do whatever one wants with the data, since the hold on the user is very strong. Since the data in the form of big data in itself creates opportunities for differentiation by analyzing apparent trends to further adapt the product to the intended user. If it is apparent, for example,

that users prefer notifications every time they pass their favorite coffee shop, then it would create the perfect addition to a travelling person who has a long commute. The weakness is that since the fast changing environment of data as a product and/or tool - there is constant need to have reevaluate the internal climate. The threat is instead that the external climate might change such as the political and legal environment, and this might jeopardize such solutions. Finally, the opportunities are almost endless in this climate because of the user's continued want of the product. With that in mind there is a great possibility to create profit from both user payments and from the data produced. However, evaluating said profit is hard in the current climate due to a lack of accurate economic models for data evaluation.

Secondly, the bottom right climate - "need to have" - revolves around the standardizations in combination with direct value and is straightforward the characteristics of the services and products that the user buys the product for. For instance the steering and brake functions in a car. As technology evolves, the amount of characteristics/functionalities that are included in the need to have grows continuously due to popular customer demands.

The strengths of this climate is that it is known, in many cases, where the environment is heading and this creates the possibility stay current if one makes use of the tools available to understand market demand and big data is only one of the latest of those. At the same time the threat of disruptive change in the environment is always possible and only staying current could be dangerous. This along with not separating the product from others available is the main weakness - as only doing what others are doing do not create a must to have wave from the buyers, but rather a dependence on pricing. This is the main opportunity, to separate in other aspects than product simply specification and to gain value in distributing not only the product, but also the data. However if the need to have possibilities are missing from a launched device there will be a mass abandonment of the device on the market since it lacks essential functions.

Thirdly, the bottom left climate of "understanding the user" combines indirect value with standardization and is not very profitable in itself, but lays groundwork for a better product for the user. The climate is about understanding the needs of the users and follow the standardizations that are in play. It is separate from "need to have" in that it is focused on the continuous evolution of the products rather than the up top payment for the product.

In this climate the main strength is that continued knowledge of the user patterns and product evolution can contribute to more effective and less expensive production costs. It also provides insight into how the users want to use their products. If there is an expectation that a car has the possibility to play music there is not always obvious that a user might want to play music from their smartphone. This in turn might lead a user to choose a car with a system which allows them to connect their phone in a simple manner over one that is more complicated. The opportunities are great in sharing this knowledge with other actors to create a larger environment

that suits the product. At the same time a large threat is that of not having the resources to truly understand the user - and instead getting stuck in the way the product works today - and not understanding the way the data can contribute to product innovation for the future. The weakness could be just that in combination with opportunities of sharing with many parties - where once again there is no real separation between the products available for the user and for the interested parties in getting data.

Lastly, the top left climate represents the differentiation in combination with indirect value - which loosely is the value created from “predicting the future”. It is different from “understanding the user” in the way that it involves the knowledge created from understanding the user but using it to create differentiating solutions. This would for most companies be the research and development department. The strength in this is in the knowledge gathered and the opportunities of separating the product from the rest in the future by creating the most appropriate solution. This could include being disruptive in a field where the knowledge supports the decision. The weakness is that the process is very costly with no real direct value, but instead hope in that it might in the future. The threat is just that, that while there is hope to be profitable in the future, there is uncertainty in the future and what competitors are doing - so sharing data is not key but rather keeping data to oneself.

7

Discussion

In this section we hope to further clarify our reasoning and train of thought. When interpreting our results we have gone several paths and some have lead to dead ends which we have not included into this report thus far. We are aware of that this leaves more possibilities for further and deeper studies within the field of big data and we will try to shine some light on these as well.

7.1 Levels of integration in development

Since we have focused on mobility-driven big data with a main focus on the car manufacturing industry there is an obvious aspect of how integrated the production process is within the company. Some companies take pride in being able to produce everything by themselves while others only take care of the final assembly and buys the parts they need from different suppliers. There are even extreme cases who only design the product and lets other actors take care of all production. Between these extremes there is a spectrum where each company has to decide where it fits in.

Apple is famous for controlling most or all of its supply line where they control the production and the whole research and design process. This means that they keep complete control of all parts of their production process. It also minimizes the probability that sensitive information will leak out to the competition. Controlling the information can be key when working in highly innovative and competitive fields but it does come at a cost of being limited to the knowledge that the company can acquire on its own as well as being limited to the production capabilities from one's own factories.

A more disintegrated company may not control the flow of information completely its strengths lie within the possibility to spread out the problem facing the company amongst the partners and in doing so finding new solutions. If there is a sudden need to increase production lines then there is the possibility to enter in a new contract with another producer if there is a need or increase the production at a current partners facility if it is possible. The company can focus on its speciality instead on and rely on the strengths of others to make sure that a finished product reaches the end user.

When it comes to big data, which is the main focus with this thesis, it is apparent that to maximize the value of the data it needs to analyzed through advanced

methods but it does not end there. There is also a need to let others use the data if the full potential should be realized. This can be done through partnerships where all actors adds their data to a pool of data to further increase the accuracy of the data or it can be sold/leased through a variety of different ways. However, to attain the maximum value by one company by itself is very hard since you cannot look for value without knowing what you are searching for when it comes to big data, there is just too much data to sift through. This reasoning leads us to think that a fully integrated view is the wrong path to take for most companies especially if the company is lacking strong ties to data analysis.

This raises the concern for data security and the protection of data rights but we will get back to that later. The important thing is to remember is that if the data is analyzed for information that is part of the current business model before it is released to partners or clients, then it will not generate any unpleasant surprises that will cause problems down the line.

7.2 Product- and multi-sided platforms

The reason for the product and multi-sided platforms being on opposite sides of the axes is due to the fluid state mention between these extreme points. Since a company can choose to take different roles in different markets or for different products. Lets look back at Apple again. They are a supplier of smartphones, computers and tablets where they take care of most of the production and a large portion of sales themselves or by using specialized resellers to peddle their goods. This makes them a typical user of a product platforms, but their App store uses a different way of thinking by letting other producers interact with their customers through their platform. This is what a multi-sided platform does which means that Apple is adaptive and searches for new business opportunities where they can make use of their large customer base which others might want to get in contact with. Getting access to the users is not free and a part of the revenue collected from the app creators is paid to Apple.

In the product platform side there is a large amount of control of the product from start to finish. This also means that all research and development, production and distribution comes from within the company with their close partners. However, this is a dubbledged sword with a constant pressure to come up with new ideas and constantly reinventing the company to stay alive in a market where the consumer is a fickle being. Figuring out how to balance customer needs and wants with a reasonable budget to gain a profit from the development costs is not an easy thing to do.

The multi-sided platform is on the other side of the spectrum and is focused at supplying companies with customers by being the link between the two. The customers use the platform to get a great availability to new apps or solutions while the companies want to get in touch with end users through an easy access network. This is in many ways a symbiotic relationship where it is crucial that both sides contribute to the relationship since when one leaves the platform the other will abandon it as

well. Here new is the key word and continual flow of new apps and users are key to keep the interests from both sides to make the business more lucrative and many platforms that have not been able to do this have eventually died out. Just look at the first attempts at the windows phones or old strip malls and compare these to Google play or App store or the mega shopping complexes in the US. This means that a platform provider needs to work very hard to keep attracting users and companies and the time and money spent on marketing can be equal to development costs for a new product.

There is no clear cut path to take, but it is clear that mobility-driven big data can be used to make applications and not evaluating the possibility of a platform at some level of the spectrum would be a shame. The level of product or multi-sided platform can be adapted to the individual company and doing both can create interesting new opportunities. We are not saying that juggling both parts of the spectrum will be easy, but not trying will be a mistake in a world where everything is becoming more and more connected.

7.3 Directness of value

Having an axis which involved the directness of value was something that from an early start of the process appeared as one of the main levels to put into a context of comparison. Throughout the different stages of analysis this took form further in the extremes of direct value and indirect value. While most possible actions that were approached in the analysis took on the form of a positive direct or indirect value - there were also some actions that could potentially be negative value in either direction. There were also some actions that might not change the value, and similarly some non-action that might change the value positively or negatively in either direction.

Having a direct source of value from a given action makes the impact of the action traceable and the effectiveness and feedback is visible in a direct way. Deciding to move on such actions are often preferred as the input and output of value/resources seem to more often than not be defined in the action. Such actions could for instance be pursuing specific partnerships with a company with a specific product that might possibly complement yours - where the value is both in the connections that the user might make through this partnership, but also the possible revenue stream from the many way of intersecting the products. The complexity of defining directness of value does however force us to simplify the action into a spectrum of either direct, a version of both or indirect value - when it is highly interesting in this case to also look at the repercussions. This is outside of this specific axis - but in the specified example this might be for instance the negative indirect effect of a partnership where there is loss of IP, with the positive direct effect of direct revenue stream from the connection.

The different extremes generally demand different approaches - where in the case of

indirect value the need is often to refine through adding resources to reach a point where there is knowledge from the data to move forward in other aspects of the product. An example of this could be to create sensor capabilities in specific elements of the product and through strategic monitoring and perhaps through smart algorithms create value through bettering the product or the service.

In opposite the extreme of direct value generally do not need specific aimed resources at refining the data, but simply aimed actions to retrieve the data. The data in question can then for instance be sold, exchanged and/or combined into a pool gaining mutual knowledge. A few more detailed examples of the possibilities of direct value will be covered later on in the report.

7.4 Differentiation and standardization

In the context of our framework the axis of differentiation and standardization is described in regards to the experience of the user. To simplify the concepts through the extremes; standardization is all things that is need to have and differentiation is all things that is desire to have. There are many layers to this in a complex landscape of competitors where what differentiates you at one point can quickly become need to have to survive in the environment. An example of this is the smart phone where the evolution of possibilities for the user with a mobile phone was disruptive to the market in a way that there is today no real marketplace for a phone without the possibility to access social networks, use a web browser and play games - besides the basic phone requirements. What once was the need to have on a mobile phone went from being able to place a call and send a text message is now far more complex and the desire to have is instead on the user interface and syncing gadgets.

This complexity is what we aimed to access with this axis - where analyzing and learning from the need to haves can create possibilities in developing future desire to haves. At the same time it is highly relevant to keep up with the current desire to haves, as they at any moment can become a need to have and if you do not keep up with that evolution there might not be room for you at all in the environment moving forward. At its extreme points this gets real evident, but there is also conscious choices to be made on what aspects, or features to differentiate on and what ones to keep on the need to have basis. To reach a level where this can be made in a highly competitive way you need to base resources in understanding the climate and what direction it is headed.

With the aim to understand how to create value from big data this truly has the opportunity to make a great impact on the opportunities on this axis. If a company can create the right resources to gain the most knowledge from the data gathered they have the possibility to in a less expensive way understand the product, the users and in extension the environment. Not all things can be analyzed by current data, especially not most things far into the future, but understanding the key element that as mentioned earlier can move on element from need to have to desire to have through smart adjustments can unlock even more opportunities.

7.5 Frameworks

In the subsections that follow the frameworks are clarified and the potential of the different areas are discussed. Some examples of potential uses of each framework is presented to give a clearer view of the possibilities associated with the frameworks.

7.5.1 Framework for business integration

This framework combines the axes of project and multi-sided platform with an integrated or disintegrated viewpoint. This gave us the four intersections that we named “Do it together”, “Do one thing and do it well”, “Be part of something big” and “Build a surrounding environment”. This is the area we think will be most valuable when considering potential business opportunities as a company. It gives several aspects that makes it easier to put new ideas on the spectrum and to understand what is needed to realize them into the next new thing.

When we talk about a platform we have in a way turned a blind eye to the fact that a consumer will always choose the platform that is the easiest for them to use. This might make it hard for new platforms that does not rely on something familiar such as a mobile phone or tablet. However, we do believe that these obstacles can be overcome by syncing the platform with other technology and by making the interface easier to use on another screen such as a tv or an entertainment screen that can be found in new cars. We know that this is not going to be simple, but it is crucial that it is easier to use another platform than an incumbent one for it to be successful because, that is the whole reason why you use Microsoft instead of Linux or why you use Google to find you information. Yes, there are other reasons behind the choice of a platform such as quality or familiarity but that can be further developed after the users are already hooked.

We believe that if company has the possibility to move towards incorporating a multi-sided mindset in their current business model. As we have stated before, there are levels of product and multi-sided platforms and moving one step to the right or left opens up new possibilities in venues that were not available before. Music and cars have gone hand in hand since the radio was added to cars and now you can listen to music through the car speakers that is streamed from your phone. So why not take it farther? Incorporate the apps directly in the car, add screens and Netflix to capture the families that are using tablets for the same deal today. Similar possibilities have been available on airplanes for a long time and there is no reason not to add the same possibility in cars now.

When this is done the possibilities are just beginning to surface. Games, books and much much more are only a few things that can be added and displayed on such screens. Here the importance of data comes in. We do not claim to be experts on exactly can be done with all types of mobility data, but by sharing the data and allowing access to an entertainment system there will be no end to the ideas a skilled developer can dream up. We are not saying that there are no strings attached,

but controlling platform with external developers wanting to create something for themselves that can be integrated into the existing platform since they will have a hard time to reach users otherwise.

7.5.2 Framework for strengthening user experience

The second framework really puts the end user into focus and asks the question, what do they want? If this question cannot be answered adequately then it is likely that the product will flop. This is why this question needs to be answered and be analyzed from many different perspective and we think that the framework does just that.

There are always going to be questions to ask about the prospective end user and data can provide a company with many of the answers. There are possibilities to search for trends such as commonly visited places, search history and commonly used apps. This is where a company really can get to know the end user and not only get to know what the users need now, but also what they want tomorrow and what they do not want - which is just as important. Understanding the user is going to become more and more important in the future especially if a state of hypercompetition is present.

Why do we think that these four intersections are important? We will make it really simple, people want to have a clear choice what to buy in a market where everything seems to look the same. Finding something that really sets your company and product apart from all the rest, your golden goose so to speak, is what's going to make people choose this particular product over the alternatives. We strongly believe that if people had a choice they would not want several products that together solve their one problem, they want one that solves all their problems.

So how do we create this product? Start by finding something that sets you apart from the competition and then add what must be included in the offering to not be inferior to anyone else. Now it becomes harder. Find those little things that the users rely on that are so important for the experience that lets the customer know that you understand who they are. Now comes the really hard part, do the same thing over again the next year or cycle. We are not talking about releasing an updated version of the same thing because everyone will be doing that and they will have added those nice features you worked so hard to find the first time.

It might not be easy, but the framework will help a developer look at the people and not just the product. Who is going to use it? What do they want? Those are good question, but it misses the point that the framework is going to show a developer. The why, why do they want a screen that is 9" instead of 7". Well maybe they have a hard time seeing the text displayed otherwise or maybe the icons are too small or any other of a hundred reasons. The point is not to answer every single question in the book because the data and market research can do that, but instead to answer the elusive why question. Find the why and then proceed to the how not the other

way around. This is what our hope with this framework is and how we hope it will be used.

7.6 Data policy

Having a data policy is not new to most, but there has never been as much data as there is today and the amount will only keep increasing. The problem as we see it is that with the market maturing over time there will be a continual need to look over current data policies and have different policies in different regions. Having a more open policy where others can interact with data and systems much like Google Play and controlling the data flow where developers can be drawn in and allowed to gain access for a small fee of course. There are several actors that just want the data to improve already existing applications, imagine Google Maps wanting more input for traffic updates or a store wants to know how many people/cars pass them each day.

It is easy to see that while building a business around data there are going to be many types of deals such as simple one-offs, where companies buy data in bulk one time just to have something to work with, or a license that allows access to a database, all of them or only one specific one. Then there are the ones who want to analyze and sell the data and this is where it gets tricky, who owns the data? It is everywhere and can be protected in different databases, but once it is sold and changed, interpreted or otherwise altered it is not automatically the original company's property anymore which means separate contracts for the aftermarket of the data.

It is important to remember that data is only useful if you know what you want to use it for. This does not mean that it does not contain a potential valuable information for someone else and a company which keeps supplying valuable data will be a company one keeps coming back to for more. We are not saying that you should not look after your interests within the data, but do not over analyze it so that others will have a hard time finding additional value. Data, in our opinion, will play a more and more important role in the future and sharing it with new contributors of applications will pay back the value many times over.

The data policy axis is meant to be a general rule of thumb that innovators can look to when evaluating the viability of their ideas. The axis in itself needs to take into consideration the market maturity and other ethical and legal aspects. This means that this axis will be a constraining space where the frameworks can operate to create new ideas that are in line with the company's policies.

7.7 The aim, method and reflections of the process

The identified axes that we found to be relevant, and subsequently the two frameworks explaining the two different viewpoints of actions on data, are all based on the results of the method in place. Therefore it is limited in that it is based on a broad review of theory, interviews with a few key actors as well as a deeper dive into the context in place for NEVS. While the framework is designed to be useful to any actor that fall under the category of creating data from a current product and evaluating the possibility for it to be a possible source of value - there is no way for us to test the frameworks on all known, or unknown scenarios.

We did however start of with a couple of more axes than the ones covered in this report. Through our analysis of the material gathered however we came to the conclusion that the ones in this paper were both the most relevant to NEVS situation, but also in a general setting when diving deeper into the theory in question. Since this is all knowledge gathered throughout the process - the creative process and analytical process was in many ways trial and error based. The concepts of scenarios, actions and identified axes were among the most iterative in the process - where we ended up with axes, scenarios and actions that fit both the context we had available, but hopefully for any given actor with previously stated context at hand.

The context at hand of having the focus of the possible value in big data came with a great need to define boundaries while still creating a framework that should work broadly for all the actors with previously mentioned context. With that said the limitations we made of mobility-driven big data is still broad, since it includes all data gathered from products on the move, i.e. excluding phones, tablets, computers, electronics at home. The companies producing these products might not necessarily not gain insight in some of the results in this report, but they have not been the focus.

While the framework for strengthening the user experience can in many ways be universal - the framework for business integration is more focused on the situational context. Both of these aspects we experienced important in analyzing the data we gathered through the interview and case face, and the one is dependent in many ways on the other. To have a clear vision and to set a purpose in the data that you collect is what we believe is the key to succeeding in a fast changing environment where all actors are just waiting to crack the possibilities in big data.

8

Conclusions and recommendations

In conclusion, the frameworks presented in this thesis creates an opportunity for any company within mobility driven solutions to pursue the possibility of gaining value through the strategic use of mobility-driven big data. The axes and the corresponding climates in the framework shows the opportunities available in each decision, but also the threats. Important to note is that any given opportunity is not static in the framework, but can move in accordance with actions or non-actions.

This is why we recommend a company new to data analysis to evaluate the possibilities with their data by using these frameworks and using their data policy as a constraint that might need to be reevaluated when considering adding data analysis to the business model.

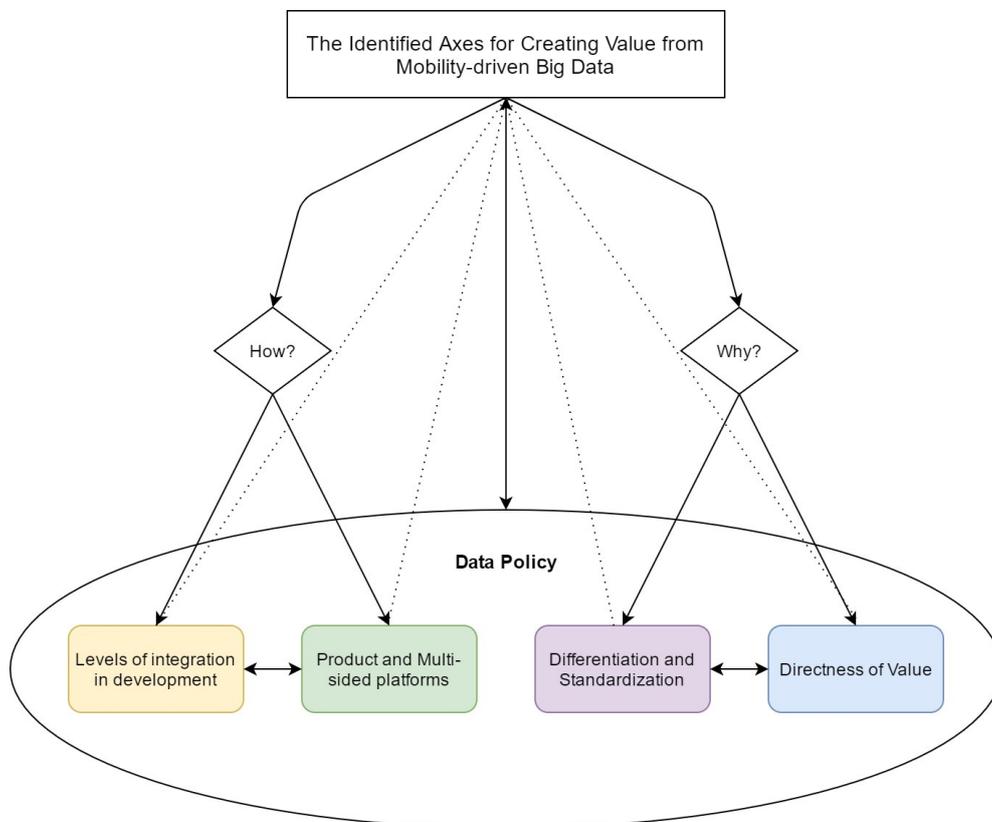


Figure 8.1: The identified axes for creating value from mobility-driven big data and their relations with one another.

The reason for using two frameworks and not just one is that there are two views that need to be considered. The first framework, which is suitable for a business perspective, is of interest in the strategic decisions of big data collection and ideation while the second framework is used to gain a consumer perspective to easier strengthen the company's position towards the consumer. This culminates in the two questions of "How?" and "Why?" which is seen in Figure 8.1.

We recommend for new actors working with mobility-driven data to start by evaluating their own data by asking the how and why questions. How can the data be used to benefit the end user and/or the company? How can this be implemented? How willing is the company to change to better adapt to an evolving climate? How can our company create advantages associated with sharing data with others? What does the data tell us? What trends can be found within the data? Why do we want to work with data? Why do we need it? What benefit does our customers gain from us using big data? These and many more are questions that do not have one generic answer that can be implemented in all businesses. For some a perfectly acceptable answer for "how do we work with big data?" will be "we do not". This answer is just relevant as a complete detailed plan would be to other companies.

We have mentioned many potential solutions where data, and benefits, can be shared. The possibility for platforms incorporated into mobile technology has been mentioned as a possibility where applications can be incorporated into cars and busses as well as other mediums. GPS, sensor data or service data can be used to track people, measure trends, or show highly trafficked routes as well as improve quality issues in a wide variety of devices. There are several ways to gain value from data and these include selling, trading or using data, but it is important to know that there is not always a monetary value that can be placed on all data.

We recommend that a company trying to enter the mobility-driven big data business ask themselves six questions:

1. Are you currently collecting data?
2. Do you have a data policy in place?
3. What limitations have you made?
4. What is your purpose with the data?
5. What do you hope to achieve?
6. Then what is your next step?

The first five questions sets the foundation for using big data and finding out what the purpose for using it is. Without a clear picture in mind, such an endeavor will surely fail due to a lack of understanding of the how and why. We believe that a grasp of these questions will automatically lead to an understanding of the sixth question which is where the possibility for the different axes becomes more clear. We recommend that companies should be more open with their data and adapt more dynamic policies which allows for a tailored response to shifting market trends.

9

Further research

One of the obstacles we have encountered is the newness of the big data concept overall. Many actors dabble in data overall, but it is perceived by us that this is a field where all actors want to at least pretend to know what they are doing. In reality, after speaking with several actors over a period of time to schedule interviews - we kept getting rejections over and over again. This made us come to the conclusion that very few individuals feel comfortable enough to consider themselves experts on big data.

In many organizations there are only certain individuals who stand a chance of knowing what their own company's data strategy is. In other words, there is at the moment a lack of transparency of how data is processed and used to gain advantages. This will become more and more apparent when the market matures a bit and we believe it would be very interesting to revisit this question in five or ten years to see the difference in the market. Compare it to when computers first made an appearance on the market, everybody knew what it was but few knew how they worked.

Another research topic that would be of great interest is future process and analysis methods used to handle big data. Also, since big data is classified as data which is too large to handle with conventional means, it would be interesting to find a benchmark for when data is considered big data. Since new methods and ways of reasoning will come to light it will cause our way to view all data differently and how it is viewed will be key to fully understanding it.

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A

Appendix 1

The direction of the semi-structured interviews was to cover three main areas of interest. These areas are “Internal Policy”, “Operations” and “Business Strategy”. There are a couple of main questions that was part of these three areas, but since the aim was to get information about how it is applied specifically in the case of the company in question, there was also room for follow-ups.

The main questions for each subject are as follows:

Operations

1. Do you currently collect data?
 - (a) Do you continually collect data?
 - (b) Do you process the data?
2. Have you made a strategic plan for the data?
 - (a) Is the data currently used as:
 - i. A product?
 - ii. A tool?
 - iii. Decision support function (BI)?
3. What are your limitations today, and how will they be affected the future?

Business Strategy

1. Is the data in a current business model of yours?
2. Whats the value of data for your company?
3. How do you see data influencing your company moving forward?

Internal Policy

1. Do you currently share the data with third parties and/or partners?
 - (a) What type of partners/third parties do you currently work with?
 - (b) What type of partners do you see working with in the future?
 - (c) Do they access the data raw or processed?
 - (d) How much does the data-contributer know (i.e. contracts etc.)?