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THE ROLE OF DATA AND ARTIFICIAL INTELLIGENCE IN STRATEGIC MANAGEMENT OF TOP MANAGEMENT: A CASE STUDY

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World has become unpredictable place where everything is affecting everything. Constantly changing business environment challenges managers and introduces new challenges for strategic management. Today interconnected digital devices are being used in every aspect of life. Therefore, data is being created with constantly increasing pace. Artificial intelligence research has been in headlines during the past decade as there has been high expectations and fears cast over this field of technology. This case study explores experiences and expectations of strategic managers of the role of data and artificial intelligence in strategic management today and near future.

Data is having significant role in strategic management. External data is offering opportunities to those who have capabilities of mastering the data processing. However, those who are lacking required capabilities to turn data to advantage for business are being disadvantaged as companies and their competitors can access to the same external data. Therefore, being out of reach of competitors, internal data is to be considered privileged. Thus, it may provide competitive edge.

When data volume is huge, artificial intelligence can help for refining the data. With AI solutions correlations can be found from data that might not be found with human labor alone, or which would have taken significantly more time. Thus, AI can be helpful part of strategic management, but at least today still requires human expertise to evaluate the findings.

KEYWORDS:

Strategy, Management, Strategic management, Artificial Intelligence, Big data, Data,

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Maailma on muuttunut arvaamattomaksi paikaksi, jossa kaikki vaikuttaa kaikkeen. Jatkuvasti muuttuva liiketoimintaympäristö haastaa johtajat ja tuo uusia haasteita strategiajohtamiseen. Nykyään toisiinsa liitettyjä digitaalisia laitteita käytetään jokaisella elämän osa-alueella. Tämä vuoksi dataa muodostetaan jatkuvasti nopeutuvalla tahdilla. Tekoälytutkimus on ollut otsikoissa kuluneen vuosikymmenen aikana ja tähän teknologian kenttään on kohdistunut suuria toiveita ja pelkoja. Tämä tapaustutkimus tutkii strategiajohtajien kokemuksia ja odotuksia liittyen datan ja tekoälyn rooliin strategiajohtamisessa tänään ja lähitulevaisuudessa.

Data on merkittävässä roolissa strategiajohtamisessa. Ulkoinen data tarjoaa mahdollisuuksia niille, joilla on kyvykkyyttä hallita datan prosessointi. Kuitenkin ne, joilta puuttuu tarvittavat kyvykkyydet datan muuttamiseen kilpailueduksi ovat epäedullisessa asemassa, sillä yritykset ja niiden kilpailijat voivat päästä käsiksi samaan ulkoiseen dataan. Tästä syystä sisäistä dataa voidaan pitää etuoikeutena, sillä se on kilpailijoiden ulottumattomissa. Täten se voi tarjota kilpailuetua.

Kun datan määrä on suuri tekoäly voi olla avuksi sen jalostamisessa. Tekoälysovelluksilla voidaan datasta löytää korrelaatioita, joita ei löytyisi pelkin ihmisvoimin tai joiden löytäminen vaatisi huomattavasti enemmän aikaa. Täten tekoäly voi olla hyödyllinen apu strategiajohtamisessa, mutta ainakin tällä hetkellä yhä edellyttää ihmisasiantuntijoita arvioimaan löydöksiä.

ASIASANAT:

Strategia, Johtaminen, Strategiajohtaminen, Tekoäly, Big data, Data

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LIST OF ABBREVIATIONS (OR) SYMBOLS

AGI	Artificial General Intelligence
AI	Artificial Intelligence
GDPR	General Data Protection Regulation
HR	Human Resources
NN	Neural Networks

1 INTRODUCTION

1.1 Background

Gruel machine overlords that enslave humanity or paradise provided by benevolent supreme intelligence where all humans live happily for eternity without any troubles. In popular culture future visions where artificial intelligence or AI is involved expectations vary from dystopias to utopias. In dystopia movies like Terminator or Matrix general AI has developed to sentient super intelligence that consider humanity as an enemy. Star Trek presents future scenario where more utopia style future vision exists. In all of these cases AI is present universally. However, while in the mentioned dystopias AI is in lead role, in the latter Star Trek future scenario AI is more in the background enabling society to run and aiding humans in all kind of situations and needs. This scenario where narrow AI is present generally in the background resembles more the world is currently heading as solutions of narrow AI are continuously getting more numerous.

Artificial intelligence is being invested in heavily and there is plenty of hope and expectations put on this technology as well as into the benefits that it may bring. Advantages of AI technology are not limited to optimizing performance-based tasks, but it is expected to fit also in creative tasks and decision making. Therefore, instead of asking can AI act as the strategist of a company the question could be when AI can be the strategist of a company. However, the former question can be studied and assessed against known requirements of the strategy processes while the latter would be more speculative study. Though AI is widely talked in business and science articles, there are sometimes some mystical elements associated to it (Mäntylä 2018). Also, AI is generalized term that describes several types of computer program algorithms. To demystify AI and to understand the concept it will be dissected in the theory part. In addition to examination of AI, big data and strategy in data rich business environment are examined in the theory section. For the research part it is vital to understand these factors. Despite science fiction future dystopias, AI may offer new improved solutions for management in the world of tomorrow.

Already there are companies which have harnessed competitive edge in business by adopting AI technology into company's operations (Anonymous 2017). World is changing constantly and complex competition environment forces companies to rethink their

strategies constantly to survive (Ritakallio & Vuori 2018, 14). Since AI seems to give competitive edge to companies this may lead to situation where company either adopts AI or becomes overpowered by a company on the same field of business that has adopted AI. Purposes of AI use are already multiple, and range is anything from chatbots, logistics and HR management systems to pay-with-face services and even creative tasks just to mention few. New uses emerge and the effect to employment will be noticeable at least. There are estimates that majority of the jobs will be lost to automatization and AI, not only from the blue collar but also from offices and even creative businesses (Fuhrmans 2017). However, there are also estimates that new jobs will emerge to compensate the loss (Fuhrmans 2017). In any case it seems that due the benefits of AI adaptation, it will become constantly more embedded within business world.

1.2 Purpose of the study

Focus of this thesis is to study how AI is adopted for the strategy work of the top management of a company. In practice, this means researching the possibilities that AI technology currently offers, defining requirements that strategy process sets for AI to fulfill and what requirements embedding AI to strategy work sets for the organization. The reason for studying this is to find more effective solutions for strategic management that can conquer the challenges in the world that is constantly changing in disruptive scale. Data is generated more than ever but getting insights from big data new methods and means must be adopted. Technology understanding is usually in IT department, but strategic decisions are made in the management teams (Rydén et al. 2017, 157). Therefore, aim of this study is to investigate the ways that a company has for embedding new technology to the strategy process of a company.

Due popularity of artificial Intelligence, there is increasing number of studies around it. However, studies that focus to AI use in the top management, strategy work and decision-making functions of companies are harder to find. Still there is need in these functions to be more effective in building real time and even predictive views of the business environment and the surrounding world as a whole. Therefore, this study aims to give more knowledge and understanding of possibilities to use AI solution in the context of strategic management.

Data is the oil of the modern world and as Jim Hare of the research company Gartner has stated it is the fuel for AI (Aziza 2018). Current focus areas of AI research like

machine learning require vast amounts of data. Big data as a term may have disappeared from the hype curve of Gartner but only because instead of a hype it is actualizing already with full steam (Rydén et al. 2017, 31). This data requirement is important to keep in mind while considering possibilities to use AI for the strategic management purposes.

2 LITERATURE REVIEW

2.1 What is strategy and strategic planning

To be able to investigate role of data and artificial intelligence in strategy work, the first step is to define what is strategy and how it is formed. There are several different approaches for the concept of strategy. Oxford dictionary defines strategy as “A plan of action or policy designed to achieve a major or overall aim” (Oxford University Press, 2020). In general strategy can be seen as problem solving. Required tools vary as does the context and circumstances. (Reeves et al. 2015, 6-7). Michael Porter’s approach in 1980 was to see strategy as position. Ten years earlier Peter Drucker had described strategy as a perspective. (Mintzberg 2007, 1-6.) Though strategy can be thought as a plan, when it is actualizing it is seen as pattern of actions and decisions. These actions and decisions can be either deliberated or those can just be emergent, unintended which dilute the intendent plan approach for strategy definition. According to Henry Mintzberg, strategies tend to have both deliberate elements and emergent elements and therefore, realized strategy rarely is the same as intendent strategy. (Mintzberg 2007, 1-6.)

It is rare that a strategy is purely either deliberate or completely emergent. Most strategies tend to have both elements, but the ratio varies case by case. Mintzberg together with Jim Waters defined eight types of strategies that linger between deliberate and emergent extremes.

1. Planned strategies are closest to deliberate strategy. These are formed and controlled by central management in stable environment.

2. Entrepreneurial strategies rely on vision of the leader. These strategies can change when new opportunities emerge but are still rather deliberate.

3. Ideological strategies have collective vision that relies on shared beliefs. Organization with these strategies are often proactive with environment and normatively controlled.

4. Umbrella strategies rely on setting strategic targets or boundaries to steer organizations actions. Therefore, leadership controls the direction but leaves freedom for other members in the organization to act within the given boundaries.

5. Process strategies are as the name implies, relying on the controlling of processes.

6. Unconnected strategies are strategies that can be found in organizations that have rather independent sub-organizations, teams or individuals, which may have deliberate strategies, but which are not aligned with each other. Therefore, the strategy of the whole organization appears to be emergent.

7. Consensus strategies are emergent as those are not results of intentions of a sole actor. Instead these are results of adjusting intentions of more than one actor to mutually acceptable result.

8. Imposed strategies are forced by operating environment. This strategy type is the most emergent as it is dictated by circumstance. However, though it may come as given, organization may choose to deliberately act accordingly. (Mintzberg 2007, 6-8.)

Businesses differ from each other in many ways. Different organizational structures can emphasis different features in strategy forming process. Mintzberg has recognized four groups that companies can be divided in. Entrepreneurial organizations where power is focused to individual or small group tend to have visionary strategy formation. These companies are usually small and possibly operate in dynamic and competitive environments. The second company type is machine organization. Name refers to organization's machine kind operating as these companies as commonly production companies with mostly unskilled labor force and stable business environment. these companies tend to be large and matured. For these organizations forming strategy by planning process is typical. Third group consist of professional-type organizations. As a opposite to machine-type organizations, labor force in professional-type organizations is highly skilled and instead of being led by rigid instructions, workers in these organizations are working mostly autonomously. In these organizations strategy is formed with a venturous process. The last of the four organization types is adhocracy-type organization. These businesses use learning process for strategy formation as these companies tend to produce innovative outputs that their expert labor force produces through projects. (Mintzberg 2007, 340-342.)

2.2 Strategy work in the age of information overflow

World is changing faster than ever before, and this creates challenges for businesses but also opportunities for those that can swiftly adopt to the new conditions. Fortune 500, the list that ranks the 500 largest companies in the world according to their revenue had in 2017 only 60 companies that were in the original list in 1955. Though this turnover has happened over a span of several decades, the turnover rate has increased constantly during that time. Estimate is that average time that company can stay on the list will be only 14 years in 2026 while it was 33 years in 1965 and still 20 years in 1990. Only 50% of the companies that are now in the top 500 list will still be there in the next ten years. (Perry 2017.) In comparison 60 % of the companies on this list that were on it in 2000 remained there ten years later in 2010. (Solis 2013, 2016.)

There are several megatrends that drive this increasing pace of change in the world. Along with climate change, aging population, urbanization and globalization, technological development and digitalization are one of the key factors that alter the rules of the business world (Ritakallio & Vuori 2018, 11). However, while technology itself may be the tool that allows the change, the reason for the change lies elsewhere (Solis 2013, 15).

Challenges in strategy work

While external pressure due increasing competition sets challenges for the strategy, it is not only the external world that has become more demanding. Growing complexity of the modern organizations together with global operating spots makes strategy work of the management challenging (Franken et al. 2017, 157). Rigid strategy plans like positioning don’t work in constantly changing world where the battle field and the rules of the game alter in an eye blink. Therefore, strategy as an ongoing process is more fitting to the present. (Ritakallio & Vuori 2018, 14-15.) This is also due large amounts of real time data, big data, that alters the strategy work. Structures of traditional strategy processes are not compatible with big data which can be valuable for the business. However, adopting big data to strategy can benefit company. (Woerner, S. & Wixom, B. 2015.)

Data drives the change

To understand the accelerating speed that data is created it has been estimated that in average over 2,5 million emails are created every second in addition to all social media

data creation and google search (Rydén et al. 2017, 41). Other aspect that demonstrate how steep this speedup curve is, is that over 90 % of all data ever created is generated after the beginning of 2016 (Marr 2018).

2.2.1 Strategy in the fast changing world

As markets are in many cases both, hypercompetitive and fast moving, adopting strategic flexibility can give advantage for a company. Having this strategic capability designates that a company has abilities which allows it to lead or respond to change in business environment. Strategic flexibility has been shown to have positive relationship to performance of company in fast moving industries and in occurrence of environmental shock. (Combe et al. 2012, 1321.)

The study by Combe et al. (2012) recognized three main antecedents of strategic flexibility that occurred in prior studies. These were management cognition, firm resources and strategic option formulation. Management cognition consists of beliefs, knowledge structures or schemas of strategy that management has. These schemas can be considered as lenses through which data is examined and understood by strategists. These lenses consist of prior experience and knowledge as well as beliefs. (Combe et al. 2012, 1322.)

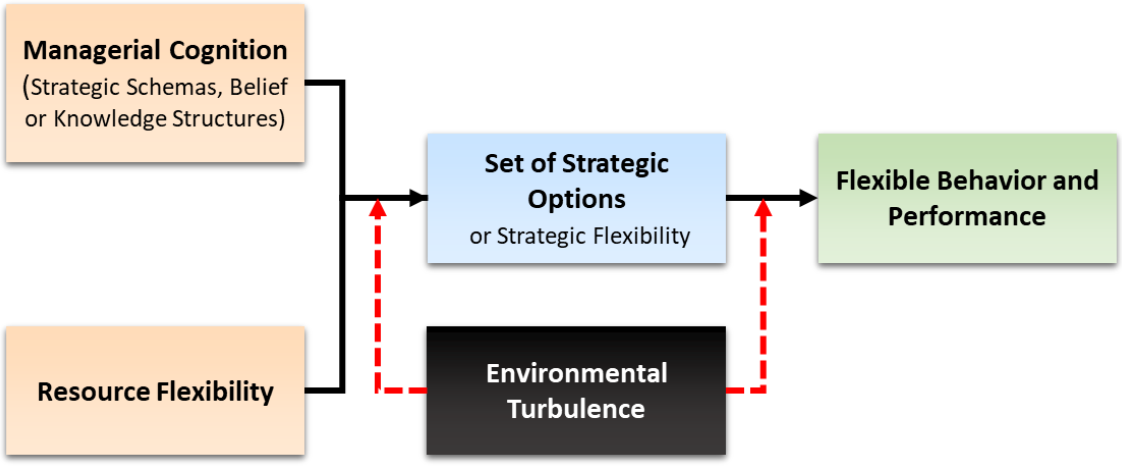

Figure 1. Theoretical model of strategic flexibility (Combe et al. 2012, 1322).

Second element for strategic flexibility is firm resources. To be able to adapt company needs to be able to reallocate resources flexibly. Therefore, company that prefers to adopt strategic flexibility needs to ensure excess liquid assets and pool of slack, flexible resources. The third antecedent, strategic option formulation consists of the alternative options that company is able to take in the given situation. These options are limited by the two other antecedents. Management cognition limits strategic options according to the cognitive capability of decision makers as resource flexibility sets the other boundary. Introduced antecedents are internal factors that create basis for strategic flexibility for an organization. However, environmental moderators affect also. In some business environment flexibility strategy can be costly in comparison to advantage that it offers. Therefore, flexibility fits best in hypercompetitive and turbulent business environments. (Combe et al. 2012, 1322-1323.)

2.3 All data becomes Big

Big data means of course very large mass of data like the concept name implies. However, the volume is not the only factor that is typical for big data. Other qualities that concern big data are the rapid speed that it is growing, the fact that it is constantly updating and the diversity of the data. It can consist from e.g. text, pictures and sound. (Constantiou & Kallinikos, 2015. 44.) Big data qualities such as high-volume, high-velocity and high variety of data require information processing capabilities that are innovative and cost effective. These capabilities are also expected to induce to new discoveries or insights from the data, fact-based decision making and process automation. For a company data is an asset, a resource that can be used for value creation. (Bogdan & Lungescu 2018, 66.)

2.3.1 Big data definition and qualities

Cambridge definition for big data is: “very large sets of data that are produced by people using the internet, and that can only be stored, understood, and used with the help of special tools and methods” (Cambridge University Press 2019d). The Oxford Dictionary definition for big data is slightly different: “Extremely large data sets that may be analyzed computationally to reveal patterns, trends, and associations, especially relating to human behavior and interactions.” (Oxford University Press 2019b). The former definition limits

big data to data that is produced by humans while the latter does not directly restrict out data that is created by machines although it emphasizes big data's connection to human factors. Therefore, in this work big data is defined according by Oxford definition. However, in most parts of this thesis it is not relevant to classify whether data is big data or not. Therefore, term data is used to instead of term big data as it covers all data. Thus, term big data is only used in sections that concentrate particularly to big data.

One way to define big data is the V model. The original V model was introduced by Garner in 2001. In this first version big data was defined with three V's: Volume, Velocity and Variety. In 2017 there were already nine V's. In addition to the original ones there are now Veracity, Visuality, Validity, Volatility, Value and Viewpoint. (Rydén et al. 2017, 35.)

	2001	2012	2014	2017
Volume	X	X	X	X
Velocity	X	X	X	X
Variety	X	X	X	X
Volatility		X	X	X
Visuality		X	X	X
Veracity		X	X	X
Validity			X	X
Value			X	X
Viewpoint				X

Figure 2. Development phases of V model definition of big data (Rydén et al. 2017, 35).

Volume is one of the first three definition elements of big data. Volume of data in world increases with accelerating speed and this causes challenges for storing and handling of data. It does not help that many companies still struggle with already existing data. (Rydén et al. 2017, 38.) In figure 3 is listed examples of some actions made per second in today's world which all mean also data creation. These examples form only a part of the total data that is formed but these can give understanding of the magnitude. (Rydén et al. 2017, 41). The pace of data creation is anything but slowing down. Emerging technologies such as internet of things or IOT together with 5g network will even further speed up the data creation. (Hendricks, 2015; Yost, S. 2017.)

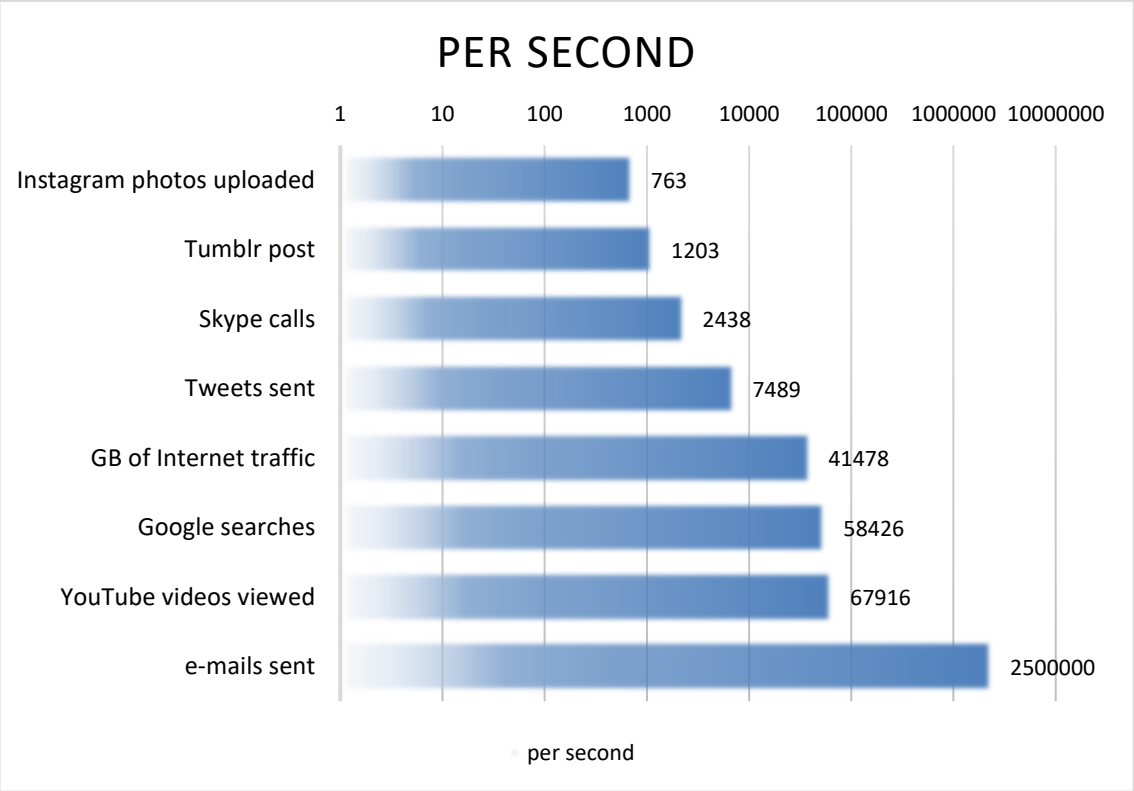

Figure 3. Actions made per second (Rydén et al. 2017, 41).

Second V of the big data is Velocity. This refers to both, data creation speed and data transferring speed. Data creation speed is constantly accelerating like described above in the volume paragraph. Transferring and processing of data has also been getting swifter with digital technology compared to past communication methods. With ever increasing processing capacity and improving network infrastructure real-time reacting to stimulation has become possible. (Rydén et al. 2017, 42.)

Variety of data means that instead of traditional structured data that can be fitted in an excel sheet big data consist from very heterogonous data formats. It can contain for example text, pictures, video, sound and sensor data. Unstructured data forms over 80 % of the total data created in the world. Large amount of this unstructured data is generated in social media platforms like Facebook and Instagram. (Rydén et al. 2017, 40-41.)

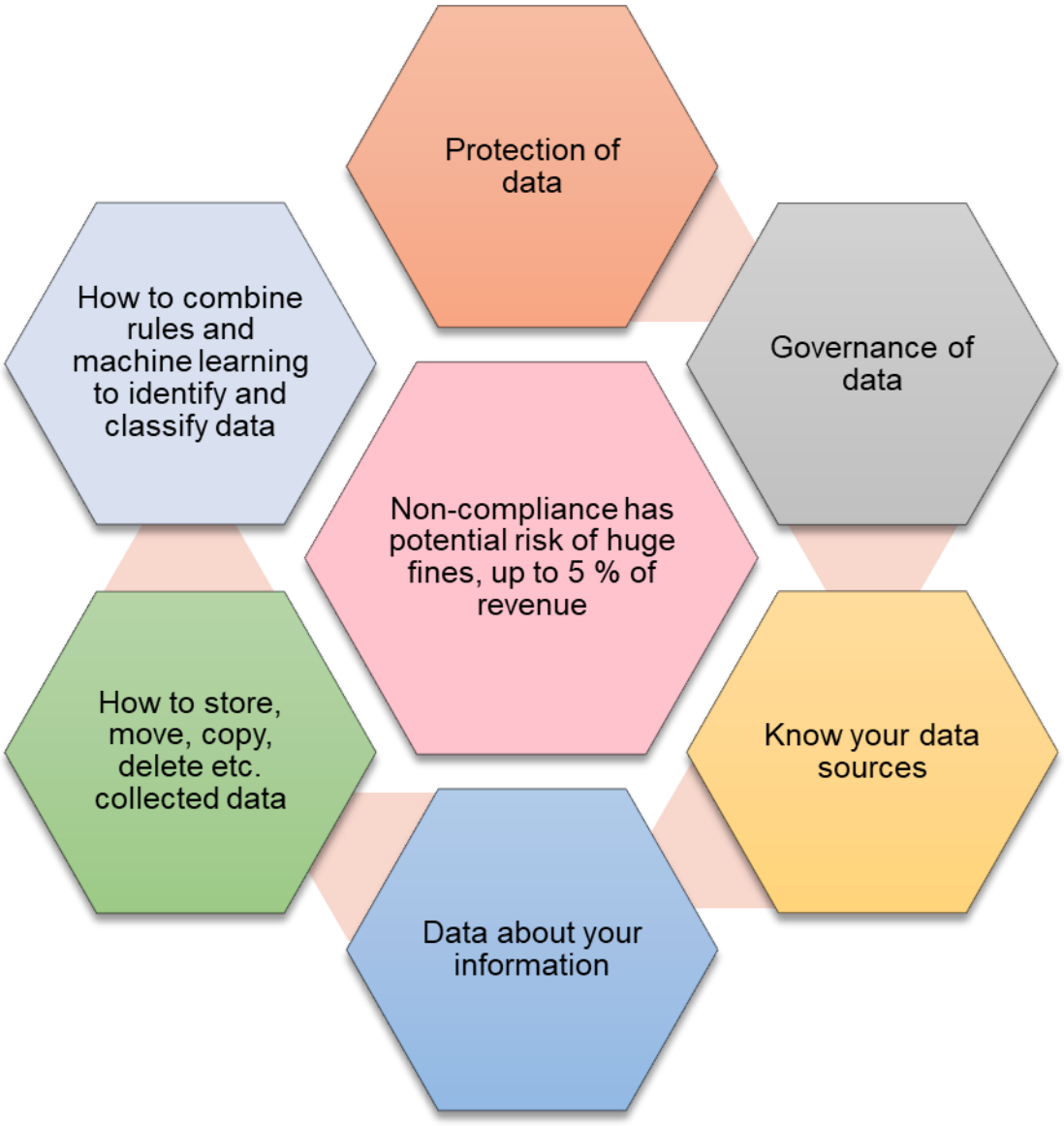

Figure 4. GDPR in a nutshell (Rydén et al. 2017, 48).

Volatility concerns pragmatic aspect of data like storing and using of data and issues that concern these functions. Since real time data mass is vast, it casts a question what is relevant to store and what is not. Security of data storing also must be considered to avoid data theft and data loss by e.g. data storage breakdown. Owning of data is also concern that has got more weight with EU's The General Data Protection Regulation better known by its abbreviation GDPR that came in to force in 2018. Aspects that this new regulation concerns have been listed in figure 4. (Rydén et al. 2017, 48.)

Visuality helps humans to understand data and therefore it helps effective decision making. Modern tools make building of charts easier and allow managers to visualize data without data experts. (Rydén et al. 2017, 45-46.)

Veracity was originally introduced to V model by IBM. It means the bias that comes from the nature of the big data, combination of structured and unstructured data that has been created with ununified ways. As an example, data from social media is extremely versatile given the vast number of people that act as data generators. This data can cause bias for many reasons like typos and irrelevant hashtags in comparison to the content to mention few exambles. However, sophisticated analytics can help to overcome these errors in data mass. While more sensors are available, quality of individual one might not always be good. However, sensor grid that has larger number of poor-quality sensors can still provide better picture of the reality than few high-quality sensors. (Rydén et al. 2017, 43-44.)

Validity reflects the relevance of the data. While large amount of data is available it may occur that some factors act seemingly similarly even though it is clear that these factors don’t have any interaction and their correlation can’t be explained. However, in some cases unlikely correlations can turn out to be true. Therefore, taking closer look to strange correlations before neglecting those may reveal unexpected insights. (Rydén et al. 2017, 47.)

Value is basically the reason for big data existence. Big data can be converted into insights of present and with predictive analytics also to insight of the future. Therefore, big data can be valuable asset in managing of organization. (Rydén et al. 2017, 49.)

Viewpoint is the newest of the V’s and it was introduced in 2017. It determines four mindsets that can be found in the way how organizations approach big data. Organizations and individual managers typically have mix of these arch types of mindsets, though some is the dominant one. These are: Promote and Sell, Listen and Learn, Connect and Collaborate, Empower and Engage. Organizations with Promote and Sell mindset try to benefit from big data by finding more ways to increase sales of their existing products and services. This usually gives modest benefit to the organization. Listen and Learn approach uses big data to modify their products and services to better meet the wishes and needs of the customers. Using big data with

Connect and Collaborate mindset means inviting external stakeholder to participate in product or service development though this can be approached in many ways. The last of the four, Empower and Engage viewpoint entails organization to reach for higher purpose that is beyond financial success. In practice this can for example be mission that significantly improves society or environment. (Rydén et al. 2017, 98-188.)

2.3.2 Big data and strategy

Since big data by its nature is huge in quantity, heterogenous in quality and constantly shifting, the traditional analysis methods do not fit well for it (Constantiou & Kallinikos, 2015. 44). The volume of data alone sets a challenge for many companies as it is not uncommon for companies to have room for improvement even in using of traditional sample data (Rydén et al. 2017, 38.)

Big data offers more input for the strategy, but it does not mean that strategy work would be easier than before. The vast information mass sets challenges for the strategy work. The premises and the time horizon differ from the traditional process. Big data, while being real-timed, is constantly changing and unlike the static statistics it offers more challenge to find long term patterns to draw conclusions for the long-term plans. (Woerner & Wixom, 2015) (Constantiou & Kallinikos, 2015.) With sensors installed in products manufactures can get data from the actual usage of their product instead of needing to relay on data aggregators (Woerner & Wixom, 2015). There are at least two ways for companies to profit from big data: data monetization and digital transformation. The former approach means concerning information as a merchandise that can be sold or traded for other assets. The Latter approach means that with new awareness that big data offers may allow company to reform its business entirely. As an example of this transformation is Australian retailer that expanded to insurance industry and applied for banking license because of the new comprehension that big date provided. (Woerner & Wixom, 2015.)

Though continuous monitoring of big data is important, it is pointless without applicable decision process. Thus, an indicator that is monitored may constantly change between positive and negative. Therefore, there needs to be decision process that is triggered when predeterminated conditions are met. (Davenport 2014, 46.)

One business problem where big data has been utilized for in industries like financial services and retailing is understanding of customer relationships and especially multichannel-customer relationships. Customers journey through company's touchpoints like website, call center, teller and other personnel. For companies it is valuable to understand how customers toggle between these touch points and how those paths lead to service or product purchase. Data that is generated form these interactions of customers is heterogenous and complex as it can consist of things like clicks on website, voice recordings, transaction records etc. Data volume is also vast. However, payoff of understanding customer journey may be considerably valuable. Therefore, though analyzing of customer journeys is not easy, understanding common journeys and key issues related can be very fruitful for business. (Davenport 2014, 47.)

To garner valuable insights from swiftly evolving data mass corporate strategists must design organizations management and big data architecture to prioritize discovery and analysis. This includes continuous access to internal and external data for company's data scientist and general business analysts. Analytics platform also needs to be apt and allow integrating new data, ad hoc queries and visualization as it helps to create human understanding of data. Traditional highly structured approaches for insight building give results after long process and therefore, modern faster and more flexible approaches like Agile and Scrum processes are replacing those. Thus, these methodologies can be applied for big data. (Davenport 2014, 49.)

Traditional small data is commonly used on many managerial business decisions. These decisions include sales and marketing management, supply chain management and pricing. Big data can also be applied for these same decisions. In addition, big data creates new opportunities from strategic management perspective as it allows discovering new insights that can be converted to new services or products for customers. Thus, though traditional data is analyzed mostly for internal reports for senior executives and for internal decisions, big data is commonly used to create customer value by developing products and services. (Davenport 2014, 45.)

If company aims to achieve successful combination of agility and big data, it must undergo a cultural shift as this forces company to aim for change and exploration. To thrive in competition company must be fast in adopting new models of working with of big data and implement discoveries. For example, bank needs to launch digital products and services before competitors. Therefore, it is crucial to shift employee's mind-set to be aligned for big data culture. (Rialti et al. 2018, 1103.)

The role of big data has raised interest among executives across industries when it comes to best practices of strategic decision making. Data production volume continues to increase and massive investments around data collection and analyzing are being made. However, at the same time managers struggle with questions like what data to collect, how to collect, codify store it, how to analyze this data and how to convert it to value. (Mazzei & Noble 2017, 406.)

Focus of management related scholarly research around big data has mostly been around the different operational functions of organizations. Thus, opportunities in strategic management has been given less attention. (Mazzei & Noble 2017, 407.)

In their article, Mazzei & Noble state that traditional approach for strategic management is that the metrics are determined according to the chosen strategy. However, they suggest that instead of letting strategy dictate the data to be collected, process should be opposite. Thus, data that is collected should adjust the strategy. Companies that act this way to find opportunities have created new value and improved performance. They also introduced three tiers of value creation in relation to big data. These tiers are:

1. Big data as a tool
2. Big data as a industry
3. Big data as a strategy

The first, “big data as a tool” tier is when company adopts big data and uses it to improve its performance. This can actualize in many ways like improving operative effectiveness, innovating new products for customers or targeting marketing better. The second tier is when company’s business is big data. Collecting, storing and analyzing big data demands expertise and resources that are not easy to acquire if core business is elsewhere. Therefore, there is room for companies that specialize to offer big data services. The third tier where big data is as a strategy consist of companies like Alphabet, Facebook and Amazon. While the first-tier companies had adopted using of big data to their strategy it was still used to improve performance within the old business. However, companies on this third tier focus on the data flows. Businesses that these companies step into don’t always need to profitable at first but those give access to new dataflows that give these big data giants new pieces of the puzzle. By combining data flows, tier three companies can innovate business models that can disturb industries where

traditional operators have had stabile business in the past. (Mazzei & Noble 2017, 407-412.)

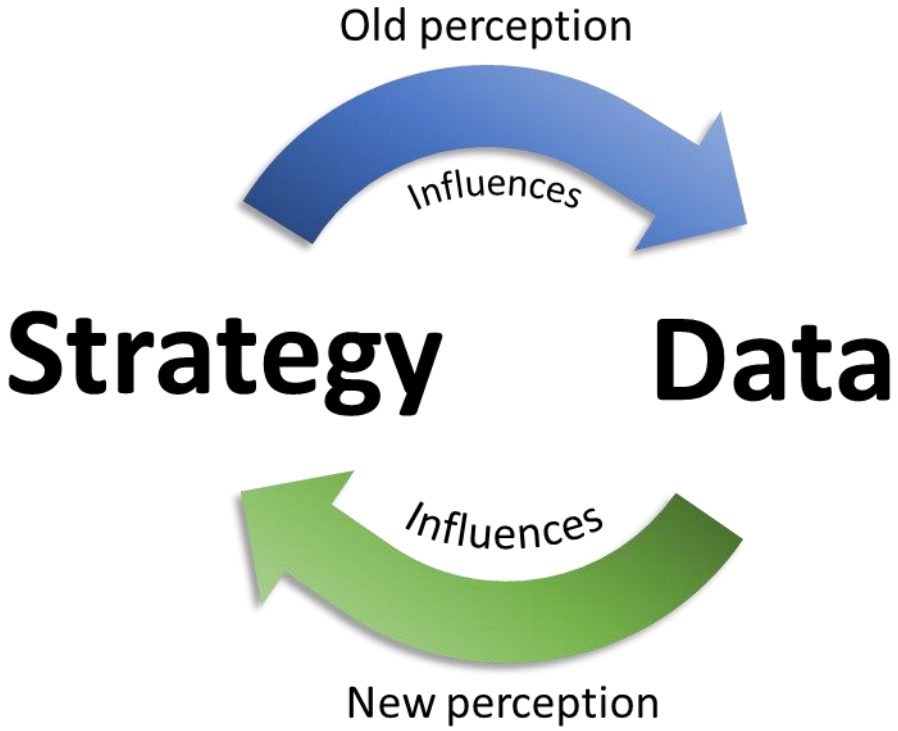

Figure 5. The evolving relationship between data and strategy (Mazzei & Noble 2017, 407).

2.4 Artificial Intelligence

When information input is vast, human capability to process it is inferior to machines. When Garry Kasparov faced IBM's Deep Blue in the famous chess match in 1996, he lost the first round of the match and had two ties even though in the end he managed to win more rounds of this first encounter of the chess grand master and this dedicated machine. Next year the result was different though Mr. Kasparov had changed the strategy towards to one that limits the possible moves and therefore cuts the seemingly advance of opponent that is capable to calculate far more possible next moves than human in the given time. However, while in the first match in 1996 Deep Blue was still using Brute Force method, basically calculating as many possible moves ahead in all possible variations as it could within the given time, and picking up the best alternative, in the rematch of 1997 the method was different. There Deep Blue, when forced to

different situation by Mr. Kasparov's strategy, played more like a human by playing subtle. (Krauthammer, 1997.)

Artificial Intelligence has beaten humans in chess which has rigid rules and therefore has limited number of scenarios to choose from though the total number of these scenarios is huge. However more resent example of a game where AI has become superior to human expert is air battle simulation where Gene Lee, Colonel of United State Air Force pilot was repeatedly defeated by AI developed by Nick Ernest and his team. Colonel Lee was very experienced pilot and had experience also from simulation battles with other AI pilots. With earlier simulation opponents result had sometimes been victory and other times loss. However, this AI named ALPHA turned out to be unbeatable by Lee. What was even more significant in ALPHA was the modest requirements for processing power it had. Instead of super computer, it needed computing power of only an average level consumer laptop. For small number data inputs Genetic Fuzzy systems are very powerful but when number of data inputs grow the need for processing power becomes significant. To avoid need for super computer level hardware ALPHA is based on Genetic Fuzzy Tree programming. This has similarity of human and animal type of information processing where instead of evaluating all inputs as individual decisions, data inputs are grouped, and decisions are based on the outcomes of these groups. Therefore, less calculation power is needed to make good decisions with Genetic Fuzzy Tree method than with normal Genetic Fuzzy method. (Reilly 2016.) These are just couple examples to demonstrate that AI can be far superior to humans in tasks that can be defined. However, playing field of strategy is very complex and rules are blurrier.

2.4.1 Definition of Artificial Intelligence

Artificial intelligence or AI as it is mostly called in this thesis, has several definitions. Definition from the Oxford Dictionary is: "AI is the theory and development of computer systems able to perform tasks normally requiring human intelligence, such as visual perception, speech recognition, decision-making, and translation between languages" (Oxford University Press, 2019a). Cambridge dictionaries offer several definitions for AI. The first defines AI as: "the study of how to produce machines that have some of the qualities that the human mind has, such as the ability to understand language, recognize pictures, solve problems, and learn", the second: "the use of computer programs that have some of the qualities of the human mind, such as the ability to understand

language, recognize pictures, and learn from experience", the third: "the study of how to produce computers that have some of the qualities of the human mind, such as the ability to understand language, recognize pictures, solve problems, and learn" and the forth: "computer technology that allows something to be done in a way that is similar to the way a human would do it" Cambridge University Press, 2019a, 2019b & 2019c). Although there are slight differences within the approach of these definitions aspect that all have in common is that technology is presenting qualities that are traditionally considered human related.

Artificial Intelligence or AI has had several definitions during history. These definitions include thinking humanly, acting humanly, thinking rationally and acting rationally. (Russell & Norviq 2010, 1-2.) Acting Humanly approach would require AI to possess skills and qualities that allow it to imitate human capabilities. These include at least following features: natural language processing to communicate like a human, knowledge representation to store information, automated reasoning to process the information that it has collected, machine learning to make it able to adapt to new situations with the help of information that has been gathered earlier, computer vision to be able to detect objects and finally robotics to be able to manipulate the physical world. To test whether these skills are mastered by AI there is a famous test called Turing Test. The plain version which tests all but the last two features, examines can a test person figure out if one is having a discussion with another person or with AI. The advanced version of the test, total Turing Test, requires also computer vision and robotics. (Russell & Norviq 2010, 2-3.) While acting humanly approach to AI is mostly interested to achieve an output that resembles human action, thinking humanly approach is concerning how information is processed. In this approach to AI information processing should follow same models that human brain has. Therefore, this is close to the field of cognitive science. (Russell & Norviq 2010, 3.)

Human as an being capable to intelligence is a sound option for benchmarking Artificial Intelligence. However, way that human can do a thing, act or think for example, is not necessarily the best and most effective way. Therefore, instead of imitating humans AI can be also be defined either by thinking or acting rationally. Thinking rationally is based on logic and in perfect world would always lead to perfect result. However, uncertainty and complexity of the real-world cause challenges to this approach to AI. First problem is that processing requires that input needs to be in correct form that can be used in the

logical processing while informal information rarely fits well in this mold. The second problem is that thinking rationally method's demand for computation power increases rapidly when number input conditions grows and therefore it does not fit well in practice. (Russell & Norviq 2010, 4.) Acting rationally approach describes AI as a rational agent, something that does. This agent, in practice computer program, differs from other computer programs by having certain qualities. First it needs to be autonomous and perceive its operating environment. Secondly it must be able to adopt to changing circumstances, set goal and act so that it gets to that goal. Also, it needs to endure time and remain operational. From these four definitions for AI that were described above, Acting rationally is the most practical one and most AI applications can be defined accordingly. (Russell & Norviq 2010, 4.)

For strategy work it is essential to gain comprehensive knowledge base about the external and internal factors that affect and may affect to business and the world around it. Knowledge, however, is not an absolute physical constant. Instead, there are three different ways to categorize knowledge. These approaches are objectivist, interpretive and practice-based approach. The objectivist approach considers that all knowledge can be codified and therefore everything can also be emulated in a form that can be processed by AI. However, two other views of knowledge stress the tacit dimension of knowledge. According to interpretive approach there are multiple levels of tacit knowledge and at least part of this knowledge can be codified on some level. The last of the three approaches, practice-based, considers knowledge tacit by its nature since this view sees that knowledge is embedded in means that aim in actions. Knowledge emerges differently in different situations depending on time and context where actions are deployed and therefore it remains tacit and non-codifiable. These tacit dimensions of knowledge which interpretive and practice-based schools recognize, reveal limitations in current AI. (Sanzogni et al. 2017, 40-42.) Natural language processing also causes challenges when words and sentences are taken out of the context. Challenges may occur due multiple meanings of individual words such as plant which can mean either biological organisms such as vegetable, or it can refer to a factory. These multi-meanings without deeper understanding of the context, may occur as the example sentence

translation between Russian and English: “The spirit is willing, but the flesh is weak” as “The vodka is good, but the meat is rotten”. (Russell & Norviq 2010, 21.)

2.4.2 Fields of AI

Artificial intelligence is a field of science that covers different subfields. AI can also be divided to artificial general intelligence or AGI and to “narrow” artificial intelligence. AGI is a field that has not unanimous definition. However, there are features that are good examples of ambitions in AGI research. AGI research aims to engineer a system that has human kind of intelligence, that is capable to perform tasks more generally than just a single task that it has been initialized for or that can generalize learnings and to use these generalizations in different contexts. Thus, AGI aims to provide AI systems that can be given complex tasks and can be asked open-ended questions. (Goertzel 2015.) AGI could also be used for complex creative tasks like design (Hein & Condat 2018). Consensus of the researchers in AGI-conference in 2010 was that AGI systems would be achieved before 2050. However, researchers are not aligned with this and some expect this technology to emerge earlier. Therefore, also concerns of possible risks and ethical concerns relating to AGI have been raised. Today, AI applications are used are presentations of narrow AI. While AGI by definition is able to adapt to many kinds of tasks, narrow AI usually requires human interference like reprogramming to be able to manage new kind of tasks. (Goertzel 2015.) Machine learning is one subfield of AI research that is an example of technology that is applied for narrow AI applications. Deep learning is subfield of representation learning, which in turn is the subfield of machine learning. Relationship of these research fields has been visualized in figure 6. (Goodfellow et al. 2016, 9.)

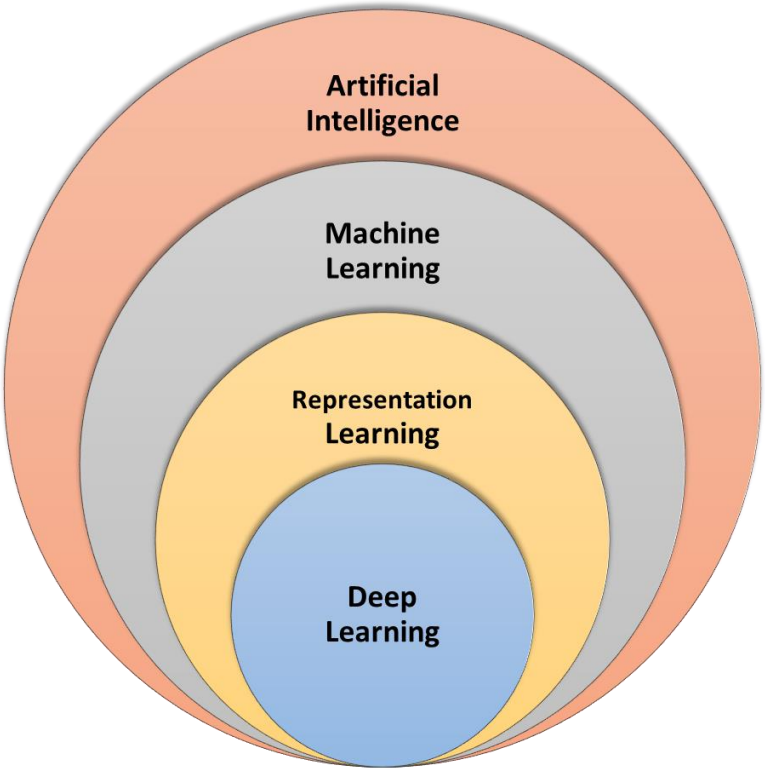

Figure 6. Venn diagram demonstrating the relationship of Deep Learning to AI. (Goodfellow et al. 2016, 9.)

Machine learning methods require data. Deep learning, subfield of machine learning has become popular over past decade as it has shown great potential in several fields including image recognition and natural language processing. Techniques of deep learning have developed but are still rather close to ones that have been developed decades ago. What has improved and made possible to harness true potential of deep learning is the availability and amount of data. Deep learning algorithms, models, become more and more accurate when data volume that is used for training increases. Typically, a model becomes accurate enough when training data consists of at least 5000 labeled samples. Achieving and exceeding human level accuracy requires millions of labeled samples. There are research areas that focus on the techniques that would achieve good results with smaller sample volumes and with unlabeled data. However, larger volume and better quality of data are always welcome. (Goodfellow et al. 2016, 18-21.) Therefore, to apply machine learning and especially deep learning methods to solve an issue or to analyze a phenomenon, sufficient amount of data is required.

Technological development is key driver that gives AI hype more solid foundation than it has had in the past decades. Since data has important role in the machine learning

technologies it is relevant to understand that availability of data has become abundant due progression of technology. As people use more and more computers, including mobile devices such as smart phones, and all devices are connected, data is created and shared in completely different magnitudes than in the past decades. In addition to data availability, another factor that enables AI technologies to become more powerful and therefore useful is the development of the computing power. Deep learning uses neural networks that have been inspired by natures neural networks, though those are not analogically copied from biology. As in biology also artificial neural networks consist of neurons and the connections between those. Connection count of artificial neural networks or NN, have had limitations in the past due hardware's capability. With current technology limitations in the connection count are model design decision rather than capability issues. Therefore, connection count in modern NN can be on the same level that is in the brains of small mammal like mouse or even cat. Neuron count of the neural networks has steadily increased over time by doubling in about every 2,4 years but are still just about the level of frog's brains. If the speed continues human brain level in the neuron count has been estimated to be achieved in the year 2056. (Goodfellow et al. 2016, 21-26.) Improvements in processing capabilities of models together with highly increased data creation pace make excellent environment for rapid development of AI and therefore allow organizations to apply this technology to real life business cases.

2.4.3 AI and strategy

When it comes to exploring of opportunities that AI technologies offer, there is huge cap between vigilance of companies. In 2017 MIT Sloan Management Review published a study about artificial adaptation in business world. The study had extensive base since over 3000 executives, manager and analysts were included in the survey for the study along with in-depth interviews that were conducted for more than 30 relevant experts. Expectation was that large corporations with more than 100 000 employees would be the most likely to have AI strategy in place. However, result from the study was that only half of these companies had such a strategy in place. Thus, large companies are only slightly ahead since from all companies in the study 39 % had AI strategy, though only about 15 % of all the companies had AI currently largely affecting to offerings or processes. (Ransbotham et al. 2017, 1-2, 5.)

Expectations towards AI are very high and 84 % of executives believe that AI will offer competitive edge against competitors. In 2017 only 15 % of the respondents saw that AI largely affected to processes of the companies. However, 59 % expected AI to have prominent effect to processes in five years (2022). Though these percentages varied between industries, the cap between current state and near future was roughly on the same level across all industries. Even though interest is extensively on high level, the level of readiness for deploying AI vary significantly between companies. This is largely due differences in data related capabilities as data is vital for applying AI systems. Therefore, the difference occurs as some companies have advanced information infrastructure and invest heavily in AI technology while others struggle without decent access to their data and sufficient analytical expertise. (Ransbotham et al. 2017, 1, 3.)

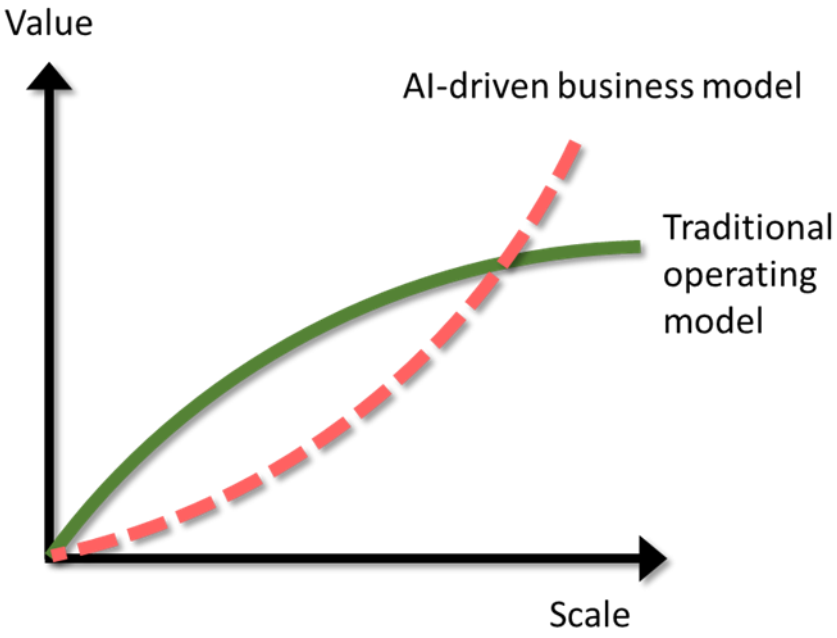

Figure 7. Value of AI-driven business model and traditionally operated model. (Iansiti & Lakhani. 2016, 66.)

Business model that is built on digital foundation and designed to harness advantages AI and automation have competitive edge against traditional business models. Business architecture that relies on AI is designed so that it does not require significant increase in of labor force nor it does for other resources either when business is scaling up. Core

of such organization is what Marco Iansiti and Karim R. Lakhani describe as AI factory. It is a process is that the is common for these companies no matter what their product or service is. This AI factory consists of four elements. The first element is data pipeline. In this part data is collected, cleaned, processed and stored for further use. This phase is semi-automatic. The second sector of the AI factory runs the data through AI models that form predictions of the future, scenarios. The third element of the factory is test field where optional hypotheses by new algorithms are simulated and evaluated. The last component is the infrastructure that interlinks customers and internal stakeholders. Setting up AI based business model can be more difficult than traditional business model. However, AI based model improves as more and more data is produced and used to improve AI systems. As scaling up this largely automated system does not require large resources, when critical data mass has been obtained and used to improve the model, the path to accelerating growth is open. Value development rate in traditional business models typically slows down in relation as scale grows while in AI-driven business model the value curve acts by accelerating value as scale grows as has been visualized in figure 7. Therefore, these AI based business models are not to be considered as disturbing innovations, but instead these should be considered as totally new kind of businesses that shake the foundation of the traditional concept of business. (Iansiti & Lakhani. 2016, 61-67.)

Business models differ from one industry to another. Therefore, company functions where AI is expected to affect mostly, also differ according to industry. Functions like information technology and operations, which include manufacturing, supply chain management and research & development, are anticipated to have most effect across industries. In addition to these functions customer facing functions such as customer service, sales and marketing are also high in ranking in industries like financial services, consumer, technology, media, telecom and public sector. However, two industries also anticipated corporate center functions to be among the top ranked functions where AI will affect. Finance and accounting were on 2nd highest rank in financial services while for professional services strategy was the most anticipated function that AI would have effect on. (Ransbotham et al. 2017, 4.)

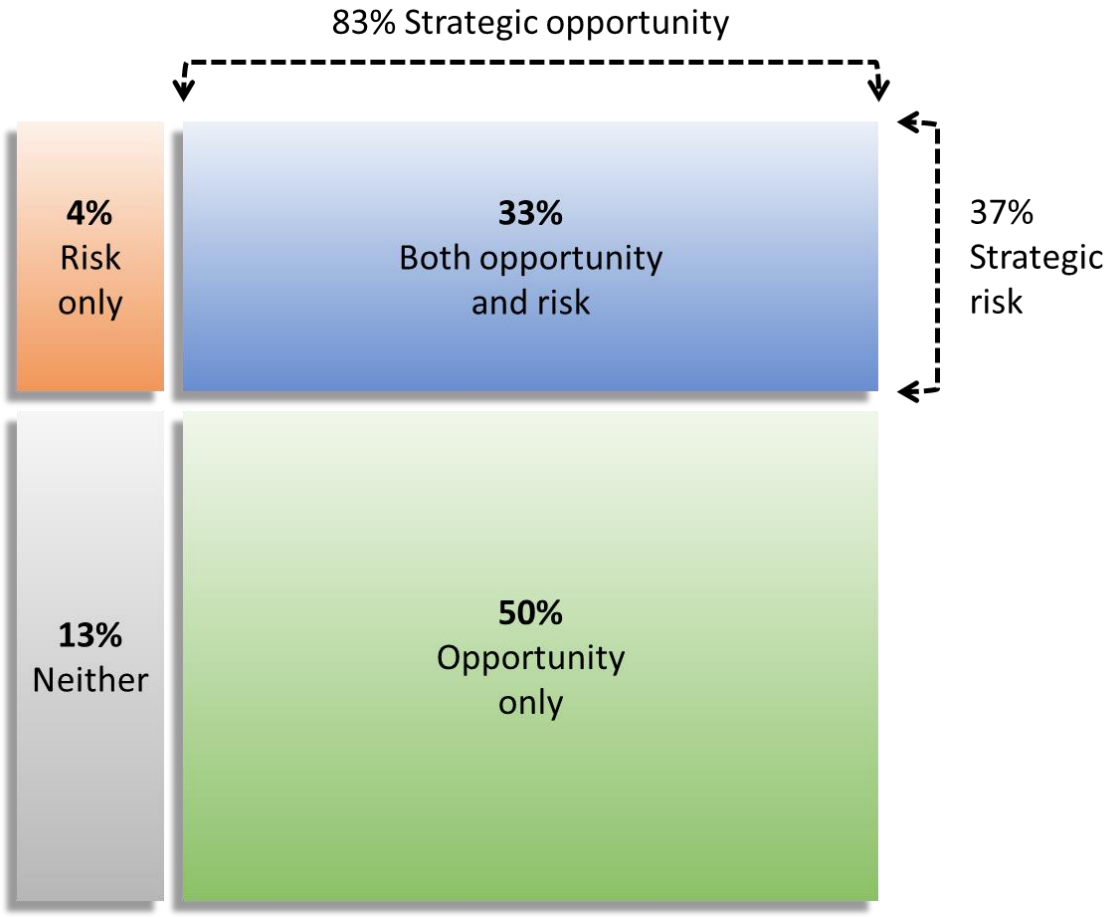

Figure 8. AI is seen as strategic opportunity and risk (Ransbotham et al. 2017, 4).

Although interest and expectations around AI are high, there are barriers for deploying this technology. AI is mostly seen as strategic opportunity as 83 % of organizations agree to this. However, at the same time 37 % see AI as strategic risk. Aspects that are considered to be barriers for AI adaptation differ according to current level of AI adoption within the organization. In the passive cluster where organizations have not adopted nor have understanding about AI, barriers that were overweighed were lack of clear AI related business case, limited technological capabilities and lack of leadership support for AI initiatives. In the other extreme, the pioneer cluster organizations which have already adopted AI and have understanding of the subject, experienced totally different issues as barriers. For this group of organizations, the most notable obstacle is the difficulty to attract, acquire and develop AI talent. Security concerns that are related to AI adoption also were on significantly higher level in this cluster than in others. Barriers that are rather even throughout all clusters, two extremes and two in the middle, are competing investment priorities and cultural resistance against AI approach. Thus,

barriers for AI adoption are different in different phases on the path to deployment of AI. While lack of leadership support is significant barrier in companies that lack AI adoption, in pioneer companies AI initiatives are led by senior executives. (Ransbotham et al. 2017, 4-8.)

Data is critical point when adopting AI. Sophisticated AI algorithms are in some cases thought to be able to solve business cases with limited data. However, most AI solutions need to be trained as part of deploying them. For training vast volumes of historical data is required. Data must also be good in quality for AI algorithms to learn to become "intelligent". Some advanced algorithms can be trained with smaller data volumes. However, for these algorithms quality requirements for data are on high level. Companies may believe that they have required data available. However, can be scattered around in fragments or company may not have the ownership for the data. Thus, issues with data may form barrier for deploying AI. (Ransbotham et al. 2017, 7-9.)

Organizations that are in the cutting edge of AI adaptation have business and technology strategy aligned. Members of these organizations also rank their companies' general management and leadership areas high. These areas include vision, leadership, openness, ability to change and long-term thinking. (Ransbotham et al. 2017, 11.)

Though outsourcing in one possible approach for building AI capabilities it holds challenges. AI algorithms that are applicable for use without need for training for specific business problem tend to offer only minor advance. However, training AI to gain major advantages requires both, comprehensive access to data and substantial understanding of the business. Therefore, company that outsources AI adoption to AI consultant, contractor or other organization, needs to allow extensive access to its data and make sure that business problem is well defined which can mean involving company's own employees. Instead of outsourcing, pioneer companies that have already adopted AI and have understanding of it, develop their capabilities further mostly by training their employees and hiring talents. This approach allows these companies to gather people from different disciples to work together with AI experts to train algorithms and to collect and integrate relevant data for the training. (Ransbotham et al. 2017, 9-10, 13.)

In 2016 Reid Hoffman, executive chairman and cofounder of LinkedIn, answered to the question: "Within next five years, how will technology change in a way we have not yet witnessed?" in MIT Sloan Management Review. His vision was that management would transform from art to combination of art and science. The key element for this

transformation would be AI that enables data science to be used and which builds comprehensive corporate knowledge graph. This AI would access to every piece of information within organization. Not only each file and document but also all communication streams, emails and chats. All meetings would be recorded and if some action points are volunteered by someone AI would keep track of this. Though this sounds futuristic Hoffman emphasizes that all the technological AI elements already exist. These include classification, pattern matching and suggesting potentially related information. (Hoffman 2016.)

Hoffman introduced three areas of advantages that this kind of comprehensive AI adaption within corporations would bring:

1. Better Organizational Dashboards

2. Data-Driven Performance Management

3. Increased Talent Mobility

The first advantage, better organizational dashboards, concerns improving information that is used for decision making on executive level. Though organizations already use dashboards for decisions those are mostly based on historical structured data that is easy to get from the systems. These can consist of e.g. financial figures and app downloads. With help of specialized AI tools scope of the data can be expanded to cover sentiment analysis of internal communications to gain overview of the hot topics within the organization, understand risks of actions and to apprehend where key resources such as capital and attention are going to be deployed by the people. With aid of AI dashboards can become predictive and therefore more forward orientated than those that have been used so far. However, Hoffman does not predict that computers would be making decisions but merely emphasize relevant factors for human executives. Thus, instead of replacing humans, AI would extend human intelligence. (Hoffman 2016.)

Other two aspect consider possibilities that AI offers but are not in scope of this study. Data-driven performance management is about possibilities to measure performance of employees who are not directly affecting to sales or other easily measured function. Increased talent mobility describes possibilities to increase mobility of talents by AI that aids adaptation to new organization for example by being able to connect to correct persons when questions arise. (Hoffman 2016.)

3 RESEARCH METHOD

This study explores AI and data including big data use for strategy work of companies. Goal is to open up the subject for further studies by probing the current meaning of data including big data and AI in the strategy process. Aim is also to examine how data and AI has changed strategy work so far, and how those are expected to affect in the near future. This exploration will be done by absorbing insights from the experts who are working with strategy planning on top level of management. These experts are interviewed with in-depth interviews that have semi-structured elements to ensure that the discussion will stay close to topic. However, since study is explorative and welcomes new unexpected traits around the combination of these new technologies and strategy process, the interview must not be too rigorous.

Presumption was that the chosen experts and the companies that they work in have access to big data and financial, technological and juridical resources and capabilities to apply AI technology to their strategy process. With interviews one purpose was to confirm or reject this assumption. If presumption was not correct, interviews would have probed why these technologies are not included and whether plans are to change this policy in the near future or to continue with current procedure. If presumption is correct, then probing will focus in how they have adopted these technologies and why. In this case the experts will also be interviewed how the role of big data and AI in the strategy process is going to develop in the future. One interesting aspect is to explore how experts see power distribution if AI has a role in the process of strategy formation and how they concern giving decision power to AI gradually.

3.1 Method

When the research topic is phenomenon that is not well known by its nature, exploratory study allows to approach the issue with open questions to clarify understanding of the phenomenon. This form of study allows new and unexpected dimensions arise from the collected data. In exploratory study may lead research to new directions that were not expected due the insights that the data offers. However, while research starts with broad focus, it can get narrower during the research process. (Saunders et al. 2016, 174-175.) The role of data, big data and AI in the strategy work has limited amount of research and

therefore exploratory approach allows to probe subject without too many presumptions that would limit the outcome.

Due the explorative nature of this study, theory formation happens through abduction. Strategy process, big data and AI are subjects of multiple earlier studies. Therefore, literature and research papers are widely available on these topics. However, lack of previous studies of the combination of these subjects sets challenge to form deductive theory of the importance of big data and AI technology in decision making and in the strategy forming process of companies (Saunders et al. 2016, 146). Forming theory solely by induction; thus, forming theory based on the collected data, can lead to interesting findings (Saunders et al. 2016, 147). However, these findings could be further from the original research question than is desirable. Abductive approach to theory formation allows to move back and forth between inductive and deductive approach (Saunders et al. 2016, 148). Therefore, theory can be formed partially deductive way from the existing knowledge and partially through the new data with induction.

Methodological choice for this study is mono method qualitive study. Quantitative research is common with studies that have deductive approach to theory formation. Quantitative methods work well when data collected can be standardized and relationships between variables can be observed and evaluated. (Saunders et al. 2016, 166.) However, in this study there are no relevant variables that can be standardized. Qualitative research works well with abductive approach to theory formation and therefore with this study (Saunders et al. 2016, 168).

Case study as a research strategy fits well in a research that studies a topic or a phenomenon. The scope is set to determine boundaries for the study. This is relevant to be able to understand relation of the subject and the context. Case study allows forming of rich in-depth insights of the subjects within the context. (Saunders et al. 2016, 184-185.) Case study can be formed around single case or multiple cases depending on the research question. Choosing single case may be when phenomenon is not studied before or for example when research is done within one's own organization. Single case also may be chosen due the nature of the case. However, choosing multiple case strategy produces more evidence. Multiple case also allows to observe whether there can be found either literal or theoretical replication. Former is when results are predicted to be similar and latter is when results are purposefully predicted to be different. (Saunders et al. 2016, 186-187.) Therefore, this study has two cases. Cases are from different sectors of business and results are predicted to be partially different. However,

due study concerns top management's strategy work, some level of similarities in both organizations may be found and therefore literal replication is also possible.

For the explorative study interviewing of experts of the subject is one way conduct the data collection phase. Theme interviews allow asking of open-ended questions starting with "What" and "How". (Saunders et al. 2016, 174-175.) Theme interviews in this study are not completely unstructured but instead have few directive questions that can be found in appendix 1. However, instead of being rigorous, these questions work merely as a guide for the interviews and as theme setters.

Comprehensive level of knowledge about big data, AI and strategy process is required before data collecting. This deeper level of understanding of the areas of the research questions allows better understanding of the interviewees and the unexpected aspects that may arise in the interview situation. Profound conception of the topic helps to form relevant questions as well as gives more credible picture about the interviewer. It also allows to asses answers of the interviewee.

3.2 Data collecting

Data collecting for the study is done by conducting in-depth interviews. These interviews were performed for selected experts. These experts were selected with following criteria:

1. They work in companies that are large enough to be thought to have financial, technical and legal capabilities to access big data and AI technologies.
2. They work in companies that are in the field of business where large mass of consumer data is formed.
3. They are working in the role where they participate in top management strategy forming process.
4. They are high enough position to have wide access to company plans across functions.

The first interviewee is in the top management in large Finnish retailer with strategy as area of responsibility. This retailer organization was chosen with very similar reasons as

was the finance corporation. This company has already reportedly adopted AI technology for some of its operational functions (Lappalainen 2018; Mäntylä 2018).

The second interviewee is in the top management in major Finnish finance corporation and his responsibility areas cover strategy. His organization is chosen due its size, field of business and positive attitude towards digitalization according to headlines (Korpimies 2016; Kolehmainen 2017). Large size means more resources, including financial and human resources and capabilities. Size also creates more complexity to organization and more internally created data to be used in the strategy work. In Banking sector amount of data created constantly is vast. However, legislation restricts using of this data. Digitalization is ongoing trend in banking sector and many processes are already digitalized.

3.3 Quality of Data

When using in-depth or theme interviews for data collecting data quality issues need to be considered. Five areas can be defined that need to be taken to account. These are reliability/dependability, forms of bias, cultural differences, generalizability/transferability and validity/credibility. (Saunders et al. 2016, 396.) Reliability/dependability issue arises from lack of standardization in the interviews. This is also concerning the case where another interviewer would do the same interview, and would the resulting data be similar then. This problem is also one of the bias issues called interviewer bias. It can be sum of interviewer's individual attributes, behavior, tone of voice and selection of words. The other form of bias is interviewee bias. Different interviewers affect differently to interviewees. Therefore, this may result that interviewees can react differently. Some interactions can lead to lack of trust and therefore some information can be left untold. Also, interviewee may leave some relevant information untold or only partially told no matter who interviews or how. Reason for such behavior can result from e.g. aim to protect personal interest or to show organization in positive or negative way. The third form of bias is participation bias. Some people are keener to participate to interviews while others avoid as they are not willing to use time for such activity. (Saunders et al. 2016, 397.)

Cultural differences can affect to interviewees on several ways. Differences in interpretation of words and gestures can lead to misunderstanding of questions and

therefore quality of the answers may suffer. However cultural differences are mitigated when interviewees and interviewer are from same society. (Saunders et al. 2016, 398.)

Generalizability/transferability of findings is more of an issue than validity/credibility when conducting in-depth or theme interviews. The former emerges from challenges to replicate findings with other interview conditions. Also applying statistical methods to generalize findings based on small sample of qualitative data may not work well. Validity/credibility concerns about the depth of knowledge which the interviewer has been able to reach. Therefore, interpretation of the meanings of the used words and language as a medium for the information affects to validity/credibility of the outcome. (Saunders et al. 2016, 398.)

Overcoming data quality issues

In-depth interview allows to study complex topics with flexibility. The results of the phenomenon that is studied with in-depth or theme interview may be time and situation related. Therefore reliability/dependability issue that emerges from difficulty to replicate the study and result is are trade off from the value that comes from the flexibility that in-depth interview offers for exploration of complex topics. However, explanation for the selection of this research design needs to be justified. (Saunders et al. 2016, 398-399.) For this study the reason for choosing of the theme interviews as data collecting method is due the explorative nature of the research question. Technological development advances rapidly and new unexpected possibilities emerge. Also, business environment and legislation around data and emerging technologies are in constant turmoil. These issues among the individual organizations' ambitions and internal politics are some of the aspects that make the topic of this study complex and time related. Therefore, flexibility that theme interview offers for data collection allows to explore the topic.

Since forms of bias are related to interview those can be mitigated with proper preparation and with the way that the interview is conducted by. (Saunders et al. 2016, 399). Interviewer should start preparation by obtaining solid foundation of knowledge about the research topic and about the organizational and situational context where the interview will be done. This knowledge helps interviewer to be more credible during the interview and to assess the answers of the interviewee. Therefore, interviewee may give more detailed responses about the topic. (Saunders et al. 2016, 401.) Knowledge base for this study has been demonstrated in the form of literature review in section 2.

Second part of reducing interview related bias by preparation is to develop interview themes and providing information for the interviewee about the themes. By offering information about the themes allowing time for the respondent to prepare for the interview. Therefore, better assembled information can be accessed. Themes can be constructed from literature, theories that are considered, interviewers own experience, common sense, discussions with others or from some other source. However, even if the study is exploratory the interview should have some theme to begin with. Otherwise the interview lacks direction and purpose. In addition to informing themes to the interviewee, making of an interview guide from themes helps interviewer to lead the in-depth interview logically and to explore topics in more detail with probing questions. (Saunders et al. 2016, 401-403.) To prepare interviewees for the interview sessions they were sent informal interview guidance where theme was told to be around data including big data, artificial intelligence and adopting these to top management strategy work.

The third part of bias reduction of the interview by preparation concerns appropriateness of the place where it is held. Place should be safe and comfortable and without disturbances like noise. Noise can take focus from the interview and also spoil audio recording. If interviewee has own office conducting interview there allows the respondent to get access to back up materials during the session. (Saunders et al. 2016, 403-404.)

In addition to preparation means to conduct interview have role in bias mitigation. Conducting of interview also affects to reliability and validity of the data that is formed through the session. Aspects that need to be taken to account include:

- How appropriate is interviewer’s appearance at the session?
- How will the conversation be opened?
- How questions are approached?
- How well different question types are being used?
- How does interviewer behave during the session?
- How well does interviewer show to be listening attentive?
- How to summarize gathered responses?
- How to deal with difficult participants?

- How to record the data?

When these issues have been taken account bias from the conducting of interview can be controlled better. (Saunders et al. 2016, 399, 404-405.)

Appearance should fit to the context. Interviewer's credibility in the eyes of the interviewee may suffer if the appearance is not appropriate. This may lead to less accurate responses and therefore worse bias. Clothing should ideally be similar to what interviewee wears. However, in some cases this is either hard to predict or difficult to execute. (Saunders et al. 2016, 405.) For this study interviews were conduced as phone interviews and therefore this was not relevant issue.

Another aspect affecting to credibility is the way that the conversation is opened. This will also affect to confidence of the interviewee. If interviewer is able to present the agenda and the purpose of the session clearly, it helps to set interviewee to more confident state. In case this fails there is risk that respondent is not willing to share information as openly as preferred. (Saunders et al. 2016, 405-406.)

When it comes to questions of the interview there are several aspects to be taken account. Open questions help to reduce bias from the interviewer's side by allowing interviewee to answer without too much of steering by the presumptions of the interviewer. However, probing questions that follow the open questions allow to dig deeper in the subject. Questions are ideally simple and easy to understand without excessive theoretical jargon. (Saunders et al. 2016, 407.)

During the interview the interviewer is to avoid gestures and reactions that hint about the attitude towards the answers that respondent has given. These reactions may cause bias to later answers if interviewee notices them. Attentive listening also requires interviewer to hold back urge to bring up personal opinions. Sufficient time needs to be provided for respondent to contemplate questions. Summarizing interview allows to check whether interviewer has understood answers in the way that respondent has meant and therefore offers change to ensure that enough details are gathered. (Saunders et al. 2016, 410.) Summarizing is easier if written notes have been made during interview whereas audio recording allows interviewer to focus in the discussion. Writing down thoughts that emerge during interview helps to recall these thoughts while going through the audio record of the interview. Therefore, using both, audio recording and written notes complement each other. (Saunders et al. 2016, 411-412.)

4 RESEARCH RESULTS

The research part was done by conducting theme interviews for individuals that are the heads of strategy in their organizations. These organizations are among the largest of their business field in Finland. The first organization's main operations are in finance sector. Earnings before taxes of this finance corporation was almost one billion euros in 2019 and in 2018. The core business of the second organization is retailing. Turnover of this retailer was over 11 billion in 2016-2018. Both organizations employ several thousand employees and have customer base of 2 million or more. Though study is a case study, it is not a case study about these organizations, but about perception and view of individuals who are in position that allows and perhaps also forces to consider relevance of data and AI in top management strategy work. As interviewees are in position where they have best possible view to the challenges and opportunities that their business environment offers, and they have power to act and affect to resource allocation, their view can be considered to have significant weight. Thus, significance and relevance of interviewees compensates the limited count of the interviews for that is conducted to study the research question of this thesis.

Analysis of the interviews was done with several steps. Interviews were first transcribed from audio records to text files. Next phase was to examine the transcribed text sentence by sentence and to find key themes. After these themes were listed, interview content was classified according to these themes and sentences with relevant content were arranged under matching theme or several if it matched more than one theme. Next the relevance of themes was once more evaluated against the research question to remove irrelevant themes. After this process following topics found from the theme interviews remained:

1. Strategy
    a. Change in the strategy work
    b. Continuous strategy process
    c. Agility
2. Data
    a. Importance of data
    b. Internal vs. external data
3. Artificial Intelligence

Interview findings form these areas is presented next. Interviewees are referred as A and B.

4.1 Change in the strategy work

A: In the past, pace of change in the world was considerably slower. Business environment and business models developed and changed slower. While the pace of change was slower, organizations were able to construct analyzes that were used to plan future and crush it in numbers. This allowed organizations to create alternative plans for suspected future scenarios. Thought that future could be predicted or at least understanding on how it could be was starting point for the strategy work. Now the world is moving in era of big uncertainties and therefore the toolset needs to be different.

A: Chosen strategies may vary from a visionary strategy where it is believed that world can be understood and affected to a strategy where one believes that understanding of surrounding world is impossible. In this latter strategy future is full of uncertainties and therefore preparation and agility are emphasized. This strategy is based on the idea that it is not yet known what needs to be done to survive and succeed in the future that cannot be foreseen.

A: Using historical data in traditional MBA Harvard business review style manner can lead to thinking that future can be predicted whit such historical data. This thought together with modern data tools and data availability can further strengthen this belief. However, relying on this assumption can be dangerous in modern business environment than it has been in the past. Challenges of the traditional methods vary depending of the case as velocity of change is different in different businesses and different environments. The speed of behavior shift of customers and customers' customers affects as well. If the speed of change is rapid and conditions are unstable organization must be agile and swift. Logistic operations can be used as an example. In 70's goal was to do as good forecast as possible to ensure that product is at the right place at the right time. Today logistics still has this same goal combined to flexibility and capability to react to change in demand as sticking to forecast is not fruitful when forecast can't predict everything.

B: Change in the strategy work can be seen in uncertainty and unpredictability. In the past strategy for coming years could be formed with comprehensive analysis of the business environment and the world. Projects were established according to strategy for

the next years couple years and these plans were followed no matter what was happening in the surrounding world.

B: While predicting future gets harder the role of strategy process gets more important. Instead of using historic data to build solid strategy plan for next three years, strategy should be constantly evolving process that is modified according to real world phenomena. However, large organizations with thousands of employees which use this kind of rolling strategy, also need vision that reaches over longer period of time to ensure continuum and to align ambitions without tying organization to certain rigged project structures that are unable to react to the change in the business environment. Having continuous strategy process emphasis, the importance of the quality of such process. Therefore, the quality of the strategy process together with the skill and capability to implement the strategy are the elements that determine winners in the business world.

4.2 Continuous strategy process

B: Rolling or continuous strategy process fit better in the era on uncertainty than classical rigid strategy for next three years. This strategy has four key elements:

1. Status
2. Vision
3. Actions
4. Measuring

B: The first element of continuous strategy process is status. In this strategy process operating environment scenarios are constantly modelled, and phenomena are recognized, and current status of the company the world around it is monitored. Instead of guessing three years in the future how the world will lay, there are five lenses that will be used to monitor current world. These are:

1. Regulation
2. Technology
3. Customer behavior

4. Competitive environment

5. Economy

B: Three pictures of the world are formed from each of these lenses. These pictures describe direction where world is developing and those consist of different elements. Pictures of the world include evaluations of the most extreme, most conservative and most probable scenarios. This status monitoring that maps current business environment constantly executed.

B: The second element of the continuous strategy process is vision. This element is for longer horizon. It gives direction in form of ambitions where to develop the organization over time. Therefore, all goals must be defined. For example, if vision is to be leading company in certain business field, there is need to define what does “leading” mean, what does company mean and how is this chosen business field defined.

B: The third part of the strategy process is actions. Actions in this model can be strategic focus areas. Number of these areas is small, e.g. five areas at the time. These areas of focus may be adjusted, changed or kept as the same for longer periods of time depending on how the world around acts and how targets are achieved. This limited number of focus areas enables everyone in the organization to know where to focus and what those areas include. This allows agility within the organization.

B: The fourth and the last element of this continuous strategy process is measuring. How company’s actions affect in the strategic focus areas is actively measured to find out which of the focus areas need fixing or refocusing and which work effectively. This measuring and analyzing is done for all four areas on continuous strategy process as well as for economy and risks etc. for each quarter in form of quarterly business review. In this session actions and events from past three months are evaluated, next six month are looked for and actions across the functions for the next three months are decided. This is way to include current business environment to decision making.

4.3 Agility

A: To be able to survive in unpredictable and constantly transforming world, agility is one option. This means that organization’s strategy is to be agile. Instead of having predetermined set of strategic paths, organization has ability to adjust and adopt new.

To ensure agility, management needs to be systematic and be and desire to be data driven. This requires deploying and active following of the indicators which meaningfully display the state of the business and how it is evolving. Key point in having agility as the strategy is that the input from these indicators and therefore, from data that has been defined to be important, is used. Otherwise agility is not actualized. Therefore, meaning of data is great in organizations that prefer to be agile to thrive in modern fast changing world. When decision to build a factory is aligned with strategy but before or during the construction phase world shifts and data implies that the project is not optimal anymore, it is not an easy decision to change building plan anymore. Thus, agility as strategy is easier to implement in businesses that can digitalize operations.

B: Agility in strategic level can be considered from several angles. First viewpoint to agility is company's capability to observe and recognize phenomena in the world and efficiently draw conclusions from those. It is essential to understand what the meaning of these phenomena for the company is. The second aspect to agility is company's capability to implement actions required. The former aspect relates to strategy process while the latter relates more for the management system as a whole.

4.4 Data

A: Data has fundamentally important role in modern strategy work of company management. Though data is essential, having data doesn't do a thing unless it is used. Priority is to find means to create more value for customers, to produce benefit for them and therefore to gain more customers and grow business. Model of how to best harness the benefit from available data differ from one industry to another but the goal for data using is similar. Though data analysis itself is hard science, deciding reasons why and for what data is used, is still based more on experience and creativity and therefore could be considered more as an art.

A: One strategic bath for an organization is to be better and more efficient data user than competitors. This position is not defendable and can be lost as competitors are able to improve their capabilities when external data is in question. This is because same data is, at least in theory, available for everyone. However, internal data is not available for the other players and therefore, may offer competitive edge when used well.

B: External and internal data are both useful for businesses. External data can offer competitive advantage when organization has capability to gather and comprehend it better that competitors. However, it is highly unlikely situation, as it is presumable that relevant competitors are on the same level. Therefore, for the strategy work internal data with comprehension and insights form it are more valuable of than external data. As an example, though external data can claim that new competitors are taking over market, internal data shows whether this actually affects the business or not, or is the impact aligned with the indication of the external data. Internal data also is the base for scenarios. If competitors are able to affect to our customers in some defined way, how would that affect to our financials. Therefore, ability to understand phenomena in surrounding world and model what those mean to the organization and its business, is the key to success. When organization is large, complex and significant entity in its business sector, demand for such capability is emphasized. However, interactions and impacts of phenomena can be extremely complex and unclear. Therefore, this is an issue where AI methods can aid. However, data versatility causes challenges for AI using.

A: Internal data that companies have, is deployed in versatile ways. One useful way is to use it to try to get deep level comprehension of the customers. This means learning as many attributes as possible, e.g. what company's customers are like, what they buy and how they behave. This offers base to have customer-oriented business model. However, this does not give answers but merely a snapshot.

A: Availability of data can be a bottle neck for management team's ambition to become data driven. Management teams are acceptable towards data but sometimes it is hard to define when some data must be demanded. Therefore, concept of continuous data-based status evaluation must be embedded to organizational culture to avoid acting according to intuition, opinions or assumptions that are based on historical facts. However, this is challenging if there is very limited amount relevant external and internal data available. For example, if only thing that can be seen is that competitor is successful, sells more or customers choose competitors' products over ours, building deeper understanding of the reason why we are not selling as well is difficult based on this limited data. This may lead to situation where data is omitted also in decisions that are required and which concern areas of operations where sufficient data points are available.

A: Though in some occasions availability of certain data may be limited, in general availability of data today is on good level. This is the case at least in consumer business as social media offer vast quantities of data about things that are trending. However, at

the same time small data offered by research companies can be less reliable of for example about market size. While social media has boosted big data that is available for anyone willing to pay, a counter trend of largely available data comes from applications. When people choose to use branded applications instead of web surfing it is harder to gain data and therefore insights of the consumer behavior. However, this concerns consumer businesses. In business to business world the question of data availability concerns mostly data that company owns and which it has chosen to produce.

A: When talking about data collection within EU General Data Protection Regulation or GDPR is one thing that needs to be taken into account. It has been talked as it would disturb business. For companies that have gathered data for vague purposes this regulation forces new rules. However, for organizations that have already had appropriate reasons for data collecting and conducted collecting accordingly GDPR does not affect too much. Today enlightened organizations are generally responsible citizens. Thus, data-responsibility is just one are of corporate social responsibility.

B: In practice GDPR can affect in the way that organizations tailor their services. As corporations can be rather complex organizations, tight regulation may set obstacles for service development. As Consumer may identify corporation to be single entity, regulation can force distribution of customer data to be limited in one sub organization. Therefore, customer can experience friction in the holistic approach of service as corporation can’t seamlessly merge customer information from all its sub organizations.

A: Company management constantly faces decisions that are hard to process based on data. For many issues available data points do not exist or those are too few. For example, in budgeting process suitable data points are scarce and as the world around transforms swiftly, it causes factors that affect to the process to shift constantly. Therefore, it is an example of a process that is hard to approach with big data type solution that offers real-time monitoring. Facing situations where data is either insufficient or applying it would require too much recourses in comparison to potential payback, may lead to situation where management becomes accustomed for not having data. However, there may still be useful data available, but it is not deployed due the numbness caused by lack of relevant data in other matters.

A: In decision making within operational functions, process is ideally data driven and data reactive on a high degree. In practice this means monitoring and acting according to predetermined indicators. This model gets harder the further into the future decision

making needs to reach. Strategic decisions, like starting up a new business operation, can affect long into the future. Therefore, challenges of data reactivity concern strategic level decision making. Data may reveal that there is demand for certain business, but data does not guarantee success of this new business.

A: Deploying data for management processes is not an easy task in large complex corporations. These organizations have vast amount of data that needs to be harnessed and to be refined in form that helps strategy making. Findings like customer clusters that can be found from data, for example by using artificial intelligence, may help in the strategy process. It is not a solution by itself, but it can be for example an input for how to allocate marketing efforts to better target right customers. Alternatively, data may show that marketing efficiently converts investment to income. Conclusion could be to reallocate budget from product development to marketing as it seems that product sells well if consumers just become aware of it and therefore, there is no urgent pressure to improve the product at the moment. Therefore, for strategy it is critical to find the right questions like whether to but efforts to sales and marketing or to product development.

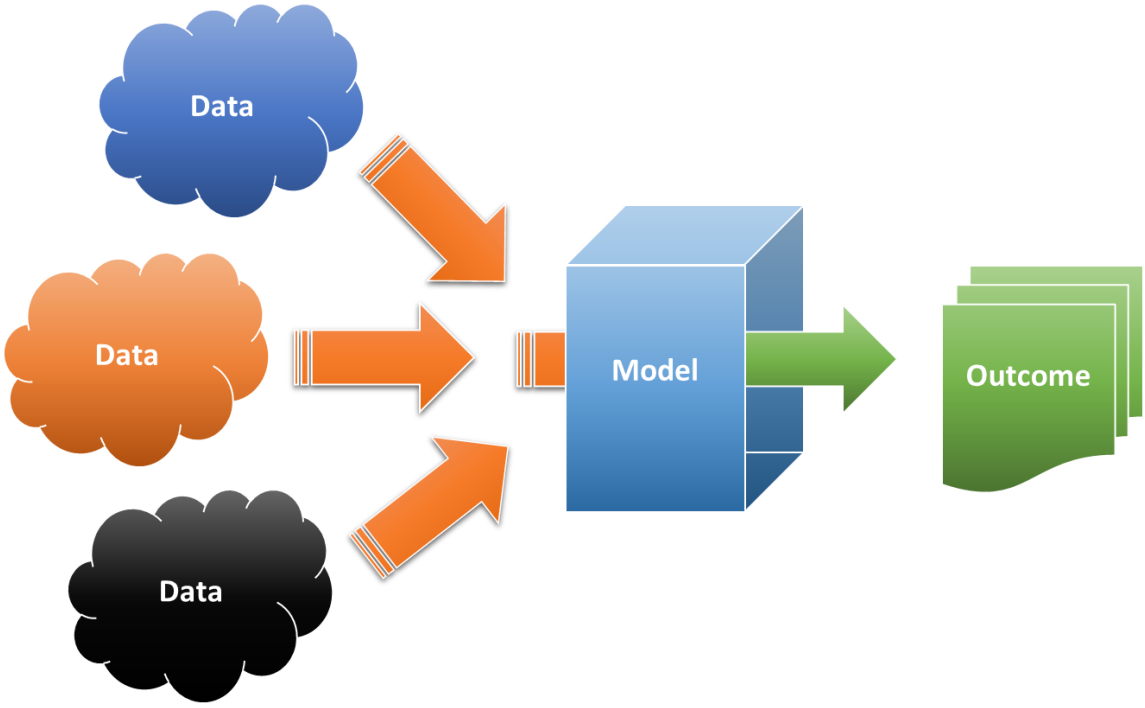

Figure 9. Running available data through a model to get an outcome that is useful input for strategy decisions.

A: Market development models are important part of strategy processes. For strategic decisions it is relevant to know e.g. is market growing or shrinking. Big data has important role in generating of understanding. Whether it used for just correlations or for machine learning varies by case. However, it is not yet standard procedure in strategy process to take all customer related data and run through some model and delve the outcome. Outcomes like customer clusters or customer behavior models can be useful for strategic decisions. Therefore, procedure of running all relevant customer data through a model could as well be embedded to strategy process as probing market development commonly is.

B: Traditionally companies are managed with historical data that tells how business has been. Current trend is to try to make decisions where and in what actions and operations resources will be allocated. This emphasis the importance of predictions. However, that is harder area to master than analyzing of the past. Though data is largely available, using it to understand the future is becoming more and more challenging as the world is constantly evolving in more unpredictable direction. Therefore, this demands a shift in the mind set of management from managing through the past towards managing the future. However, this is already ambition of every executive, but still in practice most management teams practice managing with rear-view mirror.

B: For strategy it is not only analysis that counts put also the implementation. When plans and decisions are put into action, impacts need to be monitored to reach conception whether those acts have desired effect or not. This can be done by defining relevant indicators that allow automatic tracing on desired scope. However, having indicators doesn't help unless feedback is used for steering of the strategy and actions. Management can perceive what direction applicable indicators move and whether development is fast enough. Net Promoter Score (NPS) is an example of useful indicators. When large amount of effort is put to increase the score for three months, but no significant improvement can be seen in NPS, management must consider what is the problem. Are efforts put in the relevant actions and are those on high enough level. This can help to disillusion false expectations that some means can have and help to put resources in more efficient actions. Therefore, feedback loop is important part of strategy process.

B: Today there is immeasurable quantity of data sources and vast volumes of data available in the world. At the same time business environments are complex and in continuous turmoil. Therefore, corporations need to have capable human experts who

can use available data and refine it to useful insights. This requires significant experience. However, individual experts are not required to be super humans or top of the field, but to have comprehensive understanding of how events affect to each other. Understanding causality and relations between phenomena is not always learned from theory, but in practice. To further enhance insights, teams of experts form insights together within teams and with other teams that are specialized in different substances. Therefore, insights are not formed only from one point of view but of several perspectives.

B: One challenge with data is the quality of it. Here quality not necessary referring to reliability of data but lack of uniformity. Large corporations tend to have many systems that produce data. Commonly these systems are not acquired at the same time and with coordinated project. Therefore, data output format from one system may differ significantly from other. Though from data harmonization point of view this would be optimal, acquiring and commissioning all information systems at once for large organization is not feasible financially nor it is possible in practice.

4.5 Artificial Intelligence

A: The most contemporary popular methods of artificial intelligence (AI) like machine learning and its subfields require large amounts of data. From data AI can find correlations that humans might not figure out. However, AI solutions available today represent narrow AI instead of generic AI. Popular consensus is that generic AI is not available in very near future. However narrow AI solutions are available and those need to be initialized for certain purpose. Thus, management still needs to come up with the questions that need answers. In strategy work one hard thin is to figure out what are the questions that need to be answered. Though narrow AI can be efficient tool to answer to questions that it has been set to answer from the given data, it is not able to answer open questions. Therefore, current use of AI solutions is more present in tactical level management than in strategic level. On tactical level applications of AI be used for e.g. optimizing of operations and product recommendations for consumers. However, since AI can be used to analyze data that is available, it can be set to find for example customer clusters. These can be used as an input for strategy work. Therefore, though strategy work does not lean on AI it is powerful tool that can be used for the input of the strategy process.

B: From the perspective of management's strategy work, vast amount of data in modern business environment is both challenge and opportunity. This is where AI applications come in handy. While analyzing huge data masses is time consuming and requires educated labor force, applicable AI application can do same work in no time. Need for these sophisticated AI analysis tools grows as well as need to understand growing complexity of the relations between different phenomena. Drawing conclusions from the data of any of the five strategic lenses (regulation, technology, customer behavior, competitive environment and economy) is demanding alone. When aim is to gain understanding of how a phenomenon within one of these fields of observation affects to the other areas, complexity of data analyzing grows even further. In these cases, AI methods can help to find correlations that could else be left unnoticed. However, though AI may find statistically sound correlations, those are not always apt. Therefore, human experts still need evaluate whether found correlations are relevant and should be used within the decision making or not.

B: As large organizations can possess vast amounts of data, it is typical that it is in variety of formats as it is recognized in big data definition. This can be result of many factors. One reason is that systems that produce data are not acquired nor updated at the same time. Though ideally all systems would be compatible and produce data in harmonized format, updating systems demanded by a large complex organization requires resources and time more that is financially possible nor is strategically reasonable to use. Therefore, data from systems of large organizations is hardly uniformed in near future. In addition to data from systems, also data produced by employees is in variety of formats e.g. in Excel and PDF. However, for AI use optimal would be harmonized uniform data masses. Therefore, some part of the data masses is currently out of reach from current AI solutions.

B: AI is easy to be considered as a technological matter and therefore as a part of technology function's agenda. However, it is substance understanding that is required more than technology expertise to set goals for AI applications. For example, management of sales requires more business intelligence than technological knowhow. This means moving from a world where technology supports business to a world where business leads technology and not vice versa. This shift does not only consider AI but technology with wider scope. However, this does not mean that technology manager would be obsolete. On the contrary. Role might change but the need for it is now even more than it has been in the past. Technology manager allocates resources and assures

that the best technology is used, most modern tools are available and that interfaces are adequate. Therefore, one way to ensure that business leads technology is by having technology experts within all teams.

B: In near future one relevant role for AI in strategy work is scenario building. This is in organizations where strategy process with scenarios is used. Goal is to use AI to create scenarios that are predictions of future. As requirement for this is that there is data available and it must be fit for the purpose Though AI is used in the scenario creation process, it is done under guidance of a human expert. Another role for AI is in merging of external and internal data. The goal is to get understanding and prediction of how external events impact to an organization in scenarios. AI is to be used for finding interdependencies, relations external and internal events and phenomena and how these affect to each other. AI model can be created, and it adjusts as new data is emerges. Therefore, model gets better and more accurate over time in predicting effects to business by analyzing data.

B: One key task for top management is decision making. At this point, decision making with AI is concerned with prudence. Though AI may be pressurized to decision making, strategic decisions are complex and are affected by significant variety of factors. AI can handle substantially larger data masses than human. However, as data is in many occasions formed as result of human behavior, it can get wild sometimes. For example, stock market can overreact to some event or news which may lead to over buying or selling of some shares. This data would signal AI to act on decision making to certain direction while experienced human manager would understand the bias in the data caused by overreaction of the market. Therefore, at this point strategic level decision making is still seen better as a human responsibility.

5 DISCUSSION AND SUGGESTION

There seems to be causality with modern business environment and demand for superior data processing capabilities. As companies need to adopt with haste for continuous stream of changes in various aspects in the world, agility and flexibility have become increasingly more important capabilities for organizations. To be able to reach such adaptivity organization must be able to gain information and to understand world as real-timed as possible. Insight needs to be formed to understand where company currently stands and what perceived phenomena mean to it and its ambitions. This understanding does not come alone from external data. Internal data has significant role in building of insights. Internal data is invaluable due it is not public and therefore not available for competitors like external data. Thus, it can be presumed that successful companies either already possess or are at least capable to obtain best level analysis of the external data. Therefore, *superior exploitation of the internal data offers competitive edge in extremely competitive world.*

As data volume and complexity growth will most probably keep on accelerating, mastering newest technological solutions that offer competitive edge is vital. *Present AI solutions can be used to aid decision making of executives when it comes to strategy. However, experienced human executives are essential for strategic decision as these decisions tend to be sum of extremely complicated web of countless elements*. Well trained AI solutions are far superior to humans in when it comes to data processing capabilities and correlation finding from data. However, *there is weakness as AI solutions are limited to data that is provided. Thus, AI cannot use broad life experience that humans can, when assessing whether correlations are true or not*. Therefore, thought general AI someday in the future may be able to compose strategy and supervise its implementation with merely targets set as a guidance by the company owners, for next five to ten years it is more probable to that corporations adopt narrow AI technology for operative functions and for strategy work AI supports by processing data for the decision makers to improve human decision making.

Base for the applied part of the study is narrow as it consists of two interviews. However, the expertise that interviewees have about the subject of the study is comprehensive. They are in influential positions in organizations which are very powerful actors in national scale in business fields in which these companies operate. Study revealed

several aspects that seemed to be present in previous literature and which also came up in the interviews. Findings of this study can be used as subjects for further studies. For example, quantitative study that defines how common it is for companies to have adopted AI for providing analysis for top management, and case studies of how well companies have merged internal and external data for strategic decisions.

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Steering questions

Questions

1. Describe the strategy process of your organization?
2. Has the process changed within the last ten to fifteen years and if, how?
   a. What are the main drivers behind change?
   b. What role has technological transformation played in the change
   c. If not, have you felt pressure to transform strategy process from technological transformation
3. How do you gather data for the strategic planning?
4. What is the meaning of big data in strategy work?
5. How do you process big data?
6. How does your decision making happen in strategy formation?
7. Do you use AI in strategy process and if, what type(s) and for what purposes?
8. What challenges do you see that growing amount of data will set for the strategy work in the near future (next 5 years)?
9. How do you see role of AI applications in strategy work within the next 5 years?
10. How do you see role of AI applications in strategic decision making?