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# Agile Transformation in the Automotive Industry

## A Case Study of Volvo Trucks

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# Abstract

## Agile Transformation in the Automotive Industry
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*Huan Cao, Prithvijit Choudhary*

The automotive industry has seen revolutionary changes in the past two decades. Vehicles are starting to incorporate within themselves a significant amount of electronic and software based components, due to which the industry has seen rapidly changing customer requirements. The traditional work processes that automotive companies have ever so often employed, with excessive documentation, inefficient work teams and redundant reporting have proven to be insufficient in the newer fast-paced environment. Agile project management methods, as the name suggests, could be a tool that these companies can utilise in order to tackle such concerns. Agile methods, until a few years ago, had constrained themselves to dynamic software development applications, but they are now slowly starting to penetrate the automotive sector. This study, hence, tries to identify the factors that contribute to an automotive organisation's decision to transform itself into an Agile based organisation, the challenges they encounter during the change process and the subsequent impact they see post transformation.

This thesis takes the form of a case study that has been conducted within the Swedish commercial vehicle company Volvo Trucks, a subsidiary of AB Volvo. Empirics were gathered in the form of interviews and surveys to get a deeper understanding of the internal processes and the transformational journey that helped Volvo Trucks become an agile based organisation. The collected empirical data is then further interpreted through the lens of theories pertaining to change and change management. Our findings suggest that the need for a transformation from traditional methods of management to agile can be driven by forces that are both internal and external, where the forces can present themselves at the same time. The internal factors here being, the inherent dysfunctions of the traditional methods. Significant challenges faced during transformation are of an organisational nature, where a partially agile organisation struggles to coordinate between its agile and non-agile departments. Lastly, a boost in worker morale and operational advantages such as increased planning efficiency and project transparency have been seen as major benefits post transformation.

**Keywords:** Agile, Agile Transformation, Change Management, Volvo, Automotive Industry, Organisational Change

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## Popular Science Summary

Agile methodologies have long been used in companies that have dealt with software applications but only recently have they been considered an important tool through which automotive companies can tackle the challenges that the dynamic markets present themselves. Ever since the formalisation of the automotive industry, it has been subjected to drastic changes. Now, more so that ever as seemingly companies today not only need to develop better products but must also develop newer ways of doing so because of the impending need to deliver products faster and more efficiently. Henceforth, automotive organisations seem to have realised this need to drastically change the ways of working in order to meet these dynamic demands and the adoption of Agile Methodologies, in organisation which are otherwise traditional has been seen as a major breakthrough. The transformation from traditional to agile methods of working, in an organisation is considered a change and change is often quite challenging to navigate and contains in itself several different facets. This thesis attempts to explore these facets since agile adoption in the automotive industry is still a relatively new phenomenon. This thesis tries to look into the drivers that determine when change needed and eventually push organisations to undertake those changes. This study also looks examines the different types of challenges that the organisation might encounter during the process of the change and the visible benefits that the organisation might derive from it. The study presented also uses multiple theories of change laid down by previous researchers to see whether these theories really hold out in the real world and whether the happening of the real-world organisations can be explained using the said theories.

The study found that the trigger for change does not only come from external factors such as a change in market demand, but the fact that change can also be triggered internally and what is interesting is that they might be working together, at the same time to nudge the organisation towards a transformation. The study finds that the imperatives that an organisation must address to bring about change are multi-dimensional and interdependent. While addressing such imperatives, the challenges encountered that disrupted smooth working of the company were organisational in nature, with coordination between agile and non-agile departments causing some struggles for the change leaders. Furthermore, some resistance was also encountered from the senior managers who had become accustomed to the culture of hierarchy at the organisation and were fearful of losing the command and control they had held over their departments thus far. Post transition, the benefits that was most seen was the boost to worker morale and increase planning precision and efficiency, in other words, it was now easier for managers to plan ahead, by breaking it down into manageable chunks, this eliminated need for much rework in-between further helping departments make real commitments while delivering projects. The authors believe that this study will benefit other organisation who want to undertake such transformations by helping them look out for warning signs that a change is indeed required to better the organisation or to prepare for the challenges that they could potentially face in the course of the transformation.

## Acknowledgement

We would like to express our sincerest gratitude towards **Dr. Petter Bertilsson Forsberg** and **Dr. Åse Linné** for extending their continued support towards this thesis without whose cooperation and patience, the successful completion of this thesis would have proven to be much more arduous. Also, we would like to thank all members of the **Department of Engineering Sciences, Industrial Engineering and Management at Uppsala University** for the time and effort they put towards teaching the programme of Industrial Management and Innovation and giving the us the opportunity to become a part of Swedish higher education.

We would like to express our gratefulness to all the **interviewees and survey respondents at AB Volvo** without whose precious insights and valuable inputs, this study would not have been possible.

This master's thesis is a result of a collaborative effort between the two authors, both of whom have strived to put forth equal efforts towards bringing this work to fruition. Both the authors took part in sessions where data was collected for the purpose of this study. Huan Cao undertook the responsibility of reviewing literature and Prithvijit Choudhary was responsible for studying the theoretical concepts related to change and subsequently building the theoretical framework. All other chapters were equally split between the two authors. In any case, the authors kept a cooperative approach, proving mutual support to each other throughout the course of this study. Detailed discussions were undertaken between both authors before any decisive decisions were taken.

Lastly, we would like to thank our **respective families and friends** that kept supporting us throughout the time spent away in Sweden.

**Huan Cao** **Prithvijit Choudhary**

Uppsala Universitet, May 2023

## Table of Contents

## List of Figures



## List of Tables

# 1. Introduction

This chapter begins by giving the readers a background of the changing market landscape that manufacturing industry find themselves in and highlights the importance of adopting alternate work methods and techniques, giving a general overview of how agile is starting to be adopted outside of the software industry and the probable benefits that it could bring to the automotive industry. Following this, problematisation of the concerned topic is carried out along with the formulation of research questions. This chapter concludes by discussing, in brief how the research questions are addressed in the course of the study.

## 1.1 Background

Traditionally, the automotive industry has always followed extensive development processes. To secure funding, conduct R&D, produce and finish regulated tests, it could take years or decades. However, it is now confronted with a transformative change, where well-established mechanical engineering-centric companies are finding themselves in an increasingly digital world (Kostron and Brauchle, 2016). Factors such as digital disruptions, ambitious customer demands, rising competitive intensity and regulation changes will spark a radical transformation of manufacturing across the world in the next few decades (Galli, 2018). The requirements for manufacturers are to maintain high quality, offer availability and cost efficiency and innovate continually. However, the manufacturing sector doesn't seem to be prepared for this level of market dynamism because of their seemingly obsolete traditional processes and standards, which has been considered slow to innovate due to high expenses that are attached to the redevelopment processes (Denning, 2012). For example, if a company wants to redesign a car door, it has to take years to first pay off the existing millions of door mould before making a new one. As a result, the product cycle for manufacturers becomes quite long. Thus, at a time when marketplace success is directly dependent on an organisation's ability to learn and adapt quickly to customer needs, it is not uncommon to have manufacturers lag behind global trends (Denning, 2012). On similar lines, ever since the first production automobile incorporated with embedded software came out in 1977, the automotive industry has started becoming increasingly reliant on digital technology (Charette, 2009). The amount of software on one car has increased exponentially in both size and complexity. Automobile manufacturers like Mercedes-Benz now depend on millions of lines of code running up to 100 networked ECUs throughout the body of their cars which control and monitor everything from the powertrain to the airbag system (Ebert, 2018). Hence, technology-driven trends will revolutionise how industry players respond to the changes and companies who invest their R&D budget in software solutions instead of product range are already showing stronger growth than their competitors. Today's auto manufacturers have truly, in some ways, become software companies, presenting both opportunities and challenges. (Berings, 2018; Gao, Kaas et al. 2016). Furthermore, many countries have proposed or decided to work on phasing out gasoline cars which has turned the industry upside down and has forced them to innovate with cleaner fuels and powertrain system to tackle this challenge, which could be tough if they hold onto their traditional methods (Berggreen, 2018).

In the 1990s, a new method for managing projects called Agile was developed for the software development industry as a possible solution to counter problems similar to the ones automotive industry in facing today (Beck, 2001). After the release of the agile methods, they became

popular in the said industry and were widely used in development of software. The methods have great flexibility and adaptability and enable the design and production process to respond to issues and roadblocks faster as they arise, thus saving resources and promoting delivery on time. The 12th State of Agile Report (2018), summarised that agile is starting to expand within the enterprise, indicating that the adoption of agile is becoming increasingly broad with most of these organisations belonging to the technology industry. Also, agile has greatly improved customer/user satisfaction and on-time delivery. For the demands of managing the value stream, from planning to customer delivery and get feedback loop faster, agile could be an approach to choose.

Inspired by the experiences of software companies and the subsequent adoption of agile methods by other manufacturing based industries, the same management process is now coming to automotive manufacturing. Since agile methods have great flexibility and short feedback time, there are increasing needs for agility among these organisations. So, in the next few decades, there are great opportunities if agile could be implemented in the automotive industry. Elkins and Huang (2002) pointed out that in the automobile industry, agile manufacturing systems enable fast cost-effective responses to unpredictable and ever-changing product demand, and also in support of rapid product launches and meet changing customer desires. These are corresponding to the automotive industry's goals, which are to operate profitably and effectively through changing demand trends. Tesla could be a typical example for the application of agile. It does not follow the automobile industry's standard long development cycles but operates more like a software technology company, and has applied the tenets of agile development to automotive design and manufacturing processes. During the progresses, it iterates and rolls out improvements, because of this, it could take in feedback in time and thrives on new ideas and solve problems and make continuous improvement. The success story of Tesla surely makes a compelling case for more traditional automotive organisation to adopt agile methods.

## 1.2 Problem formulation and Research Questions

Today, enterprises are operating in a revolutionary changing business environment which is characterised by global competition, faster flow of information and technological complexity. The traditional work processes, which have excessive documentation, low efficient work teams, and the business management where scale and cost, proved to be insufficient in a new and fast-paced environment (Cooke, 2012). Ever since the formalisation of the automotive industry, which was over a 140 years ago, it has been subjected to drastic changes. Now, more so than ever as seemingly, 'just' producing high quality products is not sufficient. Companies today not only need to develop better products but must also develop newer ways of doing so because of the impending need to deliver products faster and more efficiently. Similar to the software industry, where pace of development is key to market success, the automotive industry is also starting to be dependent upon the efficiency with which it develops newer models (Zapata and Nieuwenhuis, 2010). This increased need for efficiency has been caused primarily due to the globalised economy where the rise and diffusion of newer technology is tenfold faster than it used to be, giving rise to heightened competitiveness (Zapata and Nieuwenhuis, 2010).

This trend of keeping up with the market demand with multiplicity of products with short product development cycle and lead time has confronted manufacturers with problems with inventories, efficiencies and overheads. In a way, manufacturers have been trying to utilise

mass production approach without swiftly realising that the entire business environment has changed (Maskell, 2001). Automotive organisations, have historically been sluggish in responding to the changing external world, highlighted by the American and European manufacturer slow acceptance of 'just in time' or lean methods, leading to a substantial loss of profit and market share for them (Hormozi, 2001). Now with telling signs such as shorter product cycle and demand for products that are reconfigurable and specifically address customer needs, it is important that traditional methods of production must be replaced with newer approaches (Maskell, 2001) and manufacturers are starting to look towards agile methods as it empowers them by providing the capability to survive and prosper in a competitive environment by helping to react quickly to unpredictable changes in the market (Gunasekaran, 1999). But for organisations to adopt agile quickly, it is imperative that the factors that necessitate it are known. Hence, The authors attempt to identify, through this research question as to what factors influence a manufacturer in the automotive industry to gravitate towards adopting Agile methods of organisation and project management.

*RQ1: What are the key drivers that push manufacturers in the automotive industry to adopt AgilePM methods?*

Change is always challenging, especially when it involves a multi-faceted organisation. Since transformations can result in the culture overhaul of the entire organisation, it can influence the decision-making process, planning and control mechanisms as well as strategies and relationships. The mind-sets of people are hard to change and thus, it creates formidable difficulties for organisations to move to agile methodologies (Boehm and Turner, 2005). Since agile project management methods were originally designed for small, single team projects (Boehm and Turner, 2005), when applied in a larger context, certain challenges naturally arise. As the organisation size increases, the higher inertia of such organisations could slow down the transformational efforts and increase the difficulty of introducing agile methods (Livermore, 2008). Furthermore, a systematic literature review of challenges associated with large scale agile transformation undertaken by Dikert, Paasivaara and Lassenius (2016), encountered 35 types of challenges (grouped into nine categories) that presented themselves in the studied agile transformations. Excluding technical and engineering challenges, a lot of the challenges faced came in the nature of change resistance. It is difficult to attain a buy-in for a change, even organisations which have flexible culture will face some degree of resistance when they undergo any form of change. Furthermore, the review also established that organisations found agile difficult to implement, with misunderstanding of agile and poor customisation of agile principles suiting their particular organisation feeding into the implementation difficulties. Even though these are few of the challenges that are stated, it is important to note that out of the 52 academic articles that the paper reviewed, it did not include any research or case studies that were associated with automotive organisations. It is, therefore, necessary to highlight the potential challenges that might occur in the process of a transition from traditional to agile methods in an automotive organisation in order for them to foresee such challenges and have a contingency plan prepared to alleviate them. The authors, hence, form their second research questions to find out the various forms of challenges that automotive companies face in their process of transforming into agile-based organisation.

*RQ2: What challenges do automotive organisations have to encounter in their efforts to transform towards becoming agile?*

Change is often a tedious and long process requiring meticulous adjustments from time-to-time in order to keep things on track for achieving desired outcomes. Hence, monitoring progress is an important aspect of change. Nelson (2003) highlighted the importance of the inclusion of a regular review processes during the implementation of change and the adjustment of change strategy based on it. On the other hand, change needs to be visible in order to conserve the momentum of implementation and the keep morale high during the change management process. We form out third question to analyse an automotive organisation's progress in implementing agile based management principles thus far.

*RQ3: What impact, as a direct consequence of the transformation, have been observed by automotive organisations?*

## 1.3 The Studied Case

Volvo Trucks, a subsidiary of AB Volvo, is a Swedish manufacturer of trucks and heavy vehicles that has been in production since 1928. In 2012, during the course of major restructuring in the organisation, Volvo trucks decided to introduce agile methods within several departments of their organisation. This thesis tries to investigate the transformation slowly taking over the automotive industry through a case study of Volvo trucks implementation of agile methods, within two of those departments that have decided to introduce agile methods namely, Electromobility and Powertrain. The concerned departments, as the name suggests, deal with the development of electric vehicles and research on mobility solutions of the future and hence are project centric. To be able to understand Volvo's motivation towards adopting agile and the challenges they faced in the process in order to effectively answer the research questions, the authors have conducted several interviews with the management of the said departments and have sought the opinions of the team level employees through the use of a questionnaire. Later, the gathered data has been analysed through the lens of a theoretical framework which has been constructed based on theories of change and change management following which, relevant conclusions have been drawn.

# 2. Literature Review

To be able to fully understand this case study and the benefits of agile, the agile ideology will be described. Followed by this, there would be a brief description of the agile methodologies in order to better understand of the framework used by Volvo to scale these methodologies to fit their organisation. Lastly, previous agile transformations in organisations and related research work would also be investigated and presented.

## 2.1 Agile principles

Agile is an umbrella term that incorporates a family of iterative development practices, methods, and techniques. It was introduced in the late 1990s in reaction to the prevailing overly regulated, planned heavyweight and documentation driven methods (Beck, 2001). In response to these, several consultants gathered together in order make changes to what they were experiencing. The Agile Methods are actually a collection of different practices which share the same principle such as iteration (Cohen, Lindvall and Costa, 2004).

Unlike the traditional Waterfall approach, which is supposed to fix the problem at once and not allowing any changes, agile methods focus on breaking the development cycle into small pieces (Beck, 1999). The attributes of Agile Methods are characterized as incremental, cooperative, straightforward and adaptive (Abrahamsson et al., 2002). Incremental refers to a small part of the product releases by each rapid iteration cycle. Cooperation refers to a closer relationship between developers and customers. Straightforward means that the method has a brief framework and is easy to learn. Lastly, adaptive implies that the development team can react fast to the changes and feedbacks during the developing process.

## 2.2 Agile manifesto

The Agile Manifesto was published in 2001, seventeen software engineers from Extreme Programming, SCRUM, Dynamic Systems Development Method, Adaptive Software Development and others came to a need for an alternative way to replace the documentation driven and heavyweight development processes.

The focal values of Agile Manifesto are presented as follows (Beck et al., 2001):

- Individuals and interactions over processes and tools
- Working software over comprehensive documentation
- Customer collaboration over contract negotiation
- Responding to change over following a plan

These values are interpreted as firstly, the movement emphasizes more on the relationship front and communality between individuals, and the team relationships, working environment arrangements are going to be closer so that the team spirit could be boosted. Secondly, the objective of the development team is to come up with tested working software, at frequent intervals. Also, the developers shall lessen the documentation burden and keep the code simple

and straightforward. Third, the relationship and collaboration between customers and developers are given preference over a contract, the negotiation process is a means of maintaining a viable relationship. Lastly, the developing process must be flexible, which means that during the development process, the developers and customers should be prepared to make changes depending on the feedback received (Abrahamsson et al., 2002).

The principles of Agile Manifesto are presented as follows (Beck et al., 2001):

- Our highest priority is to satisfy the customer through early and continuous delivery of valuable software
- Welcome changing requirements, even late in development. Agile processes harness change for the customer's competitive advantage
- Deliver working software frequently, from a couple of weeks to a couple of months, with a preference to the shorter timescale
- Business people and developers must work together throughout the project
- Build projects around motivated individuals. Give them the environment and support they need, and trust them to get the job done
- The most efficient and effective method of conveying information to and within a development team is face-to-face conversation
- Working software is the primary measure of progress
- Agile processes promote sustainable development. The sponsors, developers and users should be able to maintain a constant pace indefinitely
- Continuous attention to technical excellence and good design enhances agility
- Simplicity—the art of maximizing the amount of work not done—is essential
- The best architectures, requirements and designs emerge from self-organizing teams
- At regular intervals, the team reflects on how to become more effective, then tunes and adjusts its behaviour accordingly

The agile manifesto has brought remarkable changes to the software development field as it has since introduced so many software techniques, methods, tools as well as practices (Dingsøyr et al., 2012). As with most new disciplines, agile development was marked by scepticism in the early years. However, a lot of methods such as eXtreme programming, scrum, lean software development which endeavoured to address the core principles have appeared, the working pattern also has shifted to agility. Primarily, people get more privileges over processes which were earlier constrained. Secondly, it was the view that there was a need to minimize unnecessary work, particularly regarding redundant documentation. Then, the customers and stakeholders could get involved and guide the software development process. Lastly, it was the acceptance, that uncertainty is a part of software development process (Dingsøyr et al., 2012).

## 2.3 Scrum Methodology

One of the most prevalent and widely-used agile methods is Scrum. The first references of the term "Scrum" was in an article by Takeuchi and Nonaka (1986), in which a quick, flexible and self-organised product development process was presented. Scrum originally derives from a strategy of rugby which means "getting an out-of-play ball back into the game" with the help of teamwork (Schwaber and Beedle, 2002).

The Scrum framework is shown in Fig.1. It has an iterative, incremental process skeleton (Schwaber and Beedle, 2002). The lower circle represents an iterative development process which produces an increment of product. The upper small circle represents the daily inspection. The team members meet at daily standup meetings to inspect the daily activities and make adaptations according to the feedback.


*Figure 1. The Scrum skeleton (Schwaber and Beedle 2002).*

The scrum process operates through three roles: The Product Owner, the Scrum Master and the Team (Schwaber and Beedle, 2002) and they share the management responsibility in a project. The Product owner is responsible for initiating the project plan, release the plan and achieve the return on investment objectives (RIO). The product owner turns the requirements to product backlog and ensures the most valuable functionality producing first. The team is responsible for developing the functionality from the product backlog through the iteration. The teams have more autonomy since they are self-managing, self-organizing and cross-functional. The Scrum Master has a lot of responsibilities in a Scrum process, the main roles include teaching Scrum to the individuals in the team and ensuring everyone follows the scrum rules, implementing Scrum at the core of the organisation's culture (Schwaber and Beedle, 2002).

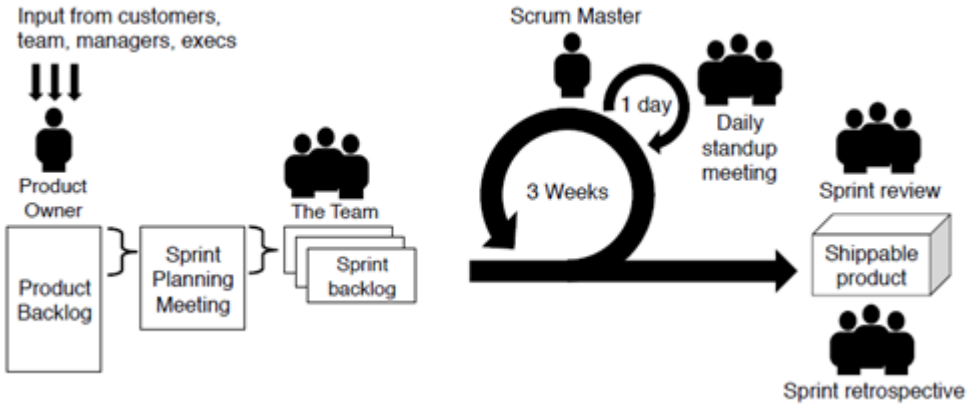


*Figure 2. Scrum Framework (Fitzgerald et al. 2013).*

As it shows in Fig.1, the lifecycle of a Scrum project consists of three phases: The initial planning phase, iterations of development phase and a final closure phase (Fitzgerald et al. 2013). The Scrum flow starts with a vision from customers, team and managers, which could be vague and unclear in the beginning (Schwaber and Beedle, 2002). The Product Owner then formulates the Product Backlog, and it includes functional and nonfunctional requirements through which the initial vision could be delivered. The Product Backlog has priorities so that the items which are most likely to generate value are in the top priority and it also goes through many changes according to the business requirement. All work is done through the iteration phase—Sprint (Schwaber and Beedle, 2002), each Sprint lasts from one week to one month. Initially, the Product Owner and the Team get together through the sprint plan meeting to discuss what will be done in the next Sprint, the first priority of the product backlog will turn into the Sprint Backlog and the Team is responsible for their own work during each Sprint. Each day, the team has a 'Daily Standup' Meeting which usually lasts for 15 minutes to review the work of the previous day and schedule the work until the next Daily Standup Meeting. As a result, the Sprint is supposed to achieve an increment of the functionality of the product. The final closure phase is entered when an agreement has been made that the requirements have been achieved. In this case, when the shippable product is ready for release and integration, system testing and documentation will be prepared for it. (Abrahamsson et al., 2002)

## 2.4 Large Scale Agile

Agile methods were originally designed for small and single-team organisations (Boehm and Turner, 2005). However, the potential benefits they show has raised great attraction to large projects and large organisations. Compared to small and single-team organisations, implementing agile methods in larger ones needs to consider other concerns, such as coordinating and communicating with other organisational units such as human resources, marketing and sales. Moreover, a large scale agile setup may cause distance between users and other stakeholders from development teams (Dikert et al., 2016). The agile size is regarding the size of teams, project budget, code size as well as the duration of a project (Dikert et al., 2016). As a result, it could cause challenges for adopting agile on a large scale, so large organisations should tailor agile to fit the company's needs and culture.

From the review of literature, there are scarce large-scale agile organisational models available, but many consultants and practitioners have proposed different models for this based on their experiences such as Scaled Agile Framework (SAFe), Large-Scale Scrum (LeSS) as well as Disciplined Agile Delivery (DAD). In 2018, The State of Agile Survey (Version 1) shows that a large number of companies use scaling agile methods: 29% of the respondents use Scaled Agile Framework (SAFe), which is the most popular one among those frameworks, 19% of the companies report using Scrum of Scrum and 5% use Large-Scale Scrum (LeSS).

### 2.4.1 Scaled Agile Framework (SAFe)

The Scaled Agile Framework proposed by Leffingwell (2017) is designed for larger companies adopting agile methods by the combination of agile principles and lean product development principles. The first version 1.0 was launched in 2011 and it had a simple diagram and only abstracts, then it constantly develops to version 4.5 which has emerged as the leading

framework for adopting agile at an enterprise scale (Leffingwell, 2017). As documented by case studies, implementing agile on a large scale has achieved substantial benefits ranging from quality, productivity, employee engagement, time to market and transparency aspects. In specific, it claims that it generally has a 20% to 50% productivity increase, more than 50% quality increase and 30% to 75% faster time to market and improvement of employee engagement and job satisfaction (Leffingwell, 2017).

In SAFe version 4.5, Leffingwell (2017) suggests a four-level model for agile enterprise - team, program, large solution and portfolio level. SAFe synchronizes alignment, collaboration and delivery in large agile teams and allows each organisation to make adaptations for its own business which is in the range of 50- 125 partitions as well as thousand-people complex systems (Leffingwell, 2017).

*Team Level*

Team level forms the basis of SAFe. The agile team, which is cross-functional and includes developers and testers, use various Agile practices such as Scrum XP and Kanban. It usually has three to eight team members, the roles include Scrum Master, Product Owner and team members (Leffingwell, 2017). The team backlog is broken down into small user stories which are short, simple descriptions of the product functionality from users' perspectives. The teams are responsible for delivering a quality increment of value through iteration, at minimum, every two weeks. Product Owner owns the team backlog and is responsible for delivering customers' questions and prioritises the work. The Scrum Master is the leader of the team and helps to foster Agile behaviour and build a self-managing team.

*Program Level*

Program level is the heart of SAFe, which is built of the same elements as team level but only scaled up. The ongoing important solution mission is achieved through Agile Release Train (ART), in which the Agile team, key stakeholders and other resources work together (Leffingwell, 2017). ARTs are virtual organisations (usually has five to twelve Agile teams) which is responsible for delivering features. All the teams on the train have the same start and end date as well as the same duration. The roles include Product Management, Release Train Engineering (RTE) and System Architecture/Engineering. The RTE is the leader of the team who acts as the Train scrum master and facilitates program level process smoothly and makes continuous improvement. The Program Manager's role is to communicate with customers and Product Owner of their needs and define the new features of the program backlog. The System Engineer is responsible for defining the overall architecture for the system and defines the non-functional requirements such as subsystems and interfaces (Leffingwell, 2017).

It operates through Program Increment (PI) planning to assure collaboration, alignment and adaptation. The content for each PI is determined by a Product Manager in the Program Backlog in the form of features. Each PI starts with a planning meeting in which all the team members get together to understand the vision and road map of the train and the features of the upcoming PI. Each team then plans the objectives they can achieve in this PI while identifying dependencies with other teams on the train as well as the risks. The team committed to these PI objectives as a group providing visibility to Product Owners and customers of what they can expect in this PI. To assure the train can meet the objectives, the team have a scrum meeting every two weeks with the Scrum Masters and RTE, a system demo will be given at the end of

each iteration. Each PI has five iterations, the final one is called an IP iteration or Innovation and Planning iteration, which is for the teams to get engaged in creative ideas.

*The Value Stream Level*

The value stream aims to help the enterprises face the biggest challenges during the project. The backlog on this level is called capability, describing the larger behaviour of the solution. The main roles include Solution Management, Solution Architecture/Engineer, Value Stream Engineer (VSE), and also supplier and customer (Leffingwell, 2017). Basically, it operates similar to the program level, which is organised around PIs and synchronized across ARTs (Leffingwell, 2017).

*The Portfolio Level*

The portfolio level is to develop the systems and solutions to meet the business objectives. It governs one or more value streams and supports those to allocate budgets and resources in order to assure that the investments meet the financial goals (Leffingwell, 2017). On this level, the backlog is called Epics, which are the initiatives that guide the development towards the aim. The enterprise value streams have the same function as the value stream in the third level, which is to help deliver solutions, products and services to make the enterprise achieve its mission.

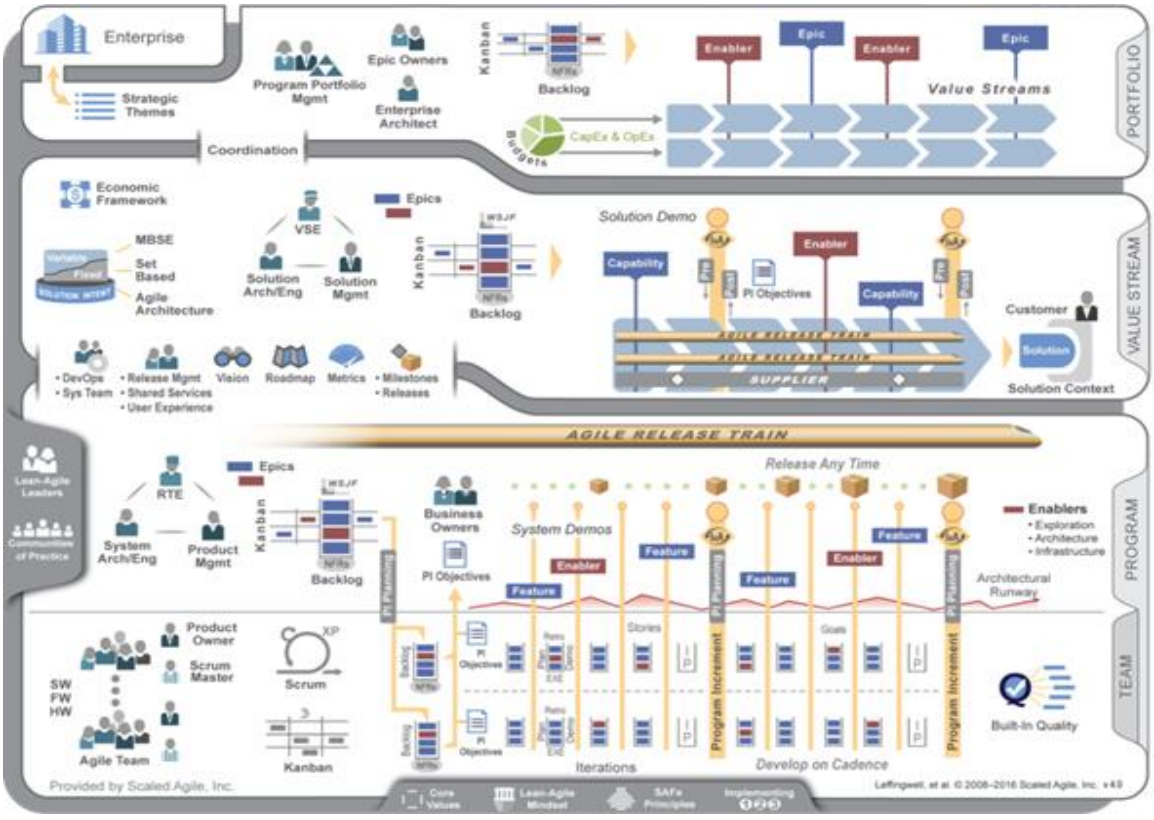


*Figure 3. The framework of SAFe (Leffingwell, 2017).*

## 2.5 Related Work and Previous Transformations

When investigating agile transformation in large scale software development companies, an overwhelming amount of studies seems to indicate that the main motivator of the shift towards more agile methods of working was in an attempt to reduce "Time to Market" for their products (Gat, 2006; Silva and Doss, 2007; Prokhorenko, 2012; McDowell and Dourambeis, 2007). The above motivator also seems to have been the primary reason why Lego decided to launch an Agile Transformation of its corporate digital departments (Sommer, 2019). The study at Lego found that, the ability to swiftly react to the changing dynamics of the market was key to their competitive capability. This meant reducing development cycles and hence their time to market and Agile methods was a viable way of achieving the same (Sommer, 2019). In a landmark study done at Ericsson, Paasivaara et al. (2018) discovered that, amongst other factors, one of the main reasons for Ericsson to adopt agile was because they were "Dissatisfied with their current way of working". Workers at Ericsson reported their previous way of working, which was a traditional waterfall approach, as chaotic due to the lack of defined process when it came to development. While their initial plan to fix this was with a team based approach to projects, it was met with little to no success as it became difficult to coordinate work (Paasivaara et al., 2018). Several literatures have discussed the dysfunctions of working in a traditional setting as a possible motivator for companies to adopt agile. It has been considered problematic due to excess bureaucracy and unnecessary overheads (O'Connor 2011; Hansen and Baggesen 2009), process gates (Chung and Drummond, 2009). Slow processes with long cycle time leading to late feedback (Beavers, 2007 and Ranganath, 2011). Another reason for Ericsson to adopt was agile was the "need to enable rapid end-to-end deliveries of features and continuous deployment" (Paasivaara et al., 2018). The need for rapid delivery of features arise from the necessity to shorten the development cycle and getting each product to market faster which complements and support the findings of Sommer (2019) at Lego.

The transformation from traditional project management methods to agile methods often requires a total change of the organisational culture alongside the fundamental way work is carried out. A detailed literature review identified the following major challenges faced by organisations undergoing a large scale agile transformation: "other functions unwilling to change" (31% of reported cases), "lack of guidance from the literature" (21%), "reverting to old ways of working" (19%), "misunderstanding agile concepts" (19%) (Dikert et al, 2016).
On reviewing literature studying similar transformations by organisation undertaken post Dikert et al's (2016) literature review and also the ones outside its scope, we found some common themes with respect to challenges faced by such organisation wanting to implement agile methods. Change Resistance is seen as a common problem amongst multiple change initiatives (Dikert et al., 2016). Paasivaara et al. (2018) found resistance to change one challenge negatively affecting Ericsson's efforts resulting from lack of universal acceptance of agile methods by the leadership. A similar issue faced by Lego and Cisco during their transformation towards agile methods (Sommer, 2019; Rosenberg, 2015). Rosenberg (2015) attempted to rationalise the change resistance to agile at Cisco to 'Territorialism'. Wherein, she argued that since in an organisation, different people have explicit roles in a waterfall approach, having agile as their primary working method meant one employee having multiple roles within a team with them having to perform tasks that they perceived as "beneath them" (Rosenberg, 2015). Another challenge faced by Ericsson has been the different interpretation of agile by different teams or the lack of it, giving rise to problems in interfacing between them. For instance, Product management was still done mostly in the traditional way, with the researchers

citing it as a mindset issue (Paasivaara et al., 2018). At Lego, the similar issue seems to be due to their own volition. Certain product teams refused to adopt agile methods, either because they had not found the right setup or because they found it unnecessary or even limiting to their work (Sommer, 2019). Perhaps the most interesting and unexpected challenge we came across which was termed as "the buzzword trap" by Rosenberg (2015) in her study of Cisco's transformation into an agile-oriented organisation. According to her, anyone in the organisation wanting to "seem agile" threw in a lot of agile buzzwords not fully understanding what they meant completely. Also, people were turning agile to be their goal rather than it being a means to achieve a goal (Rosenberg, 2015). We see something similar along the lines of "the buzzword trap" occurring at Lego. According to Sommer (2019), some teams were tempted to blindly follow a specific agile method— in their case Scrum—without altering their fundamental way of working. Everything was about *sprints, backlogs and demos.* These teams ended up doing agile without ever being agile (Sommer, 2019).

Literature has lacked a comprehensive look into what the end result of an agile transformation should look like (Paasivaara et al., 2018). Otherwise, there has been little to no research on how to measure progress except Laanti et al's (2010) survey of opinions at Nokia which at that time was undergoing an agile transformation. The Survey found that longer experience with agile positively affected opinion of adopters with regards to its usefulness. With majority respondent not wanting to go back to the traditional way of working. Reinforcing the perception that agile methods prove to be useful in practice (Laanti et al., 2010). It is quite evident from the study of previous transformation that there are certain factors that recur when large organisations try to adopt agile methods and undertake a large-scale transformation. Even though the study of such transformations has mostly been limited to software development companies with a few outliers, it was surprising to see that such a study had not been conducted in the context of an automotive organisation yet. This coupled with the lack of research that has looked into the visible changes resulting from the transformation process gives us a significant gap which this case study aims to contribute to.

# 3. Theory

Through the course of this chapter we have introduced the types of change or transformation that are undertaken within an organisation and attempted to explain the rationale behind them, bridging the human and marketplace factors that lead to them with the help of the Drivers of Change model. Change gives rise to challenges in its implementation, hence the introduction of the most commonly observed points of contention and challenges are described along with its impact on human mindset and how it develops over the course of the transformation are discussed with the support of the change curve, providing us with a holistic understanding of this critical phenomenon. Following this, a descriptive and later comparative overview of two change management models is undertaken to round up the theoretical framework as it provides an all-inclusive picture of the change process from the start to the end and serves as context for the other points mentioned. This chapters acts as the basis through which the gathered data has been analysed.

## 3.1 Organisational Transformation

Change is omnipresent; it has gained momentum in the past few decades and has grown in complexity. The future success of an organisation depends on how successfully it tackles that change. In today's market, change is often cited as a requirement for sustaining success (Anderson and Ackerman Anderson, 2001). Paul et al defined organisational change or transformation as "the difference in form, quality, or state over time in an organisational entity where the entity may be the overall organisation, a subgroup within the organisation or an individual job function". The central idea of organisational transformation is rooted to bring about change for the betterment of the organisation. Organisations carry out transformation in order to ensure their survival in a hyper competitive environment by increasing efficiency and effectiveness which contributes to them delivering improved products and services (Musa, 2016).

High Performance organisations have a proactive approach to managing change, wherein changes are planned properly with an 'inside out' approach. Such organisations do not replicate the change that other have undertaken but use the knowledge to formulate a framework best suited towards the organisation's goals and direction (Musa, 2016). There are various reasons why an organisation might want or need to change. Generally, they are divided into two broad categories of Internal and external where external factors could include Economy, Politics, Socio cultural aspects, advancement of existing technology or change in customer needs whereas a need for change in leadership is classified as an internal factor (Musa, 2016). Anderson and Ackerman Anderson (2001) described three types of transformation that an organisation can undertake;

*Developmental Change*

This type of change represents the improvement of an existing skill, method or performance standard that does not aid in achieving current or future goals of the organisation. Developmental changes are predominantly seen as improvements "Within the box" of the organisation's existing knowledge with the motive of doing better than what is already being done.

*Transitional Change*

Transitional changes are responses to big shifts in the environment forces or marketplace dynamics. It is designed against a criterion and is usually undertaken to "Fix a problem". Transitional changes are initiated when an organisation's leadership recognises the existence of a problem or an opportunity that is known but have not been utilised yet.

*Transformational/Radical Change*

These are the most complex type of changes that organisations undertake. For change to be termed transformational, the organisation must go through a change so significant that there is a need for shift of culture, work methodologies, behaviour and mindset in order to implement successfully and sustain the change over time. Organisations go through such a shift, from one state of being to another only when the survivability of the organisation is threatened. Changes that organisations choose to implement can vary in complexity but the more complex types of organisational transformations require change management practices in order to be implemented or executed in a systematic manner. During change, there is a need to streamline planning and organise processes to successfully carry about the planned transformation (Paton and McCalmain, 2008).

## 3.2 Drivers of Change

Change is disruptive in nature and are a source of inconvenience to the involved stakeholders. This requires change to have context and a supporting structure around it. The factors that provide change with such are termed as Change Drivers. They are essential in providing the necessary stimulus to organisations to trigger or to start having a discussion about change (Oreg et al., 2011). Anderson and Ackerman Anderson (2001) argue that change drivers can essentially be classified into two broad categories, namely, Internal or External (Anderson and Ackerman Anderson, 2001). Similar to what has been discussed in the previous subheading, external factors include Economy, Politics, Socio cultural aspects, advancement of existing technology or change in customer needs whereas a need for change in leadership or lifting employee satisfaction is classified as an internal factor (Musa, 2016). It is vital for organisation to have management set in place with necessary awareness to recognise these drivers or pressure in time and to act on them with necessary actions or collaborative processes. (Paul et al., 2019). Anderson and Ackerman Anderson (2001) argue that managers have been becoming more sensitive to these pressures that build up within or outside the organisation, a strategic pipeline in order to implement changes that could create new business opportunities for the organisation. To put these arguments in different words, awareness creates action. In order to understand how the drivers of change complement and interact with each other and how one driver trickles down to varying aspects of the organisations, we take a look at the Drivers of change model to better visualise the drivers of change in play.

### 3.2.1 Driver of Change Model

The Drivers of Change Model proposed by Anderson and Ackerman Anderson (2001) is a model that identifies the factors that drives transformational change. The model puts forth a sequence of triggers where one factor affects the next factor and so on. There exists an interdependency between the catalysts where there is a 'demand and response' relationship that exists. The catalysts even though, mostly linear can also be iterative and reciprocal in nature.
The Driver of change model illustrates seven such drivers, four of whom can be classed as *external* and are perhaps the more familiar to change managers and leaders. The rest three, which are newer to the afore mentioned change leaders are classed as *internal.* The model tries to establish a relationship between what is impersonal and external (Environment, marketplace, etc) and what is personal and internal (Culture and leadership). The model is shown below.

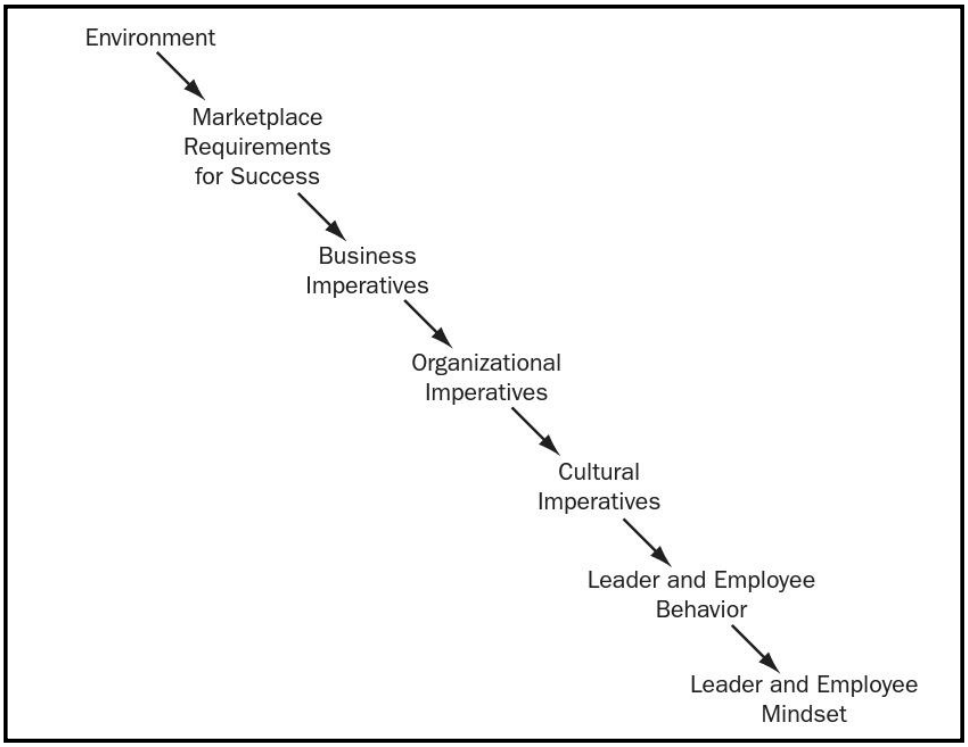


*Figure 4. Drivers of Change Model (Anderson and Ackerman Anderson, 2001).*

The central point that the model attempts to put forth is that changes in larger external domains, for instance, a shift in the environment or market place demands a change or response to the more specific domains of organisational design and business strategy, which in turn demands a response in the more human domains of organisation such as culture and behaviour etc. The authors of the model argue that the external domains are more familiar to the leaders and while the internal ones, less so. This creates an imbalance in the responses delivered by change leaders wherein they tend to miss or nor attend enough to the internal change needs. This could lead to failures in change efforts. The drivers that have been mentioned in this model are further explained below.

*Environment*
The forces of the bigger context within which the organisations and people function. These are the factors that occur outside the organisation but can trigger the need for change within the organisation. Even though the organisations may have little to no control over these factors, they often create boundaries within which the organisation must operate. The boundaries created may significantly affect the current operations, growth and long-term sustainability of the organisation, hence creating a need for change. These forces can include economics, Social, Environmental, Political, Demographics, Regulatory etc.

*Marketplace Requirements for success*
These are the set of customer requirements that lays out what it would take for an organisation to succeed and meet its customers' expectations. It can include lead times, time to market, service delivery, quality level, customisability and so forth. It is important to understand that these changes in marketplace requirements are a direct result of changes in the environment. For instance, Government regulations can force automobiles to be more sustainable which in turn drives the market towards higher fuel efficiency or electric vehicles creating a shift from the status quo.

*Business Imperatives*
These are the strategic steps that the organisation must take in order to be successful, taking into account the changing marketplace requirements. Business Imperatives can manifest itself by the means of systemic rethinking or overhaul of the company's mission statement, goals, products, business model, pricing, branding etc. In other words, it concerns itself with the strategic path the organisation takes in order to meet the changing customer requirements.

*Organisational Imperatives*
Organisational imperatives take into consideration what changes must be brought about within the organisation's systems, processes, structures, resource allocation and skill development to implement to strategy developed as a direct consequence of business imperatives.

*Cultural Imperatives*
Cultural imperatives denote the new norms and collective way of being or working the organisation must adopt or change in order work towards supporting or driving the organisations vision, new design or strategy. For instance, Teamwork can be cited as a valuable trait amongst working groups to support reinterpreting the work processes (Organisational imperatives) to align itself to the strategic path (Business Imperative) of faster lead times.

*Leader and Employer Behaviour*
Collective behaviour of individuals within an organisation usually corresponds to the organisation's culture. Behaviour is sometimes regarded as more important that overt actions as it drives how, what or why people do what they do in an organisation. Hence this driver speaks to how the people's way of being must change in order to establish a new culture that aligns with and successfully implements the re-created organisational design.

*Leader and Employee Mindset*
To become aware that that each of the employee, be it a leader or a team member, has a mindset that is responsible for directly impacting their behaviour, their actions, decisions and so forth

is often the first critical step in understanding the employee's or and organisation's capacity to transform. Almost always, Transforming the mindset is a prerequisite to be able to sustain change in behaviour and culture. A change in the mindset of an employee is important for them to see and understand the rationale behind the change that is being expected of them, be it in the way of being or supporting functions in the newly designed organisation. It is important that leaders and change managers see this as a crucial step in locking in the change that they are attempting to bring about in the organisation.

## 3.3 Challenges of Organisational Transformation

Agile development is not the use of individual tools or practices, but rather changing to a holistic way of thinking (Dikert el al., 2016). The transformation from traditional project management methods to agile methods often requires a total change of the organisational culture and its core functionalities. Throughout the years, the studies on agile transformation have heavily focussed on the challenges that are faced by organisation during the transformational phase leading us to believe that it is one of the more critical stages of the process. Generally, failure or problem research is based on the lessons learned from the projects. Nerur et al., (2005) proposed four major categories in which Challenges faced during an agile transformation process can be categorised namely, *Organisational, Process, Technical and People*. For further simplification, we have assigned these four broad categories under two major heading, *Operational Challenges* and *People Related Challenges*

### 3.3.1 Operational Challenges

*Organisational*

The organisational issue always comes with management issues. It has a significant impact on the social structure in organisations, and thus has influence on people's behaviour (Cockburn, 2002). Since agile transformation is the culture change of the entire organisation, it also influences the decision-making process, planning and control mechanisms, innovative strategies and relationships. The mind-sets of people are hard to change, so is the organisation culture, thus, it creates formidable difficulties for organisations to move to agile methodologies (Boehm, 2004). On the other hand, the shift to agile methodologies also requires the shift from command-control management to a more democratic leadership and collaboration management because of the different working pattern, this could be a big challenge for the managerial level management in organisation. The typical change example is the project manager's role, it shifts from a planner and controller to a facilitator to coordinate the issues in teams when they work in an agile team, the team members have a lot flexibility for their work. For the project manager to relinquish such authority comes with great reluctance (Nerur et al., 2005)

*Process Related Issues*

The process related issues relate to the different working ways of traditional process and agile methodologies. The traditional processes are aimed at providing assurance (Boehm, 2004) and activity and measurement driven. Agile methodologies are more flexible which relies on planning and understanding uncertainties to achieve rapid development and high value. One of the biggest barriers of the transformation is change of process from a life cycle model to a feature based and iterative development process. This change might involve big alterations in organisation such as communication channels, tools and techniques, problem solving strategies etc. (Nerur et al., 2005)

*Technological Issues*
The technological issues usually during stages of product or technological development. Tools and practice have a big impact on technological development, without investing in tools which can support and facilitate the rapid iterative changes during development, agile methodologies cannot be implemented successfully. Simultaneously, it also requires people to be trained to use those tools correctly (Dikert et al., 2016).

### 3.3.2 People Related Challenges

*Mindset*
A collaborative environment between community members where each individual values and trusts each other is key for the success of agile methodologies. It can be overwhelming for individuals who are accustomed to solitary activities or have worked in homogenous groups to suddenly be required to undertake shared learning, collaborative decision making or reflection meetings.
Contrary to traditional methods of management, decisions in agile methodologies are a team activity where end customers are often involved. This gives rise to a pluralist environment where decision making may end up being harder due to varying opinions and diverse backgrounds or expertise. There must exist a culture of trust and respect to facilitate such processes.
There is little evidence that suggests that agile principles work in an environment devoid of competent and knowledgeable people. This creates a problem with staffing and morale, firstly it is difficult to find and recruit individuals who have knowledge of agile to staff teams that use such methodologies, secondly, it gives rise to a culture of elitism within teams or groups that may end up affecting the morale of non-agile team members. (Nerur et al., 2005)

*Change Resistance*
Employee's resistance towards the introduction of change in an organisation is perhaps the most prevalent challenge that is faced by change leaders and managers and to some extent should be expected. (Backer and Porterfield, 1998) Change resistance is defined as the retaliatory behaviour that emerges in a group or an individual in response to organic introduction of change (Anderson, 2011).
Hultman (1998) argues that resistance to change should not always be viewed as inherently negative as on certain instances, it can stop change leaders or upper management from making serious mistakes. Resistance to change in an organisation reflects an individual's unwillingness to be part of the transformation as it would require changing themselves. This unwillingness manifests itself in active opposition or an attempt to evade the transformation effort completely. (Hultman, 1998). Also, increasing the scale of transformation can incite a stronger resistance (Bain, 1998).
An individual's resistance to change stems from their desire for stability. People typically don't join organisations to be pushed into change driven chaos and turbulence. Rather, for consistency and a sense of belonging to a group that sustains one's self worth and goals (Anderson, 2011). Organisational change, in this way threatens the very comfort zone of individuals, to a point where even discussing change can lead to resistance. (Judson, 1966)
Anderson (2011) identified the following nine potential reasons for people resisting change in an organisation.

*Inherited Culture:* The existing culture of the workplace becomes ingrained in the individual's workflow and the interactions they have with one another. The employees feel reluctant to give up the existing culture that they have known so well and acquire an unknown new culture brought out by the change process. The new culture could mean changed leaderships styles, vision or heightened expectations. The resistance stems from the already established culture of the previous administration/methodology.

*Reluctance to take up new work:* The increased workload brought about by the change process make people see the change process in a negative light and makes them resist the change. In a change process, people are expected to take on new initiatives and priorities while working on their current goals. This perceived burden is actively resisted by individuals.

*Status Quo Protection:* Change processes are known to challenge the status quo. Individuals who excel at something expect to carry about their work in a way familiar to them and may resist any change that threaten their status quo.

*The Implication that the current system is broken:* The subtext on which Organisation transformations is based is that the current status quo is flawed. This could be interpreted differently by the individuals who designed the status quo as they are the ones who might have gotten it wrong. The mere suggestion that a transformation is necessary may just not imply that the current system if flawed but might also make the individuals feel like the 'bad apples' of any new 'Status Quo'

*Culture Clash:* Culture is the glue that holds an organisation together. Contemplating change without taking into consideration the impact it might have on the organisation's culture could prove to be catastrophic since transformation efforts rips through the very fabric of the institution by shredding the cultural fibres of tradition. Individuals who were accustomed to the culture or were attracted to it in the first place, may offer resistance to any change efforts being made

*Fear:* Change is threatening in many ways than one. Threat of job loss, uncertainty about newer initiatives, methods and processes creates uneasiness and confusion amongst individuals that could result in fear. Amidst all the irregularities that a change process involves, the ones affected do not always have enough information to see the bigger picture.

*Legitimate Concern:* Resistance sometimes stems from legitimate concern about the feasibility of a process or a product. Problems with change processes and mistakes made by change leaders and managers can be a matter of concern for individuals that are involved in the change. These individuals reach a calculated conclusion as to whether a change process would work or not.

*Unfair Champion Behaviour:* Resistance may be offered by individuals when they construe a change leaders' or management's behaviour as unfair and hypocritical. Trust is the basis of any change effort. Telling others to change without changing yourself can be taken as an act of hypocrisy.

*Personality Clashes:* All change efforts must be considerate towards individual beliefs, personalities and values. Resistance occurs when people are intolerant towards one another. Resistance may also be offered just because individuals do not like or support a certain change leader or manager.

The facet of 'people related challenges' can further be explored by introducing the following model that can be utilised to see the evolution of employee mindset and beliefs throughout the change process in order to better understand what lies on the other side of these challenges.

## 3.4 The Change Curve

The change curve draws its inspiration from the ground-breaking work by psychiatrist Elisabeth Kübler-Ross (1969) that modelled various stages of emotions experienced by people facing imminent death due to a terminal illness or are the survivors of an intimate person's death. Albeit with minor alteration, the model hold surprisingly true in the context of organisational change where for an individual, these transformational changes prove to be traumatic and may involve loss of authority and prestige. It is vital for an individual to make personal changes in order for the transformation to be a success. The change curve is therefore a powerful tool to understand and deal with these personal changes in individuals and help managers and change leaders predict how one will react to the proposition of transformation and extend appropriate support to these individuals during the process. (Mindtools, n.d)

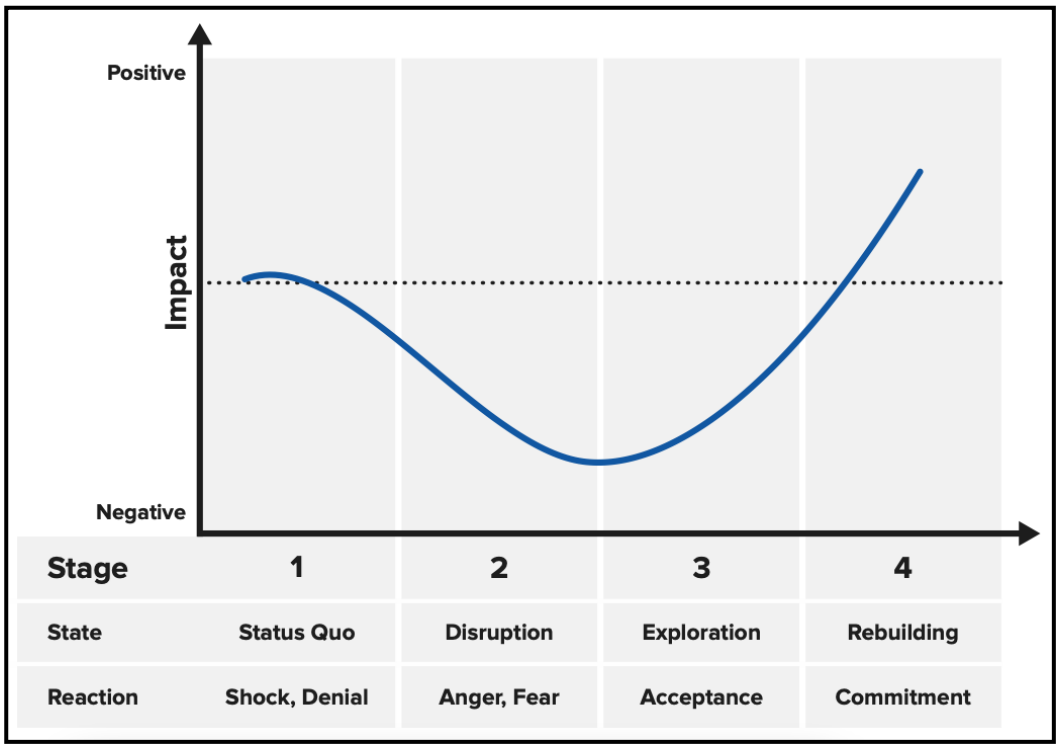


*Figure 5. The Change Curve (Mindtools, n.d).*

The change curve deviates from Kübler-Ross' model primarily in the fact that it has four stages than the original five to better suit the context of an organisation. The curve that is plotted through these four stages signify the impact that the stages have on employee attitude and performance. The stages that constitutes the change curve are as follows.

*Stage 1:* Employees, upon hearing the proposition of change might enter a state of *shock and denial*. He or she may not be able to process at first that there is indeed a need for the organisation to undergo change and the fact that they would have to adapt to something new. The employees would need time to adjust to the changes for an extended period of time or would outright deny the need for any change. At this stage, it is important for organisations and managers to be empathetic and must make efforts to make these employees understand why the proposed change is necessary. This demands heightened communication in order to fully transfer the knowledge of change unto the aggrieved individual, ensuring that they do not overwhelm them with information but rather in a gradual and systematic manner. (Mindtools, n.d)

*Stage 2:* When the reality has finally become clear and the gravity of the situation has settled in, employees may start feeling fearful of the change process, some may even turn to anger as way of expressing their emotions. The reason for this can be these individuals spending most of their employment in their own comfort zone. The realisation that they have to undo a lot in order to learn newer things or adapt to newer standards or methods, angers them. This step must be carefully managed by organisations to stop the change process from turning into chaos. Clear communication and providing assistance to any in need should be a priority for organisations at this stage. Change leaders and managers must realise that this a natural response to uncertainties and with time, it opens pathways towards wider acceptance. (Mindtools, n.d)

*Stage 3:* This is the stage where employees have had enough time to understand the change thoroughly and have finally start letting go and start accepting the new changes and try and find the best possible way for them to adapt to these changes. This is often the turning point in the change process. Once an organisation turns the corner onto this stage, it starts coming out of the danger zone. For an employee, this is a stage is vital for learning and acceptance. hence, organisation must ensure that it creates the best possible foundation by training the employees well and give them an opportunity to experience the positives aspects that the change promises to bring. Though, an organisation can expect to have made some positive impact on the individuals, it should not expect 100% productivity from them as learning is a slow process and must be given its due time. (Mindtools, n.d)

*Stage 4:* This is the stage that management waits so patiently for after initiating change in the organisation. This is where the employees finally start seeing the benefits and importance of the change and start to submit to it. While some may accept the changes for the sheer lack of other options, others might approach it in a more positive way and start building their aspirations for the future. The management can finally reap the benefits of the hard work they put in as the team start showing improvements brought in by the newer methods of working and henceforth, overall productivity start going up. (Mindtools, n.d)

## 3.5 Theories on Change Management

In the previous sections, we have discussed important facets of change, in the context of organisational transformation. But we must remember that transformation process is a change activity which has a series of measured actions incorporating the facets mentioned above. The change management models provide us with a roadmap that one should follow to design and implement future state. These theories are designed to help guide change leaders as what is needed to be done and in what order to successfully bring about change in an organisation. (Anderson and Ackerman Anderson, 2001) Here, we discuss the Change Management models of Kurt Lewin and Kotter.

### 3.5.1 Lewin's Change Model

Kurt Lewin in his breakthrough work in 1940 presented a model through which organisations can implement change. The model colloquially known as the 'Unfreeze-Change-Refreeze' model with was attested by Schein (1996), as the theoretical backdrop encompassing every change that takes place. Theoretically, the model breaks down change in three fundamental phases, wherein phase one organisations focus on unfreezing the current way it functions and operates to be able to implement change (MindTools, n.d.).

In the course of this phase, organisations need to address their need to transform and understand why it is important for the future of the organisation and hence agree upon the fact that there is indeed a need to change (MindTools, n.d.). According to Schein (1996), there is a need for people undergoing change to be assured that they are still vital to the organisation and they will be looked after and will be safe after the change has been implemented and for organisations, this is the only way employees can get behind a substantial change and discard their old way of doing things. Only when the employees foresee that the change is vital for the future of the organisation and they are essential part of it, they will be motivated towards change (MindTools, n.d.). This can be achieved in numerous ways, one of which can be educating them as to why the status quo would not fit the future the company is headed towards (MindTools, n.d.). Once the first phase has been successfully tackled, the very substructure of the organisation need to be evaluated, whether and what needs to be transformed in order to accommodate the change. This is arguably the most challenging phase the organisations face.

In the second phase, the organisations are actually faced with the actual process of change. It is this very phase where the employees begin implementing change in their day to day affairs (MindTools, n.d.). The process of change in this context is non-linear. In other words, the change occurs differently for different individuals. Some are quick to adapt whereas some need a little more time (MindTools, n.d.). This is why organisations should refrain from having a rigid timeframe within which change must occur (MindTools, n.d.). It is vital in this phase that the individuals have the time and space to adapt and a way to freely communicate their grievances (MindTools, n.d.). In this stage, not only it is important to communicate the benefits of the change in a larger context but also as to how it will benefit the individuals on a regular basis (MindTools, n.d.).

The final phase of the three-phase transformation model is to refreeze the organisation. Organisations need to, in this phase need to formalise and standardise their method of operation and make sure the changes have been engrained in the ethos of the company. Formalising

methods and behaviour must be carefully monitored in order to avoid backsliding into the earlier ways, a retardant to it can be to provide support continually to employees and address any questions that may come up (MindTools, n.d.).

### 3.5.2 Kotter's Steps to Transform an Organisation

Kotter (1995; 1996) devised eight steps that the organisation must go through in order to implement change within an organisation. The eight steps also point out possible errors that are committed by the organisations in their pursuit of change. Kotter's eight steps can also be seen as the breakdown of the Lewin's Change process where stages one through four are similar to Lewin's 'Unfreeze' stage. subsequently, stages five and six are breakdowns of the 'Change' Phase and Lastly, Steps seven and eight are similar to the 'Freeze' stage.

*1 - Establishing a Sense of Urgency*

Change in an organisation would be rather difficult to attain or materialise until the leadership manages to get the majority or in an ideal scenario, the entirety of employees on board. Kotter (1995) argues that any sort of attempt at change will fail if there is any sense of complacency exists in the organisation. Hence, creating a sense of urgency to motivate change is crucial. Kotter (1995) reports that approximately 50% of organisations fail in the first stage due to, amongst other reasons, the leadership's underestimation of the number of employees actually on board with the change coupled with the overestimation of the urgency successfully created. Even though visible crisis is always helpful in rallying employees to back a proposed change but it is often prudent for managers to anticipate crises and create a sense of urgency around it. (Kotter, 1996)

*2 – Forming a Powerful Guiding Coalition*

Formation of a powerful guiding coalition is imperative for the facilitation of change. The guiding coalition in question must possess shared objectives, a significantly high level of trust and must be powerful enough to influence their subordinates or employees. (Kotter, 1995) Needless to say, the coalition should be strong enough to move past resistances that may come up throughout the process by garnering support of the majority of employees as mentioned in the previous stage. Lastly, the coalition must possess the power to create vision and communicate those vision effectively as we will see in the later steps.

*3 – Creating a Vision*

Transformation are susceptible to failure without the presence of a clear vision. A transformation effort which lacks a vision for change might create confusion and misdirection of projects that ends up leading the organisation nowhere (Kotter, 1995). Vision creates direction and simultaneously acts as a motivating factor for employees to work towards it (Kotter, 1995). It is in this stage that the organisations need to start strategising as to how the created vision will be achieved.

*4 – Communicating the Vision*

Without the presence of effective communication, visions tend to be rendered useless. In the efficient communication of vision, simplicity is key. Kotter (1996) suggests brain down the vision to an extent that is easily comprehensible to the majority of employees. No doubt, it is a difficult task to undertake but it is crucial in heightening the absorption of these communicated ideas by the employees. Lastly, it is essential for the communication to be two-way rather than its adversary. It is important for the employees that are going to undertake the process to voice their opinions (Kotter, 1996).

*5 – Empowering Others to Act on the Vision*

This stage fundamentally deals with the action of empowering others to undertake action through removing barriers, as a result of which, employees execute the vision set forth and hence moving the machinery of change forward. Even though, following steps one through four should be enough to eradicate majority of the barriers but some may still remain. Barriers that still might persist are barriers of structure and supervision (Kotter, 1996).
Barriers of structure and supervision are somewhat intertwined such that in organisations, that are more traditional, tend to believe that organisational structures and hierarchies are set in stone and to threaten these establishments gives rise to barriers and resistances from individuals that preach to such an ideology. It is vital that such barriers are removed early in the process (Kotter, 1996).

*6 – Planning for and Creating Short-Term Wins*

To keep the momentum of change going and to strengthen the motivation of employees, it is necessary for organisations to have well defined milestones set along the way to make the change effort visible (Kotter, 1996). According to Kotter (1996), short term wins help the transformation process in six ways, Firstly, the leadership needs to show that the sacrifices made by the employees are worth it, Second, rewarding those who are working hard on the transformation by building motivation. Third, gaining short term wins helps in testing the vision and pinpointing areas where they might need fine tuning. Fourth, this makes it harder for individuals to resist or block changes when improvements are visible. Fifth, results garner support from superior management and lastly, sixth, as described earlier, it builds momentum.

*7 – Consolidating Improvements and Producing More Change*

The process of change within an organisation is a complex process and tends to span over a long period. Managers are susceptible to declare victory even when the slightest positive changes are seen (Kotter, 1996). It should be kept in mind that minimising efforts at this point can result in lost momentum and in essence failure to sustain change. Hence, rather than accepting that change has been completed at this stage, managers should focus in accelerating change even more as the change at this stage is still fragile and hasn't yet ingrained itself in the organisation's culture (Kotter, 1996).

*8 – Institutionalising New Approaches*

The final step in the process is to anchor the change within the cultural framework of the organisation to make sure the change does not backslide. Organisational culture is hard to change but when it comes to institutionalise change, it is important that the employees are continually shown how the change has helped improve productivity within the organisation. Also, it is imperative that the future leadership continue to support the change. Change will only stick when it becomes second nature to the organisation (Kotter, 1995).

### 3.4.3 Comparing the two models

After going through the two models proposed by Lewin and Kotter respectively, it is rather evident that the latter compliments the former. As Lewin's model is broad and does not cover the intricacies of change, it creates a need for a more structured and planned roadmap in order to better manage change and Kotter's model delivers precisely that. In the table below, we've attempted to categorise the steps proposed by Kotter to particular stages of Lewin's model and it is clear that Kotter's 8 steps follow the same philosophy that Lewin's change model put forth, further strengthening our notion that Lewin's model was the fundamental basis of Kotter's work. Although Lewin laid the groundwork for change studies (Schein, 1996), Kotter's work seems more relevant in the organisational context, as it is more detailed and helps change leaders by providing them with the suggestion of not just what to do, but also when to do it.

| Lewins Change Model | Kotter's steps to Transform an Organisation |
|---|---|
| Unfreeze | Establishing a Sense of Urgency<br>Forming a Powerful Guiding Coalition<br>Creating a Vision<br>Communicating the Vision |
| Change | Empowering Others to Act on the Vision<br>Planning for and Creating Short-Term Wins |
| Refreeze | Consolidating Improvements and Producing More Change<br>Institutionalising New Approaches |

*Table 1. Comparing Lewin's and Kotter's Change Models (authors' own illustration).*

## 3.6 Theoretical Framework

We have in these previous chapters, introduced a combination of models and theories but it is important to understand in what way they are important in the context of this study and how they relate to one another. The beginning of any change effort is triggered by some sort of force(s) that the organisation may or may not be in control of. Therefore, for the effective understanding of factors that may lead to an organisation needing change, there was a need for us to use a model that clearly lays out those factors that are in play. We have selected Anderson and Ackerman Anderson's (2001) drivers of change model for this purpose. We have, when describing the model in detail, seen that the model has seven consequent drivers where one driver puts into action another driver and so on, but for this particular study, we decided that that it would be appropriate to split these seven drivers into two broader sections, where e*nvironment* and *marketplace requirement for success* being categorised as 'external forces' that is acting as a trigger and is creating the need for change. The rest five drivers in the models, even though referred to as drivers of change but do not seem to be acting as the initial triggers. Rather, they seem to be driving the transformation efforts itself and lay out the factors that need to be addressed internally when the initial external trigger has been heeded. Therefore, in our framework, we group the rest of the five drivers as 'imperatives'. These imperatives directly contribute to the change process within our framework.

The process of change creates certain challenges, and the review of Nerur et al.'s (2005) work, presented us with the multiple forms of challenges that present themselves when an organisation is undergoing transformation, but as it was mentioned earlier, we have in the context of this study, condensed it down to two, where the first factor deals with the challenges that are faced at an organisational level and the second at a more human and individual level. Even though Anderson's (2011) reasoning on change resistance does provide us with a good enough rationale to the different reasons as to why certain individuals might resist change, we feel it misses out on giving us a deeper look into the psychological impact on an individual when they are faced with change and how it changes over time, the change curve has thus been used to address this shortcoming. The change curve also provides us with a good basis to judge the outcomes of the change, as to how beneficial it has been to the organisation on an individual level since the effectiveness of agile methods in an organisation is deeply connected to an environment of support, trust and well-being of an individual. A trend that closely follows the change curve, can be a good indicator that the organisation is going in the right direction. Hence, the change curve in our study is a model that aids the interpretation of both challenges and the outcomes of the change.

It is important to note that all the theories and models that we have incorporated in the framework so far deal with change and change is a process that needs to be managed well in order for it to produce desired results. Hence, Change management theories such as those proposed by Kotter and Lewin become important when we are looking into the change process of an organisation. They help to put into context the process from the beginning to the end and provide us with a backbone which supports the other models that have been described in this framework. We say this because there seems to be a significant overlap in the concept that is put forward by Anderson and Ackerman Anderson (2001) as both are linear models guiding the process of change, at one hand, the drivers of change model put forth the external triggers of and the imperatives the organisations must achieve to successfully champion change. Kotter's (1996) model on the other hand, gives an overview of the steps change leaders must

take to bring about that very change. The point of concurrence amongst both these models being the fact that imperatives that compel the organisation to change and drive the change process are managed and brought to fruition by following Kotter's (1996) steps. Where Anderson and Ackerman Anderson's (2001) model answers the 'What', Kotter's steps show us the 'How'. These two models diverge when challenges that are faced during transformation is brought up as a point of contention. While, Anderson and Ackerman Anderson's (2001) drivers of change models has little to no mention about the possible challenges that could be faced, Kotter's model does talk about the certain challenges and the human aspects behind them through steps five to seven. We feel that the change curve is a good accessory model to extend these steps to gain a deeper understanding of the human impact that exists behind these steps. A schematic showing the interaction between the different models have been shown below. Also, both Kotter's and Lewin's model fail to touch upon what precedes the steps with regards to how a need for change should identified, both models assume that the change leaders have already understood the need for change and hence Kotter's (1996) and Lewin's model help once this stage has already been achieved. Anderson and Ackerman Anderson's (2001) driver of change model could be a good model to supplement this shortcoming.

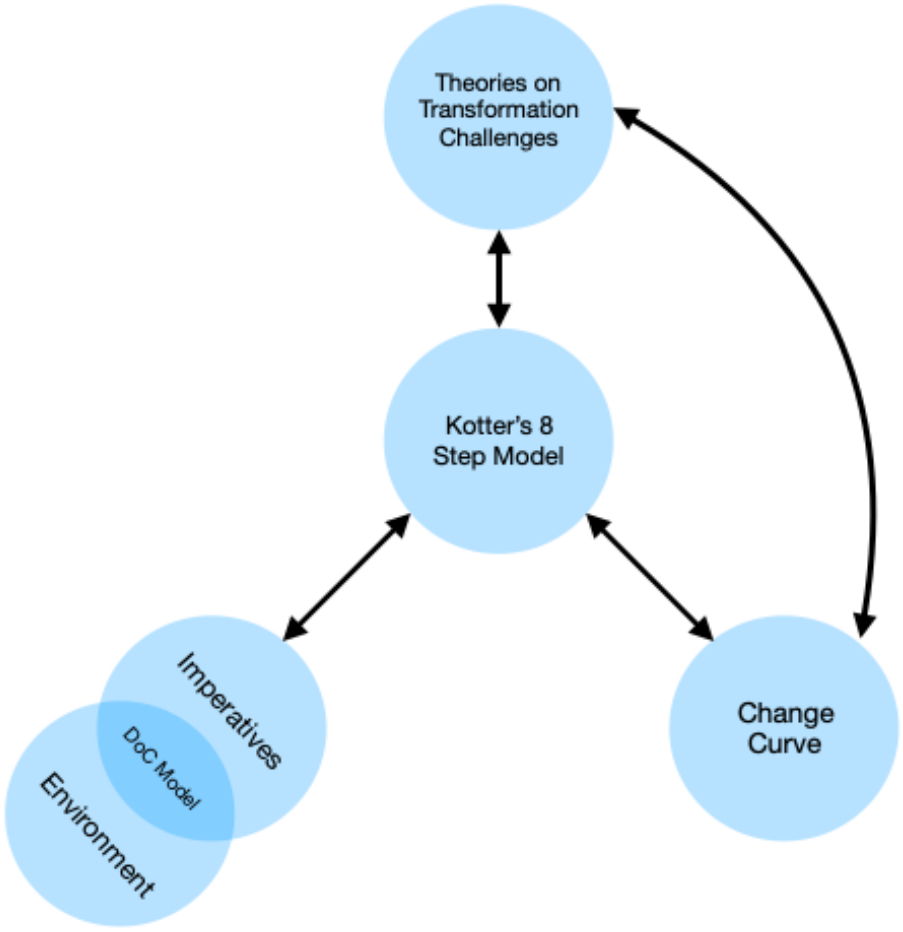


*Figure 6. The Theoretical Framework (authors' own illustration).*

# 4. Methodology

This chapter aims to provide the reader with the basis as to how this thesis has been executed by introducing the methodological approach and the methods utilised in designing of this study. This includes the rationale behind the study, the strategy that had been deployed while undertaking the study and finally the method in which the data gathered has been analysed.

## 4.1 Case Selection

The selection process for a company to do a case study was guided the authors' intension to contribute to the field of agile project management, more specifically to look into agile implementation in the automotive sector. During the time this study was conducted, only three automotive organisations in Sweden had implemented agile methods in their working namely, Scania AB, Volvo Personvagnar AB and AB Volvo. As a student conducting independent research regarding the internal dealing of such organisation, gaining access to data can sometimes be a complicated and tough process. AB Volvo was selected as the company to conduct this case study in, primarily because it was easy to gain access to through our department at Uppsala University due to already cultivated contacts that existed and later suggested to us by our subject reader during later discussions. AB Volvo, given its legacy status within the Swedish and international market, a case study within this organisation would accurately represent a number of automotive giants. Furthermore, it was thought that since AB Volvo was in the active process of undergoing transition during the time the study would be conducted, the data gathered would be more explicit since the details of transition would be fresh in the minds of interviewees and survey respondents.

## 4.2 Work Process

Both authors of this thesis have displayed an affinity towards the field of project management, in particular agile project management and hence reached a conclusion together to conduct a study that contributed to the said field. After an initial review of literature, it was found that there seemed to be a relatively low amount of research that looked into agile implementation in the automotive sector even though it was being talked about by business news journalists and management podcasts. After much discussion, the authors felt that this was a field with great potential and decided to investigate it. Initially the aim of this study was to look at the automotive industry as a whole and study the implementation of agile within it, hence the authors conducted an in-depth literature review on agile methodology.

For the purpose of the literature review pertaining to this study, the field of agile based management and change were identified as main topics. The literatures were selected from scientific journals and textbooks and in order to find the relevant literatures, keywords searching method was applied within Uppsala University's digital library. The literature review explored the themes of 'agile principles', 'agile transformation', 'agile in automotive sector'. Furthermore, a review of case studies that explored previous agile transformations were also done to identify the important aspects of the transformation in the real world. Through the review of said literature, two research questions were developed that aimed to look into the drivers and challenges of agile transformation in the automotive industry. The research questions were further refined during consultations with our subject reader where it was suggested that a case study be considered as part of this study, leading to AB Volvo being

chosen as the case company for factors that have already been mentioned in section 4.1. Following the decision to do a case study, the research questions were further iterated to include a third research question that explored the outcomes of transformation as it was believed that an access to the workings of Volvo was a good opportunity to examine whether the change has been beneficial to them or not.

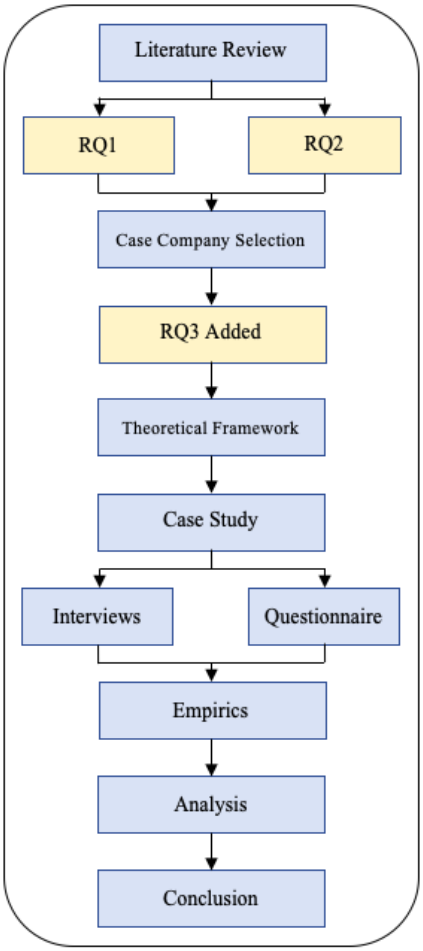


*Figure 7. Work Process (authors' own illustration).*

Following the formalisation of the research questions, the focus shifted to building a theoretical framework which would guide the analysis of the data collected through the course of the study. The major field identified for building a framework was that of change management and further investigation presented us with established theories on change management. It was felt that the selected theories on change management only partially addressed the research question hence, other models of change were used to supplement the above theories to build a framework that addressed the research questions affectively. During the building of the framework, contact had already been established with AB Volvo, and an interview guide was being prepared (see Appendix A) that would be used while the semi-structured interview were being conducted.
Several interviews were conducted with management at Volvo to get a detailed understanding of series of events that underwent in the organisation and later, a survey was e-mailed to one

senior manager to be circulated within team level employees to gain insights of the opinions that were held by non-managerial staff and the everyday workers at Volvo. The data from the interviews were coded and later analysed in comparison to the theoretical framework that was earlier developed. From the analysed data, conclusions were drawn that attempted to answer the research questions. Even though from the work process description, it might seem that the process of writing this study from conceiving the idea to drawing conclusions is a rather linear process but in reality, the process was much more complex and was subjected to many iterations and adjustments within problem formulation, theoretical framework development and data presentation to conserve the cohesiveness of the study. Many consultations from our subject reader was also sought so as to not deviate from the academic nature of this study.

## 4.3 Research Approach and Strategy

The central purpose of this study, though its research questions, is to try and understand the intricacies of a change process within an organisation and in order to answer those questions, it becomes important to understand, and interact with the stakeholders of the change (electromobility and powertrain department) at Volvo. Such interactions give rise to empirics that are of the nature of complex 'thoughts', 'opinions' and 'insights'. Keeping this in mind, the type of research most suitable for this study was thought to be *qualitative* as it is the distinct nature of qualitative research to concern itself with words than other forms of data. (Bryman and Bell, 2011). Bryman and Bell (2011) argue that the most commonly used approach to qualitative research is inductive but this study differs from this notion since it does not try to establish new theory through its empirical findings, as in the case of a purely inductive approach nor does it attempt to test any hypothesis through its findings as per purely deductive approach. Rather, this study tries to analyse the already laid down theory by holding it against the empirical findings and also use the findings to extend or highlight gaps in the laid down theory. This hybrid approach which is known as an *abductive* approach has been utilised for the purpose of this study.
In order to comprehend how this approach of research translates into this study, one must understand the two pronged approach the authors are trying to employ for answering the research questions. Firstly, from the gathered data, text will be analysed with the help of the theoretical framework built from already existing theories and models to explain and make sense of the happenings and the factors at play throughout the change process at Volvo. Secondly, with the same set of data, the authors will take a look at the used theories in order to pick out gaps and inconsistencies in them based on the events that take place in reality at Volvo. This back and forth movement between the theory and empirics can only be undertaken with an abductive approach to the study. Alvesson and Sköldberg (2008) argue that an abductive approach towards the research additionally enables the authors to move among empirical data and theory in order to achieve a better comprehension of the subject being researched over time. If either inductive or deductive approach were to be used here, the authors would be restricted to draw partial conclusions than they had originally planned for, reason being the one-directional nature of both approaches.

The authors consider this thesis to be an exploratory case study as it is primarily intended to explore the research questions and the themes that surround it, not trying to offer final solutions to the existing issues that can be used to build theory or be used as a professional tool. It could be argued by many that this thesis could also be classified as a descriptive study but the authors understand that for a study to be descriptive, there must be a solid foundation of the

phenomenon prior to data collection. But as it is in this case, it was believed that since the one method of gathering data was semi-structured interviews, it could throw light on unintended but important pathways and discourses that the authors did not attempt to venture in initially. The great advantage that exploratory studies offers is that it is flexible and greatly adaptable to changes as a result of new data or insight that might appear (Saunders et al., 2007). This flexibility does not necessarily mean a lack of direction (Adams and Schvaneveldt, 1991).
Since Exploratory studies give rise to qualitative data, as it is in the case of this study, it becomes difficult to generalise the result of the study to a wider gamut due to collected data being subjected to the interpreter's bias which affect the data analysis and result formulation. The use of quantitative methods of data collection would be disadvantageous here as, even though It may produce a generalisable result, it may risk losing the important 'Point of view' of the different change actors and leaders of Volvo trucks that were interviewed as part of the study. It is vital to implement these 'point of views' as change is a subjective term and could mean different things to different people and it may so happen that the challenges that one leader faces in the change process is non-existent for the other which gives rise to interesting dynamics within the study and open it up for further studies to be undertaken in order to explore those findings. The two ways data was collected for this study has been elaborate on in further subsections.

### 4.3.1 Interviews

Bryman and Bell (2011) argue that interview is a practical and flexible tool for data collection, which has been widely used in different settings. By high-quality interaction and reflection with respondents, it presents researchers enormous potential to dig into the research topic and achieve "intersubjective truth". By the different roles that respondents play during the interview, it could be categorised into three type interviews: structured interview, semi-structured interview and unstructured interview. For this study, empirical data was collected by conducting semi-structured Interviews to ensure a qualitative study result. The interview process was flexible but followed an outline (interview guide) pre-laid out by the authors. The outline had questions attempting to explore the themes that were taken out from the theoretical framework discussed earlier in this study. In a semi-structured interview, it may happen that the interviewee digresses and the questioning pattern does not follow the pre-laid out outline (Bryman and Bell, 2011).
On the outline that was created, there were 21 questions to be asked (see Appendix A) grouped into sections, following the flow of the change process -- from the triggers of change, the transformation process to the results and feedbacks of the change. It is important to note that questions other than the ones on the interview guide were also asked whenever the authors picked up on things said by interviewees that warranted further understanding or elaboration. Each interview, being either telephonic or over video conferencing software usually lasted for thirty minutes to forty-five minutes. The interviews were conducted primarily by one of the authors to keep the conversations clear and not have any crosstalk and interruptions between individuals. The author other than the one conducting the interview took active notes and highlighted, whenever necessary, points that needed to be followed up further with the interviewee. All the interviews were recorded with the prior permission of the interviewees to help aid data processing afterwards and ensured that no valuable information be lost for the purpose of data analysis. The tone of the interviews was kept semi-formal for both the interviewees and author to feel comfortable while speaking to one another and conversation was encouraged before questioning began in order to help build rapport. The interviewees were

encouraged to express their thoughts freely and as per to the interviewees' request, their identities are kept anonymous and only their designation within the organisation is mentioned. This also helped to ensure a non-bias talking atmosphere as the interviewee might be encouraged to share information they would otherwise withhold if their name were to be made public.

| Reference/Designation | Department | Date of Interview |
|---|---|---|
| Agile Expert | N/A | 2019-03-04 |
| Group Manager | Electromobility | 2019-04-26 |
| Director | Electromobility | 2019-05-06 |
| Hardware Leader | Powertrain | 2019-05-09 |
| Line Manager | Electromobility | 2019-05-15 |
| Section Manager | Electromobility | 2019-05-22 |
| Product Owner | Powertrain | 2019-05-23 |
| Line Manager | Powertrain | 2019-05-27 |
| SAFe Coach/ Senior Project Lead | Electromobility | 2019-06-03 |

*Table 2. Overview of Interview Respondents.*

The sampling of interviewees followed a snowball method, where a small number of individuals that are initially contacted, eventually leading up to a large number of respondents (Bryman and Bell, 2011), through means of contacts and recommendations. The process started with interviewing an agile expert, who is also a faculty member at a leading university in Sweden, with access for this interview provided by authors' university department. Selecting this individual as the first interviewee was also advantageous since this individual had worked closely with Volvo during the latter's transformation process and could be a good opportunity for the authors not only to understand Volvo as an organisation a little better but also warm up to the change process at Volvo, helping the authors prepare for the interviews with managers at Volvo. The agile expert provided us further contacts within Volvo which was followed up with more contacts and so on. This method of sampling presented a challenge for the authors as it was felt that they had less than desirable control over participant selection and could only make decision whether to accept or reject the contact being provided to them, even with these limitations, the authors made sure that the interviewees were part of either the electromobility or powertrain department at Volvo, which are two of the many departments undergoing agile transformation. Care was also taken to keep the designation of interviewees to be mostly

managerial, with the exception of the agile expert. It was done so because managers play an active part in the change and directly deal with factors that are involved in the process, with many concerned with the implementing the change. In other words, they are usually at the 'deep-end' of things. The authors believe that managers are the best candidates to be selected for interviews in this study because of the extremely detailed accounts they would be able to provide of the process that was undertaken at Volvo which is also the reason interviews were selected as a mode of data collection in the first place, to get as much valuable information as possible. The authors conducted nine such interviews in total, the overview of which are given in table 2.

### 4.3.2 Self-Completing Questionnaires

In Addition to the semi structured interviews, a self-completing questionnaire was also floated amongst employees of Volvo trucks, individuals of lower designations, such as project team members and coordinators who were participants of the transformation process. The questionnaires were aimed at individuals who, though not necessarily brought about the change in the organisation but were certainly affected by it. This helped cover and gather opinion of a different demographic to the ones that were interviewed helping to include the viewpoint of different levels of the organisation. Even though it would have been desirable to conduct an interview with these individuals too but due to limited time and access, it was decided that a self-completion questionnaire would be a quicker way to gather significant amount of data since it could be distributed in very large quantities at one time. Also, for this study, one of the important parts is assessing employee's attitudes towards the transformation, which can be better presented by taking in responses from a large amount of number of individuals who are actively trying to adapt their style of working in line with the newer guidelines. Moreover, another advantage of this questionnaire was that since the influence of interviewer effects could be eliminated, more fair responses could be gathered despite the differences of ethnicity, gender and social background.

In total, there were 18 questions in the questionnaire (see Appendix B), having a combination of 'Yes or No', open ended and ranking criterion questions along with questions that the participants could answer using a Likert scale. A Likert scale is a psychometric scale used in scientific research that has multiple categories from which the respondent can choose one to express their opinions attitudes and feelings (Nemoto and Beglar, 2014). The Likert scale was chosen primarily because the authors needed the questionnaire to be quick to fill out but at the same time tap into the degree of approval or disapproval the individual was expressing to a certain question. The initial plan was to contact individuals at Volvo with designations that matched our desired sample but it was realised that it could be a difficult and time consuming method with little possibility of success. To get around this problem, help was sought from one of our interviewees who held a senior position at Volvo's electromobility department, in order to gain access to a large number of individuals working at team level. The questionnaire was built on *SurveyMonkey* and a link to fill it out was sent to the interviewee via email, who later forwarded it to several such employees during a planned PI meet. The actual number of individuals to whom the link to the questionnaire was sent out was kept undisclosed but the authors received 44 completed surveys at the end. The total number of responses were higher but many amongst them were incomplete or wrongly filled out and hence were deemed unusable. This study therefore considers those 44 responses for further analysis.

## 4.4 Data Analysis

In this study, the authors relied on Content Analysis as their primary mode of analysing gathered empirics and data for its merits of being a flexible method for analysis text data (Cavanagh, 1997). Furthermore, Content Analysis aims to provide knowledge and helps in understanding the phenomenon under study (Downe-Wamboldt, 1992), which is closely aligned to the exploratory nature of the research questions of this thesis. Other data analysis methods, such as Grounded theory was not applicable to this study as the authors are not aiming to create any theory but rather to explore the content of the empirical data gathered and hold it against the already establish theory in order to make sense of the data and find subsequent inconsistencies in the theory. For this study, a subtype of content analysis called Directed Content Analysis was considered apt since the primary goal of directed content analysis is to validate or extend an already existing theory (Hsieh and Shannon, 2005).

The process of data analysis started with transcribing the interviews which had been gone through multiple times by the authors in order to familiarise themselves with the data set. Initial codes were developed which focussed on three broad sections namely, ‘drivers’, ‘challenges’ and ‘benefits/consequence’ based upon the three separate aspects of change this study looks into. The coded data was further grouped into sub-codes that were raised from the themes that the authors encountered in the theory that was used to build the theoretical framework. These sub-codes were essentially as breakdown of the bigger theories that have been utilised, such as ‘imperatives’, ‘organisational challenges’, in order to help the authors match a given text to the part of the theory most accurately when conclusions are being drawn. Pieces of data which could not be sub-coded, were analysed later to determine if these data belong to a new category or are part of a subcategory. The data gathered from the questionnaire did not necessitate any form of coding since the questionnaire itself were grouped into sections and distinct questions exploring separate themes and results garnered were in the form of explicit visual data. It is important to note that coding has been achieved by the authors not only by looking for keywords or phrases that directly highlights and addresses the codes but by also taking into account, bodies of texts that are indirect and have meanings not explicitly stated but according to the interpretation of the authors, refers to a particular theme and hence has been coded accordingly. The sub-coded data from interviews along with survey responses were later held for comparison with corresponding theories in order to make sense of the events at Volvo in relation to the theoretical framework used and also to find gaps and inconsistencies, if any, within those theories.

## 4.5 Research Quality

LeCompte and Goetz (1982), in their work have been critical about the usage of criteria that is used to assess quality of quantitative research to be further deployed to establish the quality of qualitative research. They argue that it is impossible to ‘Freeze’ a social setting wherein the study was first conducted in order replicate it. Hence there must be different criterions to judge a qualitative research. Lincoln and Guba (1985) and Guba and Lincoln (1994) echo these sentiments and note that it is necessary to specify terms and ways of assessing research that is of a qualitative nature thus providing an alternative to terms such as reliability and validity. They argue that, in a way seeing a qualitative research through the lens of criterions meant primarily for quantitative research, distorts the ontological position that qualitative researches

are usually based on, countering the realist nature of quantitative research. The authors of this study have utilised the four major criterions that Lincoln and Guba (1985) and Guba and Lincoln (1994) suggest that could be used to judge the quality of qualitative researches, which are as follows.

*Credibility*

To ensure credibility in this study, the authors utilised 'Triangulation' during their phase of data collection and result formulation. Triangulation is predominantly a method where more than one method or source is used for data collection to ensure that the researcher has indeed correctly interpreted the social world that they are attempting to study, which is an important aspect for the credibility of a research. Triangulation was used in this study by having two separate data collection method covering two different levels of the organisation, i.e., the team level employees and the managers, in order to confirm whether the claims upper level management is making are indeed backed up by lower level employees and teams.

*Transferability*

This criterion is tough to ensure in the case of this study since the study was conducted in a closed organisation and the findings that are shown here might be applicable to this exact context. Perhaps, it could be said that the findings of these might be adapted to other cases that are studied with the exact same theoretical backing as the discussions of this study are in the scope of the theories described beforehand.

*Dependability*

To ensure dependability, the authors have kept records of interviews conducted, the questions asked and a well compiled sheet of responses gathered from the self-completion questionnaire for the purpose of cross referencing as and when required. The authors have gone back to the records kept, to make sure the findings are aligned with the data gathered. Furthermore, the rationale of actions during various stages of the study has been described in this study to the best of the authors' abilities.

*Confirmability*

For a study to have a fair degree of confirmability, it must be apparent that, even though absolute objectivity is impossible, the researchers have not allowed personal values and theoretical inclinations to overtly bias the outcome of the study (Bryman and Bell, 2011). Confirmability during this study was made sure by having frequent telephonic conversation between the authors and their contacts at Volvo trucks and simultaneously having weekly meets with their supervisors at Uppsala University to report the progress made and further discuss the technical aspects of writing a thesis. The researchers have tried their best to not influence the modes of data collection and have tried and taken a strict approach of analysing the data gathered objectively with the theory being a guideway. The method of Triangulation during data collection used, as discussed above, further enhanced the confirmability of this study.

## 4.6 Ethical Considerations

The ethical principles are described by Diener and Crandall (1978) as four aspects: whether the research is harm to participants, whether it is lack of informed consent, whether there is privacy invasion and whether there is deception. They have some overlaps over each other but show the general human values and how the participants should be treated. For this thesis, the ethical aspects are mainly considered to be the concern of individuals who participant the case study, so mutual respect, trust and accountability are also needed to take into consideration.

Bryman and Bell (2011) describe the harm to participants into categories such as physical harm, harm to participants' self-esteem or development, or harm to their career development. As the *AoM code of Ethical Conduct* states that researchers should take the responsibility that minimizing the possible harm to participants. Another aspect of harm to participants is addressed as maintaining the confidentiality and anonymity, which could also increase the possibility of collecting open and honest responses. It claims that confidentiality and anonymity should be negotiated and agreed before conducting the research with participants. Therefore, when conducting the thesis research, the transparency is of importance, all participants will be informed about the potential harm and the confidentiality. For semi-structured interview, the interviewees could choose whether or not to be anonymous and for self-completion questionnaire, all the participants were kept anonymous. The principle of informed consent is related to the participants knowing the process of research. It means potential participants should be informed of the purposes and nature of the research so that they can freely choose whether to participate (Bryman and Bell, 2011). During this research, before starting the interview and survey, all candidates will be informed of the study purpose, how we would use the data, then they decide whether or not to participate in the study.

Invasion of privacy is a concern that during the research, even if the participants have made the consent to join, it does not mean they abrogate the right to their privacy totally (Bryman and Bell, 2011). That is to say when people agree to be interviewed, they also have the right to refuse answering certain questions if they feel it is kind of invasion of their privacy. During our semi-structured interview, participants were free to choose if they wanted to answer certain questions. As the scope of privacy may vary from different people, it would be impossible for us to know which topic or questions would be sensitive to participants beforehand, therefore, we give respondents full autonomous rights to decide whether or not to answer certain questions. As for the self-completion questionnaire, since the questions were fixed beforehand, it could be impossible to skip the question, but they still could decide whether or not to participate in the survey in advance. The last ethical principle is related to deception, it happens when the researcher represents their research results other than what it really is. When it comes to our research, we would like to present the authentic and objective research results in our thesis according to the data we collected.

# 5. Empirical Data

In this chapter, the authors jointly present the data gathered by both methods, i.e., interviews and self-completion questionnaires for subsequent analysis that would be done later on in this thesis. The method of data collection has been mentioned in-text with the respective data that has been presented below. The presented data has been separated into three central themes of this study, namely drivers, challenges and outcomes.

## 5.1 Drivers of Change

The last two decades have seen a rapid growth in the incorporation of software in cars. The cars of today have software and hardware working in tandem with one another. Therefore, it was important for Volvo to continue to evolve as a strategy to remain competitive in the market, today and in the long run. The opinions of section managers and developers at Volvo's electromobility department reflected this very ideal: 'the increasing amount of software product, and more and more customer functions are being realised through software and electronic systems.' They believed that as the market moves towards more advanced software-based automobiles, it becomes increasingly important for organisations to start looking into investing more resources into function development, control systems research and software development in order to further explore this discipline that fare well as business opportunities of the future. The superior level management at Volvo, a decade ago lacked understanding of these concerns that were being voiced by the managers at the electromobility department and hence were not very supportive of the cause, though it changed as time passed and understanding of such issues became more widespread. With these notions becoming better understood within the middle echelons of management, it became apparent through dialogue between the two levels of management that automobiles nowadays have complex software integrated within its core functionalities, which are hard to design and implement with a more traditional project management setting and is often the reason for failure. Given the dynamic nature of the market resulting from shorter product life cycles, technology based companies such as Volvo are continuously battling obsolescence to keep up with evolving customer needs and expectations forcing such organisations to continually innovate. Hence, there was a need being felt for a project management platform that welcomes changes and is structured in a way that it can keep up with it. The first to suggest Agile methodology to be incorporated within the department as viable solution to this problem were the line managers and developers within the electromobility department, since agile as a concept has been around the software development community for quite some time and the developers within the said department at Volvo were a little more familiar with the methodologies of agile and were aware of its benefits. Throughout the data collection stage, multiple senior level interviewees have also cited the dynamism of customer needs as one of the reasons for Volvo to become agile but from the interviews, there is little evidence to know how much importance this suggestion was given at that time and whether this acted as a stand alone factor in initiating Volvo's interest in incorporating agile methodologies.

Even though the external motivation towards Volvo's transformation seems formidable, the internal factors seems to have played a big role in pushing Volvo to adopt Agile Project Management methods. There were multiple factors that were identified through Interviews with Volvo executives, agile experts and questionnaires from Volvo Employees who are

currently working in an Agile Environment. Firstly, the biggest predicament employees at the team level were facing was a 'lack of mandate' in a traditional project management setting. This factor, according to the survey conducted amongst non-managerial employees of the electromobility department, was the biggest internal reason why the company decided to explore the possibilities of Agile methods since it was ranked the highest amongst others. The lack of mandate in the context of Volvo trucks was, to put it simply, a lack of any sort of democratic setup when decision making was concerned. There seemed to exist a bias towards traditional hierarchical decision making structure wherein most decisions came in top-down and team level employees lacked the autonomy to make their own decision and were rarely consulted with when decisions which concerned of affected them were made. There was tendency for superior management to micromanage throughout the course of task completion. There came a moment when the management at Volvo realised this kind of decision making structure was off putting to younger people who were joining Volvo who were more in favour of a more democratic setup where they felt included and important. When we asked an Agile Expert, who had previously collaborated with Volvo, as to what he felt was wrong when it came to the decision-making process at the company pre-transformation, his answer confirmed with the situation within Volvo truck. An excerpt from the conversation is stated below.

*"...they (Volvo Trucks) realised that there are much more like top management micromanaging in everything as they do not trust their employees to make their own decision."*

The expert believed that lack of opportunities for employees to have any real influence and decision-making power could lead to discouragement and their subsequent disengagement which could prove to be disastrous for the core value of Volvo trucks, which holds innovation in high regard. Also, it might lead to bad decision taken more frequently as an efficient decision-making process uses the whole of its value-chain rather than few elements of it.

Alongside this, another significant problem, according to the agile expert that Volvo faced through its use of traditional project management methods was perhaps that of *'Low Planning Precision'*. As it was later encountered in multiple interviews, the senior executives at Volvo were of the opinion that projects teams had a hard time making any commitments when asked to deliver in a limited time frame. In the standard approach, too much rework came at the very end, as a tiresome and often unplanned consequence of finding faults during final testing and integration. Lastly, it was observed that the lower level management complained of an overall *'lack of efficiency'* within the organisation when it came to handling projects with inefficient processes such as excess documentation, inflexible project scopes and slow feedback cycles holding the teams back from being truly productive. A line manager mentioned that since these problems had been ingrained in the working style at the company for so long, no one actually took notice of it or raised an alarm until recently.

Furthermore, there was a rising opinion amongst group managers and section level managers that there was also a need to take better care of their employees. There was rising workloads on project team members and Volvo's employees in general due to its multi-project environment. There were fears that if the situation is kept status quo, the productivity of the employee might deteriorate due to work fatigue, a line manager at Volvo during the pre-adoption of agile methods who showed great willingness to make the change, claimed that there was a need to take care of their employees. They need to be able to work, to be able to feel good at work without feeling a sense of revulsion towards it. These middle level managers, in the pursuit of rectifying this looked onto the Agile Project Management methods as a

framework to rid themselves and their employees of such workloads as such workloads are treated significantly different in agile as team members choose work or projects based on their current workloads. Hence, in 2012, a group of managers started discussing these issues that they saw so frequently in the organisation. And at some point, these managers began exploring the Agile principles and asked themselves if this was something they could look into and broke down the many opportunities and challenges yet to come into smaller, more manageable questions. Finally, when the managers had decided amongst themselves that this is the most feasible framework that they would want to implement within the company, they started sharing it with their employees.

When Volvo decided to adopt agile practices within their workplace, a significant task facing them was communicating the new plan that the organisation had drawn up and implementing it within the organisation itself. Initially this group was kept small, being just 50-70 employees and a workshop was conducted to relay this information in order to alleviate doubts and give the employees a chance to ask questions and give feedback. And largely enough, the feedback was positive. Data gathered from the questionnaire revealed that the initial reactions towards their division adopting agile practices for most responses gave off a slightly sceptic note but not as much as expected from such a radical transformation or change. The higher amount of scepticism amongst the group was corroborated by the fact that most people in the questionnaire respondent group had little to no knowledge about agile working practices. So, it is fair to claim that a rather unaware audience was being dealt with. Though the management maintained their stance that the introduction of Agile Principles was met with much glee and reactions remained mostly positive. When the authors again asked whether the reaction of the employees was largely positive, a line manager said:

*"Absolutely, very positive. In my experience working with this for quite some years is that moving towards agile is actually very well accepted by employees. The difficulties are when you bump into managers, traditional leaders and so on."*

Clearly, there was a need for education to get the employees who would work with agile methods in the future, to get them up to speed. Employees were given workshops, lectures and talks from Agile Coaches depending on the role that they would go on to fulfil in the company's agile framework. Employees were highly satisfied with the level of training they were provided as in the responses to the questionnaire, it was considered a non-issue amongst the challenges that the organisation had to overcome in the transformation to Agile. As a result of comprehensive training, the acceptance of agile amongst the employees in the company rose significantly stressing on the importance of training and education plays in the process of transformation. Effective education and communication involve everyone in discussions that enhance understanding and further help by providing feedback, options, and new ideas to the team in charge of the improvement endeavour. Most out of the total 44 respondents to the questionnaire, agreed with the management's decision to adopt agile practices in the company after they had worked with it for some time and had been given the needed training.

As the management gradually saw the positive attitude from employees and a more organised team in 2013, through 2014, the adaptation of agile was scaled up. The middle level managers saw the opportunity to create a team that shares functional software development and

mechanical and electronic design. Thus, they took small steps towards program level in SAFe. As the manager mentioned, SAFe was used as an inspiring supporting framework but not a law when they scaled up. Going further, the support from top management made the transformation much smoother and faster. A completely new line organisation was created and a SAFe implementation with the whole levels of portfolio, program and team level fell in place.
The department structures or the framework of large scale agile could be described this way, according to the interviews of higher managers at Volvo trucks: the value streams are all organised according to the products as they are manufacturing or delivering, namely like electric buses, hybrid buses, hybrid trucks and full electric trucks and construction equipment and machinery. The agile release trains (ARTs) connect to those value streams and totally about 25 teams working together in the ARTs. In each small team, it works for defining, building and testing for small backlogs in fixed-length iteration and releases. Teams mainly follow Scrum framework but also have enough autonomy of deciding how they should work, the agile expert who has close collaboration with Volvo also confirmed this that:

*"they (the teams) have not been firm how the team should work, they let the team decide a lot on their own, they mainly have Scrum framework but they have adopted it differently in different teams."*

The interviewees agree that to achieve an agile based management system, there needs to be a significant cultural change in the organisation with most effort to be put by the upper level managers who have, till before the transformation have operated in a traditional environment with preference for command and control. It proves frustrating for them when they have held a commanding position and suddenly after adopting agile they have to actively take the role of a coaching leader. Majority of the interviewees agreed upon the fact that there needs to be an environment where teamwork is rewarded, employee concerns are heard and leaders actively take part and devote themselves to create the best possible circumstance for the team and as agile often works in small units, its working processes focus on creating a shared sense of ownership and common goals for the team members. People in the team were encouraged to voice concerns, suggest changes or provide inputs in early stages of projects. Employees felt more comfortable to raise their opinions in this kind of self-organising team. Moreover, stakeholders also had multiple opportunities to get engaged in every step of the project. So, the team could truly understand the business vision and raise their voice in the early stages. This was thought of as a monumental shift from how Volvo operated previously.

## 5.2 Challenges

Since the agile way of planning is to build milestones and additions, which is like turning the planning upside down compared with the traditional way, it also causes the problem of breaking requirements down into backlogs. As a result, from the interviews of higher managers, one of the biggest challenges they faced was in coordination and interfacing. When they talked about that they have challenges in cooperating with the rest of Volvo departments that are not agile yet, a section manager said:

*"since some parts of Volvo aren't agile yet, sometimes it is hard to talk about commitment, for they say what we will do in detail in ten weeks here now, but someone says that our plan is what to do in two years"*

This also matters when seen from the viewpoint of allocating funding and money, the traditional way of working is that a stringent plan and a framework are made beforehand and then according to everyone's funding report to follow the spending. But in agile way of working, since the projects are divided into backlogs and they have priorities to execute, and it also usually has several iterations during the process, it could be harder to follow the money flow. However, they did not mention that they have problems in interacting with other departments like purchasing, aftermarket, operation etc. It is important to reach as many people as possible throughout the organisation when a new working method is adopted by the organisation. During the interviews, neither the higher managers nor the agile expert mentioned any sort of communication barriers being faced within the organisation, but it was mentioned by the survey respondents as a challenge that they faced. One possible explanation is that it might be because of the above mentioned coordination problem between those agile departments with the traditional department. This might cause cognitive difference for projects and thus communication issues amongst those departments. Moreover, when it came to Human Resource Management (HRM), since it had a different view of looking at management and leadership, Managers at Volvo complained of HRM imposing their opinions and their viewpoint of the company on departments. The HRM of Volvo continued using their dated guidelines and operating procedures even after some departments at Volvo were transforming into agile. They had trouble understanding that the departments that were working with agile methods needed to be seen through a different lens and should be subjected to separate criterions when routine procedures such as hiring were concerned.

From the questionnaire responses, other challenges were pointed out in the process of agile implementation. 'Lack of clarity regarding roles in an agile environment' was the most quoted. As agile transformation requires a culture change, especially on the middle management level, the unclear of middle management role may pose problems to the transformation process. As mentioned as initial resistance before, in the traditional management approach, the managers usually stand in the centre point and have a preference for command and control, but in agile, it needs to allow room for self-organisation and let the team to make their own decision. The managers are also required to devote themselves and time into teams and create this kind of environment for agile teams. However, this previous mindset is difficult to change and thus became a challenge during the transformation. Except the role of middle management, how to work with project managers is also a challenge. As the working pattern is totally different compared with the traditional one, the project managers have difficulties now because they are not just following one team, but several teams in one time. The agile expert said:

*"since you are a project manager now…previously you know the exact team would help you, now it's not like that since you make decision, in ten weeks it could be different teams with different stages, and that makes harder to follow up. So, the project managers have a harder time now in how to fit in this organisation"*

Through the interviews, it was established that the employees at Volvo were surprisingly open to adopting agile practices when it was initially proposed in a meeting that the company was considering a transformation. Even though, the responses from the questionnaires reveal there was a small amount of scepticism amongst the employees toward agile practices, it did not convert to full-fledged resistance. It was also reported that, there were a select few in the counts of two or three employees at the team level that were not happy with what was going on and

eventually decided to leave the team. But largely, the reaction was positive. The senior project lead who was in the core of the planning said,

*"I clearly remember that when we were in that session...to the end of that session, there were a few employees that came to us and said, "This is the best you've ever done, keep it up…"*

The initial resistance that the change leaders at Volvo faced were significantly from the upper echelons of management, to whom the disruption to their grasp over the organisation, their loss of command and control meant their positions as leaders were being challenged. There were managers that were very curious and as to what was going on and were annoyed at the changes and issues that the transformation was starting to bring at the upper level. Even though it might be evident from the previously reported data from the interviews that the employees at the team level were overjoyed with the decision to adopt of agile practices within their organisation, the questionnaire revealed that they still didn't have the answer to why was it being done and was hence put down as big challenge by the employees during the change process. The agile expert believed that this was a major problem for Volvo since not having a clear reason and the employees not knowing what was expected of them could possibly slow Volvo's progress. On further enquiry, it was stated by a manager at Volvo that since the decision to go agile they had great insight as to why the organisation need a transformation but it was not effectively communicated throughout the ranks. She further stated that this was rectified through effective training and education.

## 5.3 Outcomes of the Transformation

Agile, in the current age is starting to become a more preferred method of working for organisations that are looking to get past the dysfunction that traditional methods of working possess. Some of the benefits beings the ability to manage changing priorities and project visibility. According to the interviews and questionnaire, adopting agile also brought benefits to Volvo, and as they saw these benefits, they wanted to scale it and simultaneously make more and more departments agile. An overwhelming majority of the respondents to the questionnaire thought the transformation to be positive. It is interesting to note that during data collection, it was seen that there was a difference between what the management and the team level employees felt was the most considerable benefit that agile methods brought to Volvo. The employees, amongst which the survey was conducted, felt that the adoption of agile has created a better work environment for them. On the other hand, interviewees who were mostly managers and executives, believed that biggest benefits of agile have been on the operational front. This is the first indicator that agile at Volvo had started to prove beneficial at all levels of the organisation. Overall, the benefits that the people of Volvo saw were in the domains of operational efficiency, employee morale and project planning and execution. These benefits can be seen in these statements made by the group manager and director (electromobility) respectively.

*"I'd say that the transparency when it comes to developmental activities which are on a completely different level (now). We also see that the dialogue in between managers, teams and so on were also increasing"*

*"There's so much energy being part of the organisation now to see how our employees are growing everyday and learning new things, making them even more capable of developing new products by working closely with teams."*

Compared with traditional project management, which is not iterative and more about a process of progress flowing in different phases, agile methods address more on customer requirements. From the beginning, it breaks down the project into small backlogs and during the whole cycle, it shows visibility and transparency and the actual progress of projects. In Volvo, according to the managers, it is now easier to see problems because they spend a couple of hours on ten-week planning sessions. And also, the first half day they get together to talk about the overview and thus get the sense of how it fits together. Now, at the heart of every Agile Release Train (ART) at Volvo, there is a Program Increment (PI) planning followed by peer planning after a few days which provides a great opportunity to have transparency all the way from the business need down to the teams as to what they need to deliver. The agile way of working is to break down requirements into small backlogs and each of them is completed through sprints. Since each sprint has a fixed duration so the amount of work that would be done in a sprint can be estimated beforehand. Thus, it enables the department make more precise plans. At Volvo, the consensus was that compared with the old way of working, agile methods made people make commitments more and felt more responsibility for their products, and it also had a positive effect on product quality. Agile teams at Volvo, often works in small units, and its working processes focus on creating a shared sense of ownership and common goals for the team members. Thus, people in the team feel more comfortable to raise voice in this kind of self-organising team. Moreover, stakeholders also have multiple opportunities to get engaged in every step of the project. So, the team could truly understand the business vision and raise their voice in the early stages. During the interview, the agile expert said:

*"they (Volvo trucks) really had problem with that previously, they got to hear problems so late because people were afraid of telling someone about this because they might get the blame. Since they have this (agile), which are more self-organising, they see problems much earlier because people speak out"*

Managers at Volvo feel good about the change the transformation has brought about as it is more suited towards their leadership style, many managers that were interviewed believed, that their philosophy of leadership was closely aligned with the kind of servant leaders. They think that it is far more rewarding to be coaching their teams, being part of the dialogue and being able to create a better environment for their teams which goes along very well with the agile way of working. Moreover, as it was once mentioned in section 5.1, that there was rising opinion amongst group managers and section level managers that there was a need to take better care for their employees since Volvo's multi-project environment created too much workload for their project team members. As the transformation is underway the managers in the interview report that, they are seeing this problem becoming alleviated. Further, according to the interviews, the organisation is becoming much healthier and such an efficient and well-organised organisation definitely increases the team morale which was also seconded by the responses gathered from the questionnaire wherein respondents claimed that increased team morale was a major benefit brought along by the transformation. A senior level manager, heading a department undergoing this transformation claimed that he saw immense

improvement in sick leave statistics which were coming down drastically. Moreover, there seems to be an immense source of energy within teams who are now more outgoing and open to learning new things. This not only makes the teams more capable but it was a confident indicator that things were improving within the organisation.

The interviews conducted at Volvo, did not indicate any dip in productivity or efficiency during the course of the transformation. One manager told us that he saw the opposite, productivity actually increased. Even though it is difficult to measure productivity within an engineering department, he mentioned that the overtime accumulation was starting to reduce, and the number of problems reported were decreasing and they were about to deliver more. Also, since agile way of working has cut them down, it increased the time for engineering work instead of report procedures. This was further supported by the agile expert who was of the opinion that even though Volvo did not see an immediate spurt of increased productivity immediately, there was however no loss of productivity. He stated:

*"…but well it didn't get much better at the beginning but then it got better, however it never got any worse when they started making this transformation."*

# 6. Empirical Analysis and Discussion

In this Chapter, the authors have attempted to further dissect the data that has been collected and described in the previous chapter and have tried to make sense of the finding by deploying the theoretical framework that has been constructed for the purpose of this thesis. The chapter takes the shape of three major sections that follow the format in which the research questions have been framed and data been presented. The first section (6.1) looks to analyse the factors that contributed to Volvo's decision to transform and the imperatives that were tackled to bring about the transformation. Drivers of change model and change management models have been used for this part of the analysis. The second section (6.2) talks about the challenges that were faced during the transformation and have been analysed using theories advanced by Nerur et al. (2005) and Anderson (2001) that relate to challenges, the change curve and change management models. Lastly, the outcomes of the change (6.3) have been analysed using change management models and the change curve.

## 6.1 The Driving Force of Agile Transformation

As we have seen in our review of previous literatures, companies have tried to adopt agile practices from the early parts of the millennia due to different reasons with varying levels of success but certain themes are found recurring when these literatures are held against each other. Similarly, here in Volvo Trucks, we see similar trend which may have pushed them to undertake this change within their organisation, but to successfully implement all the necessary attributes of agile within the organisation, the transformation had to be of radical nature. Anderson and Ackerman Anderson (2001) argues that for a change to be radical, the organisation must go through a shift in culture, significant change in work methodologies, behaviour and mindset. And that is what was seen in the data gathered from Volvo. The way the case of Volvo differs from most cases that were cited in the literature is that the change or the idea that a change is needed was brought forward by middle level management which is similar to Paasivaara et al.'s (2018) study at Ericsson further adding truth to the notion that working in a traditional setting is inherently dysfunctional (O'Connor, 2011; Hansen and Baggesen, 2009; Chung and Drummond, 2009; Beavers, 2007; Ranganath, 2011). Where in Volvo, other than the employees feeling overburdened and overworked, there were significant working style challenges faced by employees, such as micromanagement and lack of mandate that became hard to ignore in the face of decreasing efficiency within the organisation. Coupled with factors that were external, it became crucial for Volvo to transform in order to remain competitive, cementing Musa's (2016) argument that the survivability of an organisation depends on its ability to undergo a transformation when it is imperative.

Volvo Truck's undertaking of radical transformation meant that the overhaul spanned through multiple structures of the organisation and the core working philosophy that the organisation deployed. We have seen in the data that was gathered from the interviews, that the drivers of change were multi-dimentional where many forces, both external and internal seem to be working at the same instance. For example, at Volvo, dysfunctions faced by employees made the management to look into ways to alleviate these problems, on the other hand the company was witnessing the emergence of a dynamic market, where the company needed to adapt to rapidly changing customer requirements and keep up with evolving technology. The solution that suited the organisation best was to become an organisation that integrates principles of agile in their way of working. But for that to happen, Volvo trucks had to successfully tackle

and respond to the demands that the organisation was subjecting itself to, driven by the vision of change that they initially planned upon. Firstly, the managers involved in the decision to turn agile had to effectively communicate their vision amongst employees at all levels of the organisation conveying how 'it is a good thing to happen to them' and how beneficial it would prove to be for the organisation in the near future. Once that is done, the managers face the difficult task of drawing out what and more essentially where change is needed within Volvo's framework in order to become agile. This led to their decision to use SAFe as a supporting framework to open a new line organisation with SAFe implementation in portfolio, program and team levels. But this required the culture of the organisation to be overhauled, where preference for command and control was discouraged and teamwork is rewarded. The team hence focussed on a shared sense of ownership and believed in working towards a common goal necessary to be able to be truly agile.

Certainly, here we see that drivers are not just external and impersonal but also internal and personal which are a direct result of the former. As pointed out by Anderson and Ackerman Anderson (2001) in their model for drivers of change in an organisation, change is often triggered externally, which requires or demands a change in the more specific domains of the organisation such as organisational design or culture etc. At Volvo, we do not see an imbalance in the response delivered by the change leaders and managers in recognising the external change drivers and addressing the imperatives that the organisation faced during the transformation process, rather it is evident from the data that the managers were faced with multiple drivers and later imperatives at once which they tackled well forming the basis for a relatively smooth transition. This is a significant departure from Anderson and Ackerman Anderson's (2001) claims that state change managers struggle with the imperatives that are involved in the change process, contributing to a disproportionate response. Furthermore, multi-dimensional nature of the drivers we saw at Volvo casts a doubt over the linearity of the proposed model. The above-mentioned point that the change leaders and managers at Volvo had to respond to multiple triggers and imperatives at once only exemplifies this observation. The data gathered during this study points to the possibility that the drivers are flat with multiple interdependencies between them.

During data collection, we encountered one factor that Anderson and Ackerman Anderson's (2001) model failed to describe or deem necessary. It was of the internal Pressures faced by the organisation. It is true that the model talks about some forms of internal change drivers, in the form of imperatives, that demand a response as a direct consequence of external drivers of change faced by the organisation but it could be often the case that an initial trigger for an organisation to transform itself could be the internal dysfunctions the organisation faces, exclusive to the external pressures it faces for change, something we saw happening at Volvo. The organisation was experiencing the imminent drawbacks of traditional project management methods. The managers that were interviewed and the employees that answered questionnaires believed that the project management methods or the working style that the organisation used to execute projects made Volvo inefficient. The problems ranged from the lack of involvement that the employees had to face when it came to influence big decisions taken by the company resulting in low morale to projects teams struggling to make commitments when it came to project delivery timeframe. All of it culminated in sluggish organisation that suffered from excessive rework and documentation, slow feedback cycles and lack of productivity which inadvertently slowed Volvo truck's progress as an organisation. Paasivaara et al. (2018) during their case study at Ericsson reported that customer dissatisfaction was a major motivator for

Ericsson to venture in Agile methodologies, adding that teams at Ericsson had difficulties in finishing promised features on time and slow development lead times were seen across the organisation hence work was not considered efficient. What was happening at Ericsson is comparable to the problem and dysfunctions faced by Volvo at an internal level and similar problem as motivator for agile has been mentioned in numerous literature over the years (O'Connor, 2011; Hansen and Baggesen 2009; Chung and Drummond, 2009; Beavers, 2007; Ranganath, 2011). Hence, we feel it is necessary for the model to include these factors as a legitimate driver for change along with the ones mentioned.

Through the steps of the Drivers of Change model, we can also observe the concept of unfreezing undergoing in the organisation (Lewin, 1947) and subsequently the the initial four steps of Kotter's (1995; 1996) transformation model. From the data gathered it is evident that, a sense of urgency was created by the managers when they saw the drawbacks of the traditional ways of working at Volvo and the impact it had at the competitiveness of the organisation in a rapidly changing market. The middle level managers hence formed a strong guiding coalition after convincing the top-level managers that this is the way to go about the future of the organisation. Kotter (1995; 1996) talks about the importance of inclusion of top level leadership in the the coalition as it must be powerful enough to create a vision that influences the whole organisation and can move past barriers and garner the support of most employees. Such a vision was created at Volvo to adopt agile as their primary method of working. It created a direction for the organisation to work towards and strategies must be drawn as to how this vision would be achieved (Kotter, 1995; 1996). The vision was then Communicated to a small group of employees, and through feedback, their doubts and scepticisms were addressed and relevant education was provided so that they were better equipped to understand the principles of agile. From our findings, it can be inferred that not just Anderson and Ackerman Anderson's (2001) Driver of change model applies to the process of change that is being undertaken by Volvo trucks at the moment but also Kotter's (1995; 1996) 8 step of organisational transformation. Even though the two theories might seem to refer to separate contexts, they still are concerned with change at an organisation and at the case of Volvo Trucks, they seem to be working in tandem with one another.

## 6.2 Challenges Faced During Transformation Efforts

In a transformational effort, there is seldom change without encountering challenges in its path, at Volvo we have seen the same. The interviewers have talked in length about the issue and challenges that the organisation had to face in their attempt to adopt agile working principle for their organisation. Challenges in the organisation being multifaceted that transverse multiple organisational domains and people related (Nerur et al., 2005), we have in this study, as described in previous chapter, broadly categorised it into two factors, which we will analyse separately, one after the other.

### 6.2.1 Operational

The agile style of working is indeed quite different from that of the traditional way that were in use by Volvo up until the transformational efforts were undertaken. It was not surprising to see that a big part of the problem that were faced by Volvo trucks were of an operational nature. The way things are planned and executed in an agile setting is highly contrasting to that of the traditional ways. One of the biggest challenge that was encountered was that of '*interfacing*

*and coordination'* which in simpler terms would mean that one part of Volvo was agile and the other parts were still maintaining status quo and it became increasingly difficult for them to coordinate between themselves due to divergent working styles. Boehm (2004), points out the differences between these two working styles, where agile ways of working are more geared towards flexibility and relies on planning and realising uncertainties to achieve rapid development, Traditional processes are measurement driven aimed to provide assurances.
These fundamental differences create a difficult scenario for two departments or entities to work together in tandem to derive maximum efficiency. This exact problem also results in communication barriers between theses departments, as mentioned by employees in the survey. The hindrance in communication echoes the problems Volvo is facing with regards to interfacing between two departments with different methodologies. These problem at Volvo looks to be of both Process related and technological in nature.
As Nerur et al. (2005) argue that perhaps the biggest barriers that an organisation faces in its transformation efforts is the change of process from a life cycle model to an iterative based development and since it results in big alterations in tools and techniques, strategies etc, it is hard for one department to predict or be at the same page on of the other, where both are using different methodologies to make progress. Unless the same or similar tools and techniques of agile methodologies are also made available to the department using traditional processes, these issues would be tough to alleviate. Dikert et al. (2016), advise the use of training as an effective way to understand the use of these tools correctly. So, until the time comes when the department using traditional process also becomes agile, training in agile methodologies can be an effective way to synchronise divergent departments better and have better coordination amongst them.

Further on, the managers and employees at Volvo Trucks have pointed out about the *lack of clarity regarding roles* after adopting agile practices. During the traditional practices at Volvo, there had been a preference for command and control but now some managers are facing the evolving methods of working where there is now room for teams to organise themselves and make their own decision. The mangers feel that they are losing grasp of their status in the organisation which could lead to forms of resistance to change which will be discussed further on. Boehm (2004), highlighted this as a form of challenge that could occur during a transformational effort as mindset of people is hard to change and as agile transformation is also a cultural change, it creates formidable difficulties in the transformational process. Also, managers face difficulties managing projects in an agile environment as the work pattern is significantly different as they are managing several teams simultaneously and have lower control over each group that they did in a more traditional setting. It has been argued by Nerur et al. (2005), that the role of project manager is an agile setting becomes that of a facilitator and a coordinator rather than a planner and controller, as agile teams enjoy higher flexibility and autonomy to make their own decisions and hence, there is great resistance by these managers to let go of these controls.

### 6.2.2 Individual Challenges

It has been said multiple times in this study that the transformation from traditional process to agile is as much a transformation of mindset as it of technological aspects. A collaborative environment where each individual value and trusts each other is one of the keys to successful agile implementation. (Nerur et al., 2005). Even though individuals at Volvo have been quite open to the idea of agile, we have seen instances where this troubling factor of mindset has given rise to resistance against the transformation efforts. It is vital to note that the maximum

resistance faced by the transformation effort were from the upper echelons of management where it seems that these individuals had an affinity towards the command and control structure that the traditional processes offered them and having their grasp over the organisation disrupted, led to a form of resistance to *protect the status quo* in order to not have their position in the organisation challenged. Steps one and two of the Change curve, talks about how the idea of change can be threatening to some, so much so that they may enter a state of shock and denial and further turns to anger in order to express their opinions. This could be the reason why some individuals at Volvo left their teams when they were not happy with the adoption of agile. A lot of it can be explained as a mix of different factors that were put forth by Anderson (2011) as compartmentalising the reasons why some managers were behaving the way they were would be problematic or overly simplistic.

After going over the data from interviews at Volvo and reviewing Anderson's (2011) work on change resistance, we are of the impression that change resistance is seldom, or at least in this case, not due to one singular cause that can be easily categorised but rather a number of factors, one leading to another that ultimately results in some form of resistance. Similar to the model on Drivers of change proposed by Anderson and Ackerman Anderson (2001). We feel what was going on at Volvo was due to the culture that existed there spanning decades. One of hierarchy, control and predictability. The employees are reluctant to give up the culture they have known so well. Adopting a new culture, such of that of agile where command and control is discouraged and teamwork is rewarded leads to *clash in the two opposing cultures*, one that the mangers were used to and the other being the one being bought about by the adoption of agile. This only send a message to the managers who are wary about the change that the system that they have helped build and have worked with for this long is inherently broken which in turn creates a sense of uncertainty and fear as to what changes the transformation would bring about and what their position at the organisation would be reduced to. This creates a strong push for status quo protection which may be achieved by providing strong resistance to the change efforts being made. The inference that the problem of resistance from upper level management stems from the culture of command and control that existed at Volvo is again reinforced by Kotter (1995; 1996) who argues that even though most barriers of change are eliminated during the first four stages of eight step transformation model analogous to Lewin's (1947) change model's Unfreezing stage, the one barrier that remains is usually that of 'structure and supervision' which is essentially, a belief that is held in traditional organisations that hierarchies and command structures are set in stone and a threat to these structures can give rise to resistance as it threatens the people and the organisation that hold these beliefs.

Another challenge that was faced at Volvo trucks was where employees were unclear as to why they were transforming to an agile based platform. This challenge was encountered exclusively on the surveys and were not mentioned about by the interviewees at all. It was a challenge that could not be categorised as a type of resistance as the general consensus amongst the same group of employees were that they were open to the transformation but this problem could prove to be a hindrance to the transformation effort's progress due to the reason that an employee who does not know what is expected of them can slow down the change effort. It was a unique challenge that was not mentioned in the literature that we reviewed in the course of this study. The change curve (mindtools, n.d) puts forth the notion that at a stage (first) where the idea of change is new and understanding about what the change entails is lacking, the management must make their best efforts to make the employees understand why the proposed change is necessary and must be prepared to answer questions in order to best address the

doubts that the employees might have. This stage requires heightened communication in order to fully transfer the knowledge of change. This is corroborated by the fact that the management did agree on later questioning that there had been lapses in communication with regards to the need of the proposed change to every level of the organisation and corrective steps had been taken by means of education and training. It seems at first that this issue is primarily an organisational oversight and should be an operational challenge for Volvo during the course of the transformation but since this issue deals with human interaction and emotional matters, it has been categorised as a people related challenge.

### 6.3 Visible Outcomes of the Transformation

It is certain from the words of the interviewees that Volvo is finally starting to see the change that it had planned. Changes have been evident in multiple sphere of the organisation, from planning efficiency to worker morale. This type of visible change is important for Volvo to sustain their transformation effort in the long run and it is important to note that Volvo has taken the opportunity to scale their change effort once they started seeing that the change that they have brought about till now has been beneficial. This is backed by Kotter's (1995; 1996) argument that visible changes are important for a transformation effort to succeed and the organisation must not yet think that they have achieved what they set out for, which could lead to a loss in momentum. Rather, it is important to accelerate the change as employees at the organisation gain a wider acceptance of the change. If we turn our attention toward the change curve, it mentioned that at the step three, where employees start accepting and working towards the change, productivity in the organisation tends to dip (mindtools, n.d), but it was not the case at Volvo, where productivity remained high during the phase of change which could go on to make a point about the level of training and education that was provided by Volvo to their employees at critical stages of the transformation process and highlights the openness the employees have shown towards agile principles.

It could be acceptable to say that the changes that Volvo has seen over the organisation after adopting agile practices has been positive. The final stage of the change curve talks about the employees seeing the benefits of the change and submitting to it. This is again an important point to highlight why visible changes during change in an organisation is so vital, so much so, that now at Volvo, an overwhelming majority of employees were less likely to want to go back to the old methods of working. This not only helps reinforce the decision that the management took that there was a need to change but also it build momentum to bring about more change (Kotter, 1995; 1996). We feel that in the process of seeing change, the seventh step of Kotter's (1995; 1996) model being deployed, but not the eighth step as it is too early for Volvo to institutionalise the changes that it is still undergoing. Change is iterative and is subject to tweaks based on feedback, even though change at Volvo has been positive so far, it cannot yet be said that there will not be things that need adjustment, the cultural aspect of this is the biggest part where to institutionalise a change such as the adoption of agile principles, the mindset of agile need to be the backbone of the culture of the organisation. As we have seen in earlier chapter that the lack of such mindset causes problems for change, such as resistance, we feel that seeing visible change is one of the way to alleviate those said problems and subsequently a wider acceptance and finally institutionalising the change, but for the scope of this study, change is still underway and it is early to refreeze the organisation.

# 7. Conclusions

Answer to Research Question 1: *What are the key drivers that push manufacturers in the automotive industry to adopt AgilePM methods?*

The motivational factors that encourages automotive manufactures such as Volvo trucks to adopt agile methods can be broadly divided into two categories: external and internal. The external driving force being the shift in global automotive industry and ambitious customer demands. As there is a rapid growth of electrified and autonomous trend in automotive industry, the amount of software on one car has increased exponentially on both size and complexity, thus, today's auto manufactures have truly become software companies. To catch up with external trend and meet the ever-changing customer demand, adopting Agile could be the ideal choice for their project method.

Meanwhile, in the case of Volvo trucks, the internal factors also played a formidable role in pushing Volvo to adopt agile methods. From our study, the three main factors that were identified are "lack of mandate", "poor precision planning" and "too much workload". Lack of mandate could cause employees lack of opportunities to have real influence and decision-making power to the organisation, which could be a catastrophe for the core value of the organisation which pursues innovation and effective decision making. Alongside this, "low planning precision" was the main shortcoming of the previous waterfall project management method, which usually plans a project at the very beginning at requires lot of rework in the end. More importantly, the previous way of working has caused rising workload due to its multi-project environment, to better take care of the employees and form a healthier organisation rose as an important driving force. It was also seen, with the support of Anderson and Ackerman Anderson's (2001) Drivers of change model, that within the organisation the push for change, be it internal or external, demanded a response from multiple domains within the organisation for the transformational efforts to be successful. These imperatives are a direct result of triggers of change that the organisation encounters, where the tackling of one imperative triggers the need to address another imperative. It is important to note that it may so happen that the tackling of one imperative may need a response from multiple imperatives at once, not necessarily in the order proposed by the model, which is exactly what was observed at Volvo. This observation casts a doubt over the linearity of the model.

Answer to Research Question 2: *What challenges do automotive organisations have to encounter in their efforts to transform towards becoming agile?*

The challenges encountered by Volvo trucks in their transformation efforts could be categorised under two major segments. First being the challenges that are of an operational nature and the second being those which are individual. The operational challenges that were encountered in this study revolves around Volvo's struggle to coordinate and interface between departments which are agile in their work methodologies and the rest that are still using traditional methods. This challenge was found to be rooted in the fundamental differences in the philosophies of the two working styles. This was also the reason for the barriers in communications that the departments faced in their day to day operations.

A transformation from traditional working methods to agile methods also demands a change in the culture of an organisation, the present command structure is therefore incompatible with

the agile way of working, where teams have more autonomy to make their own decision. This mismatch caused a distortion in the roles of managers and was also deemed as a challenge for the organisation to tackle in the long run. Change resistance, which is a common problem during most transformation processes in the initial stage was also encountered during the course of this study. This resistance mainly came from the upper echelons of management at the initiation stages as it threatened to disrupt their grasp over the organisation resulting in loss of command and control. Also, there was scepticism initially from employees, resulting from their lack of previous agile experience. As the transformation went on, most of these resistances were gradually mitigated when benefits of agile methods were seen. Also, even though most levels of management knew the benefits of working in an agile environment, it seemed from the data that employees working in teams were not sure why they needed agile methodologies within their organisation. This could prove to be catastrophic for the overall productivity of the department and hence was cited as a challenge. These two challenges were part of the people related challenges faced by Volvo

Answer to Research Question 3: *What impact, as a direct consequence of the transformation, have been observed by automotive organisations?*

During the course of the transformation, Volvo has slowly but steadily observed the benefits of agile methodologies present themselves in the daily working of the departments, that have transformed themselves or are in the process of transforming. It was gathered that there has been an uptick in worker morale and increased efficiency in planning activities. The general opinion about the transformation has been revealed to be largely positive. Unlike the sceptical attitude at the beginning, the current attitude of the transformation changed dramatically, as majority of employees now hold a positive attitude towards the change and are less likely to want to go back to the old way of working. Apart from the listed benefits seen at the organisation, the workers now enjoy a healthier work environment as there has been a significant reduction observed in overtime accumulation and sick leaves taken by employees at Volvo. These benefits, as also mentioned once above, has played a vital part in promoting a wider acceptance of the change, bringing down resistance and have provided a benchmark on which the momentum of change can be maintained and appropriately scaled throughout the organisation.

## 7.1 Academic Contributions

The contribution of this study mainly includes identification of the challenges and benefits of implementing agile in automotive industry. When implementing agile in traditional automotive companies, the challenges could be different from other industries due to the organisation structure and previous working patterns. In this study, the resistance of change mainly came from the mid-level managers rather than the employees since, this working pattern challenges their command and control in the organisation, which were never mentioned from literatures. Moreover, among all the challenges, interfacing and coordination as well as to understand the change were defined as most important ones, even though education and training can mitigate the challenges during the implementation process, those two challenges still remain. For most of the changes, in the initial steps, understanding why to change acts as a preliminary basis for the transformation. This study also saw the use of multiple change management theories be used together and an attempt has been made to understand how they interact with one another in a practical environment, through the visualisation of this study's theoretical framework.

Certain gaps and inconsistencies in the utilised theories have also been highlighted during the course of this study, most importantly being the non-linear nature of imperatives and the fact that productivity in an organisation need not drop during the course of a transition if the change is managed properly, these findings goes against the claims of the drivers of change model and change curve respectively.

As it is always considered that automotive companies should take strategic initiatives such as agile project management methods to compete in a globalised trend and be able to respond to dynamic customer demand. From the study, we found that the driving forces not only come from the external environment as it states in most literatures, the traditional way of project management method in traditional automotive has its own shortcomings, and the need to form a healthier and well-organised organisation is also a driving force of the change. On the other hand, even though it is commonly known that agile project management methods can be applied not only in software development, there are few studies about implementing it in traditional automotive industry. From this empirical study, the findings are trying to fill the gap and reaffirms the idea that an established manufacturer can indeed transform to agile. As the transformation at Volvo trucks is successful, we found that the steps can be summarized as initiation, transformation and scale up. During this, the support from higher management and trainings played an important role in this process, which mitigated challenges to some extent.

## 7.2 Implications on Ethics and Sustainability

Agile, when implemented properly in an organisation's general working principles, gives employees a due mandate which previously was held by only the top tier executives in the organisation. When decision making is shared it gives rise to a much more democratic way of working. In such a way, unethical, harmful or dubious decisions are less likely to be taken. If other automotive companies, or companies from any industry for that matter wants to follow Volvo trucks in their footsteps, it is always viable to take into consideration the unsatisfactory work environment that the Volvo truck employees were working in. Such changes in the work environment brought upon by AgilePM gave employees and team members a voice when in they can protest and not agree to collude in a decision that goes against their moral principles, further on, as we learned from the study, the traditional way of working brought along fatigue and project overload amongst employees contributing to their sickness and general non-well-being. Agile, as we have seen significantly reduced such loads from the employee's shoulders and gave them a work environment where they are able to choose their own tasks based on the amount of workloads they already have. Also, it is important to understand that AgilePM methods fuel innovation, which is the need of the hour as climate change is an ever-growing concern amongst the general population and innovation is much needed to foster newer ideas of sustainable vehicles and such which run on cleaner fuels.

## 7.3 Limitations

When it comes to the scope of this thesis, it limits itself to providing a holistic view of the principles that agile project management entails. The case study was conducted at Volvo trucks, as an observer who were not able to join the transformation process, it could be difficult to have a comprehensive overview of the whole process from interview and survey results. Moreover, due to time constrains, there were limited interviewees and respondents who joined the study, thus, the lack of resources and the arduous selection of these candidates might cause limitations of the study results. Lastly, the authors conducting the research are university students, majority of whose understand of the field being discussed comes from university lectures and reviewed literatures and hence in no way are experts in the field. This may result in certain misinterpretation of facts and concepts; however great care has been taken to avoid such issue and achieve the project aim.

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# Appendices

## A: Semi-Structured Interview Questions

1. Can you, for the sake of records, tell us about your association and history with Volvo Trucks?
2. At what point did Volvo Trucks think of Implementing AgilePM methods?
3. Do you think there were particular reasons for it? Why did it become a necessity?
4. According to you, what were the factors that led to Volvo Trucks adopting AgilePM methods? Can you list them or name a few?
5. Did you use the Agile Manifesto as a benchmark while implementing AgilePM methods? If not what reference did your department use?
6. How was the transformation brought together? What steps were involved?
7. How were the employees educated about these new ways?
8. Did you face challenges while undergoing the process? What all? And to what degree?
9. How were these challenges alleviated?
10. Is your department still facing challenges or issues?
11. How do you plan to bring about an overall cultural change?
12. Why do you think your department faced these challenges?
13. How Scrum is used in small teams/ what are the team settings?
14. How and why did your department decide to implement the SAFe framework? How was it implemented?
15. How does the hierarchy structure of safe look like in your company?
16. Agile release train?
17. Is your department satisfied with the new methods of working? What were their reactions initially? (any resistance?)
18. Did you see a dip in efficiency or productivity while the transformation process was ongoing?
19. Has the organisation or department seen any sort of benefits after the successful implementation of Agile, what are they?
20. Do you think the benefits overweigh the challenges?
21. How would you summarize the change that took place? Do you view it as positive?

**B: Self- Completion Questionnaire**

1. What is your name?
2. How long have you worked at Volvo Trucks?
3. What department of Volvo Trucks do you work at?
4. What role(s) do you fulfil in the organisation of your division's overall agile framework?
5. Were you aware of AgilePM methods before the time of your division's adoption of the same?
6. If your answer to Q5 was YES, how long have been your experience with AgilePM practices?
7. How did your division's upper management communicate the initiation of the change process?
8. What was your initial attitude towards the division adopting agile practices?
9. What were the major driving force behind your division's decision to adopt AgilePM methods?
    a. Apart from the ones listed above, is there any factor that you would like to add?
10. Did your organisation provide any sort of training during the initial stages of the transformation?
11. Were you provided enough time to adapt to the newer working style?
12. To what extent do you agree with your division's decision to adopt agile practices?
13. In your opinion, what were the major challenges that were faced by your department during the transformation process?
14. Are there still persistent challenges? If yes, what are those?
15. What do you consider as the main benefits of agile practices in your division?
16. What is your current attitude towards the division adopting agile practices?
17. Do you think of the transformation as positive?
18. Would you want to go back to the previous way of working if given a chance?