CHALMERS

MAPPING OF CATALOGUE PROCESS FOR VOLVO CARS ACCESSORIES

Process analysis for improvement identification

Bachelor thesis within the Industrial Economics & Manufacturing Processes program

JESSICA RÄIHÄ

SOFIA GULDBRAND

Department of Technology Management and Economics

Division of Operations Management

CHALMERS UNIVERSITY OF TECHNOLOGY

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REPORT NO E2013:023
Department of Technology Management and Economics
Division of Operations Management
Chalmers University of technology
SE-412 96 Gothenburg
Sweden
Telephone: 031-772 10 00

Cover:
The picture on the cover illustrates interior accessories, rear seat entertainment. Read more about different product segments on page 17.

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Mapping of catalogue process for Volvo Cars accessories
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JESSICA RÄIHÄ & SOFIA GULDBRAND
Department of Technology management and economics
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ABSTRACT

Since "*The machine that changed the world"* (1989) was published, around thousands of firms worldwide started to eliminate waste and the majority of the effort was spent on the shop floor. Since 90 % of the potential waste elimination proved to be found outside the shop floor, this is the area to put effort in (Keyte and Locher, 2004). Volvo Car Corporation now faces an administrative process that does not deliver the quality needed. Since the product of the process is a web catalogue, a communication channel between the company and its customers, it is highly important that the content is correct when being launched. If this product turns out to be incorrect, that inaccurate information is delivered to end customers, it jeopardizes customer loyalty or in worst case, the loss of customers.

The objective was to map the current web catalogue process for accessories with all process steps and time consumed. Furthermore the process was to be analyzed in order to find potential improvement areas. The task was deepening into one area of potential improvement to find the root cause of the problem.

To be able to manage the task to map up the process of the catalogue in order to analyze and improve it, a lot of research needed to be done. Interviews were the best way to get to know the process, the people working in it and at the same time inhale all opinions, grievances, expectations and the corporate culture. After researching and analysis, one of the root issues was discovered for the new aim of the research.

The research showed that there were many issues in the process to improve for better quality of the catalogue. The selected area for deeper research was "get correct information from the beginning". Conclusions drawn from this report are that the standard needs to be improved to fulfill its purpose and the users of the standard needs to be involved in the process of developing it. Moreover the communication through the departments is another important aspect to solve this problem. To solve the issue of getting correct information from the beginning is the foundation to make an effective process. And when this problem is solved side effects will improve the process further and the lead-time and the process steps can be minimized.

Keywords: lean, administrative processes, standard, web catalogue

GLOSSARY AND ABBREVIATION

VCC	Volvo Car Corporation
VCCS	Volvo Car Customer Service
ABU	Accessory Business Unit. A department in Volvo Car Customer Service
R&D	Research and Development, the department of Design Engineers and Technical Project Leader
Vehicle line project	Development of the car produced in the assembly line
PM	Project Manager on ABU
CO	**“**Carry Over”-products
NCO	**“**Not Carry Over”-products

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1. INTRODUCTION

This chapter will explain the background of the project and the aim of the report as well as goals and limitations.

1.1 BACKGROUND

Companies are nowadays facing hard competition (Liker and Meier, 2006). Therefore it is important to be aware of the surroundings and the processes inside the company, those are the easiest ones to change (Lind and Skärvad, 2012). Since "*The machine that changed the world"* was published, around thousands of firms worldwide have started to eliminate waste where the majority of efforts were spent on the shop floor. To reach a fundamental change, involvement from the whole enterprise is required whereupon some firms' effort proved to be inefficient. It is proved that 90% of the potential waste elimination could be found outside the shop floor, but the problem is that administrative waste is difficult to see and therefor activities that truly create value for customers are not in focus (Keyte and Locher, 2004).

Volvo Car Customer Service, VCCS, is a business unit of Volvo Car Corporation, VCC, which handles customer service operations. One of the units of VCCS manages the accessories to both new launched cars and older models. This department is called Accessory Business Unit, ABU. The aim for ABU to make Volvo accessories the most desired and personalized accessories in the world. One objective is to sell accessories for SEK 4 billion by the year of 2015 compared to year 2012 when sales totaled SEK 2.5 billion.

ABU has been working with lean philosophy for two years, which is a way to add value for the customer and eliminate waste. ABU believe that one way to reach the company goals is to implement lean further and use lean thinking to review the processes to increase the added value for the customer. Right now, focus lies on reviewing all processes to reach more value-adding performances and to eliminate waste to get more competitive. ABU is responsible for a variety of processes in the accessory area and one of these is the web catalogue process. ABU is located in Torslanda, Gothenburg, and is the starting point of this assignment.

Volvo car accessories as well as Volvo parts are offerings to the aftermarket as a complement to the vehicle line project. Accessories, that customers can choose from are for instance; Comfort options such as electric engine heater, or Pack & Load options such as roof box and bicycle holder. Accessories are mostly sold to new produced cars, which makes the timing for the launch of the catalogue vitally important. When the new car models are released on the market, the catalogue with the associated accessories must be launched.

This web catalogue is the communication channel for accessories both to the final customer and internal customers. The catalogue is published on the web and nowhere else. In this process there are primarily three different departments involved, ABU, R&D, and the Editorial team. The current web catalogue has a long lead-time and the quality of the information in the catalogue is not satisfactory. Many corrections are necessary, both during the process and after the catalogue has been published. Some errors in the catalogue therefore reach the final customers, which is not acceptable while this can lead to dissatisfied

customers, and in worst case lost customers. This process needs to be examined to improve quality for the customers.

1.2 Purpose and research questions

The assignment for the bachelor thesis is to map the process which is to compile information and put the accessory catalogue together. All process steps, the roles / functions that are involved, the time taken for each process step are to be explored and documented. The gain of the possibility to see and understand the process is many, but our purpose of mapping it is to identify problem areas for improvement.

VCCS is very active in implementing lean in its official organization and has worked on this for more than two years. As VCCS, and therefore also ABU, actively work with lean, this is the expected method of our research, analysis and recommendations in this thesis.

The overarching questions that need to be answered were formulated as follows.

What tasks does the process of the current web catalogue include?
Which are the potential areas for improvement?
What is the most critical or fundamental issue to provide the customers a qualitative catalogue?

1.3 Limitation

The project will be within the limits of ABU. It will only include the process for the development of the product catalogue for accessories. Analysis in order to find improvement areas will be executed and delineation will be to only dive into one problem area.

1.4 Method

Interviews will take place with people who are involved in the web catalogue process in order to achieve deep understanding of all process steps. According to Robert K. Yin (2009) interviews is one of the best sources of information. When the process is mapped, focus will be to improve the process to ensure quality of the catalogues content at release. The situation will be analyzed thoroughly with tutor support and problem-solving tools within the lean principles and problem areas are to be discovered. When the most fundamental area of improvement is determined, focus will be to find the root cause of that particular problem. Tool as “5 why” and A3 will be used. When this is accomplished, recommendations for improvements from a lean philosophy will be presented.

When interviews are made there are possibilities for misinterpretation. Since this study will be based on 13 interviews, these kinds of misunderstandings are prevented. Different persons with the same role or connection to the catalogue process were interviewed as well as persons from different departments. Editorial Team, Technical Project Leader, Project manager, Picture owner and several other persons involved were interviewed. In addition to this, three meetings concerning the subject with all the responsible persons have taken place. These meetings have been used to clarify the information that was discovered. This was done in

order to get a wider and more realistic picture of the process to be able to draw natural conclusion of what the real problems are in the process.

Due to the importance of personal opinions of what the actual issues are, the interview questions are open ended. To ask questions in two levels are required in order to satisfy the inquiry while simultaneously asking friendly questions to prevent the person to create defensiveness (Yin, 2009). For example, questions could be; where in the catalogue process are you operating? And to follow up on that question; what are the main issues in the process according to you? And to follow up on that answer; how comes that is an issue? Posing "why" questions shows a difference from posing a "how" question, where how is the preferred way to address an informant while the "why" question creates an urge to start defending oneself (Becker, 1998). The following questions were asked during the interviews;

- What is your involvement in the catalogue process?
- Are there any issues, from your point of view?
- If you had the chance to change the catalogue process, what would you do?
- Do you have any other inputs, which need to be considered?

These questions were the starting point of the interviews where the data have been collected. During the interview supplementary questions as how, why and explain further have been asked. Moreover other inputs from the interviewed associates were also analyzed for its relevance for the catalogue process. Interviews were the best way to get to know the process, the people working in it and at the same time inhale all opinions, grievances, expectations and the corporate culture.

The literatures have been collected from relevant courses during the studies on Chalmers University of technology. For instance from one of the previous courses called lean production an amount of literature and scientific articles connected to lean were offered. When research with the keywords "lean administration" where made, some scientific articles were found in the Chalmers library database.

2. LEAN PHILOSOPHY

VCCS is working hard to implement lean in the whole department (Director ABU) and therefore the theory of basic lean philosophy is presented below. The right way to solve issues, which we will face in the catalogue process, is according to lean to find the root cause, and there are different tools to achieve this. For example there's A3, five why and PDCA, which are all described below.

2.1 LEAN PRODUCTION BASIC PRINCIPLES

Lean philosophy was from the beginning a production theory that came from the Japanese car manufacture company Toyota. In the beginning of the 90´s, when competitors faced the fact that Toyota needed considerably less time and money to produce cars, other car- companies opened up their eyes for lean and started to implement the lean-tools in their own organizations. Unfortunately, the tools are just a support to reach "lean-thinking" and it will therefore not be very profitable only to implement the tools. Lean is a never-ending process since it is a way to think and a way to view the surrounding. It is first when companies try to find their own philosophy they will begin to succeed. The tools may change over time when a better way is invented, but not the fundamental philosophy. Toyota productions system (TPS) is associated with the word lean. Today the lean philosophy is wildly spread through the world. Lean stands on four p´s; "philosophy", "process", "people and partners" and "problem solving", which will be described below together with the underlying principles which are fourteen to the number (Liker and Meier, 2006).

The first P means philosophy, which is the foundation of lean.

Principle 1: "Base your management decisions on a long- term philosophy, even at expense of short-term financial goals"

Lean basic is to always aim for more value to the customer, which is an aspect that many companies misunderstand when they just copy the tools and do not create their own philosophy (Liker and Meier, 2006).

The second P is regarding the process. Right processes will produce the right result, and the right result can be reached by doing as the following principles say, number 2 to number 8.

Principle 2: "Create a continuous process flow to bring problem to the surface"

Flow means that a product through a process will never have to wait, it will move slowly or fast in a consistent speed. It does not matter how fast or how slow; it just has to be in movement. Products moving continuously on an assembly line without buffers will directly show where the problems are by getting stuck somewhere along the line. Instead of covering that problem with buffers, it is brought to the surface and by this way the problem will be solved and allows the workers to be efficient instead of running around to "fight fires" (ibid).

Principle 3:" Use "pull" systems to avoid overproduction"

Overproduction is one of the worst waste possibilities, because it creates all other of the seven wastes, which is; to rework, unnecessary transportation, waiting, inventory, unnecessary

motion, over processing. The customer demand should decide the inventory level and before new material gets in the old have to leave the system (Liker and Meier, 2006), (Keyte and Locher, 2008).

Principle 4; "Level out the workload"

There is only one realistic way to create continuous workflow, and that is stability in the workload. If one assembly station is able to produce quicker than the following station, either a buffer will be created or waiting time will be necessary. To level out the workload there is need to even out the working time between all stations. Otherwise it is hard to get stabile processes and all the other principles will be hard to implement (Liker and Meier, 2006).

Principle 5;" Build a culture of stop fixing problems, to get quality the first time"

Many companies today use the firefighting method, which means that when problems occur they are solved as quickly as possible and the primary issue will be covered up but eventually the issues will come back. Furthermore the first problem is often more of symptoms of the real problem. Toyota are working with an andon system, when someone detect a problem there is a button to push so all production affected by this problem will stop. Technicians and Production Managers will come running to help find the root cause and solve the problem. The production will be stopped until the root cause is corrected to make sure the same problem will not come back. It is highly important to do right from the beginning instead of fixing the problem later in the process (ibid).

Principle 6; "Standardized tasks and processes are the foundation for continues improvements and employee empowerment"

The current theory is, there can be no improvement unless there is a standard. If this standard does not exist there will be no development for the better just another variation. And lean tries to minimize variation. A standard means that this is the best way to do this task today but in the future it may change for something better and a standard helps associates to flexibility.

Principle 7; "Use visual control so no problems are hidden"

Today it is usual to work for a paperless environment, but Toyota are printing all the important information, to make sure that everyone can see how things are going. If there is a problem it will be noticed fast. Imagine a picture with a sailing boat with rock hidden below the surface. If this rock instead is above the surface it will become easier to not hit them and go around them or take them away. This is the same in lean thinking, do not hid problem with buffets try to solve them instead (ibid).

Principle 8; "Use only reliable, thoroughly tested technology that serves your people and process"

The technology today is amazing and very advanced but when a brand new machine takes into work, it is important that it is truly tested. The technology should support the work of the people not the other way around. But as soon as this machine is tested and will improve the work it should be put in production (ibid).

The third P deals with people and partners and stresses added value to the organization by developing your people and partners.

Principle 9; "Grow leaders who thoroughly understand their work, live the philosophy, and teach it to others"

Toyota in Japan rarely hires people outside the company. The philosophy and the technical knowledge are too important. The leaders are to carry the philosophy and it takes years to reach a leading position, *"Toyota don´t just build cars, they build people"* (ibid).

Principle 10; "Develop exceptional people and teams who follow your company´s philosophy"

One of the most important parts in TPS is that all the associates know what the company expects from them and how the company wants them to act. The philosophy is deeply rooted at all levels at the company. This is something that will become a weak link if an enterprise tries to implement lean but do not have the people deeply understanding lean thinking.

Principle 11; "Respect your extended network of partners and suppliers by challenging them and helping them to improve"

The most common way to do business is to put different suppliers against each other to push down the prices. Some lean companies develops a partnership with their suppliers and involve them in the production and pay rather a little bit more to secure and the quality and if a problem occurs it will be taken care of. The partnership includes trust and the primary company helps the suppliers to become better and this will benefits the primary company by better quality and the prices of the suppliers will slowly go down (ibid).

The fourth P means problem solving, to continuously solve root problems drives organizational learning.

Principle 12;" Go and see for yourself to thoroughly understand the situation"

To manage to solve the problem it is essential to deeply understand the root problem. To only read a report that describes the problem you may just read a description of the symptoms, not the root cause of the problem. That is why go and see by yourself is significant, "go to gemba". Gemba is the Japanese word for "see for yourself".

Principle 13; "Make decision slowly by consensus, thoroughly considering all options; implement rapidly"

To reach the fundamental problem, there have to be a lot of thinking and more thinking. Often it ends up with the first problem not being the real problem only the symptoms of the root cause. That is why a long time of consideration is essential (ibid).

Principle 14; "Become a learning organization through relentless reflection and continuous improvement"

Continuous improvements are the next step after achieved a stabile process. Tools to reach root causes are for example the "plan-do-check-act circle" or "five why". These tools will be further explained the A3 theory later on. Essential for Toyota is self-criticism, what was good and what went wrong. If there is no self-criticism, there will not be any self-development and

improvement in the processes, which are significant to hold your position in the market. The Japanese word Kaizen is often used in these circumstances, because it translated into continues improvements.

Here is the background of the Toyota way, lean production or TPS, the same thing but just different names. From the beginning it came from a car manufacturing company but that does not mean lean cannot be used outside the production area. Many enterprises use lean but have adapted it in another way in the service sector (Liker and Meier, 2006). This bachelor thesis is done at the customer service department and they are using lean thinking but have developed the tools to fit their businesses.

The lean temple is a classic way to see how the principles are related to each other. It first begins with the foundation and then the walls follow and in the end the rooftop is completed. The meaning is; there is no point to start to build a roof before there are walls to put the rooftop on.

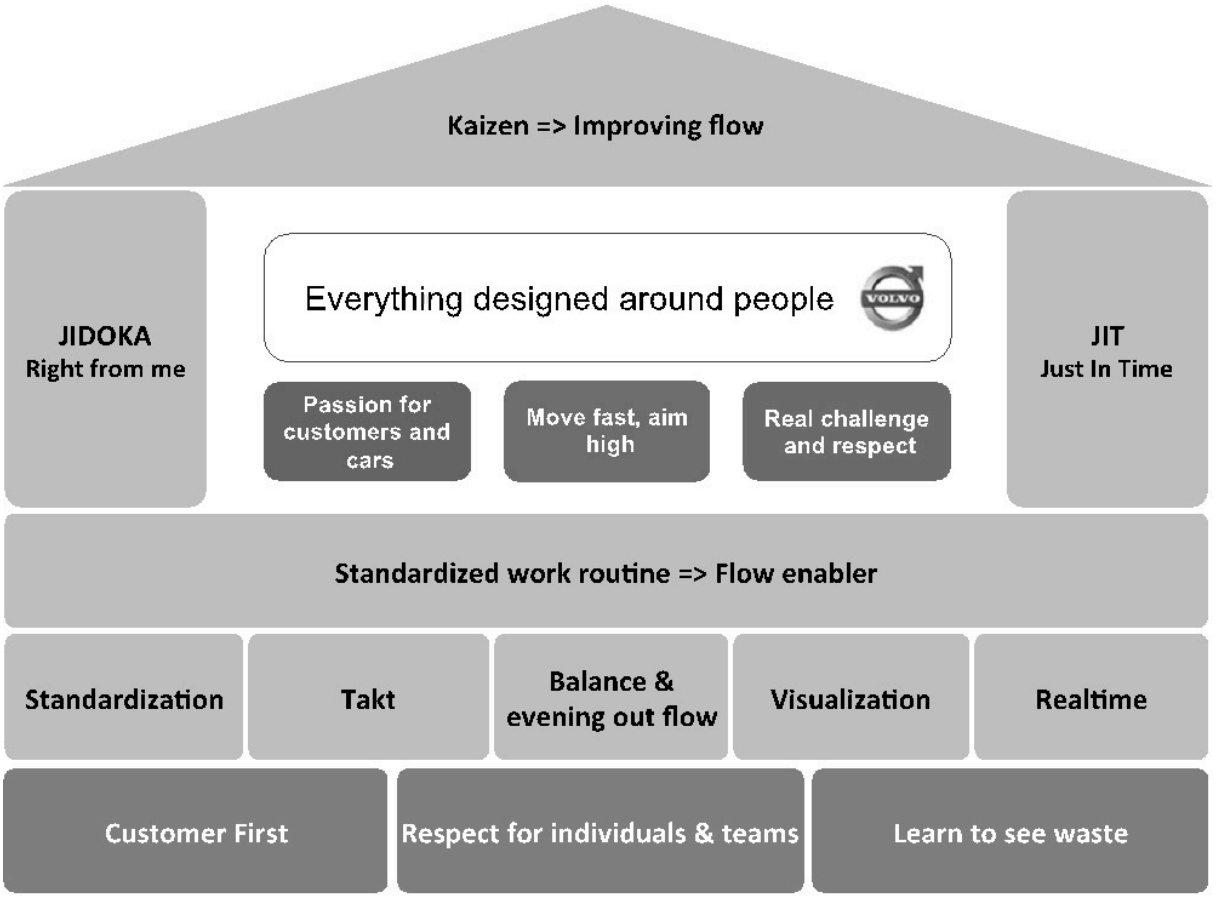

FIGURE 1 - THE LEAN TEMPLE OF VOLVO PRODUCTION SYSTEM

The lean temple of Toyota is often the basis of other companies' temples but with modified words to fit their own organization (ibid). In figure 1 is the Volvo production system showed.

2.2 LEADERSHIP

There are many different theories about leadership and its impact of its surrounding, traditional leadership has gone from a trait approach to the style approach and to a situation approach leadership. The situation approach involves many different ways to lead and the significance is that leadership depends upon the situation the leader face. The basic of leadership is the willingness to lead (Jönsson and Strannegård, 2009).

Many enterprises fail to implement the lean philosophy to their company because their lack of great leadership. In lean approach it takes a lot of time to develop leaders, and years of experiences to become a great leader in Toyota. To get the experience needed to become a leader, the first step is often to start in the production and work the way up in the hierarchy. A leaders` most important function, from the lean philosophy, is to teach others. And to be able to be teach, the teacher need broad knowledge which will only be known if she have wondered the path by herself before (Liker and Convis, 2012).

There have been discussions about who can become a leader, are some people born as one or can all people develop the characteristic that is needed, as teaching, problem solving, expertise about the processes etcetera. Both (Liker and Convis, 2012) and (Jönsson and Strannegård, 2009) describes that leadership can be taught as long as the possible leader have the willingness to take the power to lead others. "Toyota knows that only exceptional leaders can channel the combined effort of team members and work groups effective to achieve larger goals" (Liker and Convis, 2012).

To get associates aware of the goal and achieve the objective, the leaders use feedback and visualization. Every leader knows exactly what is going on all the time as well as the labors. By this way if they get off the right path it is fast showed and corrections can be made. Fast feedback and involvement with the labors can also create the feeling that the leader notices the work. When associates accomplish good performances and get feedback, it is most likely the associate end up in a positive circle (Lindèr, 2011)

One other typical way of leading in the lean philosophy is to help the associates to develop and always make them think. To not use the associates knowledge and creativity is a waste. Everyone most be aware how to solve a problem not as a quick fix but as a long lasting solution until a better solution is found. The leaders in a lean philosophy have a coaching approach to the associates. Lean is all about value added work and try to eliminate waste. The assembly workers have a direct value added work and that is why the leaders have to give these workers the best conditions to perform a great job. Lean organizations should not be flat and have no hierarchy; actually it is the other way around. If a coaching approach is the way to lead, the leaders need to have a deep knowledge of the labors, to be able to come with feedback, which are supposed to help the associates to improve. There is no possibility to be a good coach for 75 assembly workers. To make it even more clear there is more information about a servant leadership in Toyota leadership (Liker and Convis, 2012).

One point that often stands out in lean leadership is how the associates are viewed, the people of the company is the most important assets the enterprise has and this asset has to be taken

care of. That is why so much investment ought to be done in the people of the company. Because of this big investment, it demands workers that are willing to make the enterprise better and their self at the same time. A classic example is when Toyota end up in recession they educate their people while their competitor dismiss associates to cut down the labor costs (Liker and Convis, 2012).

One other strength in lean leadership is the communication, leaders have to be good communicators and information should flow bottom up and sidewise. If a big problem occurs in a department that affects another one, this will quickly become identified and the problem will be solved together within the two departments. The problem will not be put under the rug; it would rather be showed in daylight until it is fixed. No firefighting. To keep this information updated, lean organization often has daylily meeting, short ones for just information check from bottom up. These meetings are highly effective. One important aspect to this is the requirements of deep knowledge employees need to assimilate before they can step up in the organization. The common way is that the leaders make one move horizontally instead of one move up in the hierarchy, and the reason is to deepen the knowledge in other areas and create a holistic view. If the knowledge of the other departments are received it creates bigger chances to make better decision and understanding how one situation will affect the other departments (Liker and Convis, 2012).

To observe a process carefully without prejudice, with a blank mind, starts the important process of truly understanding a problem. One classic way to develop leader's ability to see the root cause is to let them stand in a circle and watch a part of an assembly line and search for waste. Not try to solute the problem just identify it and really dig in the problem to find the root issue and not just symptoms of it. (Liker and Convis, 2012). The leader is responsible for the processes and shall make sure that they have a standard. A standard is the best way to get a work done right now. But tomorrow another standard can be made and the old standard will be upgraded to the new one. If there is no standard there is no way to know if the work has improved or another variation to the work have been invented (Liker and Meier, 2006), (Emiliani, 2008).

Final differences to regular leadership and to lean leadership is that the most important part is to teach others and to help others improve and also the leaders` self-awareness. Other organizations are very different when it comes to the view of the associates. The leadership in lean is one of the fundamental pillars that need to be implemented and work well before the company will face success in lean thinking. It may sound simple but in reality it is all about hard work and willingness to every day try to work for improvements and then teach others to improve their selves (Liker and Convis, 2012).

2.3 PROBLEM-SOLVING TOOLS

To be sure to attack the problem in the right way, the first step of all is "to see it with own eyes". "Go to Gemba" is an expression Toyota uses, which means to go to the actual place and look at the problem to truly understand the situation. Fully complete the problem definition before action is taken, because if the problem isn't clearly defined, there will be no

clear understanding what the subject is to improve, and furthermore it will be hard to identify when the goal is reached. Moreover, it is crucial to have stabile processes and standardized methods to be able to know what issue is improving. How the current work is done and how the standard is followed are important facts to be aware of in a problem-solving situation. More information about the importance of stabile processes and standardized methods can be read later on in the theory. There are a few steps that needs to be carefully considered once the problem is defined (Liker and Meier, 2006):

- *Broadly consider all possibilities*
- *Narrow the list*
- *Evaluate the ability to implement quickly*
- *Develop consensus of the proposed solution*
- *Test ideas for effectiveness*
- *Select the best solution*

PCDA is a great tool to use for problem solving, which will be explained in more detail. The Plan-Do-Check-Act cycle starts with the development of a *plan*, which the first P means. All work up to this point is a part of planning but what also needs to be done, to reach the goal of the solution, is to develop an action plan. The action plan should consist of two types of countermeasures, short-term and long-term. In many cases the "ultimate" solution is not possible in the current conditions (Liker and Meier, 2006). The most essential cause to the problem must be determined and big issues broken down into smaller and manageable problems (Bergman and Klefsjö, 2007). The short-term solutions will only give temporary relief to prevent waste of time or lost benefits until the long-term countermeasure can be implemented. The core of the plan phase is that a plan should state what, who, when, where, and maybe even how the task is to be achieved.

To be able to know how the results were achieved and what the reason for improvement was, it is important to implement one countermeasure at a time, which are completed in the *Do-phase*. If the progress is not documented, maybe not even repeatable, the future problem-solving activities will be less effective because of unknown cause of development. This is the phase when actually something is being done, the actions created in the plan phase are being implemented. It is common that once the solution is implemented, further improvements will appear. But as far as it comes to a PDCA-cycle, the job is to complete decided actions and then move on to the next phase. The new possibilities that are revealed after the first implementation will become a part of the next step after PDCA, namely "continuous improvements".

The effects of implementation have already been noticed. But it is important to verify the improvement and collect actual data after the change to be able to compare the results with the data collected in the Plan phase. This is what the *Check-phase* is for. Present charts of the results the same way as the charts from the planning to visually verify improvement. When root causes are eliminated, it is important to show results from both root cause solvation but also from the original problem, what effects the root issue caused. Did we attack the right root

cause or not? (Liker and Meier, 2006). When the effect of the actions are satisfactory and better quality levels are achieved the improved situation needs to be maintained.

The key aspect in the last phase, the *Act-phase* of the PDCA-cycle, is to convey gained knowledge throughout the organization to prevent others to make the same mistake. Not only have the results been told, but also the way problem-solving was made to get to success. In the end of every PDCA-cycle the ”next step” should be reviewed to remind everyone that it is not the time to relaxation, it is time to start working on the next problem to keep improving the process. Of course the good results should be celebrated and everyone included in the projects effort should be recognized (Bergman and Klefsjö, 2007).

Another way to solve a problem slightly more detailed is to tell the story by using an A3-report. When to solve a problem, it is important to present the relevant data in a perspicuous way (Liker and Meier, 2006). Toyota is using the single-page presentation called “A3” for problem-solving activities. It is named A3 because the presentation of the problem fits on one side of an A3-sized sheet (Sobek and Smalley, 2008). The report is divided in sections that each are labeled in a logical flow to follow throughout the report, which is illustrated in figure 2.

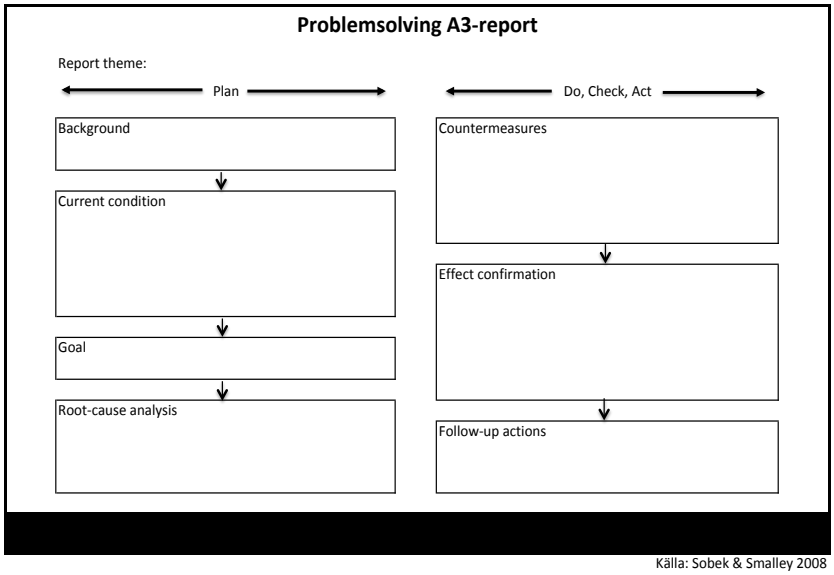

FIGURE 2 - A STANDARD TEMPLATE TO PREFORM A3 ANALYSIS (SOBEK AND SMALLEY, 2008).

“Just as there are many potential causes and root causes for any problem, there is always more than one way to solve any problem” (Liker and Meier, 2006).

There need to be a lot of thinking to be able to solve a problem, and writing things down will help to make the thinking process clearer. An A3 report includes the PDCA phases, the difference is the way the documentation is done. Key information is written down at each step to be able to share the problem with others. The A3 report is a way for Toyota to implement the PDCA management at all levels in the organization (Sobek and Smalley, 2008). When the A3 report is showed it becomes easy for outsiders to get a hold of key information and are able to give relevant feedback (Liker and Meier, 2006). Why that is important is because

generally support and advice is needed to be able to get to consensus. In 5 minutes, the helper will understand the problem, as well as the relevant fact that has been collected, and right decisions can be made. Any major expenditure is an important decision at Toyota, and therefore sufficient information needs to be presented to be able to make the right decision. There are different formats on an A3, presented below is one of them (Sobek and Smalley, 2008).

When to start with an A3-report the author first of all present the content of the report with a *thematic title*. This should be a description of the document that will help the reader realize the problem area. (Sobek and Smalley, 2008). The first square in the A3 report should present *background* information of the problem that is essential to understand the extent as well as the importance. It is important to adapt the content to the reader, that the type of information will vary depending on the audience knowledge. The objective of this part is to make it clear for the reader what the report is trying to accomplish. There needs to be a clear objective and explanation how it is aligned with the company´s strategy and vision. There will be a waste of time if the objective of the project cannot be tied to the company´s goals because it is then not important to the success of the company (Sobek and Smalley, 2008).

The section called *current condition* might be the most important part of the A3 report. The reader should here be given an objective picture of the current condition using diagrams and charts while it is an effective way to communicate the core issue to the reader. The information should be graphically or numerically and should clearly illustrate the problem in a way that is readily understandable to the audience. The company executives might only give 30 seconds time to present the left-hand side of the report. Therefore the visual manner is the key to help the reader´s comprehension. Describe the critical elements of the system that produced the problem in the current state with actual data, not words and opinions (Sobek and Smalley, 2008). It is not only the executives this part of the A3 report addresses. Without a documented current state there is no way to measure the improvement. If improvements cannot be measured, there is no feedback on the countermeasures either. It's simply impossible to know if the actions made really are solving a problem or not. Also when the current state is defined there are possibilities to dig deeper and get a better understanding of the problem which will increases the chances of attacking the right problem (Sobek and Smalley, 2008),(Liker and Meier, 2006).

When the current state is mapped, precise *goals* to reach for should be defined. With precise goals to aim for, it is easy to confirm if the project was successful or not. Be sure the goal is measurable and clear in what performance it takes. All actions performed towards the goal should be evaluated and investigated to check the effectiveness. Goal statement could explain a future state or a target condition to reach, for example "reduce waste with 2%" or "reach 100% on-time delivery" (Liker and Meier, 2006).

Root cause analysis is a part of the report where problem symptoms identified in the current condition are analyzed. Needed is therefore a deeper investigation of the current condition to uncover what actions will prevent the problem to recur. The first insight is rarely correct and neither the ultimate cause of the problem. A3 thinking stresses the necessity to reveal the root

cause by using the tool of "5 Whys" which repeatedly asks, "Why is this problem occurring?" This question will be repeated until the very bottom of the problem is reached (Sobek and Smalley, 2008). When to perform an analysis with the "5 why-method" it is important to carefully answer every "why" and not jump down the chain into the deeper issues. It is then a possible risk of loosing important information along the way. Make sure to always put "therefore" in front of the question after reading the answer. Once the analysis is done with finding the root cause, there will be many different causes, then determination which one is most significant.

When the first page of the A3 report is filled in, the first phase of the PDCA-cycel is completed in a more detailed and visual manner. It is time to create a list of *countermeasures* to attack the root causes of the problem, just like the Do-phase (Bergman and Klefsjö, 2007). To follow up on the tasks, figure 3 visualize how the countermeasure list should be done properly

	Cause	Action	Responsable	Deadline	Findings
1	Incorrect info from R&D	Review the standard	PM	W20	Incorrect standard
2					

FIGURE 3 – A PROPER COUNTERMEASURE-LIST, AN OWN INTERPRETATION FROM (BERGMAN OCH KLEFSJÖ, 2007).

When countermeasures have been implemented it is important to check if the actions gave the expected result. Without the *effect confirmation* box to fill in, people would easily just move on after implementation whether or not the problem is eliminated. At the same time as the company make sure the problem is solved, an evaluation of all the involved parts ability to analyze and solve problems are executed (Bergman and Klefsjö, 2007). To solve a problem it is common to implement many solutions at the same time, which will not give the answer to what action actually eliminated the problem. To make sure to determine true cause and effect, this section was made. To visually show cause and effect, as being asked in this section, it is important to implement one action at a time and to continuously collect data. In that way it is possible to verify the effectiveness of each action.

The intent of the section *follow up actions* is to reflect what further changes should be made to the system to sustain the improvement and what remains to be done. By standardizing new methods into the process, benefits will be preserved. Intents are also to make lessons learned, not only stay local or not fully optimized. The readability of the A3 tool really has an impact on sharing new learning throughout the organization. So, before the report is complete, it is necessary to look for similar processes that can benefit from the countermeasures (Sobek and Smalley, 2008)

2.4 STANDARDS AND STANDARDIZED PROCESSES

Before standardization is possible a stabile process is needed. To see if a process is stabile there is three conditions that have to be achieved. First one is, if the work is described "if, then, sometimes", this shows clear that the process is not stabile. The other step is reliable

machines and technology to manufacture the products, there is no way that the standards can be made if there will be interruption of the work in consequence. The final statement to see if a process is stabile is that quality issues must be minor. If workers all the time try to fix quality problems on the products this will not give a fair picture about how the standard supposed to look like (Liker and Meier, 2006).

> ”*The establishment of standardized processes and procedures is the greatest key to creating consistent performance. It is only when the process is stabile that can begin the creative progression of continues improvements*” (Liker and Meier, 2006).

The book reveals that some kind of stabilization is needed before standards can be created. Liker and Meier enhance the importance by this expression.

”..the Toyota way is a cyclical process of achieving stability, standardized practices, and then continually squeezing the process in order to expose the obstacles (system weakness)” (Liker & Meier, 2006).

There should not be 100 different way to assemble a product. It creates a variation and with variation comes waste. The primary way to go for the lean philosophy is to minimize waste, the cost reduction is not supposed to be the main cause. Cost reduction will be the outcome of waste reduction.

There are a lot of misunderstandings about standards and its objectives, one old view about it is that standards are made for cost reduction and not as a best possible way to perform a work. A standard is the best way to perform a work for the moment and the standard will be upgrades as the method become improved. The best standard is a standard that minimize waste and create a lot of value added work. A way to see a standard is a starting point to improve the work, without this starting point there will not be any documentation that improvements have been made. Standard in a lean philosophy is supposed to be made together with the leaders and the employees. It is of highly importance that the one who perform the work task everyday will be in the standard developing phase. Standards are good in the aspect of keeping the knowledge in the enterprise even when associates are changed (ibid).

Common misunderstandings about standards are that anyone can learn the job by just reading the documents. Most job need more than a few papers to be described. A new associate will have a teacher who shows by firsthand how the work is done in a way of lean learning. It becomes a piece of cake to learn a new job when a standard exists, anyone can do it. To get deeply knowledge and truly understand the work and to become a problem solver takes a lot more than just to read a piece of paper. Another common misunderstanding about lean standards is that employees develop their own standardized work. Lean thinking is all about own the work to get a higher satisfaction about the work, and the leaders and the labor develop the standards together. The associates do not develop the standards by themselves; they have support from the leaders. To clarify this even more imagine players in a team, the coach does not just abandon them and says, fix it. The coach helps the players to stick to the

strategy and the players do the work (Liker & Meier, 2006). When this task is done together it helps the feeling of owning the work and after all the associates are experts of their work and their knowledge have to be taken care of and their useful inputs. The feeling of autonomy is showed during research to be the most important aspect to feel satisfaction about the work and by this satisfaction the outcome can be better performance of the work (Lindèr, 2011). By standardized work the job will be done properly and everyone will stick to the standard. Defining work by just put it on a piece of paper does not creates a good performance. But by evident standards deviation will appear fast and corrections can be made quickly (Liker and Meier, 2006).

3. MAPPING THE CATALOGUE PROCESS

The current process of bringing the accessory catalogue together is highly complex because many different work pieces from different associates as well as different departments are gathered. The department called Editorial Team works the same way as a newspaper's Editorial Team. Journalists and photographers deliver material for the Editorial Team to put together. In this case the journalists are Design Engineers from the R&D department that deliver technical specifications and limitations. The photographer delivers photos of the new accessories and the marketing team on ABU department delivers the commercial text to create a need for the final customer. There are geographical distances between the three involved departments; ABU, R&D and the Editorial Team.

Figure 4 illustrates the web page. (Volvo Cars Accessory Web, 2013)

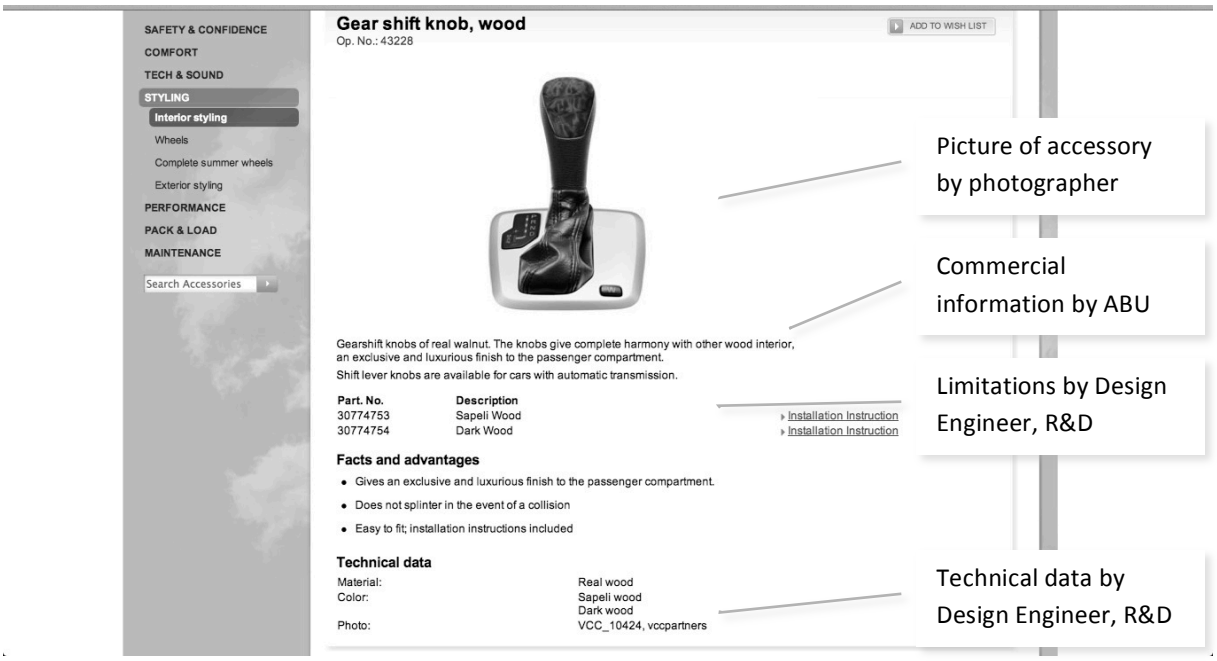

FIGURE 4 - A PAGE FROM THE WEB CATALOGUE

The Design Engineers are divided into different product segments, electronics, interior, exterior styling, exterior loading and infotainment. So the amount of people involved in the catalogue process from this department depend on the type and amount of new products realized. This gearshift knob belongs to the segments of interior styling and before this accessory was released, the Design Engineers of that department produced this information.

To put this complex catalogue together the collaborators put a lot of time into this process. The lead-time is 40 weeks in total. Every year, two catalogue processes needs to be completed to be able to publish two catalogues on the web, one w.20 and the other w.46. The consequence is that two different catalogue processes will overlap each other in order to get finished in the right time, which is presented in figure 6.

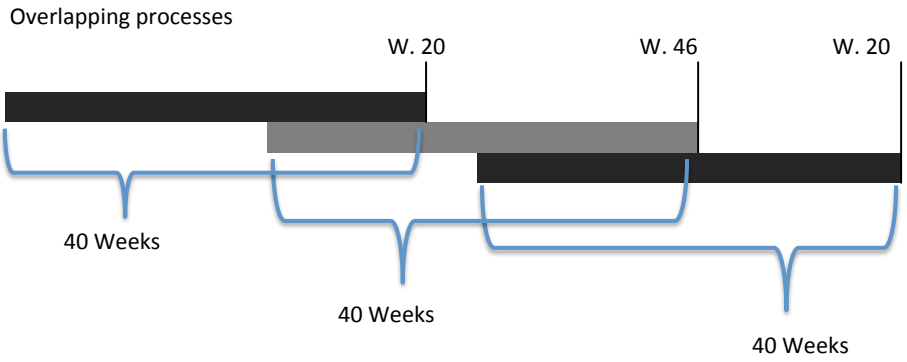

FIGURE 3 - THE CATALOGUE PROCESSES ARE OVERLAPPING EACH OTHER

The result of the overlapping processes is that it creates confusion among the associates who need to keep track of two different releases with different products at the same time. This will be discussed further down in the analysis.

Below are all the steps in the process explained, all steps that eventually will deliver a web catalogue. First the binder will be described because it contains all new products that will be added to the former catalogue to become the new release.

3.1 BINDER PROCESS

The catalogue process begins with a pre catalogue, which are called binder. The binder includes all the new accessories that will be release for the first time in the catalogue. This pre catalogue needs to be accomplished to give suppliers and marketing departments information about the new accessories. The reason is that product marketing must begin long before the catalogue is published to prepare for sale. The binder is not published on the web, it is just for the internal customers, not the final one. In figure 6, the steps in the process are illustrated in an image to make the process easier to understand when the steps are described in more detailed (Appendix 1).

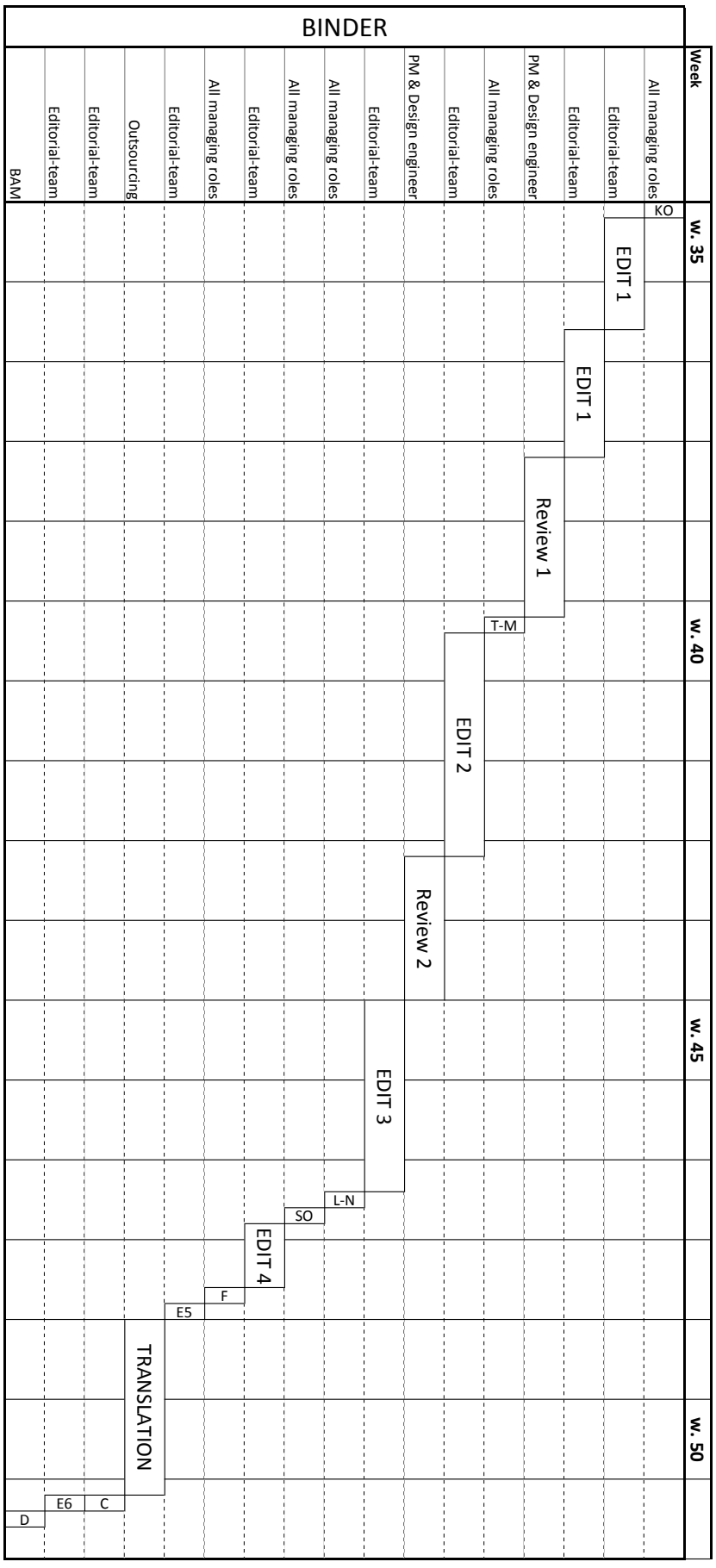

FIGURE 6 - THE BINDER PROCESS

KICKOFF

The binder process starts with a kickoff meeting with all involved roles. The outcome from the kickoff is to decide the preliminary content of the binder, which accessories that are ready to be launched, and deadlines for the process steps. To decide the content, the following areas will be taken into account.

- Cut from the last binder
  These are products that were supposed to be launched in the previous catalogue but were not ready in developing or production.
- List of requested products.
  Are the requested products realistic and viable or not.
- Suitability to introduce the new products to the market
  Is this the right time to launch this particular product; is there a need for this product on the market?
- Property description.
- Preliminary CO & NCO list. (CO=Carry Over, NCO=Not Carry Over)
  CO-products are products to carry over from the previous binder and NCO-products will removed.
- Future launch products
- Products in need of photo

As showed in the lists above there are many different areas to consider in the kickoff meeting. When the preliminary binder content is set, it is time to make catalogue pages out of every new accessory.

EDITORIAL WORK 1

The Editorial Team put the web catalogue of new products together with the information from the kick off meeting. This results in a binder draft.

REVIEW 1

During this period the Design Engineers and Project Managers will go through the catalogue sheet put together by the Editorial Team, and correct mistakes. This process is an old fashion way of working; corrections are written on printouts of the catalogue. The Project Managers contribution to the catalogue is the commercial text and the Design Engineers provide the technical specifications and limitations.

EDITORIAL WORK 2

The Editorial Team will update the web catalogue by the corrected printouts and put together an upgraded version.

REVIEW 2

The Design Engineers and the Project Managers will go through the catalogue sheet that they are responsible for once again to correct mistakes from themselves or the catalogue team. Still, corrections are made with a pen on printouts of the catalogue.

EDITORIAL WORK 3

With the corrected printouts, the Editorial Team will once again put a new version of the catalogue together.

SIGN OFF

In the Sign Off meeting, CO and NCO-products will be confirmed. This process step also set the final date for new input to the catalogue. Now the final binder content is determined, no new products are allowed after this meeting. A follow up on the new accessories that are under development and production are also made, to make sure the launch is able to take place. Confirmation of all the images and pricing is also done during the sign off meeting.

EDIT 4

This is the final editorial opportunity that will only be necessary if new information will arrive.

FINAL CUT

In this meeting decisions about removal of products will be made. Products that are doubted to be ready in time for the launch will simply be removed. If the product is too important and really needs to get out on the market, more time will be given despite this deadline.

EDIT 5

The editorial team will remove products from the catalogue that will not be ready in time.

TRANSLATION

The binder is translated in an extern enterprise to all necessary languages.

CHECK

A control is made of the translation so everything is correct and fit together.

EDIT 6

This process step is needed if there are any failures that need to be changed before launch.

DELIVERY OF THE BINDER

The binder is delivered to its customers, which are the Marketing Department, sellers, and as an input to the catalogue process.

3.2 CATALOGUE PROCESS

The binder process brings the new accessories into the accessory catalogue. To make sure that the release of the final catalogue will be in time, the catalogue process will start before the input from the binder process is ready. What this means practically for the associates in the process, is that when the previous catalogue starts to be reviewed there will be old or not updated accessories that are not supposed to be there. This will cause confusions since the same person a few weeks earlier reviewed the binder, which included these recommended updates. The catalogue process is almost a repetition of the binder process. The biggest difference is that the catalogue process includes not only the new accessories but all of the accessories to be published. The catalogue process is illustrated in figure 7 (Appendix 2).

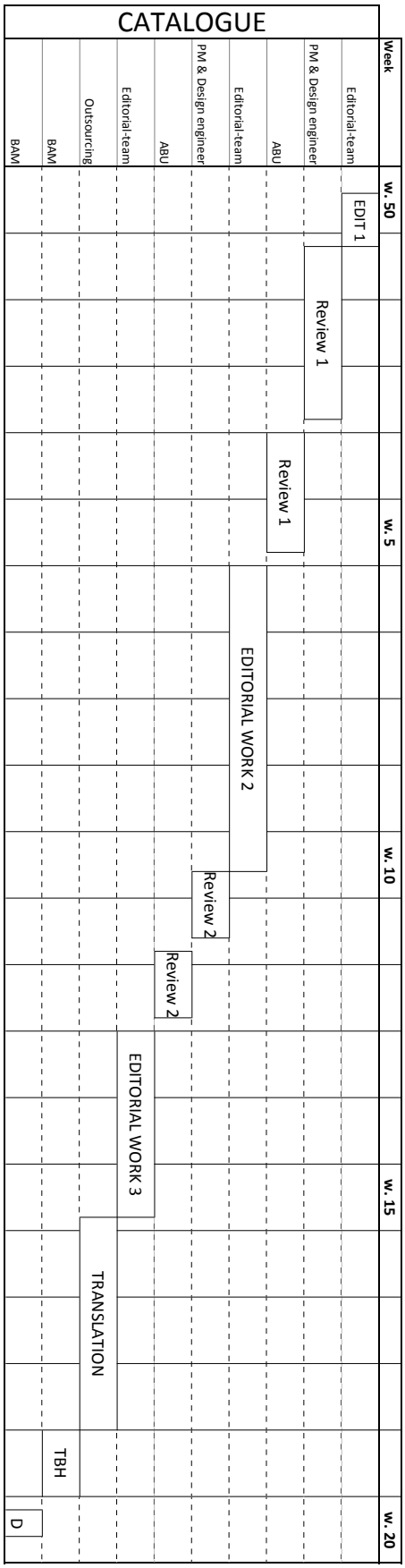

FIGURE 7 - THE CATALOGUE PROCESS

EDIT 1
The first editorial work will not include the binder content. The latest released catalogue will be printed.

REVIEW 1
Design Engineers will update the printouts with technical text and the Project Managers from ABU will update the commercial text for the same product.

EDIT 2
With the corrected printouts, the Editorial Team put a new version of the catalogue together. The binder content will now be included in the catalogue as well.

REVIEW 2
First review of the whole catalogue with both binder content, NCO- and CO-products included. Design Engineer and Project Manager will check to make sure the corrections made by the Editorial Team were right.

EDITORIAL WORK 3
With the corrected printouts, the Editorial Team put a new version of the catalogue together and also adds all pictures.

TRANSLATION
The accessory catalogue is finished and sent to an external firm for translation to all languages that are needed.

TBH
The last version with all the different languages is prepared for the web.

PUBLISHED
The final part of the process, the accessory catalogue becomes available on the web for all customers, even the final ones.

The whole process with both binder and catalogue is illustrated in appendix 4.

3.3 INVOLVED DEPARTMENTS IN THE CATALOGUE PROCESS

There are many different roles involved in the catalogue process, mainly from three departments named *ABU, R&D, and the Editorial department*. There are a few roles outside these departments for example translation and Business Application Manager. Every involved person has different amount of time they need to put into this process and are involved in different steps. There is no role that is involved in all the process steps, the catalogue process is just a part of the involved associates working tasks and nobody works with this catalogue for full time.

The *ABU* is mainly responsible for the commercial text in the accessory catalogue. ABU is also the owner of the catalogue process. The most important roles for the catalogue process in this department are described below.

- Process Owner of the binder, this role is highest responsible for the binder. This includes, the information in the binder, make a good planning, right information, and right accessories etcetera.
- Process Owner of the catalogue is responsible for the same as the Owner of the binder but instead of the binder naturally the responsibility includes the web catalogue.
- Marketing Developing Manager, this role is aware of the market needs of accessories, what needs to be develop and gives frames of idea suggestion to the R&D-department which will try to develop the wanted accessory.
- Product Plan Leader takes care of question as deadline for the accessories and also when the development can start. This role also set up the frames for the Technical Project Leader. These two work close together.
- Picture Manager. The main task is to make sure that correct pictures are available for the catalogue.

The biggest task the *R&D department* has in the catalogue process is to write down the technical fact that is needed, most of the associates in the R&D department have a degree in design engineering. Below are the main roles from R&D that are involved in the catalogue process.

- Product Owner. There are a few product owners and they are in charge of one product family. These are the ones who review the catalogue printouts.
- Technical Project Leader. This manager is responsible for a project group and this project developing can last for years. The Technical Project Leader work close together with the Product Plan Leader from ABU.
- R&D Section Manager, is involved in many parts during the process for example during the meeting where the confirmation about if correct information has come forward and also if a reasonable time frame is set. The Section Manager makes sure that everything is running as it supposed to and jumps in if a problem occurs.
- Component Owner is mostly involved in the review and in the step where changes are being made.
- Director of Accessory Development is involved in the "sign off"-meeting and also the "final cut"-meeting where products that are not ready for selling will be removed.
- Director of Production Accessory affects the process only during the "final cut"-meeting where products that are not ready will be removed from the catalogue.

A way to see the *Editorial Team* is as a middleman who puts all parts together and makes sure everything is working together, the texts, the pictures and the layout.

- Team Leader, of the Editorial Team, have responsibility that all information is put together in the right time and also plan how the project will flow.
- Editor. The editor is the one who put the commercial and technical text as well as the picture together to create a catalogue.

As mentioned before, there are some roles from other departments, which have a minor but still important role for the catalogue process to work. These minor departments are more involved in the latter sequences. The roles that have the biggest impact of the catalogue process are described below.

- Translation, this department translates the entire catalogue to the languages that are needed.
- Pricing Manager- Take care of questions as, what will a reasonable price for the accessory be? This price includes assembly costs and product costs.
- Volvo standard time guide (VSTG). This role handles information about time frames of the assembly of the accessories. By measuring this time the cost of the product installation can be estimated. This is a part of the final price.
- BAM-Business Application Manager is responsible for the web site where the catalogue is uploaded for the customers, the final step in the process. Business Application Manager makes sure that everything is up and running as it is supposed to be. The three biggest areas to keep track of are the response time to customers, answer their questions on the website and the availability of the website.
- System Manager (SA). SA is involved with the CO and NCO- list from the latest catalogue

The most fundamental part to understand this process is not to forget that the accessories are depending on the *vehicle line project*. If the car changes so will the accessories. For some years ago the air-condition system was an accessory to make the car more luxurious but today all new cars have air-condition system. That is why the accessories have a limited time before they become basic parts. During development of new accessories a close contact with vehicle line project for updates of the basic car is of extreme importance.

3.4 COMPILATION OF THE INTERVIEWS

From the interviews an amount of issues have been discovered. The potential improvement areas are described below.

- Who is the customer?

Today they have one internal customer and one final customer and they have different kind of needs. The internal customer can be divided between the mechanics and the vendor of accessories. The mechanics need information about, how to install this piece while the final customer and the vendor need information about price, what is different to this product against others etcetera. The persons who have been interviewed strongly feels this question needs to be answered before anything can be made to the process. Lean basic is to add value for the customer and that is why it is basic to define the customer first.

- Right information at the right time

The Editorial Team is depending of the ABU/ R&D to get the right information in time to be able to put the catalogue together. Estimation in the department has been made of how the working time is used. 25% of their working hours are used for editing and the rest of the time is needed to chase information, mostly from R&D, which can be read in appendix 1. The information that comes from this department is often not completed. Around 50% of the information goes through the first review step without the need of correction. One problem area is that R&D has another time aspect; they work with development projects for years while the Editorial Team works in 15 minutes periods.

Typical errors found after the release in the catalogue are, incorrect part numbers, limitations are missing, the color options are not correct. One example, which has been mention in several interviews, is a cabling which has been removed from the vehicle line project that was needed to assemble an accessory. This change from vehicle line project had not been shared with the involved associates in the catalogue process and the final customer detected this failure when mechanics tried to install it. This kind of miscommunication is not acceptable.

R&D is the source to a lot of the information for the catalogue process and it is highly important that the information they send to the next step is correct. There is a standard available for the R&D but the Design Engineers do not use it. According to some of the interviews this standard is not user friendly and to complex.

Figure 8 describes the checklist that is available for Design Engineers at the R&D department that are not being used in the desired extent.

Current standard - Review work for R&D

Checklist for involved associates in the R&D department for how the review work for catalogue pages needs to be executed.

Technical Project Leader

- Make sure that the product pages are distributed to the responsible Design Engineer.
- Remind the Design Engineers about the work during the time period.
- Make sure all Design Engineers know what to do.
- Communicate potential updates and changes to the kick off- list and CO-list.

Design Engineer

- Make sure no products are missing.
- Print out each product on one printout.
- Review the technical information, confirm or update if something is missing.
- Explain why the changes are necessary, clearly.
- If there is a change of article number, write the new number over the old number.
- Leave comments and suggestion about the picture to the picture owner.
- New information and changes about the vehicle must be delivered to Project Manager through Technical Project Leader.
- Do not write any question on the printouts, existing questions needs to be cleared before the reviews are sent to the editorial team.
- Do not forget to sign every reviewed printouts, even the one without changes.

FIGURE 8 - THE CURRENT CHECKLIST FOR THE R&D DEPARTMENTS WORK IN THE CATALOGUE PROCESS

Another problem for Design Engineers are; they have many other things to do and often get information about the deadlines for the reviews to late, so they will not be able to plan their own work. This causes that the reviews will be done in hurry and that is not the best prerequisites to make a great catalogue and create good conditions for the next step of the catalogue process.

- Pre catalogue arrives too late

The binder, which is the pre catalogue and include new products, CO and NCO-products are being added to the catalogue. This doesn't happen until after the first review period in the

catalogue process, which means that the Editorial Team, ABU and R&D make correction in the first review period on a version that are not updated. This causes confusion among associates while they already have reviewed the binder with upgraded en new products. To correct and update pages in the catalogue that soon will be exchanged for the new binder page is only waste of time.

One of the managers in R&D described a problematic area, the confirmation and testing of the accessories are made together with the new car in January but the pre catalogue, the binder, must be finished in December. The R&D associates will not have the chance to test the new developed accessories enough and errors might occur. In the end the information in the binder might turn out to be incorrect.

- Review procedure

During these review periods all involved associates make handwritten comments on printed pages from the catalogue and these paper sheets are put in to binders. These binders are carried around from department to department and ends up at the department of the Editorial Team. The editors read the written comments and type it in on the computer to upgrade and correct the first draft. There are two review periods in both the binder and catalogue process. The information about upgrading the text only happens through these comments.

- Geographical distances

There are three departments that are involved in the current catalogue process and they are divided in different geographical areas. They never see each other; they need to make an appointment through phone calls, meeting, and emails. Some information is lost through this way of communication. To deliver material late in the process are easier to prevent if the associates are connected to each other and know the person the late delivery will affect and how it will affect the person and the process.

- Lack of holistic view

What the associates felt about the catalogue process was that everyone focus on their own work and what the department should deliver. A feeling of “us and them” existed. The lack of a holistic view was clear, the understanding is limited and within the departments and jidoka,” right from me” is not practiced.

- Communication

Through the interviews communication issues have been discovered. Communication is often an issue in functional divided organizations and VCC is not an exception. Lack of holistic view and knowledge about what other departments are doing causes information get lost on the way between the departments. If knowledge of its importance to other departments does not exist, this kind of miscommunication is understandable. Because of the geographical distances all communication goes through mail, phone calls or meetings, it is hard to seek up a person and tell them “something on the way”.

The accessories are depending on the vehicle line project, and if the car changes the accessories have to adapt. Sometimes changes are made in one department without sharing the information with other departments that this change may affect. When the changes affect accessories, errors will occur in the web-catalogue. Design Engineers are good at their job and have deep knowledge developed through experience, and when the associates are replaces, the competence will be lost. A big part of the job is to know who to call to get right information.

4. ANALYSIS

The most fundamental issue is that the customers to the catalogue require different kind of information. To create only one catalogue in order to satisfy two very different customers are not an easy job. If the customer is not clearly defined and therefor nor the requirements for the content, there will be hard to know what information is the correct information. This issue will not be further analyzed, the existing customers are the ones the analysis will adapt to. In the continuation of this chapter, the problem area, to get correct information from the beginning, is explained and further analysis in that area is provided.

4.1 PROBLEM-SOLVING

To dig deeper in the issue of why incorrect information is being published an A3 report was made. In the year of 2012, the number of changes made in the already published catalogue was 250 (Appendix 3). This is a good starting point in this work of improvement, and also something concrete to follow up on. The root cause analysis that was made using the "5-why"-tool is illustrated on the next page in figure 10. As the A3 report shows in figure 9, the current situation is visually identified and the goals for the future wanted situation are set. Proposed countermeasures to the found root causes are showed as well. This is to be analyzed further down in the analysis chapter. Since no countermeasures are implemented the "effect confirmation" box is left empty.

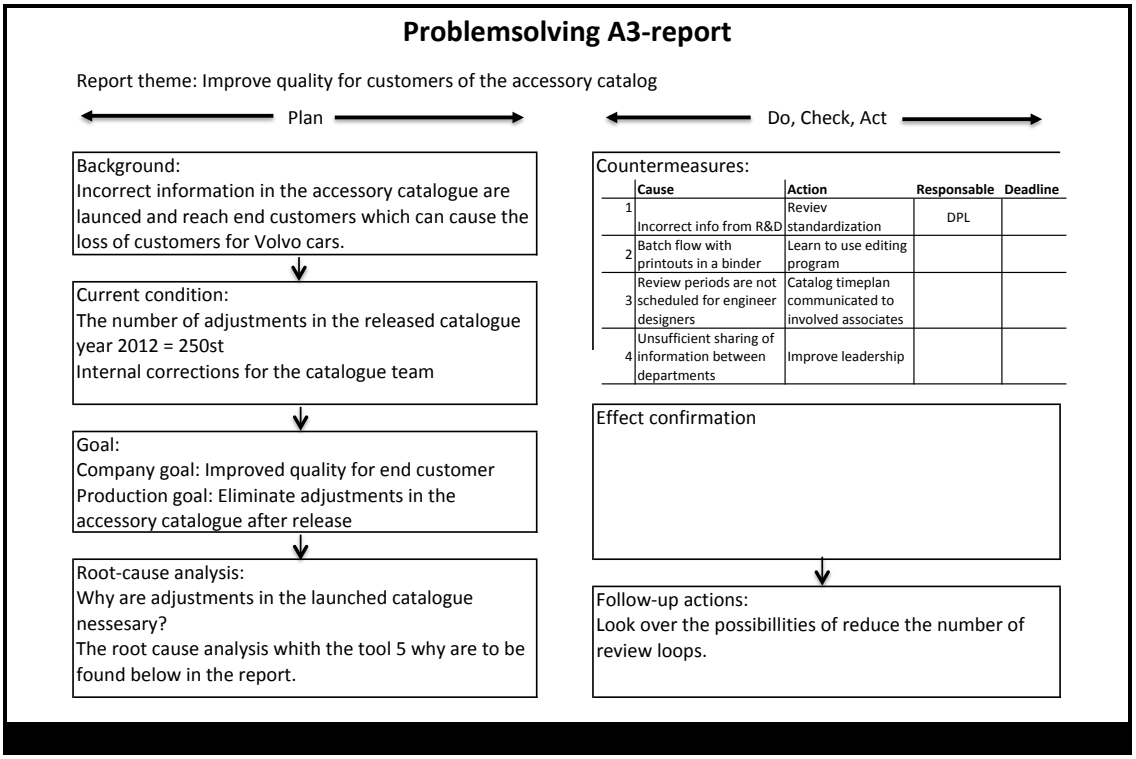

FIGURE 9 - A3 REPORT BASED ON THE INTERVIEWS

To be able to propose countermeasures, a root cause analysis was made. The fundamental issue is; "too many adjustments are made in the catalogue after release". This is also the starting point of the analysis. The "5 why"-analysis are illustrated in figure 10.

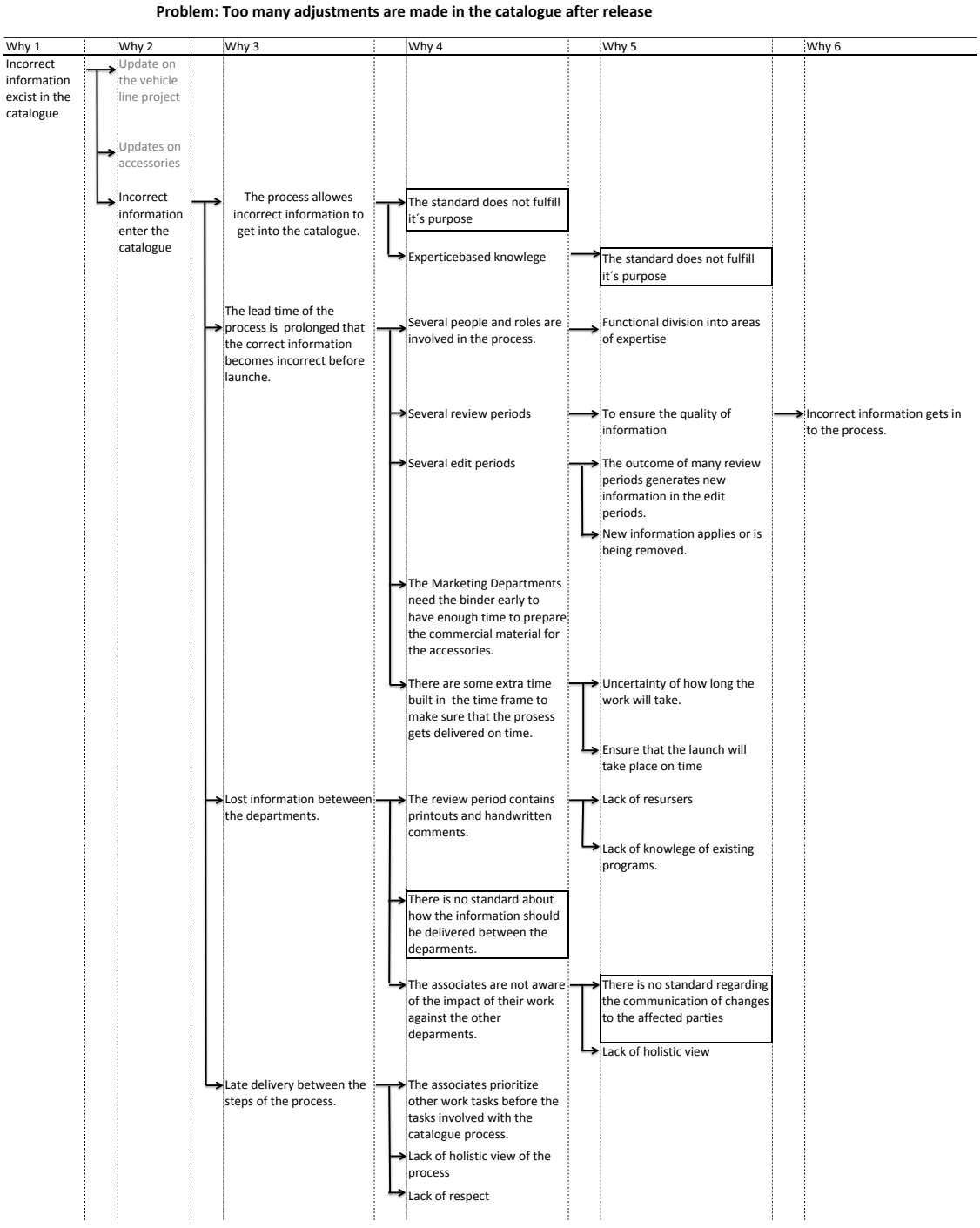

FIGURE 10 - THE "5 WHY"-ANALYSIS TO FIND THE ROOT CAUSE

There are three answers to the first why-question, and we focus on the only answer that is within the limits of this thesis. The analysis by "5 why" leads several times to that a standard could be the solution. This together with the fact that several errors occurs in the delivery from the R&D department, according to the research made by the Team Leader of the Editorial Team, the problem area to dive into is chosen to be "correct information from the

beginning". The use of standards is one basic principle in the lean philosophy, and is a great tool to get the work done properly by everyone in the process (Liker and Meier, 2006). If the information that is put into the catalogue was correct from the start, a lot of work concerning corrections of the catalogue wouldn't be necessary. The interviews indicated that there are many opportunities for improvements in the catalogue process. Since the focus of this bachelor thesis is to deepen into one area of potential improvement, the other problem areas will, in the end of the report, be suggested for further research.

According to lean philosophy, "right from the beginning" is needed before other aspects of improvements can take place. Compared to the lean house, "right from the beginning" is the basic pillar before the roof of the house can be built. What "right from the beginning" means in this case would be that the content of the catalogue, the information, are supposed to be correct when it for the first time are delivered to the editorial team. Correct information is a fundamental part to make the catalogue process efficient, without this basic achievement the solvation of the other problem areas will not have a big impact. Furthermore if incorrect information ends up in the process, incorrect information will probably also get published. Waste will be created if associates work with the wrong/not updated data instead of focusing on value added work. By this choice there will be a platform for further development of the process to reach good quality of the launched catalogue.

To get the information right, lean philosophy tries to achieve one-piece flow, even though this is not always easy to accomplish. This is an important aspect of lean; to study how the product are being produced (Liker and Meier, 2006). In this catalogue process, the product is the information. In the current catalogue the information is flowing through the process in batches, the batch is the binder that is carried around with all printed catalogue pages. Since the catalogue is delivered in batches it is harder to level out the workload and problems will be covered. To level out the workload is another wall, which need to be built before the roof can be put on the lean house (Liker and Meier, 2006) .

4.2 STANDARDS

Unfortunately the Design Engineers do not use the standard that do exist. The reason why, is mainly because it is not designed in a user-friendly way, according to the interviewed persons. This standard needs to be reviewed and designed in a proper way. The users of the standards need to be involved in this process together with the leaders for an optimal designed standard (Liker and Meier, 2006). A standard, which is not developed together with the ones who uses it will never work and do not fill its purpose. Important information about the best work or great inputs from the associates will be lost and prevent the developing of a great standard. A basic foundation in lean is to use the talent and knowledge of the labors, after all they are experts of what they are doing (Liker and Meier, 2006). Once the standard is set, continuous improvements can begin to take place. Without a foundation to start from, there is no evidence what was improved. Why a standard is important in this situation is that the best way of executing the task should be preserved, written down, followed and also improved.

4.3 COMMUNICATION AND LEADERSHIP

Whether the information that comes into the catalogue is correct or not is also affects by another factor. One of the biggest issues lies between vehicle line project and accessories, the lack of communication when changes appear causes big side effects. Correct information will turn incorrect if there is changes in the vehicle line project that affect the accessories. If that information is not shared, or shared to late, incorrect information can get published. When this miscommunication occurs, associates will work with the incorrect information and the time spent will be waste. Leaders are responsible for the communication flow and how the processes are designed. Vertical information as well as horizontal is of highest importance. As mentioned in the lean philosophy chapter, leaders are developed for the long run. The deep knowledge they need to have, takes a long time to get. The recommendation is to move in the horizontal direction before they move up in the hierarchy. This creates good knowledge about how one decision will have impacts on other departments and therefor also about how the communication should flow (Liker and Convis, 2012). This is highly important in this case.

Visualization in lean philosophy stresses how important it is to share information to all associates. Relevant information must be available to everyone so that everyone knows what is coming or how the current situation is (Liker and Meier, 2006). The Design Engineers apparently do not even know the deadlines of the reviews. Suddenly the materials to be reviewed are delivered and the Design Engineers are expected to deal with it even though they have not made any room for it in the schedule. The information about the deadlines is available in the original schedule, but the information is not coming through. The core issue is then that Design Engineers are not given the prerequisites needed to be able to plan for the review. And the reason is that information is not shared to associates concerned. The solvation to this problem lies in the hands of the leader, for the leader is responsible for the communication and that the expected work is done.

Troubles the Design Engineers meet when changes are made in the vehicle line project would not occur time after time if they would use the lean principle of go to the root cause and solve it before moving on (Liker and Meier, 2006). If work is being done in this way the same problem would never occur two times because of the thorough research that have been accomplished to find the underlying cause. Every time insufficient information reaches the catalogue team, an investigation should take place to track back to find out why it happened. When accessory parts have restrictions that they are not compatible with other parts/accessories, that information need to reach the final customer to make sure the customer do not order the wrong parts to its car. When this kind of important information is missing out, instead of a quick fix and correct the incorrect information, leaders should make sure the same problem will not occur again. Since these kinds of problems have happened several times, conclusions can be drawn that this is not the way the company handle issues. To become a learning organization, as lean philosophy stresses to be vitally important, lessons learned need to be used to further development and be spread throughout the organization.

5. DISCUSSION

Below is a discussion about the conclusion of this bachelor thesis the writers have made and also implementation suggestions.

5.1 VEHICLE LINE PROJECTS IMPACT ON THE CATALOGUE PROCESS

The changes in vehicle line project will always affect the accessories development and it is of fundamental importance that the communication of the changes exists. As written before many of the errors in the launched catalogue is depending on this. That changes in vehicle line project don't reach other parts of the organization that is affected by the changes is not acceptable. Liker and Meier write, as long as the possibility of errors exist there will be errors made.

5.2 LEADERSHIP

According to the theoretical framework one cause of this issue is poor leadership because the leaders are the ones to set up the organizational structure and how the information should flow. As stressed before, the leadership is of high importance in all aspects of running a company. To be a great leader is difficult and all the leaders need to have the right prerequisites from the corporate management. Lack of the right prerequisites causes that communication suffers and when communication problems occur, bigger side effects are created. The absence of right conditions for the leaders can result in that focus will be on firefighting and handling the current situation instead of seeing the consequences of their action a few steps ahead, before it happens. Since there´s a limited amount of time to accomplish work tasks, prioritization will be needed of what those tasks should include, manage the work tasks concerning the current situation or to raise your eye and look forward.

5.3 COMMUNICATION

The Design Engineers do not work full time to accomplish their part to the web catalogue, they have other projects that are their main tasks. Their workload depends upon the project cycle, when the catalogue process reach the review state where the Design Engineers are involved the workload will increase and they will end up in a matter of prioritizing. If the review state´s deadlines had been put in their own scheduling for a better planning this prioritization wouldn't be necessary. According to lean philosophy, it is necessary to level out the workload. Moreover the actual time that is spent on the review task is not as long as the planed one. Due to bad planning and heavy workload, the review task is not executed until the very deadline, the end of the process step. If the review step in the process was planed for, the process step could be shortened. Furthermore, today there is a schedule with all deadline sent out early in the planning phase of the process so the information is available but not communicated correctly to the affected parties. This exemplifies the necessity of improving the communication.

5.4 STANDARD

As the analysis of the research showed the existing standard need to be developed to fit the current situation and the Design Engineers need to be involved in the arrangement of this standard. The Editorial Team also needs to have influence on the standard because they know what the output should be. The leaders involvement is important to carry the process forward, to make sure the standard are designed correctly and to make sure it always get updated. According to the current standard for the Design Engineer the aspect of limitation is missing and is something we would recommend to put in the standard. As soon as the standard is ready it needs to be tested and evaluated for further improvement to achieve its purpose. Which also Meier and Liker stresses in their description of developing standards. When the standard serves its purpose, it's of importance to get the other walls from the lean house working before next level will be reached (Liker and Meier, 2006).

The reason to deepen into the Design Engineers work is because most of the incorrect information originates from the R&D department (Appendix 3). This does not mean that ABU or editorial team doesn't need a standard.

5.5 IMPACT OF RIGHT INFORMATION

If the fundamental question concerning who the actual customer is could be answered, knowledge about what the right information is, which the receiver wants, can be gained. When, in addition to this, correct information flows through the process, a god platform is created for the catalogue process for further development. To be able to supply the catalogue with correct information, standards are one aspect that is needed. Right information has many great impacts, for instance:

- The number of process steps could be reduced.
- Information flow will be better
- Shorter lead time
- Makes it easier pass on right information.
- The information does not need to be updated along the process before launched.
- Motivation for the involved parts
- Satisfied customers.

What the bullet list above shows is that there is many good side effects from correct information from the beginning. The positive side effects should be reason enough to prioritize this issue.

6. CONCLUSIONS

The conclusions that has been made, is that there are many potential improvement areas in the catalogue process, but everything cannot change for the better over one night. The process of achieving long-term improvement that also is accepted from the involved associates is to develop step by step (Liker and Meier, 2009). What we will recommend is to start solving the fundamental issues to achieve a stabile foundation to be able to continue developing.

6.1 RECOMMENDATION

It is a tough challenge to improve the catalogue process because of its complexity and due to the many involved parties. When correct information is delivered at the right time, great perquisites will be created to shorten the lead-time and improve the quality of the catalogue.

Our recommendation to improve the process is:

- Decide who the customer is to know what the requested content of the catalogue is.
- Changes in the vehicle line project must be communicated to the affected departments.
- Standards and checklists need to be reviewed by the users, and continuous improvements and changes to keep them up to date are necessary.
- Information about the process schedule and deadlines need to be shared with all involved employees to enable planning of their work tasks.
- The leaders must be given the prerequisites to implement these suggested improvements while leaders are the ones to decide where the resources will be put in. If the leaders do not visually show what is important, the associates will not prioritize that question.

This is an opportunity to learn, if ABU wants to implement lean philosophy they need to be a learning organization. This process involves many aspects as standard, communication, use the knowledge of the labors, root cause solving to aim for a learning organization. Volvo Cars is a big organization and need to develop all the time because of the constant change in customer demands to survive. As Liker and Meier writes, self-developing is the most important trait for a leader as well as help other to self-develop. Good questions to always analyze: What did I do? How did it go? What did I learn for the next time?

6.2 FURTHER RESEARCH RECOMMENDATIONS

As mentioned, there have been limitations of what to focus on in this bachelor thesis. Through the interviews many improvement areas have been discovered. Even though these areas have not been explored, we still want to describe them as a recommendation to further research. Further investigation areas:

- The time the pre catalogue are delivered to the catalogue process
- New accessories are not being tested in the new car before the deadline for the binder.
- There are handwritten printouts that are sent fort and back between departments. This needs to change for a more advance system.
- Geographical distances
- Lack of holistic view from the associates

If waste elimination mostly is applied on the shop floor, it will have sub optimizing effects. It is important to look at the company as one. Waste must be removed from all departments and focus needs to address both production processes and nonproduction processes. Ask yourself how much of your work today have added value to the customer? Compare the answer from one operative associate on the shop floor and one administrative associate. The answer will speak for itself (Keyte and Locher, 2004).

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8. APPENDICES

Below are all the appendixes related to this thesis.

APPENDIX 1 – THE SCHEDULE FOR THE BINDER PROCESS

BINDER 13w20, DELIVERY 12w51:3

Id	Activity	Duration	Start	Finish
	Binder production	**83 days**		
1	Kick off (12w35)	1 day	Mon 12-08-27	Mon 12-08-27
	Deadline Minutes of meeting and Product description	n/a		
2	Editorial work 1	15 days	Tue 12-08-28	Mon 12-09-17
3	Review 1	10 days	Tue 12-09-18	Mon 12-10-01
4	**Tuning one meeting (2 okt, 12w40)**	1 day	Tue 12-10-02	Tue 12-10-02
	Note! Last chance for new products to Binder at this meeting	n/a		
5	Editorial work 2	14 days	Wed 12-10-03	Mon 12-10-22
6	Review 2	9 days	Tue 12-10-23	Fri 12-11-02
	Final date for input (12w44)	n/a	Fri 12-11-02	Fri 12-11-02
	Note! Input means content for excisting products (NOT new products)	n/a		
	Note! Deadline for images as well	n/a		
7	Editorial work 3	12 days	Mon 12-11-05	Tue 12-11-20
8	Binder-pdf available on Lotus Notes	1 day	Wed 12-11-21	Wed 12-11-21
9	**Sign off meeting (12w47)**	1 day	Thu 12-11-22	Thu 12-11-22
	Note! Only "OK or NOK" on input given at Review 2, no new input			
10	Editorial work 4, Incl. Proofreading	4 days	Fri 12-11-23	Wed 12-11-28
11	**Final cut/"Sista rycket" (12w48)**	1 day	Thu 12-11-29	Thu 12-11-29
12	Editorial work 5, Note: Only removal of products	1 day	Fri 12-11-30	Fri 12-11-30
13	Translation 1 , CBG	10 days	Mon 12-12-03	Mon 12-12-17
14	Language Check, CBG	1 day	Tue 12-12-18	Tue 12-12-18
15	Editorial work 6	1 day	Tue 12-12-18	Tue 12-12-18
16	Delivery of PDF-file and available at Volvo Intranet (12w51)	1 day	Wed 12-12-19	Wed 12-12-19

APPENDIX 2 - THE SCHEDULE FOR THE CATALOGUE PROCESS

WEBCATALOGUE, SOP 13w20

Id	Activity	Duration	Start	Finish
	Catalogue production			
1	Editorial work 1, Prep. Catalogue PDF	3 days	12w50:4	12w51:1
2	Review 1 PD, Review period for KU	19 days	12w51:2	13w03:4
3	Review 1 ABU, Review period for PPL	9 days	13w04:1	13w05:4
4	Editorial work 2	23 days	13w06:1	13w10:3
5	Review 2, Review period for KU	5 days	13w10:4	13w11:3
6	Review 2, Review period for PPL	5 days	13w11:5	13w12:4
7	**Final date for input (13w12)**	n/a	13w12:4	
8	**Deadline for delivery of photo material from ABU (13w12)**	n/a	13w12:4	
9	Editorial work 3	12 days	13w13:1	13w15:4
10	Translation	15 days	13w15:5	13w18:5
11	Content XML to Back-office	1 day	13w16:1	13w16:1
12	TBH Back-Office	4 days	13w19:1	13w19:5
13	Available at Volvo acc. web	1 day	13w20:1	

APPENDIX 3 – A3-REPORT WRITTEN BY EDITORIAL DEPARTMENT

Recommendation for PDCA

Issuer:
Team member: Tillbehörsredaktionen
Date: 2012-11-19

Attention: ABU, R&D
Theme: Sena leveranser

Background:

Redaktionen skapar en tidplan som skickas ut och godkänns inför varje produktion. Ett återkommande problem är dock leveranser som inkommer efter utsatt tid i den överenskomna tidplanen.

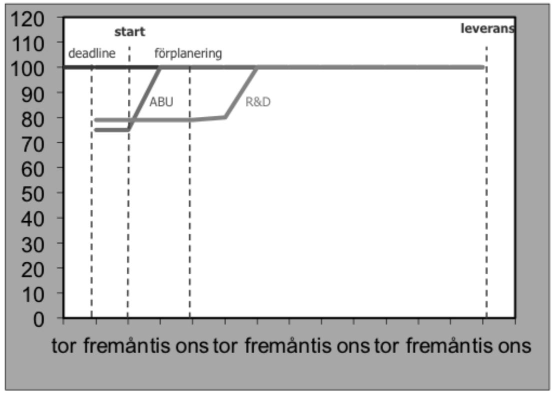
Taktat flöde är beordrat från högsta ledningen inom VCCS och är en av grundstenarna inom LEAN. Redaktionen är beroende av att tidplaner följs och att leveranser kommer JIT för att kunna leverera enligt sina åtaganden och kravställning.

Under årens gång har redaktionen byggt in luft i tidplanen för att kunna hantera sena leveranser och avvikelser. Problem med leveransprecision har varit en återkommande punkt sedan lessons learned 10w20 med undantag för 12w20. I tider av LEAN måste vi börja identifiera waste och försöka kapa våra ledtider.

Current situation Data and facts:

Editeringsperioden är uppdelad i två faser, förplanering och produktion. Förplanering handlar om att hantera avvikelser, uppskatta komplexitet och tidsuppskatta en produkt. När man vet detta kan en produkt kategoriseras vilket i sin tur ligger som grund för takten. Takten leveranssätts och styr produktionen.

Under 12w46 saknades 52% vid deadline och all information var inlämnad först två veckor senare. Nu under 13w20 var det bättre men man saknade fortfarande 21% av produktsidorna vid uppstarten av förplaneringen, dagen efter deadline. Allt material var inte inlämnat förrän på fredagen, långt efter att förplaneringen var avslutad och produktionsfasen startat.



Consequences:

För att redaktionen ska kunna takta sin produktion måste man konsekvensbedömma varje remissad produkt och omvandla denna efter kategorier och enheter inför taktningen. Eftersom remissen inte levereras enligt tidplan kan redaktionen inte arbeta på det sätt man är beordrad att göra. Istället för att förplanera och säkra produktionen tvingas man jaga in svar och lägga tid på fel saker – waste. Under Edit3 spenderade redaktionen ca 24h på att jaga in svar via mail, telefonsamtal, möten, utredningar etc.

Sena leveranser innebär en kvalitetsförlust i bindern då arbetsbelastning inte kan balanseras och högre tryck skapas mot slutet av en produktionsperiod. Produkter kategoriseras fel utifrån avsaknad av data och tvingar redaktionen till omprioriteringar. Sämre kvalitet är i sin tur en källa till binder corrections.

Eftersom leveranserna kommer efter överenskommen tidplan visar vi inte bara bristande respekt för gemensamma överenskommelser, vi kan inte heller arbeta med att försöka reducera ledtider. Det planerade arbetet störs av avvikelser och man kan inte arbeta med den utveckling och förädling som man vill och planerar för att kunna göra.

Ytterligare en konsekvens blir problem med att kunna hantera löpande katalogförändringar (changes). Allt fokus ligger på att försöka leverera till kommande remissperiod och andra viktiga arbetsuppgifter blir nedprioriterade för att kunna hantera leveransen.

12w46 var vi nära att inte kunna leverera en produkt enligt tidplan.

Om vi inte arbetar med JIT och standard blir förbättringsarbetet kraftigt försvårat.

Time frame and feed back

En orsaksanalys och åtgärdsplan för hur ABU och R&D ska kunna säkra sina leveranser behöver tas fram. Detta bör vara omhändertaget inför nästkommande binder 13w46.

Om ABU och R&D behöver längre remissperioder för att kunna leverera enligt en tidplan så är det där vi ska justera tidplanen, det är inte redaktionen som "måste bli flexiblare" kring en överenskommen tidplan.

APPENDIX 4 – TOTAL PROCESS OF THE CATALOGUE