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**Cross-brand standardisation  
- A case study of Volvo 3P**

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## **Abstract**

Volvo 3P's aim is to create one single truck platform which shall be used for all brands (Volvo, Renault and Mack). Having a common platform requires the support of common standards, and these are produced by the Corporate Standards department in cooperation with all three truck organisations. However, the end users at Volvo 3P are not making full use of these standards, and therefore we were asked to investigate the reasons for this. The research problem is: how can the process of standardisation be improved in order to increase the usage of common standards within Volvo 3P Lyon?

The research, which consists of a pre-study and a case study, was carried out by interviewing 33 employees representing different organisational levels of Volvo 3P both in Lyon and Gothenburg. The results show that the main obstacle for using standards occurs in the implementation, but at the same time barriers can be found in the process of development. Furthermore, communication, management support and resources were other significant obstacles to standardisation.

In order to improve standardisation, implementation should be initiated already during the development process and performed through a formalised process. Moreover, standardisation must become a strategic goal.

*Keywords:* standard, standardisation process, implementation, development process, product development, international standards

## **Acknowledgements**

“Sometimes you have to go in order to come back.”  
-Snufkin in the Moomin stories-

When starting our journey at the International Management study programme at Göteborg University, we both left our safe and sound lives and started something new with the purpose to return with rich experiences. Similarly, in the thesis we entered the world of standards where our previous studies helped us to understand the complexity of the research.

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# 1. Introduction

The rivalry in the global market has forced organisations to seek new solutions to maintain their competitiveness; mergers and acquisitions are just a few to mention. To maintain their level of competitiveness, the Volvo Group acquired Renault Trucks and Mack Trucks, and launched one of the largest projects in the history of trucks with the aim of building a shared platform for all three brands. By intensifying synergies between these business areas through the use of common standards, Volvo aims to decrease the costs and therefore stay competitive.

Volvo 3P, one of the business units within the Volvo Group, needs to have common standards to support the shared platform architecture for Volvo, Renault and Mack Trucks. These technical documents are created in a standardisation process, which includes development process as well as implementation. In this thesis we explore how standardisation is carried out at Volvo 3P Lyon, by investigating both the implementation and the development process. The purpose is to provide Volvo 3P with information of how to increase the use of standards, and give recommendations for further action.



## **1.1 Background of the Problem**

The investigated problem presents a large number of elements. In order to clarify it and give the reader an overall view, we first define standards, describe the standardisation parties and the standardisation process within Volvo Group.

### **1.1.1 The character of standards**

Standards, described as voluntary rules<sup>1</sup> and created by different bodies<sup>2</sup>, often lack the authority to force people and organisations to follow them.<sup>3</sup> According to Brunsson and Jacobsson (2000), standards can be categorised into three types. There are standards for what we do, for example describing how different parts of a truck should be welded. Then there are standards for what we have, for instance an organisation should have a strategic plan. The third type is standards about being something, which describe and categorise things and actors, such as what a telephone is. To sum up, standards are made to simplify things, to make communication and co-ordination easier.<sup>4</sup>

The types of standards we investigate in our thesis are standards for what we do; these are technical standards, telling people how a truck should be built. Within the Volvo Group standard are seen as 1) recommendations to do things in a certain way and 2) solutions to forthcoming problems. The reason for standardising within the Volvo Group is to maintain the core-values (quality, safety and environment), while aiming to decrease the overall costs and simplify the global co-operation.<sup>5</sup> For Volvo 3P, as mentioned, common standards are made with the aim of supporting shared materials, parts and practices for the common truck platform.

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<sup>1</sup> Brunsson, N. and Jacobsson, B. (2000), p. 1

<sup>2</sup> Standard organisations such as the American National Standard Institute (ANSI) and Deutsches Institut für Normung (DIN); international standards organisation like ISO (International Organization for standardisation); and non-governmental organisations that also issue standards. Large corporations develop their own standards and cooperate with other organisations to create standards applicable to their business.

<sup>3</sup> Brunsson, N. and Jacobsson, B. (2000), p. 2

<sup>4</sup> Brunsson, N. and Jacobsson, B. (2000), pp. 16-17

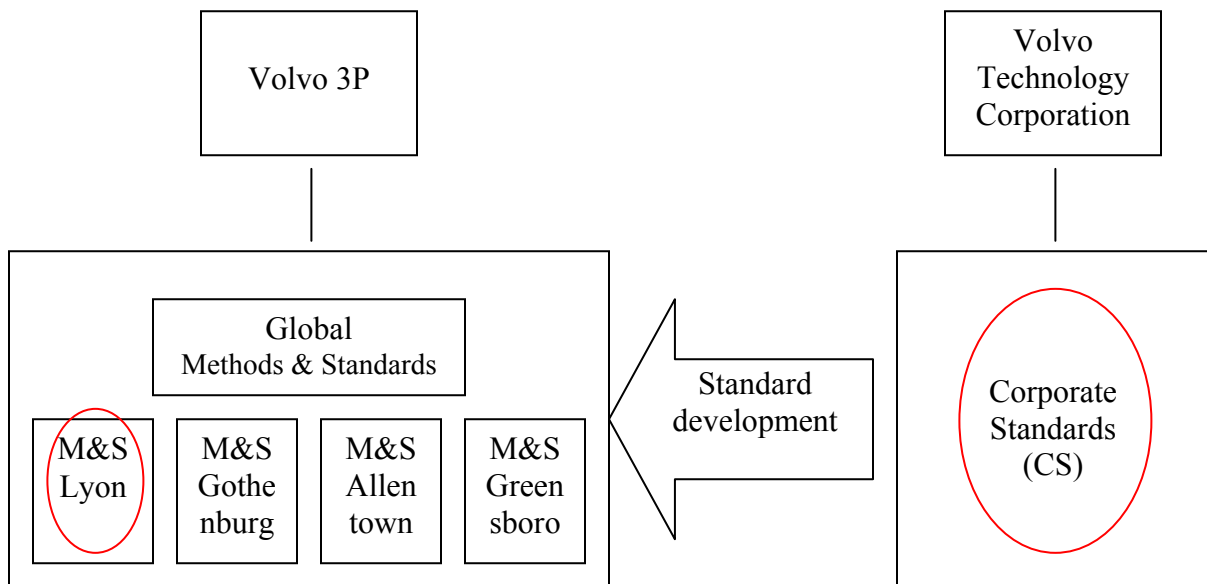
<sup>5</sup> Volvo's Intranet

Even though Brunsson, N. and Jacobsson, B. (2000) state that standards are voluntary rules, the standards we investigate are mandatory to use, at least for all common activities.

### 1.1.2 Standardisation parties

Standardisation involves standardisers and adopters which in the Volvo Group are respectively Corporate Standards (CS) and Volvo’s business areas<sup>6</sup>. The purpose of CS is to provide its service to all Volvo Group companies (see figure 8 in appendix) (and Volvo Cars), but since this thesis focuses on Volvo 3P, and more precisely on 3P Lyon, we will limit the information to the co-operation between CS and Volvo 3P which is illustrated in figure 1.

**Figure 1: The standardisation parties**



### The standardiser: Corporate Standards

Corporate Standards (CS) was established in 1969 and was a part of the Volvo Group’s main designing department until 1995 when it was incorporated in a new company called

<sup>6</sup> Volvo Group is organised in business areas: Volvo Trucks, Mack, Renault Trucks, Volvo Buses, Volvo Construction Equipment, Volvo Penta, Volvo Aero, Volvo Financial Services.

Volvo Technology Corporation (VTEC) (for further information see figure 9 in appendix). CS is still part of VTEC (see figure 10 in appendix) and its aim is to simplify the activities and reduce product costs for the Volvo companies by developing and maintaining standards and providing consultation in connection with developed standards.<sup>7</sup> The department includes specialists in different subject areas whose main task is the development of standards within their area of expertise. The development process involves not only the expert from CS but also representatives from all business areas.

The above mentioned activities of CS are controlled by two different groups: the Reference Group (RG) and the Planning Group (PG). The purpose of the RG, with members representing the product development department of various Volvo companies<sup>8</sup>, is to decide CS's overall activities, such as aims and financial principles. The PG accepts or rejects specific standardisation projects, and decides how the project shall be funded. The RG normally meets twice a year while the PG assembles four to five times a year.

### **The adopter: Volvo 3P**

As mentioned previously, standards have adopters, which could also be seen as the customers of the standardiser. In our case the customer is Volvo 3P; business unit<sup>9</sup> within the Volvo Group providing services<sup>10</sup> for Volvo, Renault and Mack Trucks. Volvo 3P was established in 2001 with the mission to “propose and develop profitable products to ensure a strong competitive offer for each truck company based on common vehicle architecture and shared technology”<sup>11</sup>. This business unit is divided into four main sites: Gothenburg (Sweden), Lyon (France), Allentown and Greensboro (USA). However,

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<sup>7</sup> CS also produces standard and design aids such as design guidelines and information systems for terminology, parts, materials, etc. as well as documentation of standard parts.

<sup>8</sup> The product development departments represented are Volvo Bus, Volvo 3P, Volvo Penta, Volvo Aero, Volvo CE, Volvo Technology and Volvo Powertrain.

<sup>9</sup> The business units providing support for the Volvo Group are Volvo 3P, Volvo Powertrain, Volvo Parts, Volvo Technology, Volvo Information Technology, Volvo Logistics, Volvo Technology Transfer and Volvo Business Services.

<sup>10</sup> Volvo 3P is responsible for product planning, product development, purchasing and product range management for the three truck companies.

<sup>11</sup> Volvo's Intranet

Volvo 3P is not a legal entity, which means that its personnel are employed by each truck brand.

The connection between CS and Volvo 3P is Methods and Standards (M&S), a department within Volvo 3P located at all four sites. For the moment, the M&S department does not have any official vision or mission, and therefore it was difficult for us to acquire a complete knowledge about the department's tasks and responsibilities. However, the implementation of common standards is one of the main activities. Originally, the M&S in Lyon belonged to the Renault's CS department, which remained with Renault Car when the company was split and Renault Trucks was sold to Volvo. Only a few persons from that department stayed with Renault Trucks and are now part of the M&S department. The global coordination of all M&S initiatives is centralised to the Global M&S manager located in Gothenburg. The global manager is also responsible for the development and deployment of a global M&S strategy, including global training, for global "buy in" of common standards at all sites and cooperation with CS.<sup>12</sup>

### **1.1.3 The process of standardisation**

Since standardisation is to create and propagate standards<sup>13</sup>, it includes both the standard development process (SDP) and standard implementation. The development of new common standards is described in Figure 2; in reality though this model is not always followed. Similarly, the way implementation of standards is carried out at Volvo 3P Lyon is also illustrated.

The SDP starts when somebody within the organisation expresses a need for a new standard and ends when the standard is released. The standard project is assigned to an expert at CS, regarded in the thesis as head of the working group, who will submit a project proposal for approval to the PG. Once the proposal is approved, the expert will initiate a concept study and form a standard development working group (SDG) which

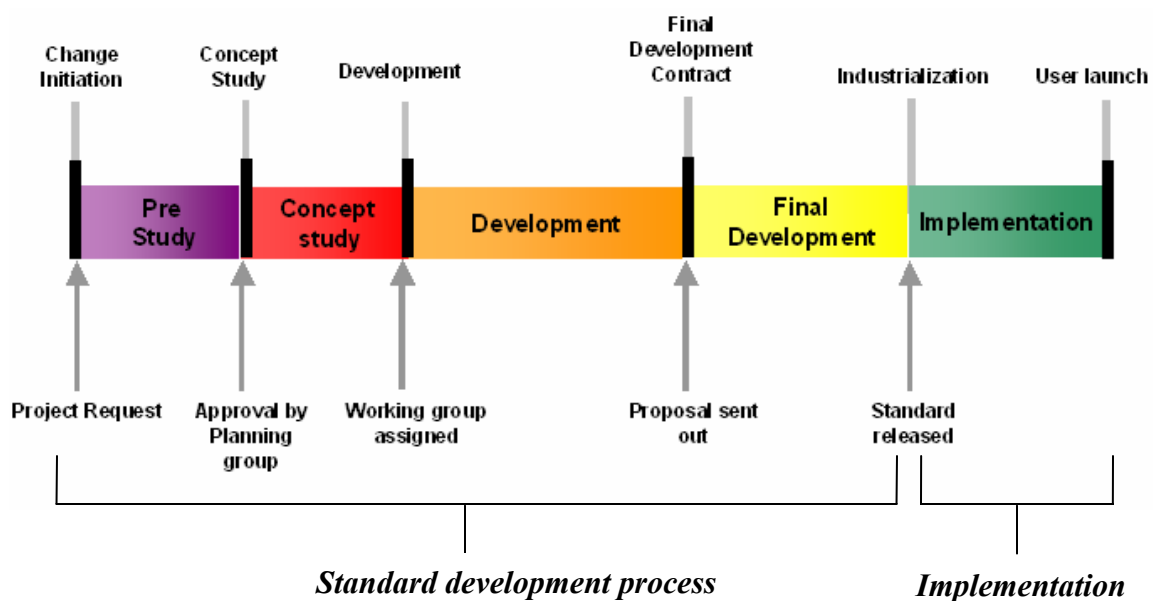
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<sup>12</sup> Only M&S Lyon and Gothenburg belong to the same organization whereas Allentown and Greensboro are part of another quality organization.

<sup>13</sup> Brunsson, N. and Jacobsson, B. (2000), p. 10

includes members from all Volvo's business areas and business units concerned by the standard. In the case of standards developed exclusively for Volvo 3P the SDG includes representatives from all sites. The aim of the development phase is to write a standard proposal which is sent out to the stakeholders for feedback. In the final development stage, the comments are evaluated by the working group and the proposal text is revised. In some cases, the standard might be brought back to the concept study phase. At the end of the final development, the standard is released and ready for implementation.

**Figure 2: Process of standardisation**



*Source:* Volvo's Intranet

The implementation is carried out by each site separately, but CS can support the process with training for example if the sites request it. Even though implementation is executed in a non-formalised way, some main milestones can be identified. When M&S Lyon receives a standard from CS, a first decision regarding the translation of the document to French will be made. The standard will then be forwarded by electronic post to different contact persons. They are usually heads of departments at the Lyon site, and they are supposed to send the document to their subordinates. Training activities or presentations do not follow any precise process and are generally organised by each department independently. Follow up on the implementation is performed by so-called design

checkers<sup>14</sup>, who randomly control drawings issued by designers and reports the mistakes. If a designer uses the wrong standard or a standard incorrectly, his department will be assigned a penalty point<sup>15</sup> by the design checker. Apart from design checking, no other activity of evaluation on the usage of common standard is established.

## **1.2 Problem Definition**

In 2001 Renault Trucks and Mack Trucks became part of the Volvo Group. The merger highlighted the opportunities of achieving a better competitive edge through the establishment of synergies between the three brands. These synergies are achieved through the creation of a common platform, which requires the use of common materials and parts and all this is supported by common standards. This is why standardisation is crucial to the success of the common platform architecture project.

Standards need to have adopters in order to achieve their purpose. Despite their compulsory nature, common standards at Volvo 3P Lyon are not fully adopted and therefore we were asked to investigate the reasons behind it and give recommendations for improvement. This request was the base for our research problem: **How can the process of standardisation be improved in order to increase the usage of common standards within Volvo 3P Lyon?**

As stated earlier, standardisation consists of a process of development and implementation. Implementation can be defined as the put into effect of a plan<sup>16</sup>, whose purpose in this case is the full usage of standards. Therefore, since the actual usage of standards at Volvo 3P Lyon is not the intended one<sup>17</sup>, we decided to investigate the implementation process in order to identify the causes of failures. At the same time, starting from the consideration that implementation is not independent from the

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<sup>14</sup> The work of the design checkers is to control drawings and to check that these are correct. Among various things, design checkers control that standards are used properly.

<sup>15</sup> Drawings containing a mistake create negative consequences for the department that issued them. This is done in terms of penalty points which are introduced in a chart for each department. Penalty points affect departments' bonuses but are also a tool to evaluate the performance of each designer.

<sup>16</sup> "Implementation" 'Oxford Dictionary of English' (2003), p. 870

<sup>17</sup> Vrakking, W. J. (1995), p. 44

development of standards, we thought appropriate to also investigate the process of development in order to see if and how this is hindering the implementation.

Since this thesis is focusing on cross-brand standardisation, cultural differences are a visible element. However, we chose not to concentrate on this topic as we believe that obstacles related to culture can be overcome by standardisation. Indeed standards are describing practices which are common to all three brands, and by doing this they are homogenising organisational traditions.

### ***1.3 Purpose of the Thesis***

The aim of this thesis is to provide, through the combination of research findings and academic literature, recommendations on how to increase the usage of common standards at Volvo 3P Lyon, by improving the standardisation process. Even though our research will mainly focus on Volvo 3P Lyon, we hope that the conclusion that we will draw will be useful for the entire Volvo Group.

According to our experience, the implementation of technical standards within organisations has been researched to a limited extent; we therefore wish that our thesis will bring valuable contributions to the academic literature.

### ***1.4 Limitations***

This research is mainly focusing on the Lyon site of Volvo 3P since this was the wish of our supervisor at CS; time and distance were also limiting elements. The observation of all three sites could have provided a more complete overview on why common standards are not widely used in the 3P organisation but it would have required more time and resources.

Technical standardisation can sometimes be very specific and since we lack the technical background needed to understand them, the study was therefore limited to the areas of

our competence. This is also the reason why we chose not to analyse issues with technical content.

A general obstacle to our research was the scarcity of earlier studies regarding the implementation of technical standards in organisations. One possible explanation is that we did not select the best possible keywords. The theoretical framework was therefore built by selecting models and studies that could be applicable to our research.

## ***1.5 Structure of the Thesis***

### **1. Introduction**

Until now a short description of the nature of standards, of standardisation parties and finally of the standardisation process has been given in order to deepen the reader's understanding. Once doing that, we provided the definition of our problem, which was then accompanied by the purpose and the limitations of the thesis.

### **2. Methodology**

The following part focuses on the methodology, whose purpose is to describe how our qualitative research was conducted. By dividing our research into two studies, pre-study and case-study, we wanted to deepen our understanding of the problem. With the outcomes of the pre-study we were able to continue the research and focus on two specific standards investigated in the case-study. In addition we explain the reasons for selecting certain interviewees. In the last paragraph of the methodology we evaluate the validity and reliability of our study.

### **3. Empirical data**

The content of the third part is empirical data derived from the pre-study and case-study. Since the findings from the pre-study are primarily used to identify the problem areas, the emphasis is on the case-study which provides deeper data regarding six problem areas. Therefore, based on the importance of the case-study, the process of standard X and Y are explained in detail. Subsequently a matrix for each standard is created and a



comparison of them is made in order to select the three problem areas that are further analysed. These areas are communication, management and resources.

#### **4. Communicating Standardisation**

The fourth part deals with the problem area of communication providing recommendations within the subject. This is done by first presenting a theoretical framework including a mathematical theory of communication, a description of the dimensions of communication, and a model of media richness. Secondly the framework is used to explain the findings in the analysis section which is divided into communication flow, communication channels and language.

#### **5. Managing Standardisation**

In this part we speak about management and follow the same structure applied in the previous part by having first a theoretical framework, then the analysis and finally a recommendation. The theoretical framework aims to give a view of different management levels and their tasks, while the analysis discusses management support for standardisation at different levels.

#### **6. Allocating Standardisation Resources**

Once again we aim to give recommendations in the area of resources, in other words how to overcome the obstacle of resources in order to improve standardisation. In the theoretical framework we describe the resource-based view model of competitive advantage, and use it to discuss the problem area in the analysis part which is made of four blocks: human, financial and intellectual resources.

#### **6. Standardising Standardisation**

Since the three previous parts are interconnected, we combined them in this chapter using the model of implementation of innovations, which we modify in the analysis in order to explain our case. This becomes a model of standardisation which explains how to formalise the implementation process. The aim is to provide an overview of the entire standardisation process.

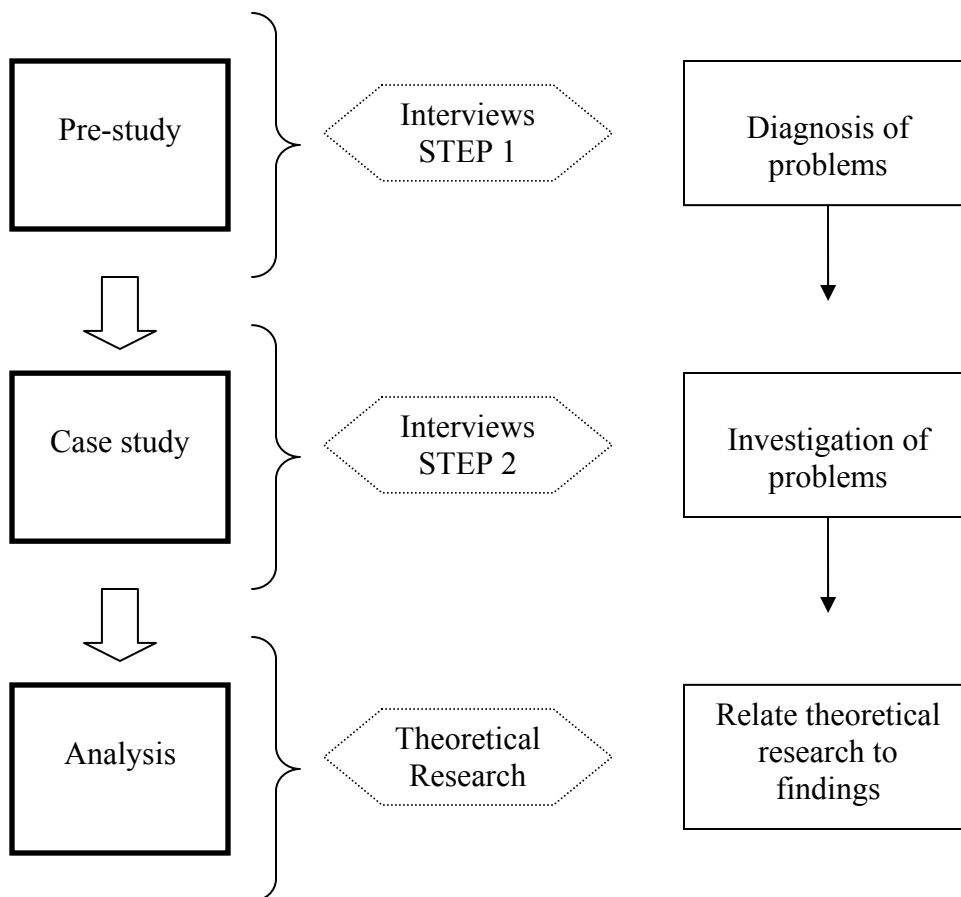
## **7. Executive summary**

This final chapter summarises our study, and contains a short description of its purpose, results, and our conclusion and recommendations.

## 2. Methodology

The development and the implementation of common standards is a complex process involving different parties and several organisational levels. In order to gather the data and obtain a clear and complete understanding of the subject we had to identify the most suitable research method and therefore decided to structure the study as shown in Figure 3 by dividing it into a pre-study and a case study, carried out through two steps of interviews. The two studies were then followed by the analysis.

**Figure 3: Research process**



Qualitative research is defined as “the gathering and analysis of “soft” data<sup>18</sup>, which can be described as records of observation or interaction that are complex and contexted and are not easily reduced immediately (or, sometimes, ever) to numbers”<sup>19</sup>. We made use of qualitative research since the situation investigated was complex and the problems observed were not reducible into numbers. The data was gained mostly through 33 qualitative interviews<sup>20</sup>. Furthermore, being part of the everyday situations as well as meetings allowed us to collect additional data generated through our observations. Text sources, such as meeting minutes and mails as well as Volvo’s Intranet were also moderately used.

## **2.1 Pre-Study**

With the pre-study we wanted to acquire a general understanding of the standardisation and to diagnose the obstacles hindering the use of standards. The data were collected through a first step of interviews which were carefully examined and categorised into six problem areas.

### **Gathering the data**

Most of the interviewees selected (see table 1) had a global vision regarding the standardisation which was functional to provide us with a general overview. We interviewed employees from M&S Gothenburg and Lyon as well as the M&S global manager and people from CS. In addition, we interviewed persons from other business areas and business units to learn how standardisation is executed in other Volvo companies and at the same time to collect suggestions and ideas for improvements.

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<sup>18</sup> “qualitative research” ‘The ultimate business dictionary’ (2003), pp. 261-262

<sup>19</sup> Richards, L. and Richards, T. (2005), p. 34

<sup>20</sup> Since the questions differed between the pre-study and case study, and were specifically formulated according to the position of the interviewees we do not include them in the thesis. Besides, the interviews were performed in unstructured and semi-structured ways; many of the questions emerged during the interviews and are therefore not included in the list of questions.

**Table 1: Summary table of the interviewees**

<i>Business areas and business units</i>	<i>Position</i>	<b>Pre-study</b>	<b>Case study</b>
<b>Volvo 3P Gothenburg</b>	Management	-	-
	M&S members	2	-
	Working group members	-	3
	Designers	-	-
	Other*	1	-
<b>Volvo 3P Lyon</b>	Management	-	2
	M&S members	3	2
	Working group members	-	2
	Designers	-	2
	Other*	-	10
<b>CS</b>	Head of the working group	1	2
	Project manager	1	-
<b>Other Units</b>	Other*	2	-
Total		10	23

\* A major part consist the heads of design departments.

The ten interviews, which were carried out personally by both of us, lasted two hours on average, were audio taped and transcribed. A framework of broad questions was the base for all interviews; however it was not strictly followed. Therefore the interviews were conducted in an unstructured way allowing us to evolve new questions and to deepen our understanding on the areas of interest.

#### **Examining the data**

Once identified, the obstacles were categorised into six main problems areas. The selection of these problem areas was done according to how frequently they were mentioned and to how important they were said to be. Problems were also chosen in relation to the trustworthiness, mostly in terms of expertise, of the interviewees.

The problems observed were not only categorised into problem areas but also in relation to each company investigated (Volvo 3P Gothenburg, Volvo 3P Lyon and CS). This subdivision showed that the comments to a large extent concentrated on the Lyon site and this result strengthened our already existing intent of performing the case study on Volvo

3P Lyon. During the pre-study we also tried to select two standards, which would be investigated in the case study. We thought that the best way to continue our research was to concentrate on one standard in order to ask specific questions and therefore gather more precise data. However, focusing on a single standard would not have allowed any comparison and therefore we decided to investigate two standards.

The initial idea was to select a “successfully implemented” and an “unsuccessfully implemented” standard at the Lyon site, but since it was difficult to find examples of successfully implemented standards we adopted a new criterion of selection. With the help of CS we chose two standards related to different technical areas and that went through dissimilar SDPs; problematic and less problematic in terms of time and content. The reason to investigate diverse standards was functional to increase the opportunity of identifying a wider range of aspects related to the SDP and implementation. The observed standards will be referred to as standard X and Y for confidentiality reasons.

Based on the six problem areas identified and the standards selected we were able to continue our study and to formulate the questions for the second step of interviews.

## **2.2 Case Study**

The case study of Volvo 3P Lyon was conducted to make a more in-depth investigation of the problem areas identified during the pre-study. The data from the case study was gathered through the second step of interviews performed both in Gothenburg and Lyon. Since the focus of the case study was on the Lyon site we considered crucial to travel to France and perform direct observations there.

### **Gathering the data**

The interviewees (see table 1) were chosen with the aim of covering all levels of the Volvo 3P Lyon site concerned by the two standards. We therefore selected group members from Volvo 3P Gothenburg and Lyon, and heads of the groups X and Y in order to explore the development process of each standard. Members of M&S Lyon were

consulted in order to examine what was done for the implementation of each standard. Since designers are often the end users of standards, it was important to know their knowledge and opinions about each standard. In Lyon we also interviewed supervisory and middle managers as they have specific tasks in the standardisation process. Furthermore, we interviewed persons covering other positions who, for the specificity of each standard, were concerned by it.

The 23 interviews were conducted personally by both of us and lasted one hour on average. We took notes, but also audio taped the interviews in order to complement our observations if necessary. The risks for misunderstandings due to the language barrier were mainly overcome by using an interpreter during the interviews in Lyon.

A semi-structured interview technique allowed us to examine certain areas of interest more in depth. In our case the advantages of semi-structured interviews were benefiting the both parties; the interviewees were able to explain their responses and provide more in-depth information, whereas we were able to gain data easy to analyse and compare.<sup>21</sup> Even though the case study was used to get more in-depth knowledge about the six problem areas, we did not want to force them during the interviews. Therefore we started the interviews with general questions, and when a problem area was spontaneously mentioned by the interviewee we asked more information regarding it. Besides the questions were formulated on the base of the interviewees' occupation.

### **Examining the data**

After the interviews we examined the gathered data and selected the problems through the same criteria used in the pre study. It was necessary to narrow down our focus and select the most crucial problem areas for further analysis. For this reason we made two matrices, one for each standard, in order to facilitate the choice of the problem areas. "Matrices are functional to identify a pattern through comparison; they are also showing whether and where a pattern occurs."<sup>22</sup> We identified the frequency of each problem in

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<sup>21</sup> Brewerton, P. and Millward, L. (2001), p. 70

<sup>22</sup> Richards, L. and Richards, T. (2005), p. 174

each stage of the development process and the implementation, and inserted them in the matrices. By comparing the matrices we selected the three problem areas that will be discussed in detail within the thesis.

### **2.3 Analysis**

After the pre-study and the case study followed the analysis of the findings which was carried out through the use of theoretical literature with the aim of providing suggestions for improvements. We created the theoretical framework by examining books, thesis works, academic journals, and Internet sources. Each of the problem areas selected are separately analysed and are joined in a final model for standard implementation.

### **2.4 Reliability and Validity**

The process of conducting the research requires the researchers not only to act in various roles from data collector to process manager but also to reach reliability and validity.<sup>23</sup> In our research the objectivity was maintained throughout the process despite the use of the qualitative method for data collection as well as external pressures from the organisation.

In the literature, validity is defined as “truth: interpreted as the extent to which an account accurately represents the social phenomena to which it refers.”<sup>24</sup> By conducting the research together we were able to consult and back up each other when processing the data.

According to Hammersley (1990), the “reliability refers to the degree of consistency with which instances are assigned to the same category by different observers or by the same observer on different occasions.”<sup>25</sup> The reliability of this research firstly emerges from the existence of a pre-study and case study. This subdivision assured the trustworthiness of our findings. By interviewing employees from different levels of the organisation we

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<sup>23</sup> Brewerton, P. and Millward, L. (2001)

<sup>24</sup> Hammersley, M. (1990), p. 57 in Silverman, D. (2005), p. 210

<sup>25</sup> Hammersley, M. (1992), p. 67



were certain that the problems identified were consistent, as they were mentioned by several persons with diverse experiences and perspectives on standardisation. Besides, we critically examined the sources of information, by requiring strong evidence for their statements.

## **2.5 Confidentiality Concern**

Since we were concerned by the ethicality of our research, the information gained from the interviews was considered confidential. We therefore chose not to use any names or data, which could be linked to a certain participant in the study. As it is possible to see from table 1, among the interviewees in the title “others” are included employees representing diverse positions that are not revealed. In line with that we used the third singular and masculine form (*he*) when referring to all interviewees.

Similarly the standards investigated during the case study are referred to as standard X and Y, and the findings presented in the empirical data part are restricted in some section, due to the confidentiality that we guaranteed each interviewee.

### **3. Empirical Data**

The transcription of the comments in the pre-study and the interview annotations from the case study, gave us a total of 200 pages of raw data. By carefully examining these data we obtained the findings whose criteria of selection were described in the methodology part. The findings will be presented in detail in the following paragraphs.

#### **3.1 Pre-Study Findings**

With the first step of interviews we were able to collect data that allowed us to identify several obstacles and which we grouped into the following problem areas. The frequency with which the problem areas were mentioned is expressed by the order in which they are presented below. This means that obstacles related to the process were the most recurrent, communication followed, and so on until the least mentioned problem area, standard-related issues. It should be reminded that the findings obtained from this study are related to CS, Volvo 3P Gothenburg and Lyon as in this stage we were collecting overall information.

1. Process
2. Communication
3. Management
4. Resources
5. Human related issues
6. Standard-related issues.

#### **Process**

In this group we look at the process from a general point of view, as a structured sequence of activities or operations designed to produce a specified output.<sup>26</sup> Here, all obstacles regarding the process of development and implementation of common standards are embraced.

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<sup>26</sup> "process" 'A Dictionary of Business', (2002)

In regard to the process of development of common standards, described in the introduction part, we observed that the sequence of phases was not always followed, which prevented people in the organisation from tracking the development and to see in which phase a standard was. Moreover, the involvement of people from all brands into the SDGs was not always put into practice.

*“Yes, sometimes we have only people from Gothenburg involved and that is not a good solution because even though you are able to work easier and quicker you will run into problems in the implementation because people were not involved.”*

We observed that Volvo 3P Gothenburg and Lyon did not have a formalised process to perform the implementation. In fact, each site implemented the standards independently. Further more, lack of transparency prevailed, none of the sites was sharing knowledge about their achievements or their implementation procedures.

*“When it comes to the implementation we do not do it in a formalised way at all.”*

### **Communication**

*“A lot of problems for implementing standards are because of the overall communication.”*

Within the area of communication we included the problems regarding communication flow, channels of communication, and language, that we identified during the interviews. With communication flow we mean the (vertical, horizontal or free-flowing) transfer of information throughout an organisation. Communication channels are the means through which the communication flow can be facilitated. Examples of them are face-to-face channels, written or mediated such as telephone or computer.<sup>27</sup>

Barriers to the communication flow appeared at different stages of the SDP and implementation, which implied that obstacles to the transfer of information happened not only between different organizational levels, but also between business units and business areas, i.e., CS, Volvo 3P Lyon and Volvo 3P Gothenburg.

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<sup>27</sup> Miller, K. (2003), p. 19

*“There is a lack of information, both ways.”*

As observed, the M&S departments were not exchanging information very efficiently; implementation activities performed at each site were not visible and therefore not known by neither the other sites nor the global manager.

*“... that is a problem sometimes because I don't really know how the implementation is carried out.”*

The SDG were usually working through a mix of face-to-face meetings, electronic post, telephone calls and net conferences. These channels sometimes seemed to be used inappropriately as they affected the information flow and understanding.

*“Physical meetings are absolutely the best way to speed up the process. To sit with ten people around the conference phone... It takes months to change small things.”*

Language is a problem that affected all standardisation parties. It occurred not only for the French speaking employees but for the Swedish speakers as well, and this hindered both the SDG and the implementation process. Language skills often seemed to be an obstacle in the SDGs, as they led to misunderstandings and slowed down the process.

*“... A few years ago he did not know almost a word of English. So everything went very slow...”*

Documents issued in English, e.g., standards, were difficult to understand for people in Lyon. According to the interviewees, the documents were not translated into French on a regular basis, as the management had decided that employees must be able to work in English.

*“Sometimes we have problems with the language in the Volvo standards that are not translated to French.”*

On the other hand, many documents were written in French and this was an obstacle for mutual understanding.

*“Sometimes they release documents in French and we can not use them as we do not understand them.”*

## Management

The word management has two connotations; it is defined as the running of an organisation or part of it, as well as the people involved in the running of an organisation.<sup>28</sup> Here we take into consideration both dimensions of management by observing how different management levels (top, middle and supervisory) carry out their tasks in relation to standardisation.

We observed that one of the most mentioned obstacles was the lack of top management support for standardisation, which was generated by management's concern for other issues such as product development deadlines and continuity of projects at hand. The interviewees believed that management did not have knowledge about standardisation and what it requires.

*"The management is more concerned about the product development gates and is not so interested in standards."*

Obstacles regarding levels other than top management did not emerge during the pre-study.

The Swedish compromising style aimed at reaching wide consensus in relation to the bureaucratic structure of the Lyon organisation seemed to slow down the process of standardisation. In the SDG, decisions were taken based on the achievement of a large consensus and this required time as the members were representing different companies and therefore sometimes had competing ideas. An additional obstacle to decision making was the hierarchical structure of the Lyon organisation, where employees had to consult their superiors in most cases. It was often said by all parties that SDG members representing Lyon did not always have the mandate to decide on behalf of the company.

*"I have been involved in the working group and I have a mandate from my manager to speak on the behalf of Volvo and take decisions, but in France they often must report what was decided to their top managers and if they approve it or not."*

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<sup>28</sup> "management" 'A Dictionary of Business', (2002)

## Resources

The resources part contains financial, intellectual, human and technological elements which are presented beneath.

Interviewees felt that the assignment of financial resources to standardisation was not sufficient to perform it successfully. Standardisation was not considered directly connected to the product and therefore customers could not be charged for it. This made all time spent with standardisation non-billable hours, and therefore it did not receive enough funds. And since standardisation was not prioritised, and other projects received more focus, it was not assigned sufficient human resources either.

*“...we do not have the time, we have other projects going on.”*

The lack of human resources was a problem since, as it is said in the quote beneath, standardisation requires effort. This obstacle was especially perceived in Lyon where the standardisation project involved a major change which required more personnel for the implementation.

*“We have a limited number of people and it takes a lot of time to check the document and manage the local consultation.”*

Intellectual capital was observed to be an obstacle too; it was hard to globally find persons with the right competences to join the SDGs and therefore it happened that the right persons were not involved in the SDPs.

*“We need experts but it is difficult to find people.”*

In addition to this, the personnel at the Lyon site were old and the new employees did not always have the required knowledge to give a full contribution to the SDP.

*“Lots of people are retired now and it is difficult to find new competence. New employees do not know the previous network. ”*

Concerning technological resources, the main problem seemed to be the lack of harmonisation of IT systems. At the Lyon site, IT tools and different sorts of equipment that were necessary in order to execute the standards were either not used or not available.

This also restricted the possibilities of communication and cooperation between the Lyon and the Gothenburg site, affecting negatively the implementation.

*“But we do not use the same information systems, so you can use the process but you have different systems and there is no way for the systems to communicate.”*

### **Standard-related issues**

In this group we include aspects that closely concern the standard document, such as its structure and content.

We observed that employees from different sites had difficulties to follow the common standards since they were structured in a different way than the standards they were used to work with. According to the interviewees, Volvo common standards were difficult to read because they contained too many references to other standards.

*“For example if you tell what to do, the common standards say do this but Renault standards say that do this but do not do that. And this is the issue all the time. There are twice as many pages as common standards.”*

In Lyon, common standards based on ISO standards were accepted more easily because they had been used in the past and are available in French.

### **Human-related issues**

This area covers many aspects that we observed: attitudes, lack of trust, resistance to change, and cultural differences.

We noticed a general feeling of frustration due to the difficulties of developing common standards. In general, we observed a lack of trust between colleagues at CS, Volvo 3P Gothenburg and Lyon. In Lyon the general climate seemed to be fear generated by uncertainty about the future which was sometimes translated into a resistance to change.

*“There are some consequences for the employment and we know it. It is a problem in Lyon.”*

Resistance could be seen in different business units and business areas, and is mainly linked to peoples' affection to their way of working and sometimes to the belief that their

approach was superior. Cultural differences were trivial and mostly connected to the corporate cultures and different ways of doing things.

Identity seemed to be an obstacle, because even though the interviewees were working for Volvo 3P, some of them, to a certain extent, still felt that they represented their old companies.

*“I think the problem today is that people do not see the three companies as one...”*

### **3.2 Case Study Findings**

The six problem areas were generally confirmed by the case study of Volvo 3P Lyon, even though some of them included a moderate number of new aspects. It is important to point out that more persons directly involved with the implementation (middle and supervisory managers, designers) were interviewed in the case study. This is why the findings from the latter study provide broader insights on the implementation compared to the pre-study findings.

Since the process was one of the main problems, we decided to observe and analyse it by looking at all stages of the SDP and at the implementation. The problem area of process is not handled separately as for the other problems, but dealt with during the presentation of each problem area, by observing in what stage of the standardisation process, obstacles appear.

The process of each standard is described, followed by the presentation of each problem area. Finally the results are visualised in the matrices.

#### **3.2.1 Process of standard X**

Standard X was one of the first common standards initiated by CS, and its development lasted a long time. It contains a large number of ‘elements’ and affects different levels of the organisation and its activities. In addition to this, standard X has an effect on the



companies' traditions and history by ruling activities which are in most cases well established.

*“This standard is touching the history of the company, the processes, the investments...”*

The pre-study for standard X was performed by the head of the SDG together with experts in the field. As the process did not have well defined milestones, we could not see when the pre-study and the concept study started (see figure 1) and if these included representatives from other business areas.

*“We should have had a more formalised process with specific deadlines et cetera.”*

The working group included representatives from Volvo 3P Lyon, Gothenburg, Allentown, and Greensboro. During the whole process though, new persons joined the meetings and a few left the group.

The development phase took a lot of time but in the final development things went smoother. A mixture of face-to-face meetings and telephone conferences was used to carry out the project. The standard has been approved even though few things are still being developed.

Today, standard X is not broadly known within the Lyon site. Furthermore, the responsibility for the implementation of standard X is not clearly assigned to a specific individual or department. No training or presentations regarding standard X have been given to the designers, whereas the tools necessary to follow standard X have, to some extent, been acquired.

Since standard X affects several activities and level of the organisation, taking it into use, generated several obstacles. So after the approval, standard X was subject to arguments which also involved top management.

## Matrix X

The matrix below is an attempt to illustrate the occurrence of the problem areas in each stage of the process of standard X, later the matrix for standard Y will be provided. On the vertical line the matrices have the five problem areas and the horizontal line shows the sixth problem area: process (SDP and implementation). As Richards L. and Richards T. (2005) stated, matrices are functional to identify a pattern through comparison. The matrices of standard X and Y will therefore be compared at the end of this part with the aim of selecting a few problem areas to focus on. The matrix shows the number of times each problem was mentioned by the interviewees. Based on where the problem was said to occur we located it in different stages of the standardisation process, for example if communication flow was an obstacle only in the pre-study phase, we assigned one number of frequency in the quadrant of communication and pre-study. However, if a problem was not clearly happening in any specific SDP's stage, we regarded it as a common obstacle and therefore assigned one point of frequency to each stage of the SDP.

**Table 2: Matrix of standard X problem areas within the standardisation**

	Pre-study	Concept study	Development	Final development	Implementation
Communication	13	12	11	11	23
Resources	11	11	11	11	12
Management	8	8	8	8	11
Human-related issues	16	16	16	16	5
Standard-related issues	2	2	2	2	11

Table 2 shows that human-related issues have a high frequency in the SDP, but not in the implementation phase. Communication follows, with a rate twice as high in the implementation phase than in the SDP. Another problem receiving a fair amount of comments is resources, which seems to have the same incidence in both SDP and

implementation. Standard-related issues are a main obstacle in the implementation stage, but not in the SDP.

It is easy to see that the implementation phase presents a higher frequency than the SDP in all problem areas, except human-related issues. However, the SDP collected a remarkable amount of comments, with the exception of standard-related issues. None of the stages of SDP seems to be more problematic than the others.

### **3.2.2 Process of standard Y**

Even though standard Y includes two standards we refer to it as a single one within our thesis because they were developed by the same group and are closely related to each other. Since the creation of standard Y was unconventional and not following the SDP described in figure 1, all phases are not included to the review below.

The development of standard Y was initiated not only in order to have a new common standard but also to simplify and internationalise the existing one. The whole project lasted approximately one year and was started by the head of the SDG involving a limited amount of participants to the pre-study and concept study phases. Despite the fact that there were no representatives from Volvo 3P Lyon, Allentown and Greensboro in those phases, the head of the SDG was active and consulted them. In fact the work was carried out in an informal way and involved constant personal contacts between the head of the SDG and parties from the Volvo 3P sites.

*“During the whole process I tried to collect comments and opinions from everybody.”*

The time spent on the pre-study was relatively long and created a situation where the pre-study and concept study were more one united than two separate phases. This also affected the standard itself, which was almost a ready proposal before entering the development phase and involving representatives from Lyon.

*“The pre-study phase in this case was very long. Before the development phase the standard was already almost a proposal.”*

Once the parties from Lyon were included, a more formal SDP was established, and meetings as well as other types of communication channels such as conference calls were taking place. In order to facilitate the communication, the standard was also translated into French before the final development phase. The opinions regarding the suppliers and other stakeholders were also taken into consideration and carefully evaluated.

*“Suppliers were not included but they were taken into consideration by using the knowledge we had.”*

In the end of the development phase the standard was sent out for public feedback. It received many comments and was revised couple of times before its launch. As soon as the standard was released the responsibility of the implementation was handed over to M&S Lyon. No training regarding the standard Y was given but a presentation from M&S regarding the differences between it and Renault’s standard was provided to a few designers.

Despite the presentation, the usage of standard Y is limited and varies between different departments. In those departments where standard Y was used, the problem was an incorrect use of it. There was also a problem of design checkers whose work did not include the detailed evaluation of how the standard was used.

*“This standard is not really checked. Some persons are good and some are not when it comes to the subject of this standard, but it is difficult to see since we do not have enough checking on it.”*

## **Matrix Y**

When examining the matrix of standard Y in table 3, there are two main problems: communication and resources, occurring in both the SDP and implementation. However, there are also other obstacles linked to management, human-related issues, and standard-related issues, which happens exclusively in the implementation phase. In fact, table 3 shows that the last three problem areas did not collect any comments in relation to the SDP.

To sum up, the highest rate of problem areas is registered in the implementation phase. Within it, resources is the biggest problem followed by communication, management, standard-related and human-related issues.

**Table 3: Matrix of standard Y problem areas within the standardisation**

	Pre-study	Concept study	Development	Final development	Implementation
Communication	2	2	2	7	17
Resources	6	6	6	6	25
Management	-	-	-	-	10
Human-related issues	-	-	-	-	3
Standard-related issues	-	-	-	-	5

### 3.2.3 Problem areas

As stated, the problem areas observed during the case study were similar to the pre-study findings. To complete and facilitate our work we decided to handle the process within each heading below in order not to have a separate paragraph for it. The results from standard X and Y are joined and therefore the problem areas are illustrated in a general way, independently of each standard.

#### Communication

Information flow is one aspect of communication and it stands for the transfer of information regarding standards. We observed that the standards did not always reach the final users and the reasons for this will be analysed in detail later.

*“They did not know that the standard existed and that they had to follow it.”*

In addition to this, employees did not receive any information regarding the changes that the standard brought.

*“When we receive the standard it would be good to know if nothing has changed or everything has changed and what has changed.”*

Besides, information was not flowing effectively in all directions, as there was no formalised system to follow up the implementation of standards.

*“We do not have any follow-up system to check if the new standards are used.”*

In the SDP, group members were not always communicating with their organisation. And there was no rule stating that they should be doing it. The list of stakeholders, created by the PG at CS, did not always include all the persons directly interested by the standard.

*“I also think that the list of stakeholders was not good... I do not understand why those persons were in the list.”*

Communication channels were also a problem since they are sometimes used improperly. The standards were usually sent by electronic mail but the end users seemed to prefer to receive them through face-to-face channels such as presentations or meetings.

*“It is difficult to find standards; it is difficult to know where to find them. The intranet is complicated.”*

Face-to-face meetings were also preferred in the SDP, but the work was carried out through a mixture of media including also electronic mail, telephone calls and conferences.

*“Face-to-face meetings were the best but we had problems in getting the resources from management.”*

A final aspect of communication is language. We noticed that this was an obstacle throughout the entire process of standardisation, as found in the pre-study. It was a problem for employees working in Lyon, but also an obstacle for mutual understanding between different sites.

*“Language is a problem, everything is written in English and we are not used to it.”*

The language skills were also a barrier in the SDGs, for the same reasons presented in the pre-study findings.

## **Management**

Our research revealed that the problem regarding management was mainly related to a lack of support. This lack occurred especially in the top-level management but the problem repeated itself at lower managerial levels too.

According to the subordinates, the person representing top-level management did not understand the necessity of standardisation in order to create a common platform and common parts for all truck brands. The lower levels of management were working more closely with the end users, so they understood better the importance of having common standards.

In line with their limited understanding for standardisation, the highest managerial level prioritised other things such as development projects. Standardisation was handled as a secondary working task which should neither require more time nor other resources.

*“It was hard to inform about obstructions I encountered during the development, managers are tougher about deadlines.”*

Closely related to the management support was decision making, which we noticed was another managerial problem. The obstacles were especially touching upon lack of top managers' firm decisions on how to proceed with the standardisation.

## **Resources**

The most common association that comes to mind when speaking about resources is the human side of it. In our research, resources occurred also in the areas of finance and intellectual capital.

Concerning the human capital, we noticed that employees did not have time to dedicate to standardisation. Either the time was prioritised to other activities not related to standardisation, or the time was limited because of other tasks, e.g., training. Time was also an issue because of personnel shortage at different departments which increased the workload further.

*“When you are changing the standard the employees need training, which takes lots of time, and after you are not efficient directly. I need more personnel.”*

Since standardisation was not prioritised, it did not receive any official status as a project and the time spent with it was unbillable.

*“We do not have time to deal with standards, and besides there is a problem with budget since we do not get paid for the time we spend with the standards.”*

The budget for standardisation did not allow travelling and joining the SDGs in order to develop standards together with CS in Gothenburg. In Lyon the budget also affected the checking functions which did not occur as often as they used to when a design checker visited the departments regularly.

Resources also include intellectual capital, which generally refers to the competencies of personnel. One of the problems in the working groups was members who could not provide the right expertise regarding the topic at hand. Similarly, selecting experts to the SDGs was difficult since the heads of the working groups at CS did not have the knowledge necessary to reach the right persons on the different sites. Besides, as mentioned in the pre-study, the average age of the personnel in Lyon was high and the retirements caused a loss of competences. Implementation was an important component of standardisation, and some employees involved in this activity stated that they lacked the skills required to perform their task.

There was often a lack of technological resources at the Lyon site. As observed in the pre-study, the IT tools and diverse equipments needed to use standards were seldom available. And sometimes when they were available the employees were not able to use them as they had not been trained. In general, there was little synchronisation between the launch of new standards and the establishment or implementation of IT tools and equipment supporting them.



*“... we have to store the documents into this system but we do not have it. Some designers have heard about it, but do not know it.”*

### **Human-related issues**

Lack of trust between members of SDGs slowed down the SDP. It seemed though, that the trust was built during the collaboration in the group.

*“The trust was low in the beginning but it was built up over time... when we sat with each other we came closer and closer and started to understand each other.”*

This lack of trust between people was also found to be an obstacle to the implementation.

Person-related issues occurred mainly in the process of development. The different personalities of the group members sometimes collided, and this affected the work.

*“He was trying to take the lead and I think he slowed down the process a lot.”*

Despite the fact that some interviewees considered the diverse corporate cultures as an enriching aspect, cultural differences appeared to be a general obstacle. This was more perceived in the working groups where people had different ways of working but still had to find a way of collaborating despite their differences.

*“I hope it will not happen again that people will work like we did in the group, but I think it will because we have great differences in our ways of working.”*

Resistance to change is a natural human reaction and since common standards often imply a change for their adopters, opposition occurred.

*“There is a little bit resistance from designers.”*

Group members producing a standard had difficulties in accepting that best practices from their organisation were sometimes not included in the standards.

*“After I started to work in the group I began to think that people were not so open-minded after all, and that they were resistant to change.”*

### **Standard-related issues**

As the name of the problem area indicates, this section refers either to the standard itself or something in close relation to it. During our interviews we observed that the structure of standards differed between Renault and Volvo. Since the new standards were based on the Volvo ones, the changes for Volvo 3P Gothenburg were not remarkable whereas for Lyon the whole structure was new.

*“It is easy for Volvo people since it has the same structure. For us it is a little difficult.”*

Another problem was that the common standards included too many references to other standards, as mentioned in the pre-study part.

*“One problem with standards is that there are too many references to other standards.”*

Likewise, there was problem with the standard’s updates, which happened often and it was therefore difficult for the users to know if and when a standard had been updated. In addition to this, the engineers normally printed out the standard from the database, and since their hard copy was not updated mistakes happened.

### **3.2.4 Narrowing down the focus**

Standardisation as a subject is a large scope and we could not focus on all its aspects in this thesis. A tool was therefore necessary in order to carefully select the problem areas to analyse more in detail. According to Richards L. and Richards T. (2005), matrices show whether and where a pattern occurs and this seemed a suitable answer to our need.

Each matrix was analysed and a comparison was made in order to focus on problem areas crucial to a successful standardisation at Volvo. In most cases implementation received more comments than the SDP; the matrices in table 2 and 3 show that communication, resources, and management in the implementation phase were the problem areas with the highest frequencies in both standards.

The SDPs seemed very different from each other; the process of standard X appeared more problematic than that of standard Y. But by looking at both matrices it was possible to distinguish a pattern of the two problem areas: communication and resources.

Since communication and resources have a high rate of occurrence in both implementation and SDP, our analysis will focus on them. Moreover, as management was as a main issue in the implementation of both standards, and an obstacle in the SDP of standard X, we are convinced that concentrating on it would provide relevant answers to our research question. When consulting our supervisors at school and at Volvo, they also recommended us to focus on these areas.

Even though human-related issues had a high ranking in the matrices, we decided not to look into this. One reason was that the high frequency only appeared in the SDP of standard X, another that our everyday observations showed that this is not a general obstacle related to all standards, but a problem strictly connected to standard X.

We did not further analyse the standard-related issues either, since this was the area that collected the least comments. In addition to this, we do not have the technical knowledge required to evaluate the content of the standards.

In the next parts the areas of focus will be discussed in this order: communication, management and resources.

## **4. Communicating Standardisation**

As stated earlier, communication was one of the most significant obstacles to standardisation. In this chapter we will attempt to build a theoretical framework of organisational communication and analyse the empirical data gathered during the research in order to understand how communication hindered the standardisation and to give recommendation for improvements.

### **4.1 Theoretical Framework**

#### **4.1.1 Mathematical theory of communication**

The mathematical theory of communication from C. Shannon (1959) provides a description of how communication takes place. This theory was primarily developed for scientific fields such as engineering, but was found to be applicable to the social disciplines too.

Shannon (1959) developed a system of communication made of five elements.<sup>29</sup> The first element, the information source, creates a message (with a meaning) which, through a coding system, is turned into a signal by a transmitter. This signal is transmitted via a channel. During the transmission of the signal new things not intended by the information source might be added. These changes are called noise and ideally the noise should be as little as possible. The channel is the media used to transfer the message from the transmitter to the receiver, which will reconvert the signal into a message. Each channel has a certain capacity, defined as the “maximum rate at which useful information can be transmitted over the channel”<sup>30</sup>. One way to maximize this transmission rate is to choose an optimal combination of source and channel<sup>31</sup>. This aspect will be discussed more in

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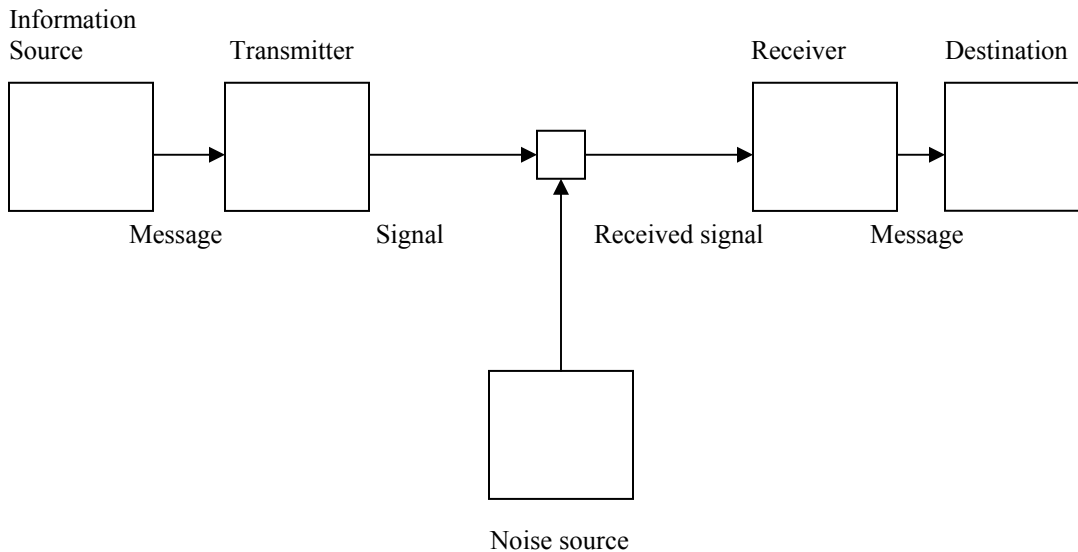
<sup>29</sup> Shannon, C. E. and Weaver, W. (1959), p. 4

<sup>30</sup> Shannon, C. E. and Weaver, W. (1959), p. 111

<sup>31</sup> Shannon, C. E. and Weaver, W. (1959), p. 111

detail later in the model of media richness. The final element of the system is the destination which is the person reached by the message.<sup>32</sup>

**Figure 4: Schematic diagram of a general communication system**



*Source:* Shannon, C. E. and Weaver, W. (1959), p. 5

#### 4.1.2 Dimensions of communication

Organisations consist of persons who are communicating with each others. Their communication content can be of different types<sup>33</sup> and the direction of the communication can be vertical (from supervisors to subordinates and vice versa), horizontal (between colleagues on the same hierarchical level) and free-flowing (employees from all levels communicate to each others)<sup>34</sup>.

Information is flowing through channels; the most basic one is face-to-face communication between two or more persons. Today though, technology has introduced many innovations which have strongly influenced the way people communicate. The

<sup>32</sup> Shannon, C. E. and Weaver, W. (1959), pp. 3-6

<sup>33</sup> Miller, K. (2003), p. 17

<sup>34</sup> Miller, K. (2003), p. 19

written forms of communication are multiplying: electronic mail, fax, Internet and World Wide Web are only some examples. Traditional communication is also increasingly replaced by audio and video conferencing, wireless networking, and a number of other technologies. Compared to traditional channels these technologies allow a faster transmission of information, and communication among geographically dispersed employees. A final dimension of communication is styles which can be formal and informal.<sup>35</sup>

### 4.1.3 Model of media richness

As stated, channels used to transfer information can have different capacities and if a message shall reach its destination, the channel must have the right capacity to transfer that information. The model of media richness is a method to select the most suitable media according to the characteristic of the channel and the type of message to be communicated. The media are divided into rich (e.g., face-to-face communication) and lean (e.g., electronic mail) based on their capability of conveying information. Every message has a certain level of ambiguity which refers to how much it is subject to “conflicting and multiple interpretations”.<sup>36</sup> The idea is that communication will be successful if the proper media is used. For example, when dealing with a task with high level of ambiguity, a rich media is the most effective (see Figure 3).

**Table 4: Effective media selection**

	<i>Unambiguous task</i>	<i>Ambiguous task</i>
<i>Rich media</i>	Communication failure	Effective communication
<i>Lean media</i>	Effective communication	Communication failure

Source: Miller, K. (2003), p. 272

<sup>35</sup> Miller, K. (2003), p. 266- 269

<sup>36</sup> Miller, K. (2003), p. 271

It has been found that the effectiveness of a team resulted from the use of face-to-face meetings and conference calls for complicated tasks, and electronic post for easier ones.<sup>37</sup>

#### **4.1.4 Communication and organisational change**

In the literature communication is broadly agreed to be a crucial aspect of change implementation<sup>38</sup>, to the extent that these are “inextricably linked processes<sup>39</sup>.” Indeed, communication in organisations is believed to contribute to avoid or decrease the resistance to change.<sup>40</sup>

Generally, communication during an organisational change has two purposes: to provide employees with information, and to create a sense of community.<sup>41</sup> The employees should be informed about changes, and how this will transform their work. This will increase people’s willingness to change. A community can be defined as a sense of belonging, and results into commitment.<sup>42</sup> This identity appears to be especially enhanced by formal communication between employees and managers rather than informal communication among peers and colleagues.<sup>43</sup> According to Elving (2005), communicating to create a sense of community and a commitment to the organisation will also increase employees’ readiness to change.<sup>44</sup>

## **4.2 Analysis**

As described by Shannon (1959), communication takes place between an information source, in our case CS, and a destination, the final user. CS creates a message, the standard document, which is given to a transmitter, the brains of the standard developers.

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<sup>37</sup> Miller, K. (2003), p. 272

<sup>38</sup> Elving, Wim J. L. (2005), p. 130

<sup>39</sup> Lewis, L. K. (1999) “Disseminating information and soliciting input during planned organisational change: implementers’ targets, sources, and channels for communicating”, *Management Communication Quarterly*, Vol. 13, No. 1, pp. 43-75 in Elving, Wim J. L. (2005), p. 130

<sup>40</sup> Elving, Wim J. L. (2005), p. 131

<sup>41</sup> Elving, Wim J. L. (2005), p. 130

<sup>42</sup> Elving, Wim J. L. (2005), p. 132

<sup>43</sup> Postmes T. *et al.* (2001), “Communication and commitment in organisations: a social identity approach”, *Group Processes and Intergroup Relations*, Vol. 4, No. 3, pp. 207-26 in Elving, Wim J. L. (2005), p. 132

<sup>44</sup> Elving, Wim J. L. (2005), p. 133

They will give meaning to the message through a coding system, language, and will transfer it using a channel like electronic mail. This channel is therefore carrying information regarding practices introduced by the standard. During the transmission between transmitter and receiver a noise is likely to occur, which may be top managers interfering or people being too busy to concentrate on standard implementation. When the message reaches the receiver, the brain of the destination, the message will be decoded and it will be given a meaning. Cultural or language differences between CS and the final user might affect the way the receiver understands and interprets the message, so he or she is likely to receive information that differs from the one issued by the information source.

#### **4.2.1 Communication flow**

In this thesis we consider communication flow as the transfer of information regarding standardisation. Elving (2005) states that to make employees more inclined to change they should be informed about the change and how this will affect their work. Applied to our study, communication should inform employees about the existence of new standards and how these will change their way of working. In order to use a new standard people must be informed about it.

*“The most common reason to why designers do not use the right standard is because they do not know it exists.”*

We noticed that the information flow in Lyon was not always efficient. One of the reasons is that the standards have a long journey<sup>45</sup> before reaching the final user. Standards sometimes got lost in the networks of people, without achieving their destination.

The transfer of information was a problem even in the process of development. Members of the SDG seemed to not always spread information about the standards within their organisation.

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<sup>45</sup> As already mentioned before, standards are transferred from CS to M&S and then to correspondents in different departments as well as managers who are supposed to forward the document to their subordinates.



*“People in the group are supposed to report to the home organisation, but I am not so sure that they do. I think they should definitely have more responsibilities to spread the information in the company”.*

If information about the standard work is not spread by the members, people cannot know about the standard project and the standard might miss out on precious knowledge. On the other hand, we could not find a formalised rule or process stating that SDG members were assigned such responsibility; it is up to each person to spread the information.

The communication of a standard needs to be followed up in order to assure that those concerned have received it. No sort of follow-up system was found however. Information about the standards was propagated in the organisation through a network of people, but there is no feedback system. The only practice established in order to control the usage of standards is design checking. This department is not testing all drawings though, nor is it checking them in depth, despite 3P’s top management orders to intensify the checking.

Sending a new standard to employees does not imply that they will take it into use. Implementing standards entail a change and people often resist it.

*“I think that the most important thing is to select a good list of stakeholders in the beginning of the project so that buy-in problem can be avoided in advance.”*

The list of stakeholders is usually made in the beginning of the SDP. It is a universal list, usually including almost the same persons for all standards. It seems necessary though to enlarge the list and to include the persons who are directly concerned by each standard, in order to inform them that there is a project of a new standard in their domain and possibly to engage them in the development process. Informing these persons early in the process of standardisation would, according to Vrakking (1995), increase their support for the standardisation and decrease the buy-in obstacle.

Until now we have discussed how the existence of new standards is communicated within the company, but according to Elving (2005) it is also important to communicate how the new standards are affecting people and their way of working. During the interviews it

became clear that people were not informed about the changes introduced by the new standards, and that it was crucial to know what kind of change, compared to the old standard, the new standard would involve.

*“Usually I have to compare the Volvo standard and the Renault standard by myself in order to see the differences.”*

This seemed to be a problem occurring even in the early stage of development when the PG accepts the project proposals.

*“I have been involved in the planning group and I have accepted to work with this standard but at that moment I did not really know how this would affect the company. I would have liked to have more information about the consequences of this standard.”*

It is therefore important in the beginning of each project to estimate the changes that the standard will entail and to inform all concerned employees.

Elving (2005) defines a second goal of organisational communication as an increase commitment to the organisation by creating a sense of community. Until now we have analysed how communication affects the implementation of single standards: standardisation within Volvo 3P can also be seen as a strategic change necessary to support the common platform architecture. Seen from this perspective, it is important that all employees, not only lower levels but also management, understand and recognise the importance of standardisation.

In our interviews we saw that lower levels, such as designers, supervisory and middle management levels, had a fair understanding of the reason for the standardisation and acknowledged the importance and essentiality of having common standards.

*“... to be more efficient, to facilitate the exchange between people from different brands and designers, to avoid the waste of time in discussions... for common projects it is very important that we use the same standards.”*

Despite the acknowledgement of the importance of standardisation, employees were not putting proper effort into it. Postmes T. et al. (2001) claims that commitment to standardisation is especially enhanced by formal communication between employees and managers. It is therefore essential that managers communicate the importance of standardisation to employees.

Higher levels of management were not considered by the interviewees to have a complete understanding of standardisation and therefore lacked the ability to communicate it to their subordinates. Communication and effective internal marketing are valuable means to increase even top managers' familiarity and commitment to standardisation. However, during our investigation we could not see any significant activity of this type towards top management.

#### **4.2.2 Communication channels**

As mentioned earlier, the electronic post is the most common medium to inform employees about new standards. According to the model of media richness, information (or messages) can have different levels of ambiguity which refers to how much this is subject to "conflicting and multiple interpretations". Since the standards in question are sometimes very specific, and includes references to other standards, the message informing about them is likely to have a high level of ambiguity. When dealing with a task having a high level of ambiguity a rich media is the most effective. The electronic mail is therefore not the most suitable channel to inform employees about new standards. A face-to-face media, such as presentations seems more appropriate for this task, as it is more interactive, employees would be able to ask clarifications and besides it would drastically reduce the time for learning the standard.

*"For us it is difficult to know when there is a new standard. I would prefer if electronic post would be avoided. As I receive 40 mails per day, I would prefer to have a short meeting where they shortly present all new standards issued in the last period."*

Obstacles connected to the channels used were partly found even in the SDP where, as stated previously, a mixture of media was used for communication. Developing a technical standard in a (multicultural) cross-brand group can be a difficult task, especially in relation to the communication hindrances.

*"The communication was good even though we misunderstood each other pretty easily... In general it was easier to understand by having face-to-face meetings."*

Due to reasons which will be discussed later on, face-to-face meetings were seldom sufficient, and the use of other means such as electronic post, telephone calls and conferences increased in some cases misunderstandings and misinterpretations which resulted in a delay of the SDP.

Since all standards are different, there is not one universal channel to use when communicating them. Simple standards involving minor changes can be transferred through lean channels such as electronic mail whereas complex standards require richer media, such as face-to-face presentations. The same reasoning applies to the SDP, in the sense that not all standards need to be developed through rich media; some can be designed exclusively through electronic mail, or through a combination of channels. It is therefore important to carefully select the channels in the beginning of each standard project.

### **4.2.3 Language**

In our study we included language to the area of communication as it was a considerable barrier not only to implementation but also in the SDP. As described by Shannon (1959), the transmitter is transferring a message through a system of codes and the receiver is decoding the message by using the same system. In our case the coding system is the language and if the receiver uses a language different to that of the transmitter, the language will not be able to give meaning to the message, i.e. standard.

Even though top management has decided that all employees shall be able to work in English, the reality is that many of them cannot. Employees try to cope with this situation by, for example, translating standards by themselves.

*“The language barrier is a bigger problem than the top management wants to see. I think it is slowing down the process of harmonizing things.”*

As mentioned before, a fair portion of the French employees have difficulties speaking and reading English, which has an effect on the level of understanding standards written in English. On the other hand, many documents from Volvo 3P Lyon are issued in French and this is a main obstacle as a limited number of persons can read French. For example

we observed that documents used in the SDGs as background information were often provided in French, and therefore their utility was restricted.

Communication is crucial in the SDGs, where all members need to be able to follow the work in order to contribute. If the language skills of the members are not adequate, misunderstandings are likely to occur.

*“... Few years ago he did not know almost a word of English. So everything went very slow...”*

Language can also hinder the work if the most competent employee do not speak English and therefore cannot participate to the group, and a less experienced member with better language skill must take his place.

We observed that having a French version of the standard had positive effects on the SDP. Translating the document in the early stages of the development helped to avoid misunderstandings and encouraged stakeholders and other employees to get involved in the project by giving feedback during the entire process.

*“Pretty early on we had a French translation which made it easier to develop the standard and made the process go faster.”*

### **4.3 Conclusion and Recommendations**

In this chapter we have reviewed the literature on communication and discussed our findings with the purpose of understanding how communication is affecting standardisation and how it can be improved. In our analysis, we came to the conclusion that the communication flow between and within the standardisation parties observed, was inefficient and failed to transmit information regarding standards both in the process of development and implementation. Nor has the communication created a commitment towards standardisation among the employees. The communication channels were not properly used and therefore they did not fulfil their purpose of facilitating the information transfer from the source to the destination. The misuse of media was a problem occurring throughout the entire standardisation process. Finally, language was a cause of

misunderstandings not only during the implementation, but also in the SDGs, which made the standardisation work problematic and slow.

### **Inform employees!**

The first requirement for a successful standardisation is to inform employees about the existence of the standards. Everybody in the organisation should be assigned a certain responsibility to spread the information.

Communicating the changes introduced by the standard, and showing the differences between the new common standard and the old one, will motivate the employees to use the standards. Therefore, market the idea of standardisation in order to increase the employees' and managers' awareness and understanding of standards and thus their commitment to standardisation.

### **Follow up!**

It is important to establish a follow-up system to control the results of implementation and the quality of standards by measuring the knowledge and use of standards. In line with this, design checking should be intensified and performed on a more regular basis.

### **Choose the right channel!**

Use the most proper channel of communication according to the task. Since each standard is unique, evaluate the most appropriate channel in the beginning of the development. Some standards require face-to-face meetings, while other might be created through telephone calls or electronic post. When informing end users such as designers, face-to-face presentations are the most suitable mean.

### **Observe the language!**

Language is a definite hindrance to the standardisation process, and should be taken into consideration. In our opinion, more efforts to translate documents should be put. Besides, this should be task of professional translators. Having a French version of the standard document early in the development process would make the work faster.

## 5. Managing Standardisation

The management is another aspect that had negative effects on the standardisation. In this chapter we will try to analyse why management is a problem, and identify the possibilities for improvements. The discussion of the findings will therefore be preceded by a theoretical part necessary to frame the topic of management, followed by a conclusive paragraph including recommendations.

### 5.1 Theoretical Framework

Management is another element to consider when implementing changes, as the management support is crucial.<sup>46</sup> It can be divided into two different dimensions representing both art and science. Art, since the tasks are fulfilled in a subjective way based on personality, attitudes, and values. Science, because management is based on a large amount of tools and techniques developed to help perform the job.<sup>47</sup> Above all, management is “getting results through the work of others for the benefit of the client”<sup>48</sup>.

If management is art and science, then what are managers? According to Peter Drucker (1974), management and manager are slippery and overlapping concepts. However, similarly to Shenhar and Renier (1996), Drucker (1974) also emphasises the results by stating that what makes a manager is the “responsibility for the results of the organisation rather than responsibility for the work of others.”<sup>49</sup>

#### 5.1.1 Management Levels

There exist different levels of management that sees the business from diverse perspectives. Depending on the author, there are different management levels as well as diverse ways to call them. According to Northouse (2004) there are top management,

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<sup>46</sup> Vrakking, W. J. (1995), p. 35

<sup>47</sup> Shenhar, A. J and Renier, J. (1996), p.26

<sup>48</sup> Shenhar, A. J and Renier, J. (1996), p.26

<sup>49</sup> Drucker, P. F. (1974), p. 389

middle management, and supervisory management.<sup>50</sup> Management levels have also different business tasks, which are described below.<sup>51</sup>

Top-level managers are a special type of managers since there are no top management task; only multidimensional top management tasks. Shortly, it is not top management's work if somebody else can do it. A top-level manager's first task is to think through the mission of the business and then decide the overall strategy as well as direction of the performance. People representing top-level keep track of organisational capabilities, i.e. resources, technology, structures and processes. They are responsible for major crises and therefore, they have a critical role in the success of the organisation.<sup>52</sup>

The role of middle management is to work between various organisational units at different levels and to facilitate the necessary activities. Middle managers build relationships between supervisors in the organisation as well as suppliers and buyers to ensure that the organisational actions flow smoothly. They also create alternative plans regarding the current needs and arising contingencies that the organisation faces and develop people, structures, processes and other resources to cope with different demands. The person representing middle-level management monitors internal organisational systems and co-ordinates the work of the organisation's different parts into a functional entity.<sup>53</sup>

The third level of management is defined as supervisory and it corresponds to those who are between management and workers. A supervisor leads the daily organisational work that needs to be done on time to provide productivity for the whole organisation and to satisfy individuals and groups. Similarly, the supervisor initiates and monitors work, providing support in terms of resources and psychological needs in order to fulfil the requirements settled by the organisation.<sup>54</sup>

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<sup>50</sup> Northouse, P. G. (2004), pp. 35-37

<sup>51</sup> Basi, R. S. (1998), pp. 232-233

<sup>52</sup> Drucker, P. F. (1974), pp. 610-617

<sup>53</sup> Basi, R. S. (1998), pp. 233-234

<sup>54</sup> Basi, R. S. (1998), pp. 233-234



## **5.2 Analysis**

In our study the management area includes two problems: management support and decision making. Since the problems with support occurred at different levels of management, we divided the levels into top, middle and supervisory management to better pin-point the problems.

### **5.2.1 Management support**

#### **Top management**

If standardisation is a precondition for the use of a common platform then it is a top management concern. However, according to the interviewees, persons representing the highest managerial level of Volvo 3P Lyon did not necessarily realise the importance of standardisation and thus failed in providing the proper support.

*“You do not have to go as high as to top management to understand to fade away. If you ask somebody from top management if this is important they say yes but they do not take any action.”*

Drucker (1974) states that a top manager’s first task is to decide the overall strategy and direct the performance. When looking at our case, it can be said that the overall strategy of creating a common platform and to generate common standards in order to support it was the strategic decision operated by top management. When it comes to directing the performance we observed that top managements’ limited understanding of standardisation affected their ability to carry out the task, i.e., the implementation of common standards.

*“What we need is a common standard, not one Volvo and one Renault”.*

Our study showed that in Volvo 3P Lyon, employees did not know what standards to use. Many areas were regulated by both Renault and Volvo standards and this created confusion especially among designers with the result of delaying the usage of standards.

*“Top managers have to give direction on the same tools and standards to use and give us time to digest it.” “We need management support; we need top management to say what way we should go.”*

Clearer instructions from top managers seem to be crucial in order to speed up the implementation process. Clear direction is especially central in a culture like that of Volvo 3P Lyon, where people are used to a bureaucratic structure with a high power distance between superior and subordinate which means that orders from higher levels are often expected and followed.

*“In France we ask in the beginning but when something is decided we just do it.”*

This reality makes it essential to have firm decisions from top management and a sort of official decision making system similar to that of legislative entities like parliaments. When the decision is made it has to be promulgated so that everybody in the organisation knows that the decision is “law”.

An additional problem related to top management support was the priority, which was rather given to projects. We learned that there were different levels of priority; projects were assigned priority number one, and this took focus away from standardisation. Designers were often under the pressure of project deadlines, and at the same time they were subject to numerous trainings, so therefore they did not have time left for adopting new standards.

*“We do not really have time, since the priority here is on projects.”*

According to Drucker (1974), people representing top-level management have also responsibility to keep track on the organisational capabilities, i.e. resources, technology, structures and processes. The interviews revealed that capabilities related to standardisation were not efficiently managed, as resources and process were among the main causes of standardisation unsatisfactory achievements.

## **Middle and supervisory management**

The understanding of standardisation seemed to be better among middle and supervisory managers. They were closer to the problem as they were dealing with product

development on a daily basis, and had a clearer view on the necessity of common standards.

*“I pushed to have this standard, everybody was asking for it here.”*

Middle and supervisory management understanding though was not sufficient in order to facilitate the implementation of standards. It was in fact problematic for middle managers to develop processes and resources (i.e. training) for the implementation of standards if this was not prioritized on higher levels of management. The same can be said for supervisory management whose responsibility is to initiate and monitor the work providing support in terms of resources and psychological needs in order to fulfil the requirements of the organisation.

*“Our first priority is to launch projects since we have to be in time with them. After that we can focus on new tools so as you can understand it is a dilemma to implement new tools and documents since we do not have the time.”*

Middle and supervisory management seem to be willing to perform their tasks in relation to standardisation but it is difficult as they lack top management support.

This was also hindering the SDP because even though middle and supervisory managers recognised the importance of assigning representatives in the SDGs they did not always have possibility to do it.

*“I assigned resources and I assigned a person to be part of the group. It was not so easy because these hours are not addressed by the budget.”*

So, top management decisions limited lower level managers' willingness to support standardisation.

Middle management is responsible for developing relationships with suppliers to ensure that they are involved in the standardisation process, because in order to achieve the final goal of building a common platform, it is crucial that suppliers adjust to common standards. In the interviews we noticed that managers did not always fulfil their task of informing suppliers about the existence of new standards and of making sure that suppliers were consequently adopting the standards.

### **5.3 Conclusion and Recommendations**

In this chapter we have analysed the problem area of management with the aim of understanding how this hinders the standardisation. Our first conclusion is that top management is not properly supporting standardisation but prioritizes other activities. In addition to this top managers do not direct the organisation's performance regarding standardisation as they have not taken any firm decisions and communicated them. Our analysis also shows that lack of support from top management restrains the standard-related activities on other management levels. These considerations on the management of standardisation suggest us few recommendations for improvement which are presented beneath.

#### **Market standardisation!**

Enhance top management support by increasing their understanding and awareness for standardisation. This is achieved through internal marketing activities towards all management levels, and should be executed by the Global M&S manager (see standardisation parties, p. 9).

#### **Involve top management!**

Somebody in top management should be assigned responsible for standardisation, and be the voice of standardisation in the top management board.

#### **Formalize decision making!**

Top management must take and communicate firm decisions regarding standardisation. A system of formal promulgation of the decisions would make them visible to everybody, and would contribute to express their effectiveness and compulsoriness.

#### **Make standardisation work billable!**

If standardisation is necessary for the common platform, this becomes a top managers concern who should make this activity billable; this would influence lower levels of management and employees, and give them the opportunity to perform their task in relation to standards.

## 6. Allocating Standardisation Resources

Resources are the final problem area that we selected for further analysis. This chapter follows the same structure as the previous ones, by first presenting a theoretical framework on organisational resources, then discussing the findings and proposing recommendations for improvements.

### 6.1 Theoretical Framework

#### 6.1.1 The resource-based view model

The core of the resource-based view model is that resources and internal capabilities are heterogeneous between companies, and that firms owning distinctive and superior resources may gain a competitive advantage over rivals. There are four conditions (see figure 5) that needs to be met in order to reach this competitive advantage: resource heterogeneity, ex post limits to competition, imperfect resource mobility, and ex ante limits to competition.<sup>55</sup>

#### Resource heterogeneity

As already mentioned, one of the basic ideas of this approach is that the firms' resources and capabilities are heterogeneous in the sense that they have different levels of productivity. Companies owning superior resources are likely to earn rents<sup>56</sup> while, other companies can only reach the breakeven point.<sup>57</sup> The condition for a company to earn rents is that the supply of superior resources is limited. Therefore, in order to keep this type of competitive advantage, a company must to make sure that its resources remain limited by hindering other firms from expanding or imitating.<sup>58</sup>

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<sup>55</sup> Peteraf, A. M. (1993), pp. 179-180

<sup>56</sup> When a company owns superior resources, its average costs are likely to be lower than the price ( $P > AC$ ), which produces extra earnings. These profits are seen as rents to the scarce resources of the company.

<sup>57</sup> For further information, check Peteraf, A. M. (1993) to read the argument lying behind the fact that companies with superior resources gain rents.

<sup>58</sup> Peteraf, A. M. (1993), pp. 180-181

### **Ex post limits to competition**

A second condition for competitive advantage is ex post limits to competition. After a company has reached a superior position and earned rents, the competition for these rents must to be limited. Indeed, competition might dissolve rents by increasing the supply of scarce resources. To avoid this, resources should have the two features: imperfect imitability and imperfect substitutability.<sup>59</sup>

Dierickx and Cool (1989) state that the imitability of a resource is connected to the features of the process by which this is accumulated.<sup>60</sup> According to the same authors, non-tradable assets<sup>61</sup> are difficult to imitate as they have a tacit nature and are socially complex, as they are generated by organisational skill and corporate learning. The inimitability of these assets is therefore owing to the difficulty of identifying and repeating their development process.<sup>62</sup>

### **Imperfect resource mobility**

Perfectly immobile resources cannot be traded while imperfectly mobile can be traded. The latter are so specific to a company though, that they do not have any value to other firms. Perfectly immobile and imperfectly mobile resources therefore stay within the company that accumulated them and assure a long-term competitive advantage.<sup>63</sup>

### **Ex ante limits to competition**

The last condition for competitive advantage is the existence of ex ante limitations to competition. This means that before a company establishes a superior resource position, there should be a limited competition for that position. If there is not, companies will compete in order to acquire that position with the result of dissipating the anticipated returns.<sup>64</sup>

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<sup>59</sup> Peteraf, A. M. (1993), p. 182

<sup>60</sup> Dierickx, I. and Cool, K. (1989), p. 1507

<sup>61</sup> Non tradable assets are all assets that cannot be bought or sold but that are accumulated internally in a company. For more information see Dierickx, I. and Cool, K. (1989), p. 1505

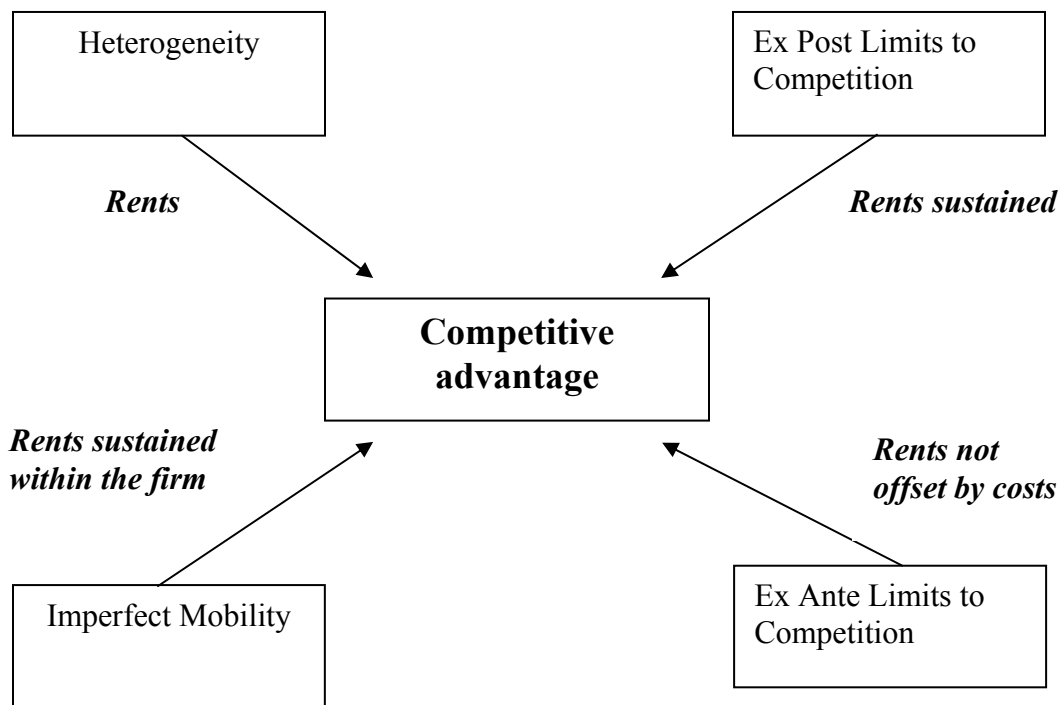
<sup>62</sup> Peteraf, A. M. (1993), p. 183

<sup>63</sup> Peteraf, A. M. (1993), pp. 183-184

<sup>64</sup> Peteraf, A. M. (1993), p. 185

This approach highlights the importance for companies to develop the resources that enhance their competitive advantage. It is therefore one of management's responsibilities to identify, invest in, improve and control its superior resources.<sup>65</sup>

**Figure 5: The cornerstones of competitive advantage**



Source: Peteraf, A. M. (1993), p.186

## 6.2 Analysis

In order to carry out the standardisation activity a set of resources must to be allocated. In our study, we observed that resource shortage was one of the main obstacles for the implementation of standards. In particular, the lack related to the following four types of resources: human, financial, intellectual, and technological. As in the previous chapters, we will concentrate on the implementation phase and touch upon the development if this has effect on the implementation.

<sup>65</sup> Collis, D. J. and Montgomery, C. A. (2005), p. 47

### 6.2.1 Human capital

By human capital we mean the workforce of the organization, or the amount of hours available to accomplish the organisational mission. Volvo 3P Lyon is experiencing a main organisational change, which requires employees to adapt to new processes, systems, activities etc. Standards are therefore only one of numerous changes that the Lyon organisation is undergoing.

*“There are too many changes and we have difficulties coping with them.”*

Standardisation appeared to employees in Lyon as one of several innovations they have to adapt to. As a result of this large change people, especially designers but also their superiors, have little time left to read new standards and to use them. Employees receive standards by electronic post and are supposed to read them, but it seems clear that there is no time for this.

*“We have heavy workloads today and people do not have time to read all documents we receive.”*

We also observed that it was difficult to schedule training activities for standards as the major part of the designers was busy with other training.

*“There is lot of training right now; so even though it would be good to train them to this standard there is no time. I think that training has been planned for next year though.”*

However, training activities should be carefully planned according to each standard. Indeed not all standards require training, and each employee does not necessarily need to be trained for all standards.

The M&S department in Lyon seemed to encounter problems of personnel shortage. As this group is responsible for the management and coordination of standard implementation, dysfunctions were likely to affect the entire activity negatively.

We noticed that the workload in this group, the translation of standards for example, took focus from the implementation tasks which in contrast seemed to require a fair amount of time to be carried out.

*“There is another problem for me, the resources. We have a limited number of people and it takes lots of time to check the document and manage the local consultation.”*



## 6.2.2 Financial capital

The financial capital represents the money that an organisation possesses and invests in its activity. What emerged from our study was that funds for standardisation were scarce as most of the time allocated to this was seen as non-billable hours. The reason for this was that customers cannot be charged for these hours as they are not directly linked to the product.

Since standardisation is a non-billable task, it is not entirely covered by the budget. According to the interviewees, learning standards does not have any project number even though it can be a demanding task that requires a lot of time. Under these circumstances there is a risk that employees do not read the standards, which would be a hindrance to the usage of common standards.

*“There is a problem with budget since we do not get paid for the time spent regarding the standard.”*

The budget does not address the involvement in the final development of standards when people are supposed to comment the standard proposal.

*“I think that giving comments to the proposal should have project number since it takes time and we should be able to locate those hours.”*

Nor does it cover the entire SDP. As the participation can last a long time and require efforts we observed that not all managers had the possibility to support their subordinates' involvement in the SDGs.

*“The budget is a main issue because as long as we are involved in one or two projects it is ok, but if we were asked to join more projects it would become unsustainable.”*

An example was that group members could not take part in all face-to-face meetings because of the travelling expenses, and this slowed down the working process and delayed the launch of the standard.

### 6.2.3 Intellectual capital

Intellectual capital is defined as the competences of an organisation's personnel. During our investigation we noticed that the competences of the M&S group in Lyon were connected to the development of standards since this used to be part of Renault's CS department. This was an advantage since the group can support CS in Gothenburg in the development task, but on the other hand the competences related to implementation were fairly limited.

*"I think our team does not have the right skills to implement."*

Since M&S is responsible for the implementation activity, it is crucial, in order to sustain the entire process, that it contains the right competences and that its members are trained for the implementation task.

The shortage of experts in the Lyon organisation causes a lack of competences in the SDGs, where the right knowledge often is missing. A main reason for this is that the personnel is old and it is difficult to find new competent people who can participate in the working groups.

*"Lots of people with experiences are retired now and it is difficult to find new competence."*

This problem was also enhanced by the difficulty of identifying the right person to join the groups. CS in Gothenburg does not have the knowledge of the organisation which is essential in order to find a capable member for the working group. If the necessary expertise is not in the working group there is a risk that the precious knowledge is left out of the standard.

Peteraf (1993) states that firms possessing distinctive and superior resources may gain a competitive advantage over their rivals. We presented four conditions necessary for a company in order to achieve a competitive advantage. If we apply these conditions to our study would make standardisation at Volvo 3P a superior resource. Starting with the condition of heterogeneity, the standardisation has a high productivity potential as it is supporting the common platform and all common projects, and therefore sustaining the

synergies between all three truck brands. A standardisation will decrease costs and by this provide extra rents.

The condition of ex post limits to competition also occurs in standardisation. As Dierickx and Cool (1989) state, this condition is ensured by the inimitability of a resource which is connected to the features of the process by which this is accumulated.<sup>66</sup> Common standards at Volvo 3P are the result of a process of development and implementation and include the companies' knowledge and best practices. Standardisation is therefore hard to imitate as it is difficult to identify and repeat the process of its creation.

Standardisation is also an imperfectly mobile resource. It is so specific to Volvo 3P that it brings limited value to other firms, and for this reason, standardisation stays within Volvo 3P and assures a long term competitive advantage.

The last condition for competitive advantage is the existence of ex ante limitations to competition. This is represented by the merger between the three truck brands and their opportunity of sharing best practices for the construction of a common platform.

If standardisation is a superior resource able to enhance Volvo 3P's competitive advantage, it is necessary, as Collis and Montgomery (2005) state, to acknowledge its importance; to invest in, improve and control it. Therefore, the assignment of human, financial, and intellectual resources to support standardisation must be improved.

### ***6.3 Conclusion and Recommendations***

The previous analysis shows that standardisation did not receive the proper attention in terms of resources. The fact that this activity was mostly performed during non-billable hours, and therefore was not budgeted, enhanced the shortage of personnel and funds. The lack of competences was an additional obstacle which together with the reasons stated above causes inefficiency of standardisation.

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<sup>66</sup> Dierickx, I. and Cool, K. (1989), p. 1507

Standardisation is a superior resource with the potential of becoming a strategic advantage, differentiating Volvo 3P from competitors. In order to enhance this advantage we recommend the following:

**Make standardisation a strategic goal!**

Standardisation must be acknowledged as a superior resource and hence a source of competitive advantage. If standardisation is a strategic goal, it must be invested in, and a first condition is that this is budgeted and performed as billable work.

**Invest in standardisation!**

Assign the necessary funds and workforce for standardisation activities. Budgeting is a tool for the measurement of standardisation efficiency. It can therefore facilitate the control of and investment in standardisation.

Invest also in the selection and training of personnel for standardisation in order to ensure and increase the right competences. Questionnaires can be used for the evaluation of competent personnel.

## **7. Standardising Standardisation**

In the previous chapters the problem areas of communication, management and resources have been analysed and we have recommended actions for each of them. At this point it seems necessary to combine all the aspects discussed in a final chapter to provide a complete overview on standardisation and the factors affecting its performance.

In this chapter we analyse the process of standardisation and focus in particular on the implementation phase since this proved to be the most problematic part in our study. The theoretical framework contains an implementation model which provides the description of a six-phase process and explains what must be done when implementing an innovation. We applied this model to the standardisation activity at Volvo 3P, and it facilitated the delineation of an overall picture and provided a frame for further recommendations.

### ***7.1 Theoretical Framework***

#### **7.1.1 A six-phase implementation model for innovations**

According to Vrakking (1995) a factor influencing the outcomes of implementation, is that people understand in forehand that they will have to go through several distinct phases.<sup>67</sup> The following model (see figure 6) is based on Cooper's stage-gate system of product development; each phase therefore includes few gates.

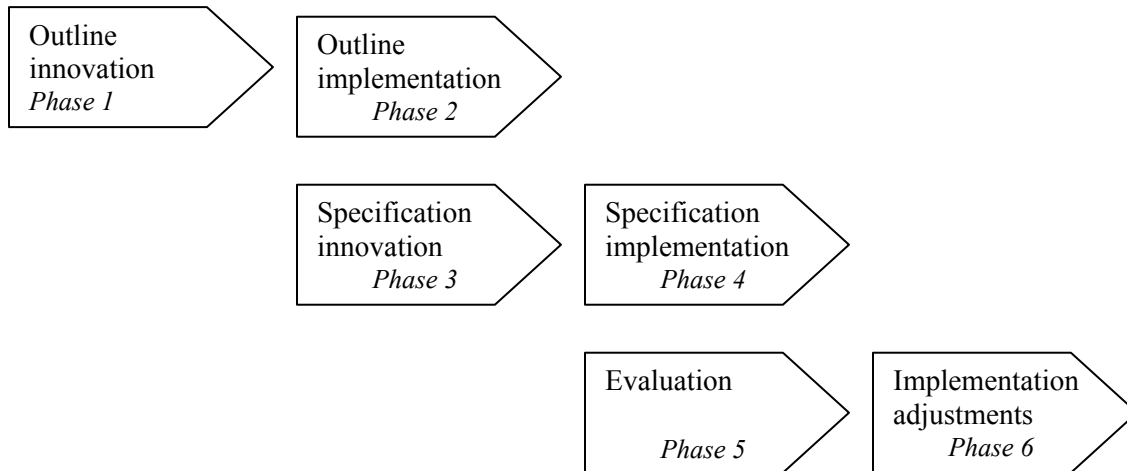
As shown in figure 3, the outline of the innovation (phase 1) and the specification of the innovation (phase 3) are the design stages of an innovation. The specification of the innovation is parallel to the outline of the implementation (phase 2) and the reason for this is to allow a divergence-convergence sequence. The development of an innovation is not separate from its implementation; in fact, involving people at the design stage is a way to include everybody's knowledge, but also a way to increase the support for the innovation. So once the innovation idea (phase 1) is outlined, it should be propagated in the organisation (phase 2) in order to gain feedback necessary to specify it (phase 3).

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<sup>67</sup> Vrakking, W. J. (1995), p. 38

When the innovation has been specified and finalised it is time to create a detailed implementation plan and to execute it (phase 4). The implementation has to be followed up and evaluated (phase 5) in order to see if its purpose has been achieved and if adjustments of the innovation are needed (phase 6).

**Figure 6: Six-phase implementation model**



*Source:* Vrakking, W. J. (1995), p. 39

As discussed, developing an innovation is not the end of the process, it must also be implemented, an activity that implies consequences both in terms of personnel and finances. So it is crucial that financial and human resources are included in the decision making and eventually assigned in advance. In line with this, it is essential to assure management's commitment as soon as possible, by obtaining an early preliminary decision on the extent to which top management is willing to support the innovation. Making the process transparent allows anyone who is interested to follow the process, and is a way to increase employees' commitment towards innovation.

In order to minimise any resistance to the innovation, managers responsible for the implementation should be appointed just after the innovation has been specified in order to give the idea that this is an irreversible decision. These managers will then work out a detailed plan of implementation following specific steps. As they will be asked to

perform a task that they might not have skills for, they should be supported, and possibly trained. It is also important to have good coordination between those responsible for the implementation in order to have the efforts directed towards the same goal.

Finally there is communication, which is crucial to implementation. The importance of information cannot be underlined enough, according to Vrakking (1995). Informing the organisation about the change is a way to facilitate the understanding and to reduce the resistance, which in turn would contribute to make the implementation successful.

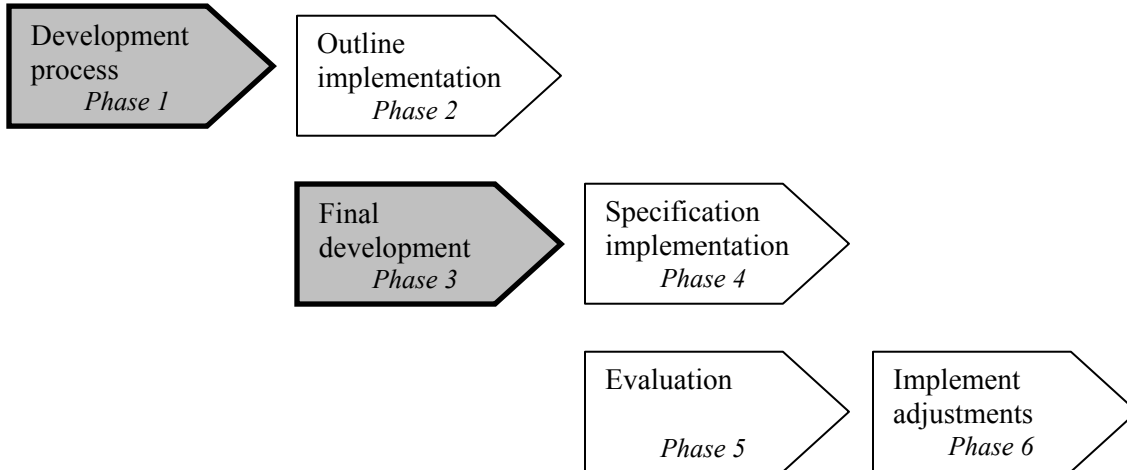
## **7.2 Analysis**

### **7.2.1 A six-phase model of standardisation**

Even though the model presented above addresses the implementation of innovation, we think it is suitable for our case, since standardisation and innovation are comparable concept as they both involve a change in the organisation. We therefore use the model, but modify it to our purposes (see figure 7).

Phase I represents the SDP with the exception of the final development stage which is Phase 3. At the same time as the final development stage, the implementation of common standards should be outlined (Phase 2). Once the standard is finalised, a detailed implementation plan shall be specified and executed (Phase 4). The implementation has to be followed up to make sure that the standards are being used (Phase 5) and to evaluate if any adjustment of the standards are needed. The adjustments are executed during the final Phase 6.

**Figure 7: Standardisation model<sup>68</sup>**



*Source:* Vrakking, W. J. (1995), blocks in grey are modified by authors

### **Phase 1**

As Vrakking (1995) states, the development of an innovation is not separate from its implementation. Involving people in the SDP is a way to increase the support for standardisation. We have observed that this has been partly done in Lyon though. As we discussed previously, stakeholders were not always involved in standardisation and working group members did not always spread the information in their home organisation. As Vrakking (1995) suggests, the SDP has to be transparent, in order to enable outsiders to follow it. Conducting the development process in a “passively public way” is also functional to the achievement of top management commitment.

According to Vrakking (1995), preliminary decisions regarding the implementation shall be taken, especially in relation to financial and human resources, during the SDP to avoid resource shortage later on. According to our findings, standard implementation was often obstructed by lack of resources which hints that resource planning had not been carried out in a proper way. We agree with Vrakking (1995) that this kind of support from top management is indispensable, so its commitment to standardisation must be assured in the very beginning of the process.

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<sup>68</sup> The blocks in grey represent the SDP whereas the blocks in white represent implementation.



## **Phase 2**

In the implementation outline phase, managers/teams responsible for the implementation of the standard are appointed and a plan to coach the team is drawn. It is important to ensure the continuity between development and implementation, and for this purpose one or more individuals must follow the activity from the beginning to the end. Our study showed that the implementation activities in Lyon were not planned already during the SDP, that there was no clear pattern for the selection of persons responsible for implementation, and that continuity was not usually ensured. CS is not involved in the implementation, and the working group members from the different sites seldom participate to the implementation of the standard after the SDP. As Vrakking (1995) states: not all managers have the necessary skills for implementing, so they should be supported and trained training. The M&S global manager must coordinate and keep track of the advancement achieved by the M&S department in Lyon (and other Volvo 3P sites), which itself has to manage all implementation activities on the named site.

## **Phase 3**

Once the standard is outlined, it is made known in the organisation in order to gather the feedback necessary to specify it. After the comments are collected, the working group finalises the standard document.

## **Phase 4**

As Vrakking (1995) says, specific decisions regarding the implementation are taken, and a plan to guide, coach and develop these decisions is created. This plan includes a clear description of each person's tasks and responsibility for the implementation. It also addresses the resources needed for the implementation, based on an estimation of the necessary time, budget, training, and tools. In our study we could not recognise any specifications of the standard implementation in Lyon.

According to Vrakking (1995), working through project management helps to coordinate the work of the implementation team, as the persons in the team are likely to work in different departments and bringing them together might be difficult task.

### **Phase 5**

An evaluation is indispensable in order to verify if the goals of standardisation are achieved. Evaluation is important in order to collect feedback and check if a development and implementation have been successful, or if they require any changes. This activity was almost inexistent at the Lyon site and the only checking established was not effective enough. In addition to the intensification of design checking, budgeting is a tool to measure the performance and outcomes of standardisation.

### **Phase 6**

If the evaluation indicates the need of adjustments, these shall be carried out during the final phase, to improve standardisation and reflect upon the experience acquired. As standardisation was not evaluated, the need for adjustments was not identified and hence not carried out.

Vracking (1995) explains that each phase is made of several stage-gates. Such a system is not utilised by the standardisation parties in our case study; though it would benefit the entire activity. This would facilitate employees' tasks by showing them what needs to be done and when; giving a sense of continuity and short term achievements.

## ***7.3 Conclusion and Recommendations***

To sum up, standardisation at Volvo 3P is carried out as a two separate processes. CS is in charge of development and M&S of implementation and this is the reason for the lack of continuity between the SDP and implementation. Implementation is seldom formally specified and follows hardly ever a formalised practice. This is why there is poor coordination of the entire activity and a lack of transparency.

### **Standardise standardisation!**

Standardisation should be not divided into development and implementation since the two processes are linked. Standardisation should be standardised: carried out through a formalised process which is known and visible for the organisation. Using a stage-gate

process to perform standardisation makes this activity more visible, which in turn increases the support and commitment on all levels. A precondition for standardisation to be carried out is budgeting which should address resources and targets in relation to each phase. Budget has to be followed up by top management to evaluate the work performed.

## 8. Executive Summary

The purpose of this study was to increase the usage of standards by improving the standardisation. Performing the case study at Volvo 3P gave us the opportunity to carry out personal interviews and collect first-hand data which was the base of our study.

The findings were categorised into six main problem areas, which after being examined were reduced to three: communication, management, and resources. The analysis therefore focused on these three subjects.

Our conclusion is that the communication flow between and within the standardisation parties is inefficient. It fails to transmit information regarding standards and to create a commitment towards standardisation. The communication channels are not used properly and therefore do not fulfil the purpose of facilitating the transfer of information from the source to the destination. Finally language was a cause of misunderstandings, slowing down standardisation.

When looking at the problem area of management, we recognised that top management is not properly supporting standardisation but prioritises other activities. Besides we observed that there is poor direction of standardisation and lack of communicating firm decisions. The lack of support from top management also affected other management levels negatively, limiting their accomplishment of standard related activities.

Our analysis showed that standardisation has the potential to become a strategic advantage capable of differentiating Volvo 3P from their competitors. However standardisation does not receive the proper attention in terms of resources. The fact that this activity is performed mostly through non-billable hours and therefore is not budgeted, enhances the shortage of personnel and funds. A third factor causing the inefficiency of standardisation is the lack of competences.

Standardisation at Volvo 3P is carried out as two separate processes where there is no continuity between the SDP and implementation. Moreover, implementation is neither formally specified, nor following a formalised process. Therefore poor coordination of the entire activity as well as lack of transparency are occurring.

To sum up, we have four general recommendations for improvement. First of all, the idea of standardisation needs to be promoted in order to increase employees' and managers' awareness, understanding, and commitment. Secondly, it is important to involve top management in the standardisation work by making a person on this level responsible for it. Besides, top-level decision making should be formalised and visible to the entire organisation. Our third advice is to make standardisation a strategic goal, and therefore to budget it and invest in it. Finally, the standardisation must be standardised, in other words it should be carried out through a formalised process clear for all employees.

### **Suggestions for further studies**

As already stated, different reasons limited the scope of our study, and forced us to leave standard- and human-related issues out of our analysis. A future research addressing these areas could provide a more complete overview of standardisation.

## References

Basi, R.S. (1998), "Administrative decision making: a contextual analysis," *Management Decision Journal*, 36 (4), 232-40.

Brewerton, P. and L. Millward (2001), *Organisational Research Methods: A Guide for Students and Researchers*. London: Sage Publications Ltd.

Brunsson, N. and B. Jacobsson (2000), *A world of standards*. Oxford: Oxford University Press.

Collis, D. J. and C. A. Montgomery (2005), *Corporate strategy: a resource-based approach*. Boston: Irwin: McGraw-Hill Education.

Dierickx, I. and K. Cool (1989), "Asset stock accumulation and sustainability of competitive advantage," *Management Science*, 35 (12), 1504-11.

Drucker, P. F. (1974), *Management: tasks, responsibilities, practices*. London

Elving, Wim J. L. (2005), "The role of communication in organisational change," *Corporate Communication: An International Journal*, 10 (2), 129-38.

Gudmundsson, A., H. Boer, and M. Corso (2004), "The implementation process of standardisation," *Journal of Manufacturing Technology Management*, 15 (4), 335-42.

Hammersley, M. (1990), *Reading Ethnographic research: a critical guide*. London: Longmans.

Miller, K. (2003), *Organisational communication: approaches and processes*. Belmont, CA: Thomson/Wadsworth.

Northouse, P. G. (2004), *Leadership, theory and practise* (3rd ed.). USA: Sage Publications, Inc.

Peteraf, A. M. (1993), "The cornerstones of competitive advantage: a resource-based view," *Strategic Management Journal*, 14 (3), 179-91.

Richards, L. and T. Richards (2005), *Handling qualitative data, a practical guide*. London: SAGE.

Shannon, C. E. and W. Weaver (1959), *The mathematical theory of communication*. Urbana: The University of Illinois Press.

Shenhar, A. J. and J. Renier (1996), "How to define management: a modular approach," *Management Development Review*, 9 (1).

Silverman, D. (2005), *Doing qualitative research: a practical handbook*. London: Sage.

Soanes, C. and A. Stevenson (2003), *Oxford Dictionary of English (2nd ed.)*: Oxford University press.

Vracking, W. J. (1995), "The implementation game," *Journal of Organisational Change Management*, 8 (3), 31-46.

"decision making" *A Dictionary of Business*. Oxford University Press, 2002. *Oxford Reference Online*. Oxford University Press. Goteborg University Library. 7 November 2005 <http://www.oxfordreference.com.ezproxy.ub.gu.se/views/ENTRY.html?subview=Main&entry=t18.e1665>

"implementation" (2003), "The ultimate business dictionary," Cambridge MA Perseus Pub.

"management" *A Dictionary of Business*. Oxford University Press, 2002. *Oxford Reference Online*. Oxford University Press. Goteborg University Library. 7 November 2005 <http://www.oxfordreference.com.ezproxy.ub.gu.se/views/ENTRY.html?subview=Main&entry=t18.e3559>

"process" *A Dictionary of Business*. Oxford University Press, 2002. *Oxford Reference Online*. Oxford University Press. Goteborg University Library. 7 November

2005 <http://www.oxfordreference.com.ezproxy.ub.gu.se/views/ENTRY.html?subview=Main&entry=t18.e4646>

Volvo's Intranet

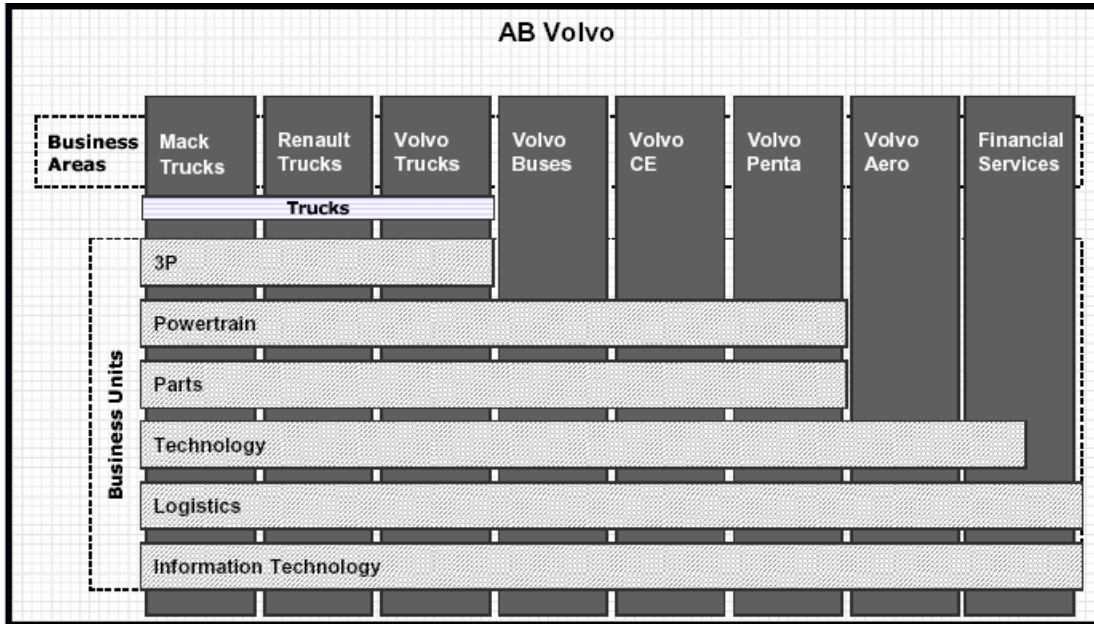


## **Abbreviations**

<b>CS</b>	Corporate Standard
<b>M&amp;S</b>	Methods and Standards
<b>PG</b>	Planning Group
<b>RG</b>	Reference Group
<b>SDG</b>	Standard development working group
<b>SDP</b>	Development process of common standard
<b>VTEC</b>	Volvo Technology Corporation

# Appendix

Figure 8: Volvo organisation



Source: Volvo's Intranet

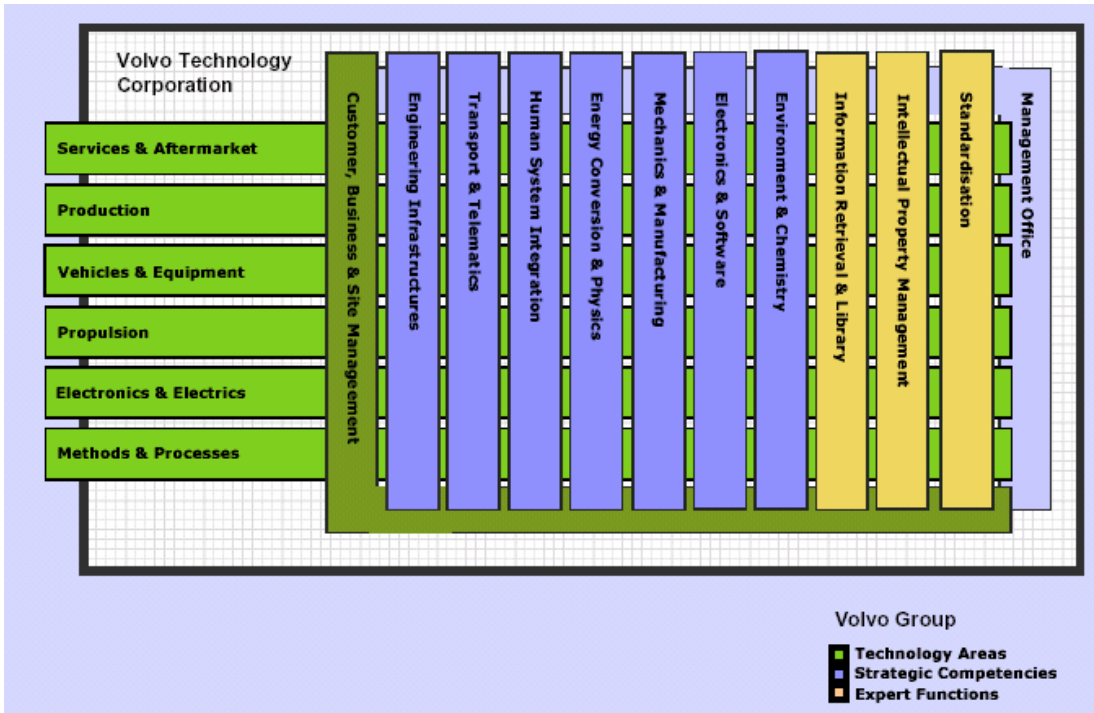
Figure 9: Facts about VTEC

- Altogether 350 employees
- Turnover €36 M
- Established 1969
- Innovation Areas:
  - Services
  - Production
  - Vehicles
  - Powertrain
  - Electronics
  - Processes & methods
- Innovation Services
  - Intellectual asset management
  - Standardisation intelligence



Source: Volvo's Intranet

**Figure 10: Volvo Technology Corporation**



*Source:* Volvo's Intranet