CHALMERS

The old way

The Lean way

Naturalising Lean in an organisation
A case study

Master of Science Thesis

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Naturalising Lean in an organisation – a case study

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Abstract

At Saab Electronic Defence Systems Operations Gothenburg (OEG), a Lean initiative has been running on a company-wide scale since 2008. This has, foremost, been visible through the use of Lean tools and methods. During the autumn of 2011, an educational series about Lean has begun to be spread to all employees at OEG. The goal of that series is to make the employees see that there are conceptual aspects to the change to a Lean organisation. In the end, Lean initiators and senior management of OEG want to naturalise Lean in the organisation – Lean should be part of the daily work at OEG.

The aim of this thesis was to investigate how Lean can be made a natural part of OEG. Through a case study, consisting of approximately 50 interviews with people that are active in driving the Lean initiative (the Lean network) as well as other employees and consultants mainly at OEG and the business unit EDS, which OEG is a part of, three research questions have been answered:

- What is the state of the Lean work at OEG today?
- What roles should the different parties in the organisation, in other words the managers and the Lean network, fill in the work with Lean?
- What should the next steps in the Lean initiative at OEG be in order to make Lean a natural part of the organisation?

It can be concluded that although Lean tools and methods have been used in the company for some time now, the conceptual thinking is not yet rooted among the employees. The employees find it hard to know how to encompass Lean thinking in their daily work. There seems to be a tendency among the employees to think that Lean is a passing thing, just as all previous transformation efforts. Furthermore, the managers that should drive the Lean initiative are still rather unfamiliar to the concept.

Currently, the Lean initiative is driven mostly by the Lean network, but through the educational series some responsibility has been transferred to the line management. This transfer must continue, so that the initiative does not lose pace in the event that the Lean network disappears. Managers should teach their subordinates about Lean in a top down manner, but the aim should still be to empower the employees and give room for creativity. The Lean network should act as a supporting function for managers by giving guidance and being a discussion partner.

For the future of the Lean work, it is seen that a strategic focus is necessary. The Lean work needs to have a direction that is common and known to everyone at OEG. This strategic focus should be set by senior management and communicated to everyone in the organisation so that the necessity of working with Lean and why it is so important is known by all employees. In a long term perspective, the focus should be to have a common Lean work within the entire Saab Group in order to realise all potential benefits of working with Lean.

Key words: Lean, naturalisation, change management, organisational culture.

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1 Introduction

In a world where companies struggle to achieve even more efficient production at an even higher quality level, there is a need for continuously improving ones' organisations and operations. Managers in western companies have been looking for a guiding light in the management of improvements. To many companies, Toyota and the concept of Lean is what they look to for answers (Karlsson & Åhlström, 1996).

The concept of Lean has its roots on the shop floor in a Toyota factory in Japan in the 1940s (Jones et al., 1997). The Toyota Production System (TPS), which was the basis for what we today regard as Lean, was not just something that Toyota implemented one day in their factory and offices; instead it has evolved over time to become what it is today (Emiliani & Stec, 2005). With this in mind organisations worldwide today are trying to copy Toyota and understand the mystery of Lean, while at the same time finding their own way forward (Spear & Bowen, 1999).

At Saab Electronic Defence Systems Operations Gothenburg (OEG), the Lean initiative has been running on a larger scale since 2008.[1] Although Saab is not a traditional mass producing company where the production can be stream-lined, benefits have already been realised due to the initiative. OEG understands that the work with Lean takes time and that the next steps in their Lean initiatives may affect how it will be received within the company. There is a need for constantly evolving the ways of communicating the Lean concept in order to reach every employee and make Lean a natural part of the organisation; there is a need for planning and a need of finding a common ground to start from. Currently, Lean has different meanings to different persons in OEG's organisation. Without finding a consensus for what Lean is and where the initiative is heading it will be difficult to take the next step together as one unity.

1.1 Company background

In 1956, Ericsson began producing radars in Mölndal, Sweden. In its 50th year of operations, the business unit Microwave Systems was sold to the Saab Group.[2] Ericsson wished to focus on its core competence, telecom, and Saab already had extensive operations within the defence industry (Berg, 2006). In 2010, Saab restructured its business units and renamed them business areas (Saab, 2011). The business unit Microwave Systems was merged with the business unit Avitronics and the new business area was named Saab Electronic Defence Systems (EDS). Together with four other business areas, EDS constitutes the Saab Group, see figure 1.

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[1] See appendix A.
[2] Based on information from the internal database, retrieved 2011-09-01, last updated: 2010-08-18
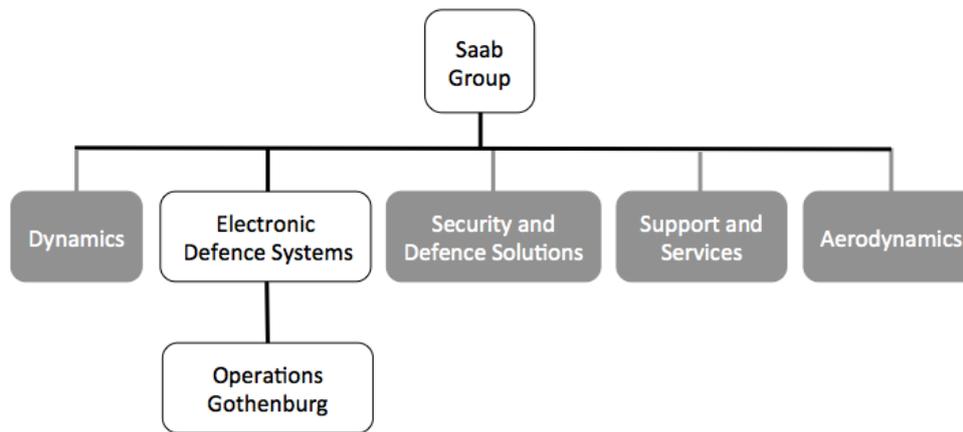
Figure 1. Simplified organisational chart highlighting OEG's position within the Saab Group.

EDS's production foremost consists of lasers, radar systems and solutions within the field of avionics. With customers in over 30 countries worldwide, EDS is among the leading suppliers within their field. EDS is present in Sweden, Norway and South Africa and has 2 450 employees, of which 1 200 are located at OEG in Gothenburg, Sweden.[3]

OEG is one of the units of EDS. It has its roots within the company Ericsson Microwave Systems. Apart from manufacturing and delivery of products to customers, OEG also have extensive operations within the product development field. The unit produces radar and laser systems in four Nordic sites – Gothenburg, Mölndal and Skövde in Sweden and Halden in Norway. Among its top selling products are ARTHUR, a weapon locating radar, and the Giraffe AMB, a multi mission surveillance system.[4] These have been sold in 60 and 500 units, respectively.[5]

The hierarchical structure at OEG is built up of three levels. At the highest level, the division managers are responsible for the four divisions at OEG: Sourcing and Supply, Product Development, Systems Design and Project Management. Each division consists of a number of departments that are run by the department managers. On the lowest hierarchical level, the section managers are responsible for groups of employees in different functions. Somewhat separate from the functional structure of the organisation, the project managers are responsible for running projects with groups of employees from various sections, departments and divisions.

1.2 The Lean initiative at OEG

The concept of Lean was first introduced at OEG in the production and mechanical departments in 2006-2007 as a response to long lead-times, lack of resource allocation and missed deadlines. Prior to this, in 2003-2004, there had been discussions among employees from different departments about the Lean concept and implementations of simple tools; for

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[3] Based on information from the internal database, retrieved 2011-09-01, last updated: 2011-02-23.
[4] Based on information from the internal database, retrieved 2011-09-01, last updated: 2010-05-26.
[5] Based on information from the internal database, retrieved 2011-09-01, last updated: 2011-02-23.

example 5S had been tested. As one of the initiators expressed it: *"I guess it all started with a discussion in the production department… after that it has spread more and more. But the expansion has more or less been in small islands [within the company]."*

During these first years of the Lean initiation, the Lean enthusiasts mostly worked on their own with the support of their closest manager. From the need of exchanging ideas and experiences with each other, the Lean enthusiasts created different discussion forums and developed a Lean team.

In 2008 the Lean team, which now had started to gain respect from senior management, started to change perspective from only working with Lean in their own departments to also looking at how Lean could become a part of the entire OEG organisation. With the Lean initiative gaining recognition, senior management was introduced to the concept of Lean and in 2008 senior management went on their first Gembas. As a step in gaining more recognition and support for the Lean concept the Lean team was able to get 15 minutes of the senior management's weekly meetings to discuss the different aspects of Lean. This soon developed into study circles where a chapter of the book *Lean i ledningen - utmana hela organisationen* (Eng. *Lean in Management – challenge the entire organisation*) from Swerea IVF was read and discussed each week. The Lean team started to seek influences from other companies such as RUAG Space and Autoliv, and a Lean Method Network within the Saab Group became another source of support for the Lean team within OEG.

When the Saab Group announced the need for major savings within its different business units in 2010 the Lean team saw this as an opportunity of showing the senior managers what opportunities Lean could bring by broadening the Lean initiative to include all the departments at OEG. Within the Lean team discussions had been going on for a while on how improvement boards (also known as PDCA boards), which had worked well within the manufacturing and mechanical departments, could be introduced to all parts of OEG. When the Saab Group presented large savings requirements from Saab Group, the Lean team saw this as an opportunity to work with improvement boards to improve the organisation continuously and save money simultaneously. Senior management gave the Lean initiative a go and improvement boards were pushed out into OEG that same year. Around the same time a concept called Lean ambassadors (LA) was introduced after influences from RUAG Space, who had used Lean mentors, and from within the Saab Method Network where Lean coaches had been used as a way of spreading and creating enthusiasm around Lean. The connection between managers and the Lean network, which consists of LAs and the Lean team, can be seen in figure 2.
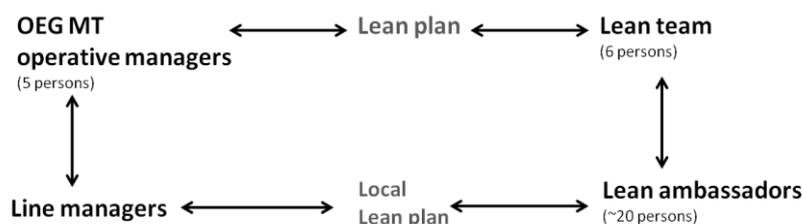
Figure 2. Overview of how the managers and the Lean network are tied to each other.

In 2011 the Lean team within OEG has put a lot of effort into educating all managers and LAs in the Lean concept. As one of the Lean initiators within OEG expressed it: *"During this last year you could say that we have woken up… and sat up in bed and started to look at our surroundings and what others are doing, and I guess we've gotten our feet outside the bed board as well. We haven't really started to walk, but we are sitting up, maybe taking a few trying steps and shaking of the sleep."* To help inspire and spread information about Lean within the company, OEG has worked together with Niklas Modig, Doctoral Fellow at the department of Management and Organisation at Stockholm School of Economics, who in his role as researcher and Lean facilitator has held seminars and workshops for all different levels of managers. An overview of the work with Lean at OEG up until 2011 is presented in figure 3.
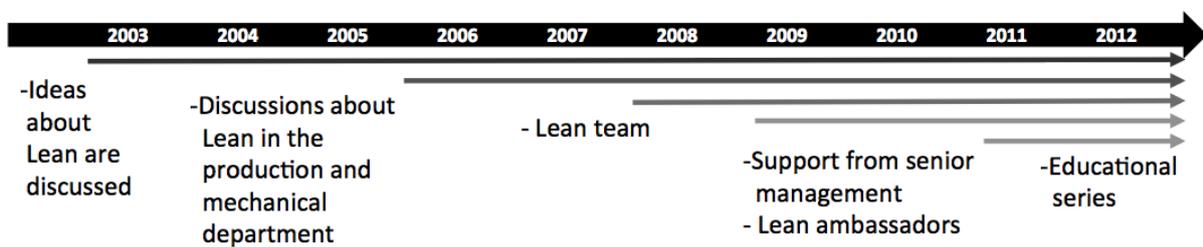
Figure 3. Overview of the Lean network at OEG.

Recently OEG has began to release movies from the seminars with Niklas Modig and studying material based on those seminars to all employees within OEG. To many employees, this educational series is their first comprehensive exposure to the concept of Lean, since all Lean work up until this point has been tool-based. By widening the Lean work to also contain the conceptual thinking and a culture of continuous learning the hope is that Lean will eventually be naturalised in the organisation.

1.3 Purpose

The aim of this thesis is to study how the Lean philosophy can become a natural part of OEG's everyday work.

1.3.1 Problem analysis and research questions

The Lean initiatives at OEG started, as mentioned above, independently from each other in the manufacturing department and mechanical department as an answer to long lead-times, lack of resource allocation and missed deadlines. In order to centralise and unite the Lean effort at OEG, the Lean team was created. The first aim of the Lean team was to include and gain the active support of senior management in the Lean work. As this aim was reached, the focus changed to the spread of Lean in the entire organisation.

At the moment the Lean team is working with creating an urge amongst employees to learn more about Lean. A lot of discussions concerning these areas within the Lean team revolve around how to create a line of communication about Lean within the organisation and create involvement and a sense of ownership of the Lean initiative in all areas of the organisation.

The Lean team has always known that the concept of Lean requires a lot of persistence and boosts of energy on their part before it can become a natural part of all co-workers mind-set. There are no simple handbooks or roadmaps on how to become a Lean company. OEG therefore needs to find the way that is right for them. However, as Lewin (1947) puts it, by knowing the current situation it may be easier to pave the way for a change. With this in mind, the first research question is:

- What is the state of the Lean work at OEG today?

To many the first sign of Lean at OEG was the day the improvement boards were introduced, and in some parts of the organisation the improvement boards are the only visible sign that there is a Lean initiative. The improvement boards were introduced at a time when the Saab Group stressed the importance of saving money within its business units. The aim was to visualise how the many small improvements in the organisation also led to cost reductions. Due to few other clear messages about what the concept of Lean is, this seems to be sending the message to the organisation that Lean is a way of saving money, something that many of the pre-study interviewees seem to agree on. Currently, there are filters in the communication between senior management and employees. It is evident that the organisational culture affects the possibility for communicating Lean in the organisation.

As a way of creating an involvement and reaching all parts of the organisation, OEG has recently started to work with a sort of change agents, Lean ambassadors (LA). What an LA is and how they should be involved in the Lean initiative is still unclear. The goal from the Lean team is to let them find their own way of moving forward and spreading enthusiasm about Lean and help support the managers. As one of the Lean initiators expressed it: *"The vision in some way is to make a thousand employees Lean ambassadors and in time this won't be a special function, but more a part of everyone's daily job."* Since most LAs are not managers, they have the possibility to understand the work situation of the employees in their particular sections and also understand the meaning of Lean in that particular environment; thus, they have the opportunity to spread Lean in a more natural way to all employees.

As can be seen in figure 2, the idea with the Lean initiative is to let both managers and the Lean network be a part in driving the initiative, since the managers on the one hand have the power to make Lean a part of the day-to-day activities in the organisation, while the Lean network on the other hand have more knowledge about Lean. At the moment, the senior management at OEG have given their support and taken on the responsibility to develop a Lean strategy. According to Ulf Näsström, the COO at OEG, the senior management should be in charge of setting the Lean strategy with the help of the Lean team. However, even if the senior management has taken on the responsibility for driving the Lean initiative, there is still some uncertainty in the organisation about who is in charge of the Lean work and what the Lean network and managers' part in the initiative should be now and in the future.

This leads us to our second research question:

- What roles should the different parties in the organisation, in other words the managers and the Lean network, fill in the work with Lean?

Something that is often discussed within Lean is the importance of continuously improving. It is vital for the organisation to constantly have changes in mind as a natural part of its way of working and to have a direction for its Lean work. Considering this, our third research question is:

- What should the next steps in the Lean initiative at OEG be in order to make Lean a natural part of the organisation?

1.4 Delimitations

This thesis only considers the situation at OEG in Gothenburg and Mölndal. Lean is not a part of the Saab Group's overall strategic work. The suggestions provided are therefore not directly transferable to other parts of the Saab Group.

The reader of this report is assumed to have a basic knowledge of the Lean philosophy. Therefore, general Lean terms are not explained throughout the thesis.

The foremost interest in this thesis is to align the Lean work with the general work at OEG. In that process we might affect the culture of the company and what is considered Lean at OEG, but it is not the main focus of the thesis work.

2 Theoretical framework

In this theoretical framework, the concepts of change, naturalisation, Lean and culture are studied. As can be seen in figure 4, change, Lean and naturalisation are interlinked in this thesis. The purpose of this thesis suggests that a *change* is needed in order to make *Lean* a *natural part* of an organisation. The concept of culture is interesting to study synoptically since the *culture* in a company will always affect the possibility of a particular change initiative to succeed and become a natural part of an organisation. The existence of a Lean culture and its effect on the organisational culture in general is indicated by the culture cloud in the background of the intertwined circles in figure 4.
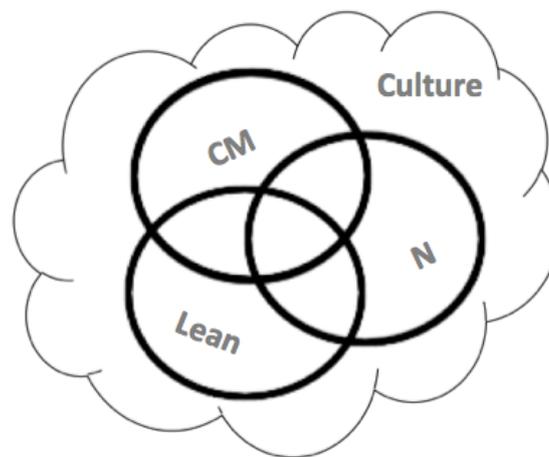
Figure 4. The connections between the concepts Lean, change management (CM), naturalisation (N) and culture, which are presented in this theoretical framework. The purpose of this thesis is to investigate how Lean can be naturalised in an organisation. Becoming a Lean organisation can be seen as a change and must be managed as such. All in all, the change to a Lean organisation is affected by the culture in the company where the change takes place.

2.1 The change process

As the name implies, change management is about managing the process of change. This could be done in private life or in a company context. In this subchapter the focus will be on how to manage change in an organisation.

Change is inherent in every human's life. Over the years, companies have also grown to realise that constant change is necessary if they want to succeed with their business (Gilley et al., 2009). Murthy (2007) stresses that change management deals with management of large changes, rather than detail steering. This is supported by Edmonds (2011), who states that change will manage itself naturally based on the strategic directions given by the organisation.

Since the world is in constant change, the organisations in it must adapt continuously. Therefore, the change process can in itself be seen as never-ending. However, the type of change dealt with in change management is not the incremental steady-velocity changes that are continuous, but rather the, often large, changes planned and executed by the organisation (Lewin, 1947).

In the following sections of this subchapter, two models of the change process are presented. Lewin's model is a three-stage model where the actual change process constitutes one of the stages. Kotter's change model presents eight steps that are necessary to go through if the change is going to be successful. This is followed by a section that introduces the motivation for working with change. Furthermore, two sections are dedicated to presenting the role of communication and change agents in change processes.

2.1.1 Lewin's three-step change procedure

In Lewin's (1947) model, the change process is divided into three stages; the unfreeze stage, the moving stage and the freeze stage. The typical change process goes through these stages more than once – it tends to loop through the stages over and over again.[6]

The unfreeze stage is the unlocking of the present situation (Lewin, 1947). This could for example involve creating an awareness regarding the pending change or to simply bring up the problems with the current situation, thus paving the way for a change. According to Lewin (1947), the unfreeze stage is not always a necessity to move through.

The moving stage is the stage when the actual change takes place. In this stage, the objectives for the change are communicated and new situation is reached. In some cases, this change is easily carried out, while there in other cases is a need to reach a group consensus before carrying out the change (Lewin, 1947).

Finally, the freezing stage is the stage that often is overlooked. After the change has been made, it is important to stabilise it, otherwise it is probable that the organisation reverts to its old ways (Lewin, 1947). Although a change is often followed by another, as stated earlier, it is important not to miss this freeze stage, but to constantly stabilise changes along the process.

2.1.2 Kotter's change model

Kotter (1995) presents eight consecutive steps that should be made in conjunction with change processes. These steps are presented below:

1. Create an urgency for the change
2. Create a powerful change team
3. Present a vision for the change process
4. Spread the vision into the organisation
5. Empower every employee to act in accordance with the vision
6. Visualise short term gains of the change process
7. Let the positive changes affect the organisation to change even more
8. Make the changes a natural part of the organisation

The first step involves making all managers and employees aware of the urgency of the change. In this step it is important not to try to implement a very big change too fast, but

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[6] Sverker Alänge (Assistant Professor at the Division of Quality Sciences at Chalmers University of Technology), Seminar 2011-09-08 with participants in the course Change Management and Improvement Processes at Chalmers University of Technology.

instead let the change take its time and make small changes continuously rather than pushing out a big change (Kotter, 1996).

In the second step, a powerful change team should be created. Support of senior management is often pointed out as a necessity in change literature, but Kotter (1996) points out that the change team must consist of more people than the senior management and that those parts of the senior management that are sceptic to the change do not need to be a part of the change team.

The third step deals with creating a vision, which will give a direction to the change process. The vision is the means to bind all small improvement projects into one large change process. There is of course a need for a plan regarding the change process, but this can never replace the vision that provides a picture of where the change process is headed (Kotter, 1996).

The fourth step points out that the vision needs to be communicated to the employees; not only the vision itself, but also *why* this particular vision is aimed for. It is very important that the management not only communicates the vision, but also lives by it, if the employees are supposed to support it (Kotter, 1995).

In the fifth step, obstacles should be removed so that employees can act in accordance with the vision. Such obstacles could for example be organisational structures and decisions that are not in line with the change effort (Kotter, 1996).

Although a change effort should have a long term focus, the sixth step stresses the importance of setting short term goals and celebrating when they are realised. The short term focus is necessary if every employee is going to see the benefits of the change process and actively participate in it (Kotter, 1995).

In the seventh step, the enthusiasm that appears when a change project has been carried out should be used to deal with even bigger change projects. One should be very careful to say that the change process is 'done' after only a couple of years, since the actual effects of a change are often hard to see before five to ten years have passed by (Kotter, 1995).

Finally, in the eighth step, the change should be made a natural part of the organisation. The two most important aspects of this step are to make sure succeeding management is trained in the new cultural values and to show the employees what the benefits of a changed behaviour are. Once this step is completed, the change process initiated, which began with the first step, should simply have turned into *"the way we do things 'round here"* (Kotter, 1996).

2.1.3 Motivating change

Change is no longer something a company can choose to deal with. Since change is nowadays on every company's agenda, a company that does not work with change initiatives will soon end up behind its competitors (Chrusciel, 2008). On the other hand, a strategically planned change initiative can be a competitive advantage (Mariotti, 1997). Gilley et al. (2009) points out that the ability to motivate the necessity of a change will be even more essential to the success of the change than the ability to communicate within the change process.

Furthermore, Chrusciel (2008) discusses that one motivating factor for change is to decrease the negative barriers to it in the organisation. Change does not have to be intimidating or lead to negative effects, and that must be promoted. Katzenbach and Bromfield (2008) bring up the importance of motivating change initiatives as opposed to mandating them. Although change can by all means be spread top down, supervisors on lower levels of the organisation will play a large part in a successful change work (Katzenbach & Bromfield, 2008).

2.1.4 Communication in change processes

A lack of communication, specifically internally, is nowadays a main reason why change processes fail. Furthermore, the role of communication is often viewed as a top-down effort – senior management communicates a strategy for the change to all employees. In this way, the upper levels of the organisation set the borders for the change process (Johansson & Heide, 2008).

Johansson and Heide (2008) stress that the senior management should get out into the organisation and talk to employees about the change. In this way, the employees feel that they have a chance to participate in the shaping of the change process; they feel that they are part-owners of the change process.

Barrett (2002) writes about seven aspects of successful change communication. First of all, the communication must have a strategic focus. In other words, the communicated message must tell what the long term aim of the change is. Secondly, communication should be integrated with all other business processes and discussed strategically by the management. This leads to the third aspect; it is the responsibility of management on all levels to create an environment of free communication and be active in both the operative and strategic communication. The fourth aspect presents a way to align communication issues with the business processes. By making communication staff a part of strategic decision-making and process planning, communication will be integrated with all business processes in a more natural way (Barrett, 2002).

The fifth and sixth aspects focus on how the communication should be carried out. It is always important to know one's audience and to speak in a way that will most likely be well-received by that audience. In the choice of forum for the communication, the overall rule is 'more is more' – all types of forums should be used, although one should be aware that meeting people face-to-face is always the best way to ensure the message has reached its receiver (Barrett, 2002). Bergman and Klefsjö (2002) builds on this by writing that messages must be communicated from the source over and over again if they are to reach all intended receivers.

Finally, the aspect of following up the communication is discussed. Without assessing the impact of the communication it is impossible to know if a change has really rooted itself in the organisation. There is therefore a need for deciding on goals and measure the impact of the communication against those goals (Barrett, 2002).

Whitaker et al. (2007) discuss the role of a feedback seeking environment in a successful organisation. Cannon and Witherspoon (2005) write that although feedback has the potential

to increase the benefits of communication in the organisation, there is also a risk of creating a negative feedback culture, where the respondent goes into defence mode when receiving negative feedback. Therefore, it is important that the delivered feedback is possible to use for improving one's performance in a constructive and direct way (Cannon & Witherspoon, 2005). Tasler et al. (2008) discuss the role of feedback from a bottom up perspective. It is just as important that leaders receive feedback on their performance from their subordinates as it is to provide feedback from a top down perspective.

2.1.5 Change agents

In any major change that an organisation goes through there is usually a group of people who are early to adopt and eager to promote the benefits of the change to their co-workers. These are usually people who tend to describe themselves as having high levels of energy and optimism and who can see the benefits for the organisation to learn new things (Chrusciel, 2008).

Chrusciel (2008) uses the name change champion and describes the change champion as someone who is action oriented and has the ability to inspire others to follow. These same qualities have also been used to describe institutional entrepreneurs (Beckert, 1999) and corporate entrepreneurs (Holst & Alänge, 2001).

According to Flingstein (1997) and Beckert (1999), institutional entrepreneurs are people who in an institutional organisation tend to challenge their surroundings in order to, in their view, enhance it. When an organisation is institutionalised, institutional entrepreneurs tend to see the hidden faults of the institution and mobilise resources to create strategic opportunities for the organisation (Beckert, 1999). Gilley et al. (2009) uses the term change agent to describe leaders who coach others to question the "status quo" and who drive the change effort.

The motivation for those who drive the change effort is according to Chrusciel (2008) the rewards of their work being appreciated by others in the organisation, in other words the recognition that change initiatives are important. Chrusciel (2008) also suggests that the best person to drive a change is someone who likes changes, who has the respect of the whole organisation and who does not work for self-recognition.

An equal part to the change agent is the manager personality, which is described to respond to change by adapting. If change agents create new opportunities the managers can be said to help stabilise these changes (Beckert, 1999).

Key Take Aways – The Change Process
By communicating a vision and *why* that particular vision is aimed for, the change will have a direction and thus be more natural to the organisation.
Changes must be stabilised – if not the organisation will retreat to its old ways.
Motivate change as opposed to mandating it; *"People don't by what you do, they buy why you do it."* (Sinek, 2010)
Supervisors at lower levels play a big role in motivating change.
A strategy for communicating change should be set by senior management.
Change agents should be people who are positive to change and see the hidden faults in the organisation.

2.2 The concept of naturalisation

The Oxford English Dictionary (2011) defines naturalisation as the adoption or introduction of something *"into common or habitual use"* so that it becomes *"fully settled or established in a place."* To explain the effect of naturalisation, Book (2006) compares the concept *to "a flower that, through biological processes, emerges in a certain environment, or a flower that is mutated within the environment"*, in the same way as all organisms constantly evolve and change.

To further explain the concept of naturalisation, Book (2006) also relates it to institutionalisation. According to DiMaggio and Powell (1983), young organisations often start out very diverse but as time goes by the organisations are affected by their surroundings and by internal forces, which makes the organisations more homogenised. The reason for this evolution comes from all units co-existing in the same environment, which means that the units are forced to copy the behaviour of its surrounding units in order to fit with the rest of the organisation. Another name or concept for this process is isomorphism (DiMaggio & Powell, 1983).

By an organisation being institutionalised, people within the organisation are able to work out routines and habits, which enable social interaction. The routines and habits that are created help to visualise how the organisation fits together in the mind of the people in it (Beckert, 1999). In other words, habits and routines facilitate people to work more efficiently with each other since fewer conflicts and misunderstandings appear. A downside to this is, however, that the factors that usually drive innovation also disappear in an institutionalised organisation (Book, 2006).

In his doctoral dissertation from 2006, Book talks about making Quality Management (QM), which Lean is included in, a natural part of how an organisation works with *"principles, practices and techniques"* of QM in a way so that habits and routines that enable social interactions over time can coexist with an attitude that stimulates new ideas and enables change to occur in accordance.

2.2.1 Organisational learning in a naturalisation context

When it comes to stimulating the learning of these new ideas, an organisation is dependent on the learning of the individuals within the organisation (Argyris, 1999; Popper & Lipshitz, 2000). This means that in order for an organisation to learn it must either educate its existing workforce or bring in new people to the organisation (Popper & Lipshitz, 2000). If an organisation is dependent on the learnings of the individuals within the organisation, as is the case when Lean should be naturalised in an organisation, it needs to make sure that it has the right conditions to encourage learning. However, at the same time the organisation also needs to be aware of the fact that the individuals within it both can facilitate and hinder the learning from occurring (Argyris, 1999).

According to Argyris (1999) learning either occurs when the expected outcome of an action is achieved or when a problem is solved so that the intended outcome, which was not at first achieved, *is* achieved. In other words learning does not happen before someone is using the solution. Furthermore, how well rooted a learning becomes within an individual depends on

the amount of reflection, or questioning, the person has to put into the solution to the problem. The amount of reflection depends on the task in hand. If something can be done straight away without having to confront any obstacles, it is called single-loop learning. If however, the individual that is confronted with an obstacle not only solves the problem but also alters the controlling or governing variables, which in turn affects how the task is done the next time, it is called double-loop learning (Argyris, 1999). For example, when a defect in a product is detected, an engineer can either use single-loop learning and change the specifications of the product and the way it is manufactured, or the previously mentioned alterations can be done together with an alteration in the organisation's values and norms, in other words double-loop learning (Argyris and Schön, 1997).

Key Take Aways – Naturalisation and Organisational Learning
Letting something be natural in an organisation means that it is fully established and put to use.
The aim is to achieve an organisation that is constantly changing and adopting to its environment while at the same time having well functioning habits and routines that enable the occurrence of innovations.
An organisation learns through the people in the organisation.
Double-loop learning occurs when someone is using his or her own solution to a problem he or she has faced.

2.3 The concept of Lean

Liker (2004) describes Lean as the elimination of waste. The word waste is defined from three different perspectives, see figure 5. *Unevenness* (Jap. *mura*) is seen as the most important thing to eliminate, since it is the foundation to the other two types of waste. *Unevenness* is generally described by workloads that differ throughout the year. *Non-value added work* (Jap. *muda*) is the type of waste that generally receives most focus. This type of waste is often evident in organisations since it causes long lead times, excess inventories and other visually noticeable results. Finally, *overburdening of resources* such as employees and machines (Jap. *muri*) is the third type

Figure 5. The 3 M:s of Lean, as described by Liker (2004).

of waste (Liker, 2004). According to Modig and Åhlström (2011), one must first reduce the resource usage in order to increase the process usage and achieve flow in the organisation.

In the following section of this subchapter, the four conceptual levels of Lean are presented and elaborated on. After the four conceptual levels have been presented, some of the differences between Lean product development and Lean manufacturing will be presented, since these are the two focus areas within Lean at OEG. Finally, cultural considerations concerning Lean will be presented in one section.

Modig and Åhlström (2011) present a model of Lean, where the concept is described as consisting of four conceptual levels. These four levels are the values, principles, methods and tools and activities. As can be seen in figure 6, these four levels are hierarchically connected to each other. The principles driving the organisation are based on the basic values of the organisation. These principles, in turn, will decide what methods should be applied, and the methods manifest themselves in tools and activities n the lowest conceptual level.
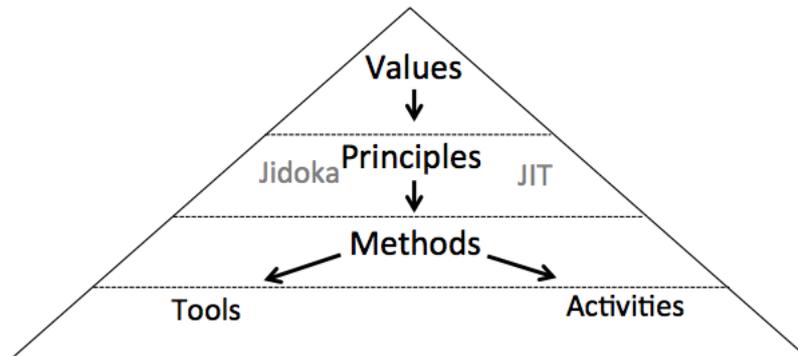
Figure 6. **Model of the four conceptual levels of Lean (Modig & Åhlström, 2011).**

According to Modig and Åhlström (2011), the highest conceptual level consists of values. Since there are many definitions of what constitutes Lean, it is important that an organisation that works with Lean defines its own view on Lean and its own goals. In the words of a Japanese Toyota manager: *"What is a beautiful tree to us?"* (Modig & Åhlström, 2011). As presented in the example of creating a beautiful tree, the values of Lean have to be based on the core values of the organisation.[7] Similarly, Liker (2004) views Lean as a holistic perspective that penetrates the whole organisational culture.

The principles behind Lean have been suggested to be Jidoka and JIT (Liker & Morgan, 2006). Jidoka is based on the idea of being able to view the whole company in one glance. More simply put, the principle of Jidoka has been used within the TPS to detect abnormalities in the product. Whenever an error occurs the operator stops the product line and makes everyone aware of the fact that something has gone wrong. Hence, the Jidoka principle offers people within the company a way to see where the company, or in this example the production, is in that specific moment (Modig & Åhlström, 2011).

The principle of JIT is about creating a flow of information about what, how much and when someone within the organisation needs something (Slack & Lewis, 2008). An example of this could be that a customer is looking to buy a Giraffe from OEG. When the initial discussions with the customer start, the customer's preferences about the product are communicated throughout the company. When the customer makes its order the entire organisation will then know how many Giraffes the customer needs and when the customer needs it.

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[7] Niklas Modig (Doctoral Fellow at the department of Management and Organisation at Stockholm School of Economics), Seminar 2011-09-22 for employees at OEG, at Roda parish house.

Methods can be characterised as *"the way we do things 'round here"* (Hugnell, 2010). Although the methods are more concrete to their nature, they do not say exactly what the company does, but rather *how* it performs its tasks (Modig & Åhlström, 2011). For example, if a company wants to even out its workflow over many different departments, the use of cross functional groups for discussing solutions to the problem might be the method of choice. However, the chosen method does not say what the solution is (Parker, 2003). Rather, the solution presented by the team is likely to be a tool or activity on the lowest conceptual level.

On the lowest conceptual level are the tools and activities that are used to fulfil the goals of all the higher levels, in particular the immediately overhead level. The chosen methods steer which tools or activities to use (Modig & Åhlström, 2011). In the example presented above, the tool chosen could be value stream mapping. Although the tool can be used on its own, it would most likely not contribute to improvements if the cross functional team was not working on it as a unit. In that case the tool would most likely only create sub optimisations (Parker, 2003). In this way, it is evident that the use of tools and activities must be linked to higher conceptual levels.

2.3.2 Lean manufacturing and Lean product development

As has been previously stated, Lean is about reducing unnecessary activities and creating a flow of value adding activities, from a customer perspective, throughout the entire process in a company (Hoppmann et al., 2011). In a systems perspective, the creation of a physical product consists of two stages, the development stage and the manufacturing stage (Slack et al., 2010). According to Holmdahl (2010), to view Lean the same way in product development as in manufacturing is unconstructive. Due to this, it is of interest to consider the role of Lean in manufacturing and in product development since both of these stages affect companies' costs markedly (Martínez Léon & Farris, 2011). This subchapter will not present a comprehensive list of detailed differences between Lean manufacturing and Lean product development (PD), but rather it will show that such differences do in fact exist.

Lean generally focuses on reducing the seven plus one wastes: overproduction, waiting, unnecessary transport, over processing or wrong processing, excess inventory, unnecessary movement, defects and unused employee creativity. In a manufacturing environment excess inventory could for example be described by storage of standardised raw material for many months ahead (Liker, 2004). In product development this is a bit more difficult to define, since concurrent engineering is carried out in a manner that makes development of different products overlap; this in turn means that each individual product is only partially developed at a time (Haque & Moore, 2002). Since product development in essence leads to a production of information (Haque & Moore, 2002), it is impossible to say what constitutes a "large inventory" in virtual reality.

It is also much easier to ensure that the work in a manufacturing unit follows standard protocols than it is in a product development unit, where every day's work might be radically different from that of the previous day. Nowadays, many researchers see modularisation as the solution to standardising manufacturing processes (Hoppmann et al., 2011). In terms of product development, that might be useful if viewed in a different way. Despite the problems

of standardising the actual parts of the design, it might be possible to "modularise" parts of the development process simply by reusing knowledge from previous projects (Morgan & Liker, 2006).

In the same manner, the principles of Lean, and hence also the tools and methods, have different degrees of usability in a manufacturing unit as compared to a product development unit (Reinertsen & Shaeffer, 2005). 5S might for example be of great use in a manufacturing unit where many people work in the same place with the same tools and need to easily find them, but in a PD environment, where everyone has his or her own desk, the use for a standardised place to put the stapler is probably lower. In such an environment, agile tools such as scrum are often used more successfully than in a manufacturing environment (Carvalho et al., 2011).

According to Liker (2004), Lean PD will mean a decrease in total development time, but an increase in actual planning time. The aim is to get it right the first time (Liker, 2004). That is also why set-based designs are focused on instead of point-based ones. This means that more than one solution is developed concurrently, as opposed to the traditional view where one solution is developed and iterated to become as good as possible (Ward et al., 1995). The aim of set-based product development is also to take the manufacturing phase into account already during the development phase, for example by letting production personnel review design suggestions (Liker, 2004).

Lean PD and Lean manufacturing can be seen as based on the same basic values and principles, since the same values and principles should be applied to an entire organisation (Modig & Åhlström, 2011) no matter which environments are part of the organisation. The big difference is clearer on a more concrete level in the methods and tools and activities, as presented in the conceptual framework in chapter 2.3.1. In terms of conceptual thinking, Lean can be viewed as an entity in an entire company, but on group level some methods are more appropriate in some contexts, other in other contexts.

2.3.3 Cultural considerations concerning Lean

As explained by Emiliani and Stec (2005) in their article *Leaders lost in transformation*, there are a lot of pitfalls and considerations to have in mind for an organisation on their Lean journey. First of all, a company may have failed transformation efforts in their history which make employees think that Lean is an initiative that will pass This is often referred to as the BOHICA syndrome, which means that there is a feeling among employees that an unfavorable chain of events is about to repeat itself - "yet another" improvement program is on its way into an organisation (Connell & Waring, 2002). Furthermore, management may lack knowledge of how to lead the initiative and there may be resistance from within the organisation. Moreover, as Liker and Morgan (2006) points out, not even Toyota themselves have an easy time creating Lean organisations when they start new businesses abroad.

Hofstede (1980) discusses the fact that management practices from one part of the world might not always be so easily transferred to another country due to fundamental cultural differences. In the article, profound differences between for example Sweden and Japan were stated, something that can add complexity to Swedish companies wanting to become Lean organisations.

However, there is other research pointing to the fact that the Japanese and Swedish cultures are very alike, which means that Lean might fit better in Swedish companies than in the USA where a lot of this research has been conducted.[8] Rarick (1994) mentions that the religions Buddhism, Confucianism and Shintoism may have affected company cultures in Japan. In the same way it is likely that Christianity has affected Swedish company cultures (Rarick, 1994).

Key Take Aways – The Concept of Lean
Lean aims at eliminating waste in the form of unevenness, non-value added work and overburdening of resources.
Lean can be considered on more conceptual levels (values and principles) as well as more concrete levels (methods and tools and activities).
Lean must be used in different ways in production and product development, although the same basic values should apply in both cases.
Previous failed transformation efforts, managements' insufficient knowledge about Lean and internal resistance are some reasons why Lean initiatives may fail.

2.4 Organisational culture

There are many ways of defining the culture within an organisation (Schein, 1985). One way of describing it is to view it as an evolving "pattern" of how things are done within an organisation and how that pattern is shared by the people in it (Gordon & DiTomaso, 1992; Ahmed, 1998). Since the word culture can have many different meanings (Gordon & DiTomaso, 1992), scholars tend to break it down into different levels such as in artefacts, behaviour, norms, beliefs and values (Miconnet & Alänge, 1999), in artefacts and creation, values, and basic assumptions (Schein, 1985) or in institutionalised ways and implicit beliefs and norms that affect peoples' behaviour (Ahmed, 1998).

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[8] Stefan Bükk (Research engineer at Swerea IVF, Mölndal), Interview 2011-12-12.
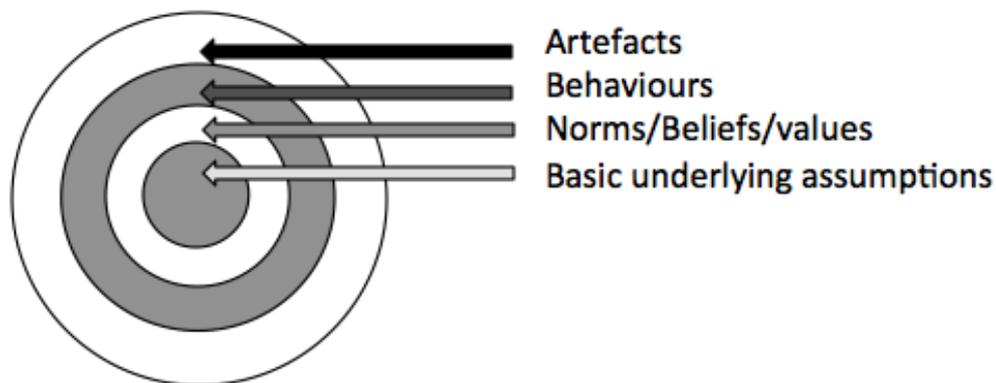
Figure 7. Model of what a culture is composed of (Miconnet & Alänge, 1999).

Looking at how Miconnet & Alänge (1999) have chosen to view culture, artefacts would then be the parts of a culture that are easy to observe, for example the way people within an organisation dress, and behaviours would be how these people act when they for instance are solving a problem. These outer levels of culture are those that more easily can be changed. Norms, beliefs and values, however, are the underlying influences that children receive from parents and society about right and wrong as they are growing up. In the core of culture are the basic underlying assumptions that all people form in their first years of life, see figure 7.

Ahmed (1998), on the other hand, chooses to describe the complexity of organisational culture by mirroring it with the organisational climate. The climate would then be the parts of the organisation that the people within it can affect in their daily work, that is procedures and practices, while the culture of the organisation is the beliefs and values that direct the "behaviour and actions" of the people within the organisation. According to Ahmed (1998) organisational culture is divided between institutionalised ways and implicit beliefs and norms that affect peoples' behaviour. By this description the outer part, that is the parts of the culture that can be formed by for example the management of a company, can be viewed as explicit, while the core of the culture, the parts that are harder to effect, are the implicit parts of culture. According to Ahmed (1998), both the explicit and the implicit parts of a culture can be altered.

To add more complexity to the definition of culture, Schein (1996) talks about cultures forming within different levels of the company, for example around functional units and at different levels of hierarchy. For instance he identifies an operator, engineering and executive culture.

2.4.1 The effect of a strong culture

According to Gordon and DiTomaso (1992), an organisational culture can be said to be continuously formed by its surroundings and by the people within it. However, companies with high performance often have more adaptive cultures that dare to take more risks. Ahmed (1998) suggested that the strength of a culture can have an effect on how well an organisation will adjust to changes. A strong culture can be defined by how well accepted and deeply held

the values are for the people within the organisation (Gordon & DiTomaso, 1992; Ahmed, 1998) and how well the implicit and explicit parts of the organisation are combined (Ahmed, 1998).

According to Ahmed (1998) there are both downsides and positive aspects to having a strong culture within an organisation. Having a strong culture means that the people of the organisation believe in what they are doing. However, having a strong culture may also hinder a company to see when it needs to change. As Johnson (1992) explains it: since the culture is reinforced, over time it becomes a web of guidelines on which an organisation can rely, so when presented with a change the organisation will try to lessen uncertainty by looking at what is familiar.

Key Take Aways – Organisational Culture
Organisational culture is divided between an explicit part (behaviour and actions) and an implicit part (beliefs and values).
Different dialects of the organisational culture also form in different functions and on different hierarchy levels.
An organisation's culture is continuously formed by its surroundings and by the people within it.
A strong culture can be defined by how well accepted and deeply held the values of the organisation are for the people within the organisation.
Having a strong culture means that the people in the organisation believe in what they are doing, but it may also hinder a company to see when change is needed.

3 Method

This study consists of two parts; an empirical case study, which focuses on how OEG's Lean work is performed and how it is received by the employees, and a theoretical study, which aims at providing insights into how OEG's Lean work can be enhanced. We have applied a deductive approach to the thesis; in other words our theoretical framework has guided the research (Bryman & Bell, 2011). The study is qualitative to its nature, for the pure reason that quantitative data is not of interest in answering the research questions. The theoretical study is foremost based on an extensive literature review, but some educational learning has also contributed. The empirical data for the case study is based on interviews with external experts and internal personnel as well as observations connected to the everyday work at OEG. An overview of the data collection process for the empirical study is presented in figure 8.

Figure 8. Overview of the empirical data collection process.

3.1 Literature review

The main part of the theoretical literature review is based on articles from scientific magazines and books by academic writers. These types of sources are used mainly for the theoretical framework and as a basis for the analysis of the empirical data. Some books that are aimed at companies have also been read in order to grasp OEG's view on Lean and receive a greater understanding on how companies think about change issues. In particular, the book *Lean i ledningen – Utmana hela organisationen* (Eng. *Lean in Management – Challenge the entire organisation*), which has been used by senior management and the Lean network at OEG, has been of interest.

3.2 Interviews

Interviews have been conducted in order to receive empirical material for the case study from employees at OEG, but also in order to extend the theoretical framework through interviews with experts within the different fields studied in this thesis. By conducting interviews,

instead of for example sending out forms, there is a better possibility to understand the reasoning behind an interviewee's answers and to gain additional information from body language.

3.2.1 Interviews at OEG

For the pre-study, the conducted interviews have been carried out as semi-structured interviews. The use of open questions has allowed the interviewee to give a subjective picture of the topic at hand (Lantz, 2007), in this case the Lean work at OEG. Some more general questions were prepared prior to the interviews in order to initiate the conversation, see appendix B. Apart from that, follow-up questions were asked as deemed appropriate during the actual interviews. The aim of this structure was that the interviewee should steer the conversation to topics that that person found appropriate in connection to the subject studied (Bryman & Bell, 2011). For the pre-study interviews, 45 minutes per interviewee was set aside.

In the pre-study interviews, questions were prepared purely based on what we thought we needed to know in order to grasp the situation of the Lean work at OEG. These pre-study interviews then created a basis for what could be interesting aspects to discuss in the interviews with Lean ambassadors (LA) and the randomly chosen employees. Some general questions have been asked at the three types of interviews mentioned this far, thus providing us with a view on how the Lean work is perceived by people who work with it a lot as well as by those who are less involved in it on a daily basis.

The interviews with LAs have mainly been carried out in the same manner as the pre-study interviews. However, in contrast to the pre-study interviews, the interviews with LAs aimed at clarifying matters in connection to things we had learnt during our initial study. Therefore, the interviewee was not allowed to steer the interview in the same way as was acceptable during the pre-study interviews. A semi-structured interview guide was prepared prior to the interviews, see appendix C. The time provided for each interview was 30 minutes.

Apart from interviews with people that are actively involved in the Lean work at OEG, we have also performed interviews with 14 randomly chosen employees and consultants at EDS. Most interviewees worked within OEG, but due to the fact that we had to choose randomly among all employees and consultants at EDS in Gothenburg, some EDS employees that are not a part of the OEG organisation were also selected. These interviews were carried out as structured interviews where the interviewee was asked six questions during the course of 15 minutes, see appendix D. After the interview questions had been answered, the interviewee was given the opportunity to freely discuss matters he or she found important in regards to the topic of Lean at OEG.

In addition to these three sorts of planned interviews, we have also carried out short spontaneous interviews of approximately ten minutes with 28 interviewees. Some of these interviewees were chosen based on their role in the organisation, since we wanted a mix of managers and non-managers, but most of them were picked out randomly as we walked around in different parts of the organisation. Only two questions were asked at these

interviews; these concerned the interviewee's role in the organisation and his or her spontaneous reflection on the concept of Lean.

All interviewees have participated in an individual exercise, which is further presented below. The aim of this exercise was to provide us with some quantitative answers to compare and contrast. This quantitative exercise has been used as a complement to the qualitative questions (Kvale & Brinkmann, 2009). The pre-study interviewees did not do the exercise at the same time as the interview was carried out, due to the fact that the exercise had not yet been prepared at that time. All others did the exercise in connection to their interviews.

The Lean exercise
As part of the data collection process, an individual exercise was prepared and conducted at all interviews at EDS in Gothenburg. The exercise consisted of eleven notes with items that were to be ranked based on the importance the interviewees found that the items had in order for the Lean initiative at OEG to be successful. The eleven items are stated in alphabetical order below:

- A vision for the Lean work
- Continuous flow of information about the Lean work to the organisation
- Education to all employees
- Feedback when something is good/bad
- Guidelines that describe one's assignment
- Motivation to the individual employee ("What's in it for *me*?")
- Support from the Lean team
- Support from senior management
- Support from department and section managers
- Visible results in the short term
- Work in cross functional teams

The choice of items was made based on what was learnt from the pre-study interviews. The pre-study interviewees have participated in the exercise at a later occasion. As can be seen in the list, the chosen items are not concretely defined. Therefore they may be differently interpreted by the different interviewees. The only further information provided by the interviewers was that all the items should be considered in connection to their role in the Lean work.

The scores for the exercise have been calculated in a very simple manner. The item that is placed in first place receives one point and the one in the eleventh place receives eleven points. This means that the higher the score for an item, the lower importance it is given by the interviewees.

3.2.2 Meetings with external experts
The external experts we have talked to are people who are knowledgeable within areas studied within the theoretical framework. These people are current researchers or people who have a background within higher academic research. We had the opportunity to meet Stefan

Book, Stefan Bükk and Jan Lindér in person, while the talk with Niklas Modig had to be carried out in the form of a telephone interview.

To prepare the meetings, we read articles about the topics we wanted to discuss during the talks, but in all cases apart from the telephone interview no questions were prepared. Rather, the meetings were conducted in the form of unstructured interviews where the interviewees could talk freely on the topics we presented and answer the open questions that came up during the course of the interviews (Brewerton & Millward, 2001).

3.3 Observations

Information on how employees at OEG work with Lean and how other companies work with Lean can always be collected through interviews and second hand documents. However, to really understand and learn about the complexity of working with Lean we felt that it was necessary to not only hear other people talk about Lean, but also to observe.

3.3.1 Workplace related observations

Two types of observations have been part of our work at OEG. First of all, our mere existence in the workplace has allowed us to have conversations with a diverse range of people, thus providing us with a balanced view on the workplace. In these spontaneous conversations, matters have been discussed more openly than is possible in a recorded interview.

Furthermore, we have had the opportunity to participate in meetings and groups connected to the Lean initiative. This has given us a chance to bring up our own ideas for reflection and hear other employees' views on different topics within the Lean field. Some of these meetings have taken the form of Gembas where we have been able to go out into different parts of the operations and see how it is performed first hand. This kind of participant observations is according to Bryman and Bell (2011) often used in qualitative research to help researchers understand what is going on under the surface of an organisation.

Apart from observations at OEG, we have also undertaken study visits at other sites and companies. We prepared a general semi-structured interview guide which was used in those cases when time was given; these questions were asked at all companies that we visited. During the course of our work, we have had the opportunity to visit Saab Aeronautics in Linköping, Scania in Oskarshamn and Södertälje, SKF in Gothenburg, RUAG Space in Gothenburg and Emballator Laganplast in Ljungby. The aim of these visits was to broaden our views on how the Lean work can be performed in an organisation.

3.3.2 Educational observations

From the participation in the course *Change Management and Improvement Processes* at Chalmers University of Technology we have been able to receive insights on the studied topics. Seminars have given us the chance to discuss the matters at hand with other students, who have had insightful views. This has made it possible for us to avoid streamlining our thoughts.

As part of our work at OEG, we were given the opportunity to participate in a one-day workshop with researcher and Lean facilitator Niklas Modig. This workshop provided insights on how OEG's Lean work has been, and will be, performed.

3.4 Secondary data

In order to broaden the empirical case study and receive a more common view on how everyone at OEG thinks about its operations and the Lean philosophy in particular, content analyses of internal documents has been of great value. These documents are company-wide documents focused on the operations in general as well as documents about the Lean work in particular created by individuals or smaller groups.

3.5 Reliability, validity and trustworthiness

Validity and reliability are of interest in order to ensure that we have performed the study effectively and in a consistent manner. While quantitative research can be evaluated using only validity and reliability, some scholars have suggested that qualitative research also can be judged using trustworthiness. Trustworthiness is used to evaluate whether or not good practices are used when the findings are presented, if the findings can be transferred to other situation, if the results can survive over time, safeguarding collected information from the study and not letting personal values affect the end result (Bryman & Bell, 2011). The literature review has been considered a source of objective information, while interviews and observations have provided subjective information that must be analysed using the theoretical framework.

3.5.1 Literature review

To ensure high validity and reliability of the literature review, only sources considered credible have been used. These sources are articles and books used within courses at Chalmers University of Technology and articles from well-reputed scientific magazines. When newspaper articles have been used, we have compared articles on the subject in different large newspapers in order to avoid descriptions of the situation that are affected by the political standpoint of a specific newspaper. The material provided by OEG is of course their view on the Lean work performed, but since they have no interest in giving us the wrong view on their Lean work, we have accepted their material as trustworthy.

3.5.2 Interviews

All interviews at OEG began with a presentation of this study and why it is carried out. To ensure the validity and comparability between the different interviews, the presentation has not differed between the different interviews. Also, the main questions asked have not been allowed to differ between the interviews with the same group of interviewees. However, the follow-up questions have been created and asked during the interviews and have therefore differ markedly.

All the pre-study interviewees have been decided on in agreement with our supervisor at OEG, Roine Lundström. This could perhaps mean that our view on the Lean work at OEG has been tainted by their view on it. However, Lundström was very clear on the fact that he wanted us to talk to people involved in the Lean work as well as people who could present

constructive criticism. Due to this, the view we received in the beginning can be considered rather accurate and balanced. Of the six LAs we have interviewed, two were recommended by Lundström for their commitment and constructive opinions about the Lean work at OEG. The remaining four were randomly chosen among all remaining LAs.

The 14 employees chosen for the employee interviews have been randomly chosen among the 1 200 employees. The only restrictions were that they had to be a sample that represented all different departments at OEG and that the sample should include managers as well as other employees. This was necessary in order to ensure that the view we received was balanced and represented the entire OEG. The same is true for the spontaneous interviewees, apart from a few interviewees who were chosen based on their role within the organisation, as previously stated.

All the interviews have been recorded and transcribed so as not to miss any details. In the end of every interview, the voice recorder was stopped so that the interviewee could share thoughts he or she was not confident or comfortable to say while being recorded (Kvale & Brinkmann, 2009).

When possible, both authors have been present at the interviews. In the cases where this has not been possible, the recordings of the interviews have been listened to simultaneously by both authors. After each interview or recording listening session, 15 minutes have been set aside to process the interview individually and to discuss our perceptions of the interview (Kvale & Brinkmann, 2009).

It is important to remember that the authors of this thesis have both in some sense represented the Lean work at OEG to the interviewees. Therefore it is possible that we have not received the same answers as a co-worker that is not involved in the Lean initiative actively would receive.

3.5.3 Observations
The main advantage of the participation in the *Change Management and Improvement Processes* course was that we avoided being 'internalised' at OEG. Through discussions with other students, we have been able to view our work from an outside perspective. However, the knowledge level of Master's students is not the same as that for well-reputed researchers published in scientific magazines, why the insights they have given us have always had to be double checked against reliable sources.

All other observations made at OEG or other companies have been collected directly by the authors. This material has been considered part of the empirical data alongside the interview material and is therefore used as a basis for analysis rather than the objective truth. Bryman and Bell (2011) have stated that there is a risk that interviewees say that they behave in one way under certain circumstances during interviewees, but in reality behave differently under those circumstances. Through observations it is possible to see such discrepancies. However, in the case of visiting other companies there is a risk that such discrepancies cannot be detected. For the purpose of this thesis, we feel that it is enough to see positive examples that

can contribute to OEG's Lean work, and the lack of balance in the view of other organisations is therefore not seen as a problem.

3.6 Generalisability of study

This study is carried out at OEG. Therefore, most of the analysis and the suggestions are aimed at improving the situation that particular company is in. However, apart from a few exceptions, most companies that work with Lean in Sweden face the same types of issues as OEG and have to proceed down a similar path. Due to this, it is possible that many of the ideas and suggestions provided in this thesis apply to other companies' Lean work as well. This cannot, however, be guaranteed by the authors. It must always be the responsibility of each individual company to investigate what applies in their particular situation.

4 Empirical data

In this chapter, the empirical data from interviews and observations is presented. Four sets of interviews have been carried out at OEG; pre-study interviews with Lean initiators and interviews with LAs are presented in chapter 4.1. These two types of interviews were followed by structured interviews with employees and consultants of EDS. Finally, we performed spontaneous interviews with people in the OEG organisation, simply by walking around in the building and asking people for a short interview then and there. The spontaneous interviews and structured interviews with employees and consultants are presented in chapter 4.2. The Lean exercise, which has been performed during all these sets of interviews, is presented separately in chapter 4.3.

Furthermore, this chapter presents the learnings from observations at OEG (chapter 4.4.1 and 4.4.2), study visits at other companies that work with Lean initiatives (chapter 4.4.3) and interviews with external experts (chapter 4.5).

In some parts of this chapter, quotes that have been said by individual employees or consultants are presented in quote boxes. Although they are exact translations of what individual interviewees have said, they have been highlighted since they emphasise thoughts that have been present in more than that single interview.

4.1 Interviews with the Lean network

At OEG the Lean network consists of a Lean team, which works to support the senior management, and the LA team. This chapter describes the interviewed LAs' and Lean team members' views on the Lean work in general and the LA network. Through their roles as active participants in the management of the Lean initiative, they can all be viewed as part of a Lean network at OEG. For the purpose of anonymity, no names or group belongings are presented in the chapter.

The Lean team has a semi-structured meeting at the start of every week where different aspects of the Lean initiative are discussed. However, a lot of the decision-making regarding the initiative seems to be happening outside of the meetings together with senior management. Later in the week the LAs meet to talk about the LA network. The members are summoned by one of the members of the Lean team, who also sets the agenda for the meetings. However, during the meeting the LAs are also asked to add to the agenda if there is anything else they want to discuss.

4.1.1 Lean in general

When asked what Lean is, the standard answer from all interviewees is: *"It is common sense."* One interviewee elaborates on this by saying that Lean is all about common sense in a structured way. However, Lean is also viewed in many other ways; it is a flow-orientated way of thinking and continuous improvements; it is customer value and a focus on doing only the necessary things; it is a way of working that allows you to focus on the details *and* the entirety, and it is also a way of shortening lead-times because all knowledge and information is easily accessible.

One interviewee says that Lean at OEG should be billable customer value, because it is important to please both customers and owners and be successful both in the short and long term. Another interviewee says that although Lean should be seen as a mental flow, there is always a risk that the focus will be on different sorts of methods and tools in an engineering company. Changing the approach to the subject a bit, one interviewee says that it is interesting to think about what Lean could mean to the company: development and improvements, more customers and larger market shares, and in general better opportunities are brought up as examples.

Lean in an organisational context

To develop and build a radar system takes more than one process - that is why it is so important to develop a systems thinking in the organisation, according to one interviewee. If the organisation focuses too much on sub optimisations in sub processes, it will eventually affect the internal customers as well as the end customer, says another interviewee. This is where Lean comes into the picture. *"As an engineer you are focused on the product – efficiency is not automatically a part of that focus. We need to find an optimum between efficient resource usage and efficient flow."*

"We have to reach our goals, but Lean is a part of that."

One of the interviewees points out that it is not until recently that the Lean initiative has been introduced to the employees through the educational series. Since mid-2010, the improvement boards have been the only visible sign of Lean and they have created scepticism towards Lean in the organisation, the interviewee continues on by saying. Why many interviewees still believe that Lean can be successful at OEG despite this is because the Lean work has been initiated by senior management, other interviewees say.

Most of the interviewees find that a clear vision for the Lean work is lacking. What is currently being communicated to the organisation is *"We want to save money."* That can be the goal in regards to the Saab Group, according to one interviewee, but the employees at OEG need to have a common, more concrete and less distant goal to work towards. Some interviewees view the current vision as getting everyone involved in making a good company even better. Some talk of creating a better working environment for the employees and creating more efficient, smarter and better working processes. One interviewee states that the vision has to be to make things better for the company and for the employees, while always focusing on the customer.

The role of management in the Lean work

Prior to the carrying out of the Lean exercise, see chapter 4.3, some of the interviewees were asked what they thought was most important for the Lean initiative to be successful at OEG. One of the most frequent answers concerned the role of senior management. Some of the interviewees point out that senior management must communicate that they are actively working with Lean and have faith in this initiative. Thinking of Lean is not enough; they also have to take action. One of the interviewees finds it important that senior management enables

all employees to work with Lean, for example through decisions. As one interviewee puts it: *"If senior management does not believe in this it will irrevocably fail."*

One interviewee points out that the responsibility of change initiatives is often split up between senior management, who should have the conceptual vision, and the rest of the organisation, who works more or less tool-based. This is, according to the interviewee, not a good division – everyone should participate in all parts of the Lean work for it to succeed. This also includes that senior management have to make themselves more visible in the organisation and actively counteract creating territories in the Lean work, according to another interviewee. When it comes to finding a balance in OEG's Lean work, another interviewee thinks that senior management could benefit from cooperating with a more "Lean forward" company's senior management, in the same way as some of the project leaders at OEG have cooperated with project leaders from 2010 year's Swedish Lean Prize winner, Autoliv.

The interviewees also bring up the role of middle managers in saying that the section managers are the only ones who can affect if the employees participate actively in the Lean work. However, one should not disregard the role of department managers in supporting the section managers, according to one interviewee. For the section managers to reach the employees, interviewees talk about the value of engaged section managers that advocate and use Lean in their day-to-day work; they should act as Lean leaders. One interviewee finds it critical that the Lean sceptics are not in some sort of managerial position.

Boarding the common Lean ship

In a more general manner, one interviewee says that it is essential that Lean finds a solid ground in the organisation, although you cannot expect everyone to embrace the concept of Lean. In a company where the average length of service is 21 years, many interviewees say that it takes time and perseverance. *"It takes time for people to really check in and understand"*, as one interviewee puts it. At the same time, another interviewee points out that there has to be continuity and pace in the Lean work, so people know that it is still active.

About the fact that people want to feel safe: *"The ratio between the willingness to succeed and the unwillingness to fail is 20:80"*

One interviewee brings up the fact that people are tired of constantly being introduced to new improvement processes. Then again*, "We have done this before"* is a comment that many mention; either they have said it themselves or heard others say it. Two of the interviewees think that the best response to that comment is: Yes, you have seen this before; this is *not* a new process, it is not intended to be something new and strange. In fact, as another interviewee puts it, most of the employees are already involved in Lean work, but they may not be aware that it is Lean.

"It's like it is in soccer, it doesn't matter which system we follow - 4-4-2 or 3-4-3 – as long as everyone knows that that is the system we're following."

Common values are by some interviewees seen as the key to a successful Lean work. Others point out that the everyday positive examples of Lean must be communicated within the organisation. Education and information are vital in that sense, according to one interviewee. Cross functional teams are by one interviewee seen as a way of mastering problems with handovers between different groups, while another interviewee thinks that visualisation can increases the awareness and motivation in the organisation.

Improvement potential in the Lean work

In communicating Lean, it is important to remember that different people respond to different types of communication, says one interviewee. Communication in all its forms is important. Another interviewee would like to see a larger focus on communication with one's customer – whether that is an internal or external customer. In terms of more concrete information sources, the intranet is felt to have a large improvement potential, both stylistically and in terms of content.

Some of the interviewees bring up the value of assessment in order to see what has been good and what has been bad in regards to a change and to learn from those experiences. This is something that few interviewees feel is ever being done in connection to the Lean work. Furthermore, one interviewee brings up the importance of defining what Lean should mean in an employee's everyday work. Otherwise it is difficult to know what types of assessments to do.

In terms of tools and methods, many bring up that it is important to find the right ones for the particular groups. For example, agile methods have been used on some sections with good results, while others have not deemed those methods appropriate for their processes. The main advantage of Lean tools and methods is, according to some interviewees, not the tools and methods in themselves, but the discussions around them and the conceptual thinking that is brought along with them: taking personal responsibility and taking on leadership are mentioned among other things. Still, for these discussions and the conceptual thinking to take place, people need to have time set aside in their work for thinking and analysing the situation they are in, one interviewee points out.

Lean for the individual employee

When talking about the part Lean plays in day-to-day work, one interviewee states that they never talk about Lean or waste in any of the teams she is a part of. Many people find it difficult to know how to connect Lean to the work they do every day, according to another interviewee. One exception from this, according to yet another interviewee, are the project leaders, who have the advantage of seeing the entirety in regards to their projects. For employees in general one interviewee says the role and responsibility is to participate by trying to see their own part of the entirety and by working with improvements.

Many interviewees find that visualisation is a good way of integrating Lean into their daily work. One of them finds that visualisation enables people to easier communicate. Another one says: *"Even when I am not present, visual planning boards can communicate with others on my behalf."* What he means by this is that people who pass by the board automatically see what is ongoing and if something concerns them – this makes it easier to see the entire flow

and avoid sub optimisation. The downside to the Lean concept is that it is possible to use as an excuse to avoid things you do not want to do since managers ears grow bigger if you use the word Lean in your reasoning, according to another interviewee.

The plus side to working with Lean

Many interviewees find that it is necessary for them as individuals to see the benefits of Lean if they are to accept and work actively with it. Some of the interviewees have a passion for continuous improvements and a strong belief that this is the best way for OEG. Others strive for more concrete benefits, such as better handovers, fewer annoyances in everyday work and more time left for doing the fun parts of the job. One interviewee says: *"The main advantage for me as an employee is that I get to work in a company that does not make a mess out of itself."*

Part of the benefits to the Lean work is that the employees are given more responsibility, but also more power over their own situation, according to a couple of interviewees. The main advantages, as some of the interviewees see it, are that the work is done smarter, easier, correct from the start and without doing any unnecessary tasks – all this should be possible while still getting the intended results and at a cheaper cost, according to the same interviewees.

4.1.2 The Lean ambassadors

In more general terms, the role of the LAs is to support the section managers in the Lean work and act as discussion partners. In relation to the employees, LAs should act as spokesmen and simply increase the number of "Lean people" in the organisation. According to one interviewee, a basic agenda for the LA work exists, but the LAs are supposed to work out their own approaches to their assignment. Best practice is intended to be spread within the LA network. There are also educational texts on Lean tools and methods on Saab's intranet. One interviewee points out that it should be in the Lean team's and senior management's interest to make sure that the LAs know and spread the right message about what Lean at OEG constitutes.

"A constructor can't avoid constructing for a few weeks, but for some reason that way of thinking doesn't apply to the Lean ambassadors – if the Lean work isn't going well it's still okay."

Three hours of LA work is budgeted for every LA per week, but in reality the section managers can affect the extent of each LA's assignment quite extensively, according to some interviewees. If the work level on the section is very high one week, the LAs tend not to have access to that much time. Every week there is a voluntary LA meeting. Due to the fact that these meetings are only attended if the individual LA finds it interesting to attend, the attendance tends to be quite low at these meetings, according to one interviewee.

The organisation of the Lean ambassador network

The aim for the LA network is, according to two interviewees, that everyone in the organisation should be an LA in the end – or at least everyone who strives to become one.

This is counteracted by another interviewee, who thinks that it is necessary to have a few LAs who work full time with this and who are passionate about it.

So far, the LA network is quite new. One of the interviewees feels that the real work as an LA has still not taken off. The LA turnover rate has been rather high, according to one of the interviewees, and the demand for LAs is low in the organisation. As another one of the interviewees puts it, the main focus as of now should be to try to create team spirit and a common approach in the LA network.

None of the interviewees thinks that the employees in general know what an LA does. There is a need for providing information about that, one of the interviewees says. Some of the interviewees say that the employees at least know who to ask if they want to know. However, another interviewee thinks that since everyone is doing the LA work in his or her own way, the employees probably sees this role as quite sprawling. Then again, no one has ever announced which people are LAs, so most people probably do not know who the LAs are to begin with, according to one interviewee.

Improvement potential in the Lean ambassador network

The LA network needs to be more close-knit; everyone should work towards a common goal and focus on the same things, say a couple of interviewees. For this to be possible, some of the interviewees think the LAs will need clearer directives. In the short term, one of the interviewees would like the LA network meetings to be more structured: *"I would like to know what will happen in the meeting I am currently attending and the following one. I should not have to wonder what will happen during the next hour."* Furthermore, some interviewees have expressed a wish that the senior management should have a strategy for the LA network.

As a motivational factor, a few of the interviewees say that education – more than what is provided to all employees – would be good. The investment in education would also make the section managers more obliged to use this source of knowledge. To be given time as an LA is also of essence, because if time is lacking in the LA's other groups, the LA work is often down-prioritised.

Although some of the interviewees feel that the section managers support the LAs' work, others says that the section managers must request help from the LAs and give them time and feedback on their work. Some of the interviewees feel that the LAs and senior management are *"on board the Lean train"*, but the middle management is not yet there.

Lean ambassadors as individuals

When asked what their role as LAs is, most interviewees answer that they do not know. One of them even says that she currently does not see it as a job to be an LA. This could perhaps be further explained by a comment that another interviewee says: *"I don't know what is expected from me – right now I am only attending meetings."* At the same time, the same interviewee says that the department managers should have an idea of what the LAs are for. This is supported by another interviewee, who says that the managers are supposed to be the LAs' job initiators.

Two interviewees present their ideas as to what their roles should contain: the LAs should practice what they preach and their focus should be on the groups that they already belong to. One interviewee finds that educating employees on Lean should be part of the LAs' assignment, but another interviewee says that education is definitely not part of what he as an LA has accepted to do. One thing is clear to the interviewees: The current role of the LAs is not enough.

The road to becoming a Lean ambassador

The current LAs have the role due to different reasons. In general they have either chosen to take on the role or been given the responsibility by their section or department manager. Most of them are positive to the concept of Lean, but some are more sceptical. One of those who was picked out by his manager says that the role was probably given to him because he had a lot of opinions about how people should act within the company.

Why they themselves want to work as LAs is clear to most of the interviewees. They feel that the concept of Lean is appealing and they are passionate about working with improvements. As one interviewee puts it: *"Anyone who is passionate about this and thinks it is fun to do would be a perfect LA."*

"I've always worked a lot with improvements – I just can't stop myself!"

One of the interviewees sees a problem in that some sceptical people have been chosen as LAs. However, another interviewee says that the problem is not the fact that they are sceptical, but that they have been introduced to their assignment in the wrong way. As stated by one interviewee, a bigger problem is perhaps that some LAs purely see their assignment as an alternative career path.

Spreading knowledge about Lean

"Talk more about it every day and everywhere!" That is one interviewee's tip on how the LAs can spread knowledge about Lean to the rest of the organisation. The interviewee proceeds by saying that the LAs should give advice on how to do things in a more Lean manner and explain why it is beneficial to perform tasks in that way. Another interviewee thinks it is necessary to make people see the positive effects of Lean, and that can only be achieved by actively doing things.

The LA network is in itself meant to be a forum for knowledge spreading. Within the group, Gembas have been performed and one of the LAs has introduced a Lean Lego® game to the other LAs,

Key Take Aways – Interviews with the Lean Network
Most interviewees think that Lean simply is common sense.
Many find it good that Lean has the support of senior management, but a vision for the initiative is lacking.
The section managers' active participation in the Lean work is seen as key by many interviewees.
Changes must be given time; people are used to working in a certain way and it takes time to change.
Feedback and assessment are things that many interviewees would like to see more of.
The LAs generally feel that their role as LAs is unknown to employees in general.
The interviewees find that a common goal and education would benefit the LA network.

among other things. One of the interviewees views it as important to know what other sections do to see if there are important issues that are being struggled with in many different sections simultaneously. Then perhaps those sections could cooperate in finding a solution.

When asked what they do to spread Lean to their co-workers, many concrete examples are presented. Some have held lectures at section meetings; others have created Lean strategies for their entire departments. Some have created exercises for their groups and some try to show their groups the bigger picture by taking them out on Gembas. One of the interviewees points out the importance of being a role model and taking the lead, although it is also important not to tell people what they should do but teach them how to think for themselves. Another interviewee says that sometimes the easiest way to spread information is to send a short, to-the-point email.

In one interview, the interviewee says that it is important not only to spread the knowledge, but also to follow-up on how it has been received by the employees. Another interviewee states that it is important not to do too much at a time, since people have some sort of saturation point after which they simply cannot absorb more information. Finally, as stated by one interviewee: *"You cannot command people to become Lean; you have to coach them into wanting to become it."*

4.2 Interviews with EDS employees and consultants

This chapter describes the interviewed EDS employees' and consultants' views on the Lean work in general and the LA network. The interviewees represent different departments and positions within the company. Some have worked at OEG for 40 years, while others are newly employed. The group also ranges between different positions within the hierarchy. For the purpose of anonymity, no names or group belongings are presented in the chapter.

4.2.1 Lean in general

When asked what Lean is, the answer differs from one person to another. Some talk about getting a better flow in the company, others describe it as a method to simplify the way of doing things. However, Lean is also described as; *"Working in the right way with the right things"*, *"a mind-set"* and as a *"mish-mash of different things that are previously known, in other words nothing new"*. However, some are still trying to rap their heads around the concept. One person says that the concept of Lean is still too abstract, while another person say that he really do not know what it is yet, and a third person thinks it is *"kind of stupid"*.

What the vision or goal for the Lean journey at OEG is, is unknown to most of the employees that have been interviewed. Some people try to speculate on what the idea behind Lean at OEG might be: *"In general make everything work more smoothly"*, *"Make more money"*, *"Getting the flow to increase in some way, less development time"*, *"Get better operation methods in the whole chain to assure the quality of the products"*, and *"Try to get a common picture so that everyone move in the same direction"*. One interviewee also answers that since it is a methodology and a work method, there is no need for a goal. This is somewhat supported by another interviewee, who says that the goal should be not to have to have a Lean initiative, but instead Lean should be the backbone of the organisation.

Moreover, other reflections regarding the Lean initiative in the organisation were that these kinds of initiatives seem to appear every now and then. As one person said: *"Not again; how many times have we done this in the last 40 years or so?"* and another interviewee asked: *"Do we need this?"* One person said that he had heard about the concept but that it was not really something that they talked about among colleagues, while a fourth person said: *"The attitude among my colleagues is not the best"*. However, the attitudes seem to be more positive in other parts of the company. As one employee explains it: *"I remember when we started with JIT, the difference now is that I don't hear the same negative attitude as I did before"*. Another employee offered some insight to some of the scepticism by saying: *"It's in one's backbone to do things in the same way as you have done it in the previous 20 years. When you look at improvement work, you have to take this into consideration."*

Lean for the individual employee

Regarding how information about Lean has been communicated to them, all interviewees mention the on-going educational series, which started in October 2011. Some have also gotten information through their LAs, and two people mention that they have searched for information on their own. One person has even actively participated in seminars on the subject, while another person has gotten some information about Lean in a previous job. When it comes to consultants, however, whether they have taken part in the Lean initiative or not depends on their closest manager.

Most of the people being interviewed think that Lean as a concept is good. However, many in the office environment struggle to see what part Lean should play in their day-to-day work or feel too overwhelmed with their workload to work with it. Some of the comments from the interviews were: *"I don't feel that I have any time to work with improvements. I keep hearing that the time should be taken from the projects, but it doesn't always benefit the project you're in"*, *"It doesn't work in my job; I do different things every day"*, *"I don't think so much about Lean, we have a lot of fire fighting going on"* and *"They have to clear stuff from our schedules if we are going to have time for this."* One person talked about the systems rewarding sub optimisation, while another said: *"I don't think they have succeeded in getting this to work in my day-to-day job. It should be concrete, but these easy things that could be done, they don't have any budget for it."*

> *"Make sure we have the strength to be transformation forces!"*

Some people talk about the hope of Lean creating an environment where one's personal interest in, for example, keeping the budget is replace with helping each other. As one interviewee explains it: *"Sometimes I may not keep my budget but it might mean that someone else can keep theirs. Unfortunately this opens for a conflict with your closest manager."* Another interviewee says: *"Everyone is thinking about their own projects, and their own budget, and their own job. We should think more about helping each other."*

On a more upbeat tone, one person gives an example of how he works with Lean in a day-to-day environment: *"I analyse my work, search for time thieves and try to think about the big picture"*, while another person says: *"If I know that I will be done with my tasks in a day, then I let the scheduler know so that he can prepare new assignments for me."* A third person talks

about how Lean is bringing people together: *"Everyone has more of a common language, or in some way a common view that something is happening."*

4.2.2 The Lean ambassadors

As previously stated in chapter 4.1, the LA network was created to help support the managers in the Lean work and to act as spokesmen among their fellow colleagues. With this in mind the question of what an LA does was therefore asked during the interviews. Out of 14 interviewees almost none knew what the role of the LAs was. As one of them explained: *"I know that some people are Lean ambassadors but I don't really know what they do."* Another employee said: *"I don't really know what a Lean ambassador does; hopefully they should inform us of what we should do."* When asked what they thought an LA should be doing most interviewees agreed that the LAs should be promoting Lean. One person continued by saying that an LA must be someone who *"inspires others"* and another commented that LAs should be *"driving spirits who can transmit the message; someone who radiates."* As one interviewee puts it, the LAs are part of the organisation and have the opportunity to both listen to others and affect them in their work.

Most seem to think that the LA network is a good initiative. As one person said: *"Someone has to be on the receiving end of information."* Another comment was that *"it can sometimes be more powerful if the message comes from a colleague than a manager."* However, one person with insight into the LA network felt that the network sometimes works in different directions and that the time spent on the LA network could vary a lot between LAs. One person being interviewed also said that he had not heard the term before.

Key Take Aways – Interviews with EDS Employees and Consultants
When asked what Lean is, the answers differ between the employees.
The vision for the Lean work has not been communicated yet.
According to employees who have worked at OEG for a while, these kinds of initiatives appear every now and then.
Most employees seem to think that the concept of Lean in itself is good, but they do not know how it will affect them yet.
What an LA does is not commonly known among employees at OEG. However, most employees seem positive to the network.

4.3 The Lean exercise

In the rest of this subchapter, the reflections of the interviewees in connection to the eleven items of the Lean exercise, see chapter 3.2.1, will be presented. These reflections may be of a descriptive nature, stating simply how different interviewees interpret the various items, or they may concern the current existence of the items in the organisation. For a summary of the results of the exercise, see figure 9.

Ranking	Item	Total points
1	Education to all employees	208
2	A vision for the Lean work	236
3	Motivation to the individual employee ("What's in it for me?")	245
4	Support from department and section managers	258
5	Support from senior management	297
6	Work in cross functional teams	345
7	Feedback when something is good/bad	353
8	Guidelines that describe one's assignment	370
9	Visible results in the short term	385
10	Continuous flow of information about the Lean work to the organisation	398
11	Support from the Lean team	403

Figure 9. Ranking and total points for the different items in the Lean exercise. A low level of total points indicates that many interviewees have regarded the alternative as important for the success of the Lean initiative.

4.3.1 A vision for the Lean work

'A vision for the Lean work' has had a tendency of being placed either in the absolute top or the bottom of the ranking. Despite this diversity, it has the second lowest total ranking score among the alternatives, which means that it has been considered as among the most important things for the Lean initiative to succeed at OEG.

"'Why am I standing in this jungle?', as he who wanted to fry the potato leaves to crisps said." (referring to a Swedish TV commercial)

Those who have chosen to place 'A vision for the Lean work' in the top often phrase the importance of having a common direction for the Lean work within the organisation. A common vision will be the glue that binds the different departments to each other, but one of the interviewees also states that every department needs to have its own reasons to why it works with Lean. The vision is thought to help show that Lean is good not only for cutting costs. One interviewee also mentions that a vision might change the view on Lean as *"yet another task to add to the checklist."*

Among those who have chosen to put 'A vision for the Lean work' in the bottom parts of the ranks, a reoccurring reflection is that the word "vision" is merely a catch phrase that has no

real meaning to the individual employee. One employee also mentions that a vision for Lean is not nearly as important as a vision for the entire company.

Many suggestions on visions for the Lean work have been provided; fast throughput times, shortened lead times from idea to development, a better working environment, focus on adding customer value and achieving flow through the entire organisation are but a few. One employee changed the perspectives completely by saying: *"Of course Lean is the vision."*

Some interviewees think a vision is lacking as of now; they do not know what Lean is about and what the gains from it will be. One interviewee discusses that the importance of the vision depends on the level it is on in terms of concretism. Another interviewee means that both strategic and tactical goals for the Lean initiative is of great value, but it is important not to forget to break them down into short term goals. This could for example be visualised in the form of a Lean staircase where the connection between short term and long term goals is shown.

4.3.2 Continuous flow of information about the Lean work to the organisation

A 'Continuous flow of information about the Lean work to the organisation' is the second least important thing in the rankings. For almost all interviewees it has been placed among the bottom five alternatives.

Although information fills an important function by showing that the Lean initiative is still active, one interviewee says that it is not enough to hear that Lean work is at progress in the organisation; you need to see it for yourself if it is to affect you. Another interviewee states that there is a constant overproduction of information at OEG, so Lean information simply gets lost in the flood of information.

Some interviewees have presented suggestions on what type of information they would like to receive about the Lean work. Among the suggestions is an even clearer dialog about the fact that this is a long term commitment and some sort of presentation of what the next step is after the educational series. Some interviewees have also expressed a desire to know what the intention with the Lean work is and why Lean in particular has been chosen to fulfil that purpose.

4.3.3 Education to all employees

In the top of the total ranking is 'Education to all employees'. This somewhat reflects the individual rankings, where most interviewees have put the alternative in the top five.

A common view among the interviewees seems to be that the actual Lean work had not begun until the first part of the educational series was introduced in October 2011. One interviewee says that her view on Lean was negative due to the improvement boards, but the educational series changed her attitude to it. Another interviewee points out that it is smart to give the educational series nine months to really let the message sink in and allow people to accept it.

Through education it is easier for the individual to understand why the organisation pursues Lean and this in turn will motivate everyone to work with Lean, according to one interviewee; see figure 10 below for a visualisation. Another interviewee thinks that the educational

movies should be seen in groups of some sort to allow discussions among co-workers and a dialog with those who are more knowledgeable about Lean to arise. It is the hope of one interviewee that the education will provide him with a way of thinking and viewing his own work in regards to Lean.
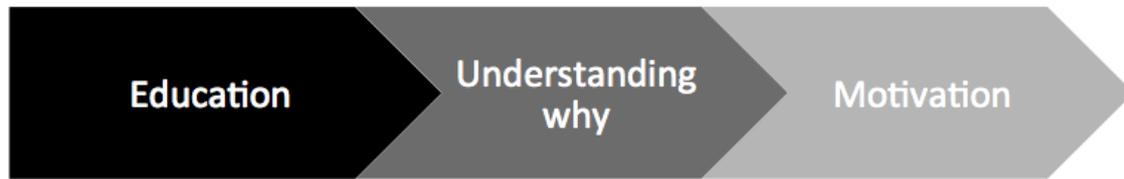
Finally, one interviewee stresses that the educational series must be followed by something. There is a need to move on from theoretical education to taking action in practice, according to another interviewee. One example of what to follow up with is provided by yet another employee: Targeted educational efforts to groups based on what they work with and what Lean means within that field.

In terms of education and consultants, it is clear that every section manager decides on its own if the consultants at OEG are to participate in the educational series. This is also true for the improvement boards.

4.3.4 Feedback when something is good/bad

In the total rankings, 'Feedback when something is good/bad' was in seventh place. This is a good depiction of the individual interviewees' rankings; in general interviewees tended to place this alternative neither high, nor low.

This category has been interpreted quite diversely by the interviewees. Some stress the importance of feedback on the individual level, while others have pointed out that it is vital on the organisational level. One interviewee finds it important to benchmark with other companies that work with Lean, thus getting more or less objective feedback on OEG's Lean work.

The form of the feedback has also been discussed. As one interviewee points out, negative feedback does not have to be interpreted as negative if it is presented in a constructive manner. Another interviewee continues by saying that nobody intentionally does wrong – that is why everyone needs feedback. The advantage of feedback is that it allows an evaluation of both good and bad parts of processes and performances in general. One interviewee brings up the fact that feedback does not have to be standardised and official. The interviewee provides a good example on a manager who simply sends out an email to the group leader if he finds that the group has done something good. Overall, a recurring comment is that feedback is good, but the art of providing feedback is not used extensively or sufficiently at OEG.

4.3.5 Guidelines that describe one's assignment

As was the case for 'A vision for the Lean work', 'Guidelines that describe one's assignment' was often placed in the absolute bottom or in the top three of the ranking. In the total ranking it is, however, third from the bottom.

The main reason for not ranking this alternative in the top, as stated by the interviewees, is the fact that people who have worked for a long time in the organisation already know what is expected of them. One interviewee says that it is difficult *not* to participate in the Lean work, because when there are routines in the company to work with Lean it is hard to avoid participating in the Lean work.

Another interviewee thinks that the word "guidelines" sounds strict and boring, but that guidelines are still necessary. As stated by one interviewee: *"The guidelines help us avoid diverging from the intended road."* However, although guidelines are considered necessary by some, it is also up to the individual employee to request guidelines if he or she feels that there is a lack of such, according to one interviewee.

4.3.6 Motivation to the individual employee ("What's in it for *me*?")

'Motivation to the individual employee' has generally been seen as the most important thing for the Lean initiative to succeed, but those interviewees that have not put it in the top three have generally put it in the bottom of the ranking. In the total ranking, 'Motivation to the individual employee' is viewed as the third most important thing for Lean to succeed at OEG.

One interviewee points out that it is important to know not only why Lean is important to the individual, but also why the group and the entire company should work with it. As of now, some interviewees feel that they do not know what the benefits are to working with Lean. *"Engineers need to know* why *they do things if they are going to do them"*, as one interviewee puts it, *"and that is even more true currently when everyone are up to their necks in work."*

Some of the interviewees have provided examples on what types of motivation they would like to see. One wishes to see his working situation develop in terms of saved time or simpler and more cost-efficient projects for instance. This is more clearly defined by another interviewee, who says that he would say that the motivation should be that saved money is spent on marketing and technology development in other parts of the organisation. Yet another feels that motivation in terms of less stress and psychological well-being would be good incentives. A fourth one puts it simple: *"It would be enough not to have to reinvent the wheel over and over again."*

Those who have not ranked 'Motivation to the individual employee' highly have stressed that the important thing is that the company wins on Lean, but not necessarily the individual. Sometimes a change that is good for the company is bad for the individual, as one interviewee puts it. Another interviewee builds on that statement by saying that those who get paid to work at OEG should do what is expected from them – that includes Lean.

Another view is that scepticism towards Lean will be the only result if the company focuses too much on inspiring and enthusing people to work with Lean. Motivation is not something you give to people; it is an effect of working with Lean, according to a couple of interviewees.

4.3.7 Support from the Lean team

In the absolute bottom of the total rankings 'Support from the Lean team' can be found. This rather accurately represents the view in the individual rankings – most interviewees have put this alternative in the bottom five.

One main reason why the interviewees do not view this alternative as very important to the success of the Lean initiative is the fact that the role of the Lean team is not to be in charge of the Lean initiative, but rather to act as a support to the senior management. As one interviewee puts it, *"The support of the Lean team is an emergency solution - the aim is for the line to own the Lean initiative themselves."* One interviewee goes as far as to say that the support of the Lean team might even decrease the chances of the initiative to succeed, because managers know that they have someone else who can run the Lean work for them.

However, many interviewees talks of the importance of the Lean team too. The Lean team and senior management are viewed by one of the interviewees as the heart of the entire Lean work. As another interviewee puts it, the strategy should be set by the senior management, but the hands-on work should be carried out by the Lean team. Yet another one mentions that the Lean team is connected to all the other alternatives, because it is a prerequisite for the rest of the Lean work to run smoothly. Foremost until the concept of Lean has found a firm base in the entire organisation, one interviewee sees it as vital to have an active Lean team in the organisation. This is in part counteracted by another employee, who feels that it is important to have an active Lean team even after Lean is a natural part of every employee's day.

Those who view the Lean team as very important to the success of Lean at OEG say that it is important that people see that someone is working effectively and efficiently with Lean. One interviewee wishes that the Lean team was even more visible than they currently are. *"The Lean team has seen more than an employee in general when it comes to Lean. They have a knowledge bank and have worked a lot with this"*, as one employee puts it.

4.3.8 Support from senior management

Although being mentioned by many as important for the success of the Lean initiative, 'Support from senior management' wound up on fifth place in the total ranking. When looking at how the individual interviewees have ranked this alternative, the alternative is frequently found in the absolute bottom and the absolute top of the ranks.

One reason for placing the alternative low is the feeling that the senior management is already active in the Lean work, according to one interviewee. The senior management, although supported by the Lean team, is in fact already the driver of the Lean initiative, says another interviewee.

Other interviewees state that the senior management is too distant from employees in general and therefore cannot affect the acceptance of the Lean initiative by employees. As one

interviewee puts it: *"They [the senior management] are not that visible anymore. A few years back the gap to the senior management was smaller."* Some interviewees lack functioning communication channels with the senior management. This has lead to a feeling that senior management's decisions are not always rooted in the organisation before they are made.

Those who have ranked 'Support from senior management' in the top point out that senior management not only should support the initiative, but also have the power to change the organisation. They have to be active in the Lean work and lead by example, but also go out into the organisation and ask employees about their view on Lean. Without the active support of the senior management the entire Lean initiative will fail, one interviewee soliloquises. Another interviewee says it crassly: *"Money rules what we do in the company, and senior management is in charge of the money."* Furthermore, one interviewee phrases that senior management must be persevering and give a clear direction for the Lean work and maintain it, because if this initiative fails it will take many years before people dare to try again.

4.3.9 Support from department and section managers

'Support from department and section managers' is number four in the total ranking. In the individual responses, very few interviewees have put this alternative as number one, or as number eleven for that matter. Instead, many interviewees have ranked it in the midrange.

Many interviewees point out that the department managers and section managers in particular are very important to the success of the Lean initiative, since they are the ones who should manage the initiative in the day-to-day work of employees in general. Therefore, many find it important that the department and section managers are visible in the Lean work by saying and showing the rest of the employees what they should do and how. One interviewee remarks: *"My experience is that no improvement initiative will be successful in the long run if the managers are not in charge of it."*

Several interviewees are concerned that the section managers have not had enough time to grasp what the Lean initiative was about before they began to educate the rest of the employees on the concept. One interviewee thinks that it would be beneficial to coach the section managers so that they easier find their own approach to Lean. Another interviewee, who is part of this mid-level management, says that it at times is difficult to think long term because there is still a short term financial focus in the company.

About support in general: *:"That is often what you hear the most about, but I think there are a lot of other aspects to succeeding that are generally not thought of."*

4.3.10 Visible results in the short term

'Visible results in the short term' is third from the bottom in the total rankings. In general the interviewees have rarely put this alternative high, but quite a few have found it to be the least important thing for the Lean initiative to be successful.

One interviewee said that the reason for putting this alternative low

"It's like when you're on a diet. You want to lose a lot of weight in the beginning and get a kick-start."

was that short term results simply have greater value to the senior management of the Saab Group than it has to employees. Furthermore, one employee has the opinion that if you do not know what Lean is and what you are supposed to do, it is difficult to see results.

In the other group of interviewees, those who have not put 'Visible results in the short term' in the absolute bottom, short term results are seen as an incentive for people to keep up the good work. It will enable Lean to easier become a natural part of the organisation, according to one interviewee. OEG is generally viewed as an engineering company, and engineers are result oriented, says one employee. If the benefits of Lean are not seen in the short term people will begin to question why they have to work with Lean, says another.

One interviewee brings up the case of the improvement board and cost of goods sold (COGS) reductions. According to that person, the stated COGS reduction is randomly decided on: *"It's Donald Duck money, because the costs in the projects are rising."* Another interviewee has the view that the money spent on Lean work is not seen as investments because one cannot see the financial benefits from the spendings in the short term; that is an example of how the short-sighted financial focus can counteract the Lean work.

4.3.11 Work in cross functional teams

'Work in cross functional teams' is on sixth place in the total ranking. This in no way represents the rankings by the individual employees – the alternative has been ranked most important, least important and everything in between.

Many interviewees have given examples on ways in which they work cross functionally and say that it is a natural part of their everyday work. Furthermore, one interviewee says that cross functionality is good, but it is vital that specialists are given the chance to learn from other specialists within their own field. Therefore cross functional teams are not believed to be the key in succeeding with Lean.

Key Take Aways – The Lean exercise
A vision will give the organisation a common direction for the Lean work.
Information shows that the Lean initiative is still active.
The active work with Lean did not begin until the educational series began, according to many interviewees.
Feedback is not used extensively at OEG.
Guidelines are felt to be unnecessary, due to the fact that most employees already know how their assignment should be carried out.
Motivation is either necessary for Lean to succeed or an effect of a successful Lean work.
The Lean Team is important in the Lean work, but rather as a support to senior management than to the individual employee.
Senior management should show that they are working actively with Lean.
Section and department managers can run the Lean initiative in the day-to-day work.
Short term results can provide employees with incentives for working with Lean.
Many interviewees say that they already work in cross functional teams.

On the other hand, one interviewee feels that OEG has created an organisation where sub optimisation is considered acceptable. This focus on the own group is by another interviewee attributed to the existence of "walls" between sections to some degree, departments to a higher degree, but mostly between divisions. At the same time, one interviewee says that it has become more acceptable not to go the right way hierarchically in the contacts with other departments and divisions than it was some years ago.

Finally, as one interviewee puts it:*"We're not many small companies. The things you are delivering to me are not intended for me, they are intended for our customer."* Another interviewee says that everyone should think one step ahead before they make a decision and try to see how the change that simplifies their work affects other people's work. *"That document that I don't want to spend five minutes on writing, what will the cost be if someone has to look up the information for many hours in the end of the chain?"*

4.4 Observations

As a part of the data collection, observations were used in order to understand and learn about the complexity of Lean within the company. Impressions about the Lean initiative have been gathered through Gemba visits conducted at the LAs' home sections and through the attendance at meetings regarding the Lean initiative as well as general impressions gathered during the time spent at the company.

4.4.1 Observations at OEG

One thing, which becomes clear after a while, is that many people within the workforce have worked at the company for a while. One employee speculates upon this by saying that it might be due to the ties one creates to other people within the organisation and the fact that the product itself is quite fascinating and may intrigue people to work with it.

The first impression when walking in a corridor at OEG is that there is a lot of Lean activity going on. All sections have their own improvement boards and many have also started to work with visual planning (VP). However, unless asked a general question regarding Lean most people do not seem to be reflecting on Lean in the day-to-day work. One thing that is noticed when walking around in different workplaces is space set aside for Lean activities. In one workplace the meetings are held in a big conference room; a space that the manager had requested when the section changed location. However, in two other sections Lean meetings with up to 15 employees are held in rooms no bigger than five to six square meters. As one person puts it: *"It's packed in here."*

4.4.2 Gembas at OEG

As mentioned above most Gembas were conducted together with the LAs that were interviewed, since the Gembas offered a chance to see the milieu that they operate in and an opportunity to ask further questions. During these visits the LAs were asked to show what Lean initiatives were going on in their sections.

During the Gembas it is noticed that two of the departments have developed their own Lean strategies. Both have been developed by the management team within each section. However, one of the departments has chosen to keep it on display and to communicate it to the co-

workers within the department, while the other department keeps it on display to others to see but have not actively communicated it to others.

Improvement boards and visual planning

The two tools that have had the widest spread within the company are the improvement boards and visual planning (VP). Meetings involving improvement boards are held within each section once a week, during which the employees meet to discuss different improvement suggestions. Some departments have found this to be a good way of highlighting improvement areas and to let the employees be an active part in driving improvements in their section. However, some departments are struggling to find improvement areas. One person reflects about this by saying that some departments may be more used to dealing with problem solving in their daily activities so they fix problems automatically when they are brought to their attention. On the other hand, another person thinks it has something to do with the fact that you are put on the spot when asked about finding possible improvement ideas, and therefore works with giving people a specific area to discuss different improvement for. Another problem regarding the improvement boards seems to be that some of the improvements are too large scale for one person to handle. In one group this problem has been solved by dividing the improvement suggestion into sub categories. The same group also lets people run improvements together as a team.

There are also different ways of working with improvement boards in different parts of the organisation. In some sections the managers are no longer the ones running the improvement board meetings; instead the task is rotated within the group. In one section the motivation for the employees to run the improvement board meeting is the opportunity to choose the person to run the meeting the following week. One of the benefits of letting people take turn in running the meetings is, according to one person, that everyone has to participate.

Even though the improvement boards are mandatory to all employees, VP seems to be catching on quickly. While walking around in the corridors many departments seem to have found their own way of fitting VP into their routine. One section visited during a Gemba has recently started to work with VP in one of their projects and two members of the team are currently trying another VP tool designed for their daily activities. In another department visited during a Gemba, the team is in the process of reviewing their VP tool to see what should be improved. However, the tools have not catched on everywhere. As one employee explains: *"Not everyone appreciates VP, some think of it as a control mechanism of how well they perform, but the idea behind it is that everyone should get up to speed and to visualise if there are any extra resources needed anywhere. We need to emphasise the intention behind VP and the PDCA board".* During another Gemba a second employee talks about not focusing on the problem per say, but to emphasise the fact that if something is visualised as falling behind schedule something can be done about it. He continues by saying that it is not a signal saying "we have a problem" but a signal saying "we need help" and that it is a problem for everyone, not only for the individual stating the problem. According to the same person it is also common that those who are looked upon as being good at their job are those who may get behind in a project, since there are so many people who are pulling them in different directions.

In connection to VP and the improvement boards there is a difference regarding whether or not VP and the improvement boards are kept in the workplace or in the conference room. One person explains the decision of having the boards in the conference room by saying that those who need to see it knows where it is and that having it in the workplace might be disturbing for some, in the sense that it can feel like clutter. Another person explains one of the reasons behind letting it be on display in the department by giving an example of a colleague, from another department, walking past their VP board and noticing that they were working with something regarding his project, which in turn made the colleague interested in reviewing the components in question. Keeping it in the workplace for everyone to see is, according to one employee, also a constant reminder that it is the duty of the group as a whole to work on solving the tasks together.

Key Take Aways – Obervations OEG
Improvement boards is the most common tool in place, but visual planning is catching up.
Some departments have developed their own standards and routines for working with the improvement boards.
The space set a side for the Lean activities differs from one section to another.

During one Gemba, an improvement project regarding analysing the cooperation between different departments was presented. The idea behind the tool is to visualise how well different departments think that their cooperation is working; in other words it offers a starting point for further discussions regarding the departments' interaction with each other.

4.4.3 Study visits to other companies

As a part of the empirical data collection, study visits to other companies were conducted as a benchmarking technique to find examples of how others have chosen to work with their Lean initiative. The companies presented below, Emballator Lagan Plast, Saab Aeronautics, RUAG Space, Scania and SKF, all work in different sectors and with different products. However, when it comes to gaining an acceptance for Lean and making it a natural part of the organisation, they are all working with people. Hence they are either facing the same challenges as OEG or they are in the process of working through them. A simple comparison of the visited companies can be seen in appendix E.

Emballator Lagan Plast

Emballator Lagan Plast started off as a mechanical workshop in 1965 but is now part of the corporate group Emballator. Today the company produces plastic packaging out of polypropylene which is used to contain a wide range of products differing from gingerbread cookies to paint. The company has approximately 85 employees and a turnover of about 210

Emballator Lagan Plast has the Lean Prize hanging in the factory for all employees to see.

MSEK. During the financial crisis in 2008-2009 the company has continued to grow and has in the last five years managed to double their turnover.

The Lean journey at Lagan Plast started in 2005 when Christian Silvasti took over as CEO for the company. On Silvasti's initiative, the company took part in *Produktionslyftet* (Eng. *The Production*

lift), a Swedish initiative to help companies with 30 to 250 employees start their Lean journey. After 18 month of coaching, Lagan Plast's Lean initiative *Vår väg* (Eng. *Our Way*) was launched. In 2011 Lagan Plast became the fourth winner of the Swedish Lean Prize (Lean Forum, 2011).

According to Håkan Larsson, factory manager at Lagan Plast, the Lean initiative is of high priority within the company. One of the secrets behind their success is, according to him, the fact that they have the support of both the CEO at Lagan Plast and the senior management for Emballator. The CEO has had a leading part in the journey and has actively brought in people that can help support the initiative; today the company for example has one full time Lean coordinator to help support the Lean work. Another thing that Larsson thinks has made them successful is patience, *"One must let it take time and do things in different steps"*. Larsson continues by answering that the biggest motivation for the employees probably has been the fact that they have received a better and calmer working environment, meaning that they now have time to prepare their next task, since they have a better view on the production flow.

Within the organisation, the company has actively chosen not to use the term Lean as such, but to talk about their own concept *Our Way*. As a result of the *Production Lift*, Lagan Plast developed their own course material for *Our Way* to be used within the company. One reason behind them having their own material and using the concept of *Our Way* was to avoid some of the bad reactions tied to the initiative among the employees in the beginning. It has also proven to be a way of deciding what Lean within Lagan Plast should be all about. All new employees start off by working three to four weeks in the production during which time information about *Our Way* is given in short.

Within the factory at Lagan Plast, the company works a lot with work rotation and visualisation, where visualisation is used to give people information and to keep them up to date on what is going on in the factory. Another thing that the company has worked a lot with is empowerment, meaning that they work with giving employees the tools to find their own solutions to their everyday problems. Each member of the taskforce is also part of a zone group. Each month representatives from each zone meet and discuss improvement suggestions. To get a better understanding of the product and the customer, Lagan Plast has given its employees 3000 hours of training in polypropylene. The training has varied depending on the tasks each employee performs, but all employees have had at least five hours training. To better understand customer requirements, study visits to customers have been conducted with the employees in order to increase the knowledge about how Lagan Plast's errors can affect others.

When asked about the Lean Prize, Håkan Larsson answers that it was fun to win but that they still know things that need to be done. For example, one of the things that Lean Forum pointed out to Lagan Plast when they were in the process of getting nominated to the Swedish Lean Prize was that they need to work on breaking down their Key Performance Indexes for their different factory zones.

Saab Aeronautics

Svenska Aeroplan Aktiebolaget was founded in 1937 to meet the need for military aircrafts in Sweden. Now, Saab Aeronautics in Linköping has widened their product range and produce unmanned aerial systems and commercial aeroplanes as well as the military aircraft Gripen. The company employs about 2200 people.

The Lean journey at Saab Aeronautics was initiated in 2008. The initiative began in different parts of the organisation, but the R&D manager was the main driver of it. Today the company is working with widening the Lean concept so that it also will be included in the offices – all with a focus on the key concepts continuous improvements and visual planning (VP). The Lean initiative at Saab Aeronautics is run by a ten-member cross functional team consisting of people from the R&D department, the production department and the test department. The function of this team is to meet and discuss best practices for the Lean initiative. To help them reach the rest of the company the Lean team at Aeronautics has 30 Lean coaches. The Lean coaches are all first line managers (the equivalence to OEG's section managers) and their task is to find ways to promote Lean, with a focus on continuous improvements, in their part of the organisation. The idea behind having Lean coaches that are managers and part of the management groups in their divisions is that if the managers can promote and work for a Lean organisation, the rest of the workforce might follow.

According to Jörgen Furuhjelm, project manager and Lean driver at Saab Aeronautics, the notion of Lean is starting to spread in the organisation. To make this happen, Furuhjelm thinks that the fact that they are letting things take time rather than pushing something on the employees and risking the concept of Lean getting a bad reputation has been one of their success factors. Another thing he mentions is that it is important that people notice that something is happening, for example by reading articles on the intranet. However, every six months or so something has to happen in the direct surrounding of the employees, otherwise people lose interest. When talking about Lean in the organisation it is also important to make people aware that you are there to help them remove obstacles and not to be blunt and say *"If you work like this you will work better."*

One of the struggles that Saab Aeronautics is facing at the moment is how to get Lean to work in the various working environments present in the company. As Furuhjelm explains it, *"In the production we know what Lean is, in the R&D department we have to reinvent it"*. In a way of educating the personnel, Furuhjelm and the other members of the Lean team have put together a three-hour-long presentation, which they started to run in the organisation in the beginning of 2011. So far, 200 managers and project managers have received the training. The idea with the education is that the course attendees should take the information and course material with them and train others in their surrounding in a train-the-trainer like manner, in other words the senior managers should train their subordinate managers, who in turn train their subordinates and so on.[9]

When asked what the long term goal or vision is for the Lean initiative, Furuhjelm answers that they do not have a specific goal as such. However, when they decided to put together

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[9] Jan Lindér (Researcher at Chalmers University of Technology), Interview 2011-11-02.

their presentation they had to discuss what the concept of Lean should mean to Saab Aeronautics, which in a way helped them create a structure or strategy. Before the education was initiated, a Lean temple construct was also suggested by the Lean team and finished by senior management at Saab Aeronautics. The temple was later handed out as a certificate to those who took part in the Lean education. For the next education phase there is now an ongoing discussion on how the education should continue. As Furuhjelm continues, *"The managers know the concept quite well now, we need an education program that they can take charge of so that they can transmit the concepts of Lean."*

Another thing that Saab Aeronautics has been working on is what kind of tools to promote. At the moment they have narrowed it down to six areas: VP, value stream mapping, improvement boards, scrum, pulse and 5S. Each area has one Lean coach who is responsible for looking at how the tools can be used better. The notion is that the tools should add value in the day-to-day work for the employees. The first tool to reach the organisation has been VP since, as Furuhjelm explains, *"If you are a sceptic, VP is still something that you can accept and the next time anyone talks to you about Lean you might have a more positive attitude."* The other tools are implemented on demand, sometimes the Lean team also shows groups of employees as a good example and a way of saying: *"Look how well it is working, shouldn't your team try that as well?"*

As with most change processes there are still some struggles left for the organisation. For example, the Lean coach team is still trying to find its place in the organisation. Even if the Lean team had a good reason for choosing managers as their Lean coaches, others have asked the same managers to take on other responsibilities. This means that it is sometimes hard to find a time and a place that works for everyone involved to meet. Another dilemma is that since people within the organisation are used to question their surroundings and think for themselves, a manager might not have the same part to play in getting others to accept the Lean concept.

SKF

The bearing manufacturer SKF was founded in 1907, after an invention by Sven Wingquist. Today the company produces bearings, units and housings, lubrication solutions, seals and mechatronics. In Sweden SKF employs around 3500 people.

The Lean initiative at SKF builds on a Channel Concept which was developed at SKF in the late 1980s after years of batch production. The Channel Concept, which in itself was a pull system, was later followed by the Temple of Manufacturing Excellence which in 2006-2007 became Manufacturing Excellence. Since 2009 the company is also working with widening the Lean concept to include product development through their Business Excellence initiative.

"The most important thing is that we all speak the same language and that the senior management takes this to their hearts. When the heart and the brain say that it is right, then the feet will move in the right direction."

In the process of developing the Excellence programs, the company started by looking at how others had developed their Lean initiative. For example they have been able to

observe Scania more closely, since Scania's CEO Leif Östling also is the chairman of the board at SKF. In the beginning they visited Toyota and the company also used management consultants to gain more knowledge in the area. But as Peter Calås, member of the Excellence Team, points out: It is all about doing the work yourself, *"The reason for bringing in management consultants is that they can ask questions and see things that you have grown accustomed to - you want to buy knowledge, not resources."*

Throughout the development of the Excellence concept two things have been important for SKF: the message and support for the initiative should be from senior management and SKF as a whole, and the fact that the Excellence concept is not a revolution but an evolution of what they have previously done at SKF.

The Excellence concept at SKF is a global program for the entire corporate group with support from the President and CEO of SKF, Tom Johnstone. The Excellence concept is spread through the different divisions at SKF, with one core team in each of them that co-operate with the others. At the Manufacturing Development Center (MDC), the group consists of eight people around the globe, who are located in Sweden, France, the USA and Malaysia. The Excellence teams have the responsibility to train others in the Excellence concept so that they in turn can train others and support their managers. Thus far the Excellence team for the MDC has trained between 100-200 facilitators.

In the education of facilitators and personnel in the Manufacturing Excellence concept at SKF, the training is done with "the Bridge of Business Excellence" as a starting point. The reason for choosing a bridge is, according to Peter Calås, to visualise how the company has tied together their value chain. In principle, the bridge is constructed with the driving forces of the company in the sky above the bridge. Below, on the bridge is SKF with its suppliers and customers on either side. The pillars of the bridge consist of SKF's principles and the arc bow that gives foundation to the pillars is made up of the values of the company.

In the training, a lot of focus is put on the driving forces, values and principles, and the idea behind them. As Calås explains it, the Excellence team does not know the processes within the company as well as the people who work in them. By giving them the idea behind the Excellence concept the organisation can ask for the methods that they need themselves.

When introducing Lean in the manufacturing departments, SKF works with practice grounds. The senior management for the department in question is first given an introduction to the concept, after that they choose where the practice ground should be. By letting them decide where the practice ground should be, they are given a head start, something that is important since they should be the ones in charge and support the team in the practice ground. The managers also have more knowledge about the processes and the workforce. According to Calås it is just as much a practice ground for the managers as for the employees, which means that the managers have to take part in the daily activities in the practice ground if they are to succeed.

> About Gembas at SKF: *"Avoid telling people what to do, it is better to ask questions."*

The idea of having a practice ground is that others in the surrounding

area of the practice ground can go there and see what they are doing. The goal is that people in the surroundings should start to ask to be a part of the initiative. The crucial parts in succeeding with a practice ground are that the managers actively participate and support the workforce and to point out that it is not a project as such but an on-going journey. Another crucial step in the initiation of the Excellence concept is that the working method within a group should be agreed upon. It does not have to be the best way of doing something as long as everyone in the team agrees that this is the way to do things. Once a group has agreed and worked in that manner for a while, they, together as a group, can start to improve their work. As Calås continues, *"Just because I'm a manager it doesn't mean that I can tell you how you should do things. I can't however hide from the fact that you as a group might not agree on how things should be done."*

When asked what the motivation for the workforce to work with Manufacturing Excellence or Business Excellence is, Calås answers that most people want to do the right thing and contribute in the work that they are doing. Working with the Excellence concept empowers the workforce and makes managers listen to what the employees have to say. To be able to work like this, Calås talks about the importance of leaders being present and encouraging learning.

Some of the things that have been challenging along the way are for example the complexity of using the same values, which in a sense might have a strong Swedish influence, throughout the global and diverse organisation that SKF is. Another thing that they had to work with in the beginning was that the message of Excellence should come both from the leaders within the company as well as from SKF as a whole.

RUAG Space

The Swiss company RUAG Space is one of Europe's largest independent suppliers of space products. Today the company develops and manufactures microwave electronics and antennas and have a workforce of about 300 people in Gothenburg.

The first steps towards Lean at RUAG Space were in 2004 when the company launched a concept called 0740. The idea was to work towards getting 40 percent more efficient in the three years up to 2007. According to Per Malmborg, one of the Lean drivers at RUAG Space and a member of RUAG Space's Business Development Council, this was the start for a more assiduous improvement work at the company. In the day-to-day activities, the company does not call their initiative Lean. Instead they talk about business development since it is what it is all about. Throughout the Lean initiative, the company has worked together with management consultants to find inspiration and get training. However, today they are doing most of the work themselves and try to find inspiration by collaborating with other companies. As Malmborg continues, *"Most companies are facing the same kinds of struggles as we are."*

According to Malmborg, the Lean initiative has strong support from the COO. However, at the moment a Lean team called the Business Development Council, which consists of seven persons, one from each department (the equivalence to OEG's divisions), within the company, drives the Lean initiative at RUAG Space. To help them, they have one mentor in each

division (the equivalence to OEG's sections) within the company, in total 30 mentors. The mentors all had a prior interest in business development. Since the telecom crash in 2001, people within the company have become more aware of the need to continuously improve and the support among employees regarding Lean is therefore considered to be strong. Since the introduction of Lean in the company, all employees have had some kind of education on the concept, either in connection to one of the Lean tools they are working with or through a Lean game. The next step in the education process is to launch a development program based on the Lean temple, which is shaped as a rocket. The development program is going to focus on the values and principles behind Lean, an activity which Malmborg estimates will be at least a three-to-four-year-long activity.

As mentioned above, RUAG Space started to move in a Lean direction in 2004 in their 0740 project. When the Lean initiative started in the company it was therefore natural to let the previous initiative be a part of the Lean concept. Lean is also a part of the company vision.

During the interview different tools are discussed. Among the more common tools used at RUAG Space are VP and value stream mapping (VSM). According to Malmborg, VP is used throughout the whole company. As a way of working with the tool, the employees are encouraged to revise the tool regularly since it is easy to forget the idea behind it after a while; as Malmborg puts it: *"After a while it might as well be a list in Excel®."* When discussing an on-going VSM project, the idea at RUAG Space of using tools in a wider sense becomes clear. In the on-going project, focus is not only put on the VSM itself but also on how VSM can help empower employees and how it can be used to create an understanding of other peoples' work tasks. Another tool, which they have developed themselves, is a revision tool. The revision tool is used by the mentors two times a year and is meant to help the divisions give feedback to each other after conducting a Gemba exercise, so that they can improve.

In a way of working with continuous improvements, a phenomenon called "the blue post-it®" has evolved around the improvement boards in the organisation. The "blue post-it®" can be written by anyone and the idea is that if a person has an improvement suggestion to another group he or she writes it on a "blue post-it®". He or she then has to find the "owner" of the targeted improvement board and explain the improvement suggestion. If a person gives the improvement board owner a "blue post-it®" and the owner accepts it, the owner has to take responsibility for the idea and give the initiator feedback; *"If you get a blue post-it®, you don't throw it away."*

When asked what kind of struggles the company might have with Lean within the company, Malmborg mentions that it is sometimes hard to gather all the Lean mentors. Another thing they want to look at is the structure and roles of the Lean mentors and the Business Development Council.

Scania
Scania, known worldwide for making trucks, was founded in 1891 in Södertälje by the name Vagnsfabriksaktiebolaget i Södertälje (VABIS). In 1911 the company merged with Scania in Malmö, a manufacturer of bicycles and small-scale producer of cars. In 1966, the company

bought their supplier of truck-cabins, Be-Ge Karosserifabrik in Oskarshamn. Study visits to both Oskarshamn and Södertälje have been conducted and are presented below.

The Lean initiative at Scania, known as the Scania Production System (SPS), was first introduced in the middle of the 1990s by the CEO Leif Östling. The idea was born after a report in the 1980s where both Scania and Toyota were singled out - Scania for their modular thinking and Toyota for their production system. As a result of the article, the companies started collaborating, a cooperation that has meant that many of the Lean drivers at Scania have gotten first hand training of Toyota themselves. The concept has then been taught to the rest of the organisation through the train-the-trainer technique.

Scania Södertälje

Scania Södertälje was the first site to be introduced to Lean in the middle of the 1990s by the CEO Leif Östling. As mentioned above, collaboration with Toyota was the base for the Lean efforts at Scania and, just as Toyota, Scania has chosen to call the initiative the Scania Production System. Today the company employs about 11 000 people in Södertälje and has set an ambitious goal for itself to in the next four years increase the production from 60 000 vehicles per year to a production of 150 000 vehicles, all with the same amount of employees.

One of the first proofs of the Lean initiatives at Södertälje is their Lean Temple on display at the entrance. At Scania, there is a lot of focus on giving the employees the tools they need to continue to improve the company's processes. To make sure that the employees know and understand the product they are working on and so that they can get a glimpse of what the customer experiences, all new employees get to drive the trucks and buses that Scania manufactures. Many of the employees in the company also have truck and bus licences so that they can create an understanding for how the different solutions and parts that they design work in reality. Scania also offers around 300 courses for their employees.

While walking through the engine-test department, some of the things noticed are the kanban boards, improvement boards and an evaluation system for the improvement teams in the department. The evaluation system, which consists of three steps, helps Scania determine how far the improvement teams have come in their quality work. The first step is to organise the work place and to start with process follow-ups. The next step is to organise the work equipment and to prevent systematic errors from recurring, and the third step is to organise the work process and establish the process efficiency. A diploma with the different steps hangs by the workstations and when the improvement team manages to complete a step, which takes about a year, the step is approved and the group can continue on to the next one.

In the line in the assembly department, Scania uses a concept called "resource". The task of being a resource is shared and rotated among the work teams. The employee that is a resource has one day to work with improvements.

Scania Oskarshamn

The Lean initiative at Oskarshamn started in 2000, according to the tour guide. However, it took about five years before the Lean effort started to feel natural in the organisation. As a result of the SPS, Scania increased the productivity by 50 percent, from a production of 20 to

30 truck-cabins per employee per year between 2004 and 2007. Today the company employs 2000 people in Oskarshamn.

According to Roger Petterson, Logistic Manager at Scania Oskarshamn, before 2010 the base and operative tact at Scania in Oskarshamn were set every month and the production orders were fixed once a week. This, plus the fact that a delivery time could not be guaranteed, meant that customers started to speculate on whether or not they would need a new truck in six months or not, which lead to customers placing orders in an available slot rather than placing an order for a product. In the financial crisis in 2008-2009 this proved to be a problem when all of the sudden the company had a lot of stock but no real orders. As a response to this, Scania made a radical change and are now offering set delivery times, which differ between different regions. Scania also have internal stocks for one week of production, the orders are fixed after confirmation and can only be changed after a mutual agreement between Scania and the customer. As a result, there has been a reduction in lead times to one third of those in the old system.

During the financial crisis in 2008-2009, Scania did not lay off any of their employees. However, most contracts with consultants were terminated. The overcapacities in the workforce also lead to three weeks of SPS education to all employees in combination with other internal education. Employees were also offered a chance to retake one or two of their high school courses. All educational efforts were lead by the employees within the company, since there was no money to bring in consultants. After the education in SPS, Maria Ronold from Human Resources in Scania Oskarshamn mentions, the employees felt that there had been a lot of focus on SPS. However, she thinks that there is a pull for it now again.

The SPS initiative was first introduced in one part of the factory and then spread throughout the whole manufacturing department. Before Lean was initiated at Scania, the people in charge of the effort were given first hand training in Lean by Toyota in Japan, as mentioned above. The concept of Lean has then been taught throughout the organisation through the train-the-trainer technique. According to Ronold, the general process of educational efforts at Scania is dependent on the managers teaching the organisation about the principles and the employees spreading the methods to each other. In general, the focus is on the working methods in place rather than on results. At the moment, Scania is moving away from their old structure of hierarchical attitude, where the managers in the top of the organisation are the thinkers who focus on results, to an attitude where the managers are seen as a supporting function that encourages people to focus on the work methods.

According to the guide, who himself works in the production unit, it took about five years of working with the Lean methods and practises before he started to think about it as a natural part of his work. More responsibilities have been given to the workforce since they know more about the daily work activities than anyone else. According to the guide, Lean has meant more freedom to control the working environment that he is in. As an example he mentions that the work shifts have a meeting, called *fyrklövermöte* (Eng. *Four-leaved clover meeting*), every Tuesday where they talk about improvements. Improvements which require the approval from a manager are discussed on Wednesdays by the work shifts and managers. If

further approval or investigations are needed, a date is set for feedback. Before implementing an improvement the priority is: Is there a risk for decreased safety? If the same safety of better safety can be guaranteed they move on to the next criterion, quality. The last criteria are delivery precision and cost. An improvement is only implemented if none of the four criteria worsens by it. The priority can be found in the SPS temple.

For new employees, Scania in Oskarshamn gives all employees two weeks of training in SPS. Technical personnel are given two to three weeks of working experience in the manufacturing departments. Trainees are given the opportunity to go through the whole production from start to finish, while others usually work in just one part of the manufacturing chain. At Scania, Lean coaches are used to support managers in Lean. To become a Lean coach, an employee can either apply for the position or be asked to become one; one criterion is that you have some working experience in the organisation. When asked about how they work with Lean in the offices, the answer is that Scania in Oskarshamn have some work to do there.

When walking around in the manufacturing department at Oskarshamn, one sees a highly automated environment. There is a clear structure in the manufacturing department and it is easy to get an overview of what is going on. In some parts of the factory there are no forklifts, instead a monorail has been placed in the ceiling. On the assembly line, about 200 truck-cabins a day are assembled. The cabins slowly move from one side to another, while people work around them. From the ceiling, andon cords in two different colours hang; one red and one yellow. The yellow cords are used to summon extra personnel if one person is struggling and needs help or if someone needs to take a quick break while the line is still running. The red andon cord is used for stopping the whole assembly line and should only be used if there are safety risks or large problems that need attention.

In the manufacturing departments there are a lot of boards hanging from the ceiling with reminders to the workforce, such as: *"put an end to defects"*, *"improvement team"*, *"total efficiency"* and *"minimise the transports"*. Other boards give direct feedback about the production status. Red, yellow or green lamps indicating whether a machine is operating in full or reduced capacity are used, for instance and some boards present stop times.

Another thing that Scania is doing is to offer education about Lean to their suppliers. In the same way as many other companies, Scania is reducing its supplier network and prefers

Key Take Aways – Study visits
Emballator: study visits to customers have been conducted with the employees to understand customer requirements.
Aeronautics: let Lean take time rather than risking the concept of Lean getting a bad reputation.
SKF: message and support for the initiative should be from senior management.
RUAG: Re-uses some of the concepts from earlier initiatives in their Lean initiative.
Scania: To become a Lean Coach an employee can either apply for the position or be asked to become one, one criteria is that you have some working experience in the organisation.

to work closely with a few suppliers in one area rather than with many. As a way of ensuring that Scania can improve their lead times and quality, shorter introductions in SPS are offered to those suppliers who actively ask about it.

4.5 External experts

Interviews with external experts have been conducted in order to gain insights within the two areas of change management and Lean. Some general learnings from the interviews will be presented in this chapter. The main contribution from the interviews was, however, in the form of guiding and structuring of the authors' approach to the two areas.

4.5.1 Interview and lecture with Stefan Book

Through practical consulting work within the field of sustainable improvement and theoretical studies that resulted in a doctoral degree in Quality Management, Stefan Book has a wide array of experience in change management. This subchapter presents some insights from him regarding change, process thinking and naturalisation.

According to Book, customers have grown more aware of the quality in products and in the process that creates the products. This is the basis on which many companies found their change initiatives. To be successful in the long run companies must be aware which needs they act on and why. Once these needs are known, change has a tendency of manifesting itself more naturally than if the needs were not known.

Book also points out that the main focus if one wants to achieve naturalisation in an organisation is to apply systems thinking to the entire company. Through this, it is possible to see what competence is needed and understand the normative rules of the company. In essence this means that a united view on the organisation must be achieved. Two more graspable parts of the naturalisation process is to allow everyone to affect the change and visualise the change through the use of tools.

One problem that is often brought up in connection with change management is change aversion among employees. Book means that this should not be seen as a problem. 'Negative' people are essential to presenting constructive criticism to suggested changes. In reality they are rarely negative to change, but rather sceptic to the way it is carried out. Instead, Book says that employees in key positions who lack insights into the change process present a bigger problem.

The word process is often used in theory to describe the flow of a product through its entire manufacturing chain. However, in some companies the internal meaning deviates from that description. In that case it might be necessary to use other concepts to describe the flow phenomenon and achieve results. The same goes for Lean concepts of sorts; if Gemba is not natural in the organisation, using the words "go see" might clarify and create a more positive attitude to the concept of Gemba.

"Why does it fail? Because you keep running around up in virtual reality."

For the change to sink in, one must allow it the time needed. Changing processes is not a short term project. In the case of creating

a Lean organisation, the entire organisation must change into a learning organisation. This requires a new focus on not only improving the organisation, but also on improving the improvement process through double loop learning, see chapter 2.2.1.

Finally, Book points out that it is important to know that the suggested process improvements do in fact improve the real processes and not the process descriptions. It is not uncommon that process descriptions deviate from how the actual process is carried out. If only the process descriptions are improved, there is a risk that no positive effects of improvements will ever be visible. It is of course of great interest to guarantee that the type of change one naturalises in an organisation is connected to the real processes rather than the process descriptions.

4.5.2 Interview with Stefan Bükk

With a background within quality, environmental and business development from, among other companies, Saab Automobile, Stefan Bükk has a solid knowledge about working with change and Lean in practice in companies. Currently, he is a research engineer within the field of Lean PD at Swerea IVF.

"The best way to sell something is to not sell it at all."

According to Bükk, a key to working successfully with Lean is to visualise the goal. He continues by saying that it requires a lot of energy to change the thinking patterns in the organisation – it is a team process to think outside of the box. Furthermore, he stresses the need for intrinsic motivation; if you want everyone to do their best in a change process they have to find their inner reason for actively participating. He continues by describing how successful companies often "tell the tale" about their history to intrigue the employees; he gives the example of IKEA, where the story concerns how the company started from scratch, but managed to become the successful company it is today. In that case, one interpretation of the story that an employee can make is that anything is possible if you try hard enough.

Bükk stresses the risks connected to the introduction of Lean to an organisation. The drivers of the initiative need to understand the organisation as well as the Lean concept. In connection to the subject of change agents, Bükk thinks that they can have a role to fill in showing the good examples and presenting the challenges the organisation is facing.

The initiative can, according to Bükk, start on any level within the company, but the full improvement potential will not be realised until all parts of the company use Lean as a natural part of their work. He proceeds by saying that Lean must be used in different ways in different types of work. In a production environment, for instance, the customer perspective is vital, while product development should focus on the user perspective – these are sometimes two very different perspectives.

Bükk talks about the fact that an organisation must function in an organic manner. In some periods it is enough to improve continuously in small steps, but in other periods incremental and innovative changes are necessary. The change to this type of organisation will not come naturally, according to Bükk, but requires coaching – ideally in a train-the-trainer like

manner. However, the main importance is to create a structure – to organise the change and get it going.

Finally, the comparison between Swedish and Japanese culture is made. According to Bükk, Swedish and Japanese culture is very similar, but the aspects that differ are very unalike. There is no need for interpreting Lean in the same way in Sweden as in Japan, he says, but by understanding the Japanese culture it is easier for a Swedish company to know when to look past it and find its own ways of doing things. To clearer describe this phenomenon, Bükk brings up the meaning of consensus seeking; Swedes tend to automatically seek consensus, while Japanese people have had to create routines and tools for it.

4.5.3 Interview with Jan Lindér

Jan Lindér is has a doctoral degree and is a lecturer within the field of change management. His insights into Lean changes and the role of leadership are presented in this subchapter.

According to Lindér, Lean works in all sorts of organisations and environments. At its core it is a leadership-based approach to organisational learning where all leaders are responsible for educating the employees. It does not focus on results, although these will eventually surface as an effect of the new approach. Instead it focuses on creating common basic values and tying everyone in the organisation to them through moral incentives.

Lindér views it as a necessity that a close-knit group of leaders that believe completely in the Lean philosophy initiates the Lean work, firstly by forming a goal and secondly by awakening the rest of the organisation to the advantages of changing and risks of not changing. This group must have the potential of completely understanding Lean. However, they must also understand that it can take a decade working in the system before the rest of the organisation begins to fully understand the value of the change.

For the initiative to be successful, it must be a top priority for the senior management. This means that they need to actively go out and meet the employees and show that they participate in the Lean work. Leaders on all levels should act as coaches and tutors for their subordinates in a train-the-trainer manner. This requires an extensive knowledge of everyday work. It also works as a double loop learning cycle, since tutoring not only requires you to know the concept, but also formulate your own view on it.

Lindér points out that the Lean initiative should be managed by line managers - not by staff functions. Of course people surrounding the managers are allowed to help them, but in the end the managers need to fully grasp the extent of Lean and be the drivers behind the system. They need to translate the concept of Lean to their organisation.

4.5.4 Interview with Niklas Modig

Niklas Modig is a doctoral student within the Lean field and also a management consultant that has been employed by OEG several times as a step in spreading Lean within the organisation. In this subchapter, his thoughts on the subject of Lean change are presented.

Modig presents three keys to success in introducing Lean to an organisation. First of all, the Lean work must have a clear vision that guides the employees. In general, this could simply

be a flow orientation, but the most important part of the vision is not how it is expressed, but that the same expressions are used in the entire organisation. Secondly, Lean is a matter of management. Senior management must communicate that they are actively participating and leading the change. Furthermore, they must stress that Lean is compulsory to everyone in the company. Third, in terms of coaching, leaders and Lean coaches should show their subordinates how to think, but let them do their own analyses. Put differently, they should teach people to fish, not find the fish for them.
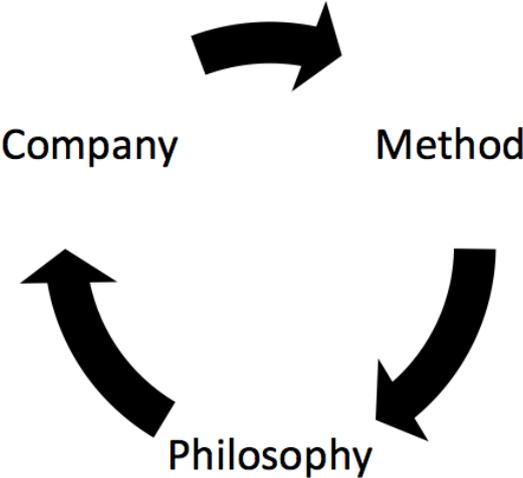
Figure 11. Visualisation of how the methodological and philosophical approaches of Lean can be a part of companies, based on the interview with Modig.

According to Modig, Lean can be initiated with a top down or a bottom up approach. Which approach to choose depends on the needs of the organisation. In some cases the methods will be chosen based on the common values of the organisation, in other cases one might start by introducing methods in units where there is an interest in Lean. However, in both cases the senior management must eventually be active in the initiative and common values must be created for the company's Lean work. In the long run, both approaches will be part of any company's Lean work, see figure 11.

To make Lean a natural part of an organisation, Modig says that behavioural changes are needed. Everyone must commit to achieving flow and learn to improve the entire flow, as opposed to his or her own little part of the chain. For some people, this behavioural change will come naturally, others have to practice more. Some practice will be group-based; some will need to be carried out individually. In all cases, it is vital to constantly work with Lean - this is not a specialist-driven initiative; everyone in the

Key Take Aways – External experts
Book: By nowing the needs the organisation acts on and why, it is possible to change more naturally than otherwise.
Bükk: Different types of work environments will require different ways of using Lean.
Lindér: Changes must be spread in a train-the-trainer alike manner by the line managers.
Modig: Show people how to think, but do not do the analyses for them.

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organisation plays a key role.

Modig resists the notion of a 'Lean culture'. According to him, the organisational culture will support Lean, not be a part of it. The organisational culture will evolve side by side with the Lean work. It will also affect the individual companies' view on Lean in their own organisation.

5 Analysis

In the following chapter an analysis will be presented based on the theoretical framework and empirical data that has been gathered during the case study at OEG. The aim of the analysis is to find answers to the presented research questions and recommendations to how OEG can proceed with their Lean initiative more concretely. Even if all visited companies have their own names for their equivalence to LAs, in this chapter they will all be called LAs to avoid confusion.

5.1 The change process

According to Kotter (1996) and Lewin (1947), every change initiative must be introduced by creating an urge in the organisation for the change. In OEG's case, the introduction to the Lean initiative has already been made although the vision is not yet set; in that sense, the evolution of the Lean work has followed the appropriate route. However, some interviewees have expressed concerns that the Lean initiative will fail just as all prior change initiatives have. This could be interpreted as a need for creating an even stronger urge in the organisation in order to get people to actively take part in the Lean initiative. At RUAG Space for example, Malmborg explains that the telecom crash in 2001 still is remembered among employees and that this awareness has made employees more supporting of Lean and continuous improvements.

By many of the interviewed employees, Lean is felt to be something new within the organisation, although some smaller groups have worked with it since the middle of the first decade in the 2000s. Many interviewees feel that the Lean initiative will require a lot of time if it is to

Remember – Kotter's model

1. Urge why the change is needed and let change take time
2. Powerful change team
3. Create a vision
4. Communicate the vision and why this vision has been chosen
5. Remove obstacles in the organisation
6. Do not forget about short term goals
7. Enthusiasm
8. Let change become natural

succeed. This is supported by Lewin (1947), Kotter (1995), Lindér and Book, who all state that one must let change take its time. Jones et al. (1997) present the example of Toyota, who has had the TPS since the 1940s. Viewing the change to a Lean organisation from that perspective would mean that a long term perspective could be measured in decades.

The second step in a change effort, such as Lean, suggested by Kotter (1996) is the creation of a powerful change team driven by a senior management team. However, to give support to the initiative the change team does not only have to consist of members from the senior management, but can also include strong believers in the change. At OEG the Lean team consisting of quality managers from the different divisions in the organisation and a member
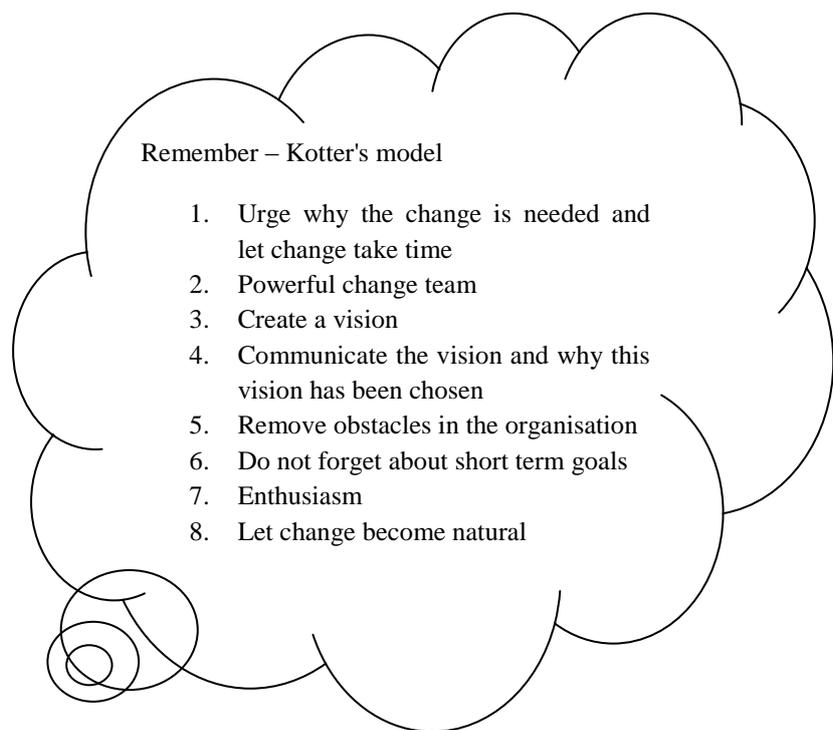
from senior management. Today senior management, who is supported by the Lean team, sets the Lean strategy at OEG. However, in the interviews with people from the LA network and on different levels in the organisation it is not entirely clear whether it is the Lean team or the senior management who sets the strategy for Lean. Moreover, according to Lindér, a Lean initiative does not only need to be clearly supported and driven by the senior management in an organisation, but also rooted throughout the different management levels.

During study visits to other companies, many talk about the importance of the strategy coming from and being supported by managers. At Emballator and Scania, the CEOs of the companies were the initiators of the Lean initiative, and still play a major role in it. All visited companies do, however, have some kind of Lean support in the organisation, in the form of Lean Ambassadors and/or a Lean team, to help the managers spread knowledge about Lean in the day-to-day activities within the organisation.

The word vision is often used to describe the direction of a strategic work. According to Kotter (1996) a direction for a change process can be more important than an actual plan. It is evident that OEG needs to communicate a common vision to its employees. The Lean exercise showed that this was considered most important for the Lean initiative at OEG. Some interviewees requested a vision that is broken down for different divisions and in the short term, but for now the main aim must be to have a common vision, as both Lindér and Modig stress. At RUAG Space, there is no vision for Lean in itself; instead it is part of the company vision. That could be one way for OEG to do it, but according to Modig no matter how the vision is created, people will need it as a basis for understanding how they should work with Lean.

Kotter (1995) also mentions that it is not only important to communicate the vision itself but also *why* the organisation is aiming for this vision. Somewhat linked to this is Bükk's suggestion of companies telling their story to make employees understand the organisation's history so that the organisation can be able to shape the culture of the company to reach their vision. At OEG a few members of the Lean network have together created a narrative, see appendix A, but it has not been communicated to the employees. However, the existing narrative does not bring up learnings from prior quality initiatives, which might help remove the comments from interviewees that this is just another change initiative that soon will pass.

As mentioned by Argyris (1999), an organisation must create the right conditions if changes are to manifest themselves. Kotter (1996) also talks of the importance of removing obstacles in the organisation in the form of organisational structures. Some interviewees have mentioned the existence of a large amount of documentation that needs to be filled out for every project. This excessive amount of documentation could, if unnecessary, lead to the preservation of non-value adding work for the simple reason that there are structures in the organisation that require the completion of those documents. One interviewee also talks of the difficulties of working in a long term perspective in the cross-functional project groups when the functional structures demand that the budgets for individual sections are not exceeded. These are two examples of structures that could counteract the change to a Lean organisation.

According to Bükk one obstacle that companies face is the fact that even though positive effects can be reached on organisational level, it will never be as good as if you work with Lean from the absolute top – in this case from the Saab Group's senior management level. At OEG the Lean initiative started in the manufacturing department and later was adopted as a common approach for the entire organisation; in other words it was not a top-down approach from the beginning, but rather a bottom-up approach. Today the senior management at OEG sets the strategy for the initiative at OEG but there is no common strategy for Lean at the absolute top of the Saab Group. At SKF the initiative was more or less initiated by on a senior management level and has been spread through a top-down approach. Today there is an equivalent to a Lean team, the Excellence Team, in place that is in charge of developing and educating employees in collaboration with SKF's CEO Tom Johnston and with the support from the company board of directors.

As stressed in the theoretical framework by scholars, in expert interviews and by employees at OEG, a vision and a long term goal is very important. However, Kotter (1995) also stress the importance of having short term goals to keep the organisation motivated. In the exercise performed with the employees at OEG, "short term results" is in the bottom three in the total ranking. Two reasons for it being placed low is the view that it is hard to see results in the short term when it is still unclear to many employees what Lean is, and that it is more important for senior management than for the employees in general to see the short term benefits. One employee also points out that it takes time to measure the results of Lean. However, at Scania for example an evaluation in three steps is used to evaluate how mature a section in the manufacturing department is in their Lean initiative. A similar system could be developed at OEG.

To keep a change initiative such as Lean going, Kotter (1995) suggests that an organisation should create enthusiasm around *small* projects. At the moment there are a lot of small Lean projects running at OEG, which have been initiated and are run by individual LAs. Another thing in place is the improvement boards where employees can come with their own improvement suggestions. However, both these ways of running projects are hindered to some extent. Many of the LAs are still struggling to figure out what part they can play in the Lean initiative and some of the improvement boards are have a low degree of usage due to lack of enthusiasm. Regarding the LAs struggling to find projects to run, the Lean team could probably offer some guidance and help them find projects to run. The Lean network as a whole could also spread best practices regarding the improvement boards; the conducted observations show that a lot of ideas regarding how to develop the usage of them exist in the organisation.

In the manufacturing department at Scania Oskarshamn something called *fyrklövermöte* (Eng. *four-leaved clover meeting*) is used. The employees meet once a week and discuss different improvement ideas together, the day after the ideas are discussed and presented to the managers and in the manufacturing department. At Scania Södertälje they talked about the concept of having a "resource", which means that the task of getting a whole day to work with an improvement idea and help other employees when needed rotates among the employees. According to Bükk one of the best ways of learning is by doing, which according to Argyris

(1999) can be seen as double-loop learning where people have to use something that they have learnt. Letting people work with small improvements will in the end result in a Lean and learning organisation.

According to Lewin (1947), in a change process there is a need for stabilisation in order to not fall back in to old habits. Kotter (1996) talks about making change a natural part of an organisation. All in all it is about knowledge transmission and making sure that the entire organisation owns the change and not a selected few. Since the big change, Lean, consists of a lot of small improvements it is important to have a routine for the stabilisation process.

5.1.1 Management's role

According to Beckert (1999) the manager's role in a change effort is to actively accept and make sure that the change initiatives implemented are continued to be used. During the autumn of this year, three major reorganisation projects have been running at OEG. In this process some new management positions have been filled. To make sure that the managers continue to promote Lean it is important to have systems in place to give these new managers the education and support in Lean that they need, in order to make sure that the Lean initiative continues to evolve.

Throughout expert interviews and literature reviews, the fact that senior management should communicate and drive the change is stressed. Johansson and Heide (2008) suggest that senior management should be present in the organisation and Katzenbach and Bromfield (2008) suggest that management on all levels needs to be involved and that the managers closest to the employees will play an important role. At Saab Aeronautics there is a discussion of letting this be the next step in the education program running in the company. As of now the managers within Saab Aeronautics have been trained in Lean by the Lean team at Saab Aeronautics, and according to Furuhjelm they should have enough knowledge about Lean to be able to run the education in their own departments.

At OEG a different strategy has been used, where first senior management, then department managers followed by section managers have taken part in the education day where Modig was the lecturer. A version of this one-day education is now run by the section managers with the rest of the personnel at OEG. However, Lindér stresses the importance of the senior managers first grasping Lean and then, themselves, translating the concept to the next line of managers.

The importance of department and section managers when it comes to giving support to employees in the Lean initiative is also clear in the performed exercise with the employees at OEG. Support from the department and section managers is in fourth place, above support from senior managers and the Lean team. According to the employees, the support from the managers closest to the employees is very important, since they are the ones who are present in the day-to-day activities in the organisation.

Another group in the organisation that can have a large impact on the day-to-day activities within the organisation is the project managers. At OEG, this group attended the education day with Modig the same day as the section managers. Since many employees tend to spend

more time with their project manager than their section manager, and since the project manager has the power to decide what part Lean should play in a project, the project managers will also need support. Recently OEG has started collaboration with Autoliv; the project managers from the different companies meet and discuss how they work with different aspects in their organisation.

The study shows that managers on all levels will play a major role in the success of the Lean initiative at OEG. At the moment the knowledge about Lean at OEG is present to a large extent in the Lean network. However, managers have a key role to play in making the initiative succeed and therefore they will need extra support in the form of education within this area. This is especially true for the section managers, who are involved in the day-to-day activities. It is reasonable to think that the managers will continue to need support from a Lean network that helps them find ways of using Lean in their specific parts of the organisation. Managers on the higher levels of the organisation also need to help the managers closest to the workforce to prioritise between different tasks.

If the Lean network can be seen as change agents, which according to Gilley et al. (2009) means that they question the "status quo" in the organisation and see the hidden faults, then the manager personality according to (Beckert, 1999) act as stabilisers who respond to change by adapting. In the case of OEG, the Lean network could be given the role of change agents that in a way trigger Lewin's (1947) unfreezing of the organisation while the managers could be given the role of enabling Lewin's (1947) moving and freezing stages. That division is could be a goal for the future, but is not yet reached.

5.1.2 Motivating change

Katzenbach and Bromfield (2008) write about the importance of motivating change as oppose to mandating it. This could be interpreted as a way of saying that changes should not be pushed into an organisation without considering the environment in different parts of the organisation. Bükk also seems to think in the same patterns when saying that not selling a concept is the best way of selling it, meaning that if you try to push on reasons for employees to like the Lean concept, like for example monetary gains, they will instead become sceptics. Furuhjelm is on the same page when mentioning that one needs to take care of the Lean trademark and not push it onto people and risk that Lean gets a bad reputation. Furuhjelm also finds that promoting the fact that Lean can help remove hinders and obstacles in the day-to-day activities for employees is better than telling someone to do things in a specific manner.

Building on the thoughts of Gilley et al. (2009), it can be clarified that it is not enough to motivate the change, but it is also necessary to discourage the current state. Although the current state is good enough right now, organisations must constantly change to stay competitive (Gilley et al., 2009). When looking at the use of improvement boards and VP at OEG, VP has begun to find a more natural use in the organisation than the improvement boards, which are used extensively in some sections but not at all

"If you look in your garden today wondering "What do I want it to look like in 3 years time?" Then you have to try to plant flowers now if you want to change it."

in other. This is a good example of how the strategy for the Lean initiative has changed towards a state where the individual sections' environments are taken into account in the choice of tools, for instance.

Looking at what should be the motivation for the employees at OEG to work with Lean, some interviewees mentioned that Lean will allow for people in the organisation to share responsibility, but also generate freedom for the individuals. Motivation for the employees, not in the form of monetary rewards, was also mentioned as the key at some of the study visits. At SKF, empowerment to the workforce was considered to be the reason for working with Lean, while Emballator Lagan Plast simply saw the work with Lean as a way of creating a better working environment for everyone.

There is a lot of focus on motivation at OEG; in the Lean exercise, motivation wound up in third place. The view on motivation has, however, been proven to differ. Some interviewees lack motivation so far, some see that motivation will present itself as a result from working with Lean. Yet another group of interviewees find that the direction for the Lean work and the answer to the question "why do we work with Lean?" is the only motivation necessary.

5.1.3 Communication in a change process

One of the Lean network interviewees spoke of awareness within this network of where the Lean initiative is heading, but so far this knowledge has not been spread within the entire organisation. A strategy for the change to a Lean organisation, which is rooted in all parts of the organisation, is thought of as being the basis for creating a common language for the change among all divisions, according to some interviewees. Barrett (2002) talks of the importance of having a strategic focus in the communication within the company. It is not enough to have a strategy for the change – the communication of the change should be strategic. Although the Lean initiative is part of the strategic work within OEG, the strategic focus on communication could probably increase.

Moreover, some of the interviewees have pointed out different ways of communicating. In rhetorical literature (Bergman & Klefsjö, 2002) it is pointed out that messages must be communicated from the source over and over again if they are to reach all intended receivers. At OEG, management has relied a lot on the intranet, but the value of seminars, emails and simply going out into the organisation and speak about changes should not be underappreciated. For example, some interviewees have asked what will happen after the educational series end in June 2012. If there is a strategy for the time period after that, it could be beneficial to communicate it now.

Barrett (2002) talks about the importance of integrating communication about a change in all business processes and that management on all levels give this a strategic focus. However, information is not the most important thing for a successful Lean initiative according to the Lean exercise; people want to be affected by Lean, not just hear about it. But, that does not mean that information is unimportant for the Lean initiative at OEG. As expressed by Furuhjelm at Saab Aeronautics, information is vital to maintain the interest for the Lean initiative. This is something that some interviewees also said in connection to the Lean exercise. Furthermore, Furuhjelm said that one should be careful when producing information so that the Lean work is not negatively affected by it. At OEG, some interviewees have discussed that there is an overproduction of information currently. One suggestion would be that the JIT principle is applied to all information; think about what you want to convey and to whom before producing the information.
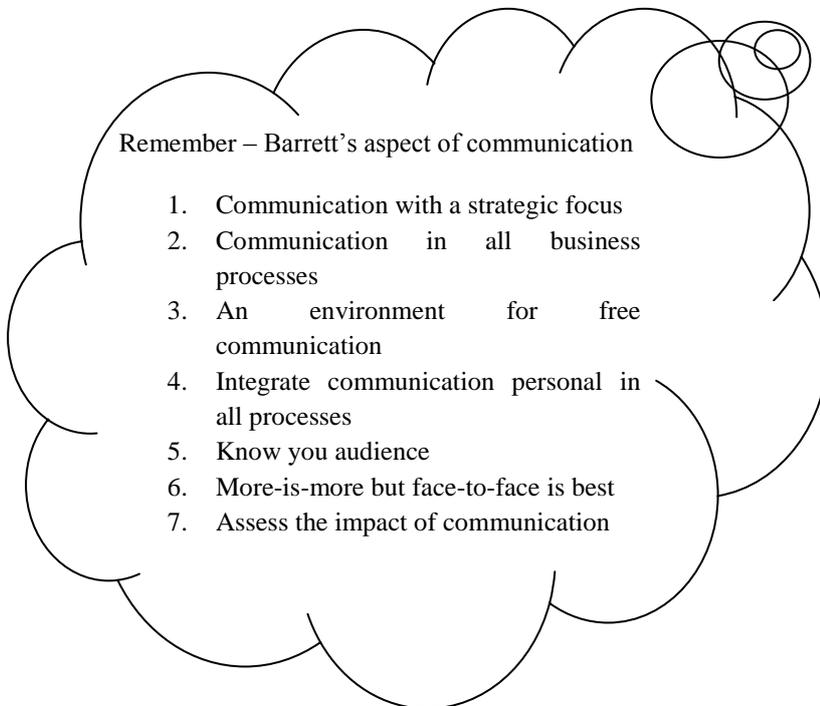
Remember – Barrett's aspect of communication

1. Communication with a strategic focus
2. Communication in all business processes
3. An environment for free communication
4. Integrate communication personal in all processes
5. Know you audience
6. More-is-more but face-to-face is best
7. Assess the impact of communication

At OEG the Lean team works closely with the senior communication manager, so as to make sure that vital information is communicated in the right manner for the right audience, something Barrett (2002) recommends. It is also important to know one's audience when communicating change in an organisation and since managers in the lower levels of the organisation have better knowledge about the concrete activities in the organisation they can have a vital role to play in the communication efforts. Even though the LAs' role is to support the managers in the Lean initiative, having promoters for Lean in the company who are not tied to management positions can help in the communication about Lean. LAs who also fill a role as colleagues to the employees can, just as a section or project managers, offer face-to-face communication, which is an aspect that Barrett (2002) says is more important than pushing out a lot of information and hoping that it will reach the right people.

5.1.4 Change agents
According to Gilley et al. (2009), change agents are leaders who coach others to question the "status quo". Chrusciel (2008) describe change drivers as people who are action oriented with the ability to inspire others and who have the respect of the organisation, views that are supported in the interviews with the employees.

In the interviews with the LAs it is clear that the reason why they have become LAs varies a lot; some have been chosen by their managers while others have requested to become LAs themselves. According to the Lean team the criteria set for the department managers were to choose someone who is an unofficial leader in the group and who showed interest in Lean. During the interviewees,

Remember – Change agents

A change agent is someone who:

- Sees the hidden faults
- Challenges the surroundings
- Is action oriented
- Recognises that change is important
- Has the respect of the organisation

all LAs said that they think that the concept of Lean is good for OEG. From this it could be seen that the second criterion for choosing them was fulfilled for all interviewees. However, as a group the LAs are a bit ad hoc. According to some LAs, the level of attendance at the meetings varies from one meeting to another, since other tasks sometimes are prioritised instead. In the interviews it is clear that the current role description of the LAs is not enough and that some want more structure. A recommendation would therefore be to clearly specify what is expected from the LAs, and, if considered necessary, make the LA meetings mandatory.

At Saab Aeronautics one way of standardising the role of the LAs has been done by giving LAs specific focus areas, in this case different Lean tools. According to Furuhjelm it has been noticed that it is easier for the LAs to work when they are given a focus area. As time goes by, however, at OEG it might be beneficial to let the LAs work more freely and to recognise that not all LAs want guidelines, but it could be beneficial for those that are new to the group.

To help create structure and define what being an LA is all about, Scania lets people themselves apply for the position as LA. In that way they can be sure that the position is filled by someone who is interested in Lean and they can define the role more clearly - it is a position employees apply for just as any other job.

The interviews with the LAs also further confirm the confusion, when some express that they themselves are unsure of what their role is. Due to this confusion in the Lean network, there is also some confusion among the employees in the organisation regarding what the Lean network's part in the Lean initiative is. One thing that is noticed regarding the LAs is that some employees think that the LAs are there to support the employees. While this to some extent might be true, when asked, the LAs themselves express that their role is to support the managers.

When talking about change agents, Flingstein (1997) and Beckert (1999) both describe people who in an institutionalised organisation challenge their surroundings in order to enhance it, and according to Beckert (1999) mobilise resources needed to make changes. While this is true to some extent for the Lean network, some LAs are still struggling and are unsure of how
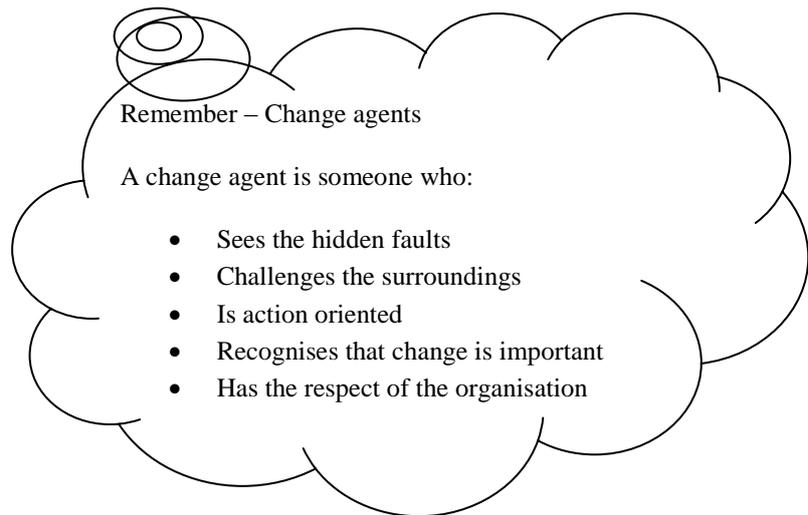
to partake in the Lean initiative. From what is expressed in the interviews with LAs, there is a difference in the amount of training they have been given in Lean and how long they have been part of Lean network. In one example with two LAs who joined the network shortly after each other, one has received extra training in Lean while the other has not been given the same opportunity; the one with extra training is more confident and has started a few projects in her department while the other one is still trying to find her place. This is just one example, but there are other examples where more support to the LAs would be beneficial. However, when giving the LAs education about Lean it is important to think about which environment they are working in and take into consideration what type of Lean education they need to be able to do their job in that environment.

According to Chrusciel (2008) the motivation for change agents is the recognition in the organisation that change is important. When it comes to recognition in the organisation that the job LAs are doing is viewed as important, the LAs are hindered by the fact that most of the interviewed employees are unaware of what the LAs are doing and sometimes do not even know who the LAs are. That means that one of the motivational factors for a change agent according to Chrusciel (2008), getting appreciation from others in the organisation, may be affected.

If the change agents can be seen as people who question the status quo, the complement to that personality is according to Beckert (1999) the managers who can act as stabilisers. In this case it could mean that the managers need to drive the Lean initiative and, when needed, ask for input and suggestions from the Lean network of what to do next and then stabilise Lean in the organisation by making sure that the new tools and methods are continued to be used.

5.2 The concept of naturalisation

OEG wants to make Lean a natural part of its organisation. Currently, OEG has adopted a habit of always making every detail as good as possible, sometimes at the expense of the entirety, as some interviewees put it. Using Book's (2006) definition of naturalisation, Lean can only be naturalised if the organisation creates habits of copying and working according to Lean practices and principles. In other words the organisation must create a habit of improving continuously. Continuous improvements should be one of the cornerstones of the organisation. According to Edmonds (2011), change can become a natural part of the organisation if the change constantly has a direction, although the direction itself may change over time. However, at present this direction is not known to everyone at OEG, as is expressed by many interviewees.

Remember – Naturalisation

By creating an organisation that is constantly changing and adapting to its environment and which is able to create habits and routines that makes it easier to coexist in the organisation, it is possible to naturalise a change in the organisation.
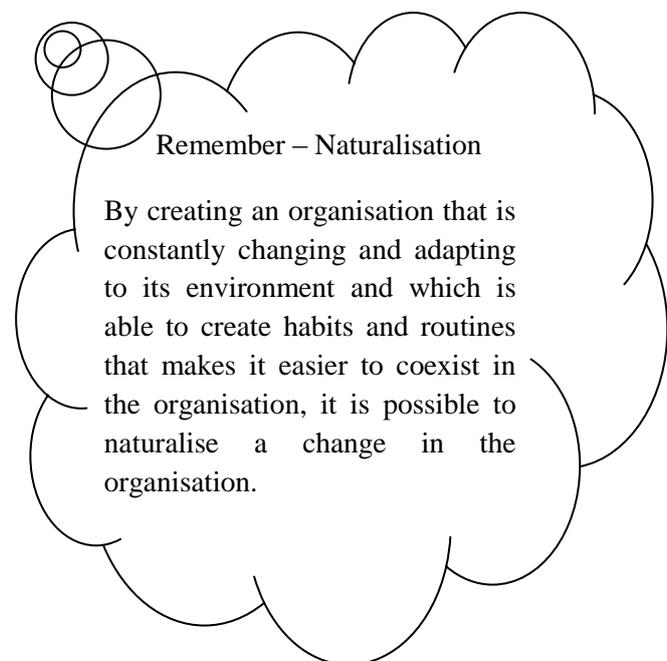
5.2.1 Organisational learning in a naturalisation context

To stimulate new ideas and to make sure that learning occurs in an organisation the individuals in it are very important, according to Argyris (1999) and Popper and Lipshitz (2000). During the interview, Book said that if an organisation wants to change its processes and make Lean a natural part of the organisation, everyone in the organisation needs to become learners. In the conducted exercise education was viewed as being the most important thing for Lean to succeed at OEG. Many interviewees have pointed out that they are very positive to the educational series with Modig, but some of them have also said that they still do not know how to bring the conceptual Lean knowledge into their everyday work.
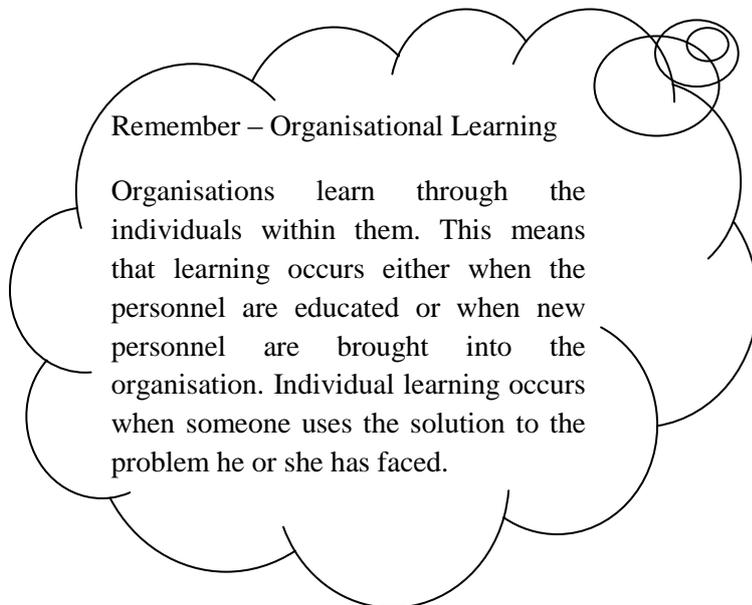
Remember – Organisational Learning

Organisations learn through the individuals within them. This means that learning occurs either when the personnel are educated or when new personnel are brought into the organisation. Individual learning occurs when someone uses the solution to the problem he or she has faced.

According to Bükk one of the best ways to achieve deep individual learning is by doing, which in turn means that someone is using the solution to a problem he or she has faced. To make sure that double-loop learning occurs, employees should be given the opportunity to after any kind of education use it in practice. At Emballator Lagan Plast, SKF, RUAG Space and Saab Aeronautics, they have created their own Lean education, where internal personnel teach the rest of the personnel about Lean in their company. Bükk mentions that it is important that companies have their own education so that they can say what Lean means in their organisation.

Book mentions that in order for a Lean to be naturalised in a company they need to apply systems thinking – in other words focus on the entirety and not just on one process. One example of a subject for education at OEG tied to this is cross functionality. Many interviewees feel that they work cross functionally within their projects, but at the same time walls have been said to exist between different divisions.

Emballator Lagan Plast and Scania have also understood the importance of creating systems thinking in the company. All employees at Emballator are given information about plastics – no matter if they work in production or in an administrative position. At Scania many employees have taken truck licenses, merely for the sake of understanding how what they produce in their part of the chain affects the end result and how Scania's products are perceived by the end customer. The importance of learning about your customer, internal as well as external ones, has also been expressed in interviews at OEG. At Emballator Lagan Plast the knowledge of the end customer has been secured by going on Gembas at the customers' sites and seeing what problems they experience in their day-to-day work.

According to Popper and Lipshitz (2000) an organisation can also learn by bringing in new people to the organisation. Until recently, OEG has not let their consultants take part in the Lean initiative. However, this is a group that might see the organisation through different eyes and who can bring in new ideas and learnings to OEG.

5.3 The concept of Lean

One of the Lean initiators said that the reason why OEG works with Lean is not because it is a badly functioning company, but because it is well-functioning and has the potential of becoming even better. Then again, as some interviewees have said, there is a culture within OEG of making things as good as possible, sometimes at the expense of the deadline. Lean makes it possible to see how the small parts affect the outcome of the entirety (Liker, 2004) and that should make it possible for the organisation to decrease the amount of sub optimisations and instead focus on increasing the billable customer value, as requested by one interviewee in the Lean network.

"The main advantage for me as an employee is that I get to work for a company that does not make a mess out of itself."

Liker (2004) has pointed out that the elimination of non-value adding work must be preceded by a stage where the organisation standardises and reduces unevenness. This is not something that has been mentioned extensively at OEG – perhaps because it is difficult to define standardisation in high technology industries. On the other hand, that does make it even more important to try to define it.

The overburdening of resources at OEG is considered high; many interviewees talk about their full schedules. There is, however, a focus on trying to reduce the overburdening of human resources. Some projects are currently trying to reduce the resource usage. In these projects people are only allowed to be scheduled for 80 percent of their capacity time-wise. As of yet, the project leaders in these groups are confident that the tests will have positive end results. Argyris (1999) writes about the importance of time for reflection for the organisation to be able to learn and improve and therefore developments like this one are vital if Lean is going to be naturalised at OEG. Scania uses the concept of "andon resources" in their production line; in other words, one extra person always mans the line and acts as a support if someone needs help. In a product development department it is perhaps not viable to have an extra person working without having an actual assignment, but instead it could be possible to decrease the scheduled time for each person in the same way as has already been done in the mentioned projects.

Lean at OEG is as of now not defined concretely. The individual employee has only been introduced to the flow concept through the educational series, but the question of what Lean is in their everyday work is more difficult to answer. OEG consists of very diverse types of operations, ranging from production to product development.

When asked what Lean is, many interviewees have had good and valid answers. However, Modig and Book have both pointed out that a united view on Lean within the organisation is essential if Lean is going to become natural. Book has said that the knowledge among people about *why* they should act on certain needs is the key to creating an organisation where Lean is naturalised. This is supported by Kotter's (1996) model, where the communication of why the change is made is mentioned as one of the eight steps. Modig has also clarified that the intention behind why the organisation chooses to introduce Lean in particular must be explained. There needs to be a common understanding of what *"the beautiful tree",* described by Modig and Åhlström (2011), will look like at OEG. Perhaps this could be shaped in a steering document where the values and principles for Lean at OEG are connected. More concretely, the aim is that each employee should give the same concrete answer when asked what Lean at OEG is.

Remember – The conceptual levels of Lean

Values

Principles

Methods

Tools & Activities
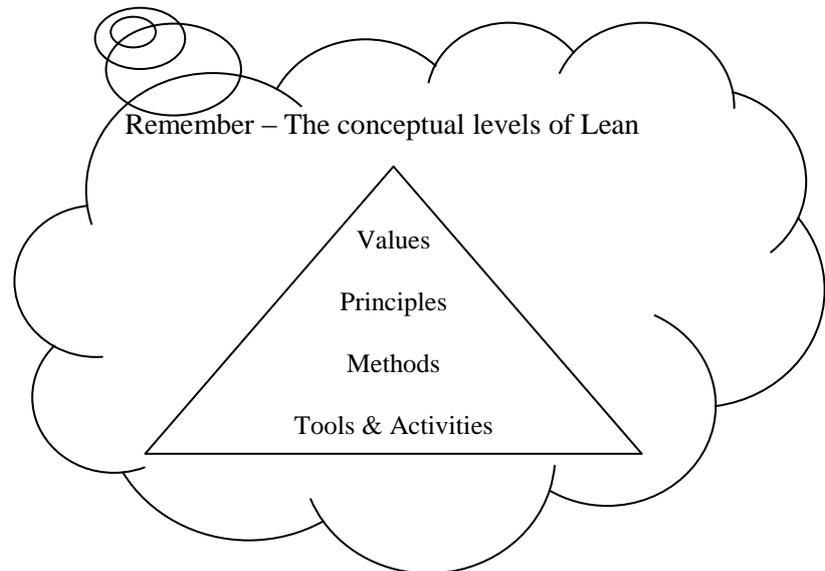
According to Modig and Åhlström (2011), Lean can be said to consist of four conceptual levels where values are at the top. Since Lean can mean different things to different organisations, Modig and Åhlström (2011) suggest that organisations should decide what Lean means to them. At Saab Aeronautics the values in the Lean temple have been based on the core values of the Saab Group, something that could be suggested to be the same at OEG. The principles of Lean have been suggested by Liker and Morgan (2006) to be Jidoka and JIT. At OEG there is a need for a strategy for how these principles could be reached throughout the organisation.

At SKF they have chosen to let the values of the organisation drive the Lean work as well. The connection between the organisational values and Lean is found in the principles presented in their "Excellence bridge". Based on the model by Modig and Åhlström (2011) and SKF's successful work with connecting the values and principles, it is once again suggested that OEG should base their Lean work on the values of the Saab Group, in order to find a foundation for those values in the organisation. They also need to create and promote principles in accordance with the mentioned model – this is something that has been requested by some interviewees too.

According to Hugnell (2010) the methods of Lean can be tied to *"the way we do things 'round here."* Presently, there are different routines in the different sections and departments at OEG. Even though the methods need to be adjusted to the different sections, it is

recommended to also find common routines for all parts of the organisation in order to reduce the "walls" that, according to one interviewee, exist in the organisation. According to Modig and Åhlström (2011,) the chosen methods will affect which tools and activities the groups in the organisation work with. At OEG it is suggested that the tools chosen are adjusted to the specific part of the organisation in which it is going to be used, for example product development sections should work with Lean PD.

As described by some interviewees in the Lean network, the use of Lean tools and methods differs between different sections and is demand driven. This means that the sections can themselves decide what tools to use, which in turn has lead to diversity in how and what tools are used within the company. The demand driven model allows for the sections to fit tools to their specific needs. It is important to know why the tools are chosen; there needs to be a clear link to the principles that guide the Lean work.

Furthermore, without knowing what tools and methods exist, it is difficult for employees to request them. One way of solving this issue is to educate people on what Lean means in different sorts of operations. For example, the employees who work with product development could be taught what set based design is, since that is something that OEG wants to make a part of the organisation.

Modig discussed that there is not one preferable way to go about the introduction of Lean in a company; in some cases it could be good to start by introducing tools, in other cases it might be easier to present the values and principles first. One could argue that different parts of one and the same organisation could start in different ways. At OEG they began with tools in the producing division (Sourcing and Supply), for instance, and there they were found to have a good impact according to one of the Lean initiators. That does, however, not mean that the same development will be evident in the product development division. There it might be difficult to see what tools fit the organisation before the conceptual thoughts of Lean are really understood. Bükk on the other hand suggests that an organisation begins with using tools before moving on to values and principles, since this gives people something to tie the conceptual thoughts to. Otherwise there is a risk that individuals get confused and do not understand how to apply the knowledge.

Apart from education on Lean, Gembas between different sections within the company could prove useful. In SKF's case, practice grounds in the manufacturing department have allowed employees to see good examples for themselves and learn from them. This type of internal benchmarking will not only make it possible to see what tools other groups use, but also make it possible to compare the work with a certain tool and see what makes it well functioning in one group, but not in another.

5.3.2 Lean manufacturing and Lean product development

Since the creation of a product in a system perspective consists of two stages, product development and manufacturing, Martínez Léon & Farris (2011) suggest that there is a need for both the approach of Lean manufacturing and that of Lean PD. According to Holmdahl (2010) it could also be catastrophic for a company to use the same Lean concepts in the development stage as in the manufacturing stage. Therefore it is suggested that OEG, which

works with development and production of products, should use both approaches to the Lean concept. However, it is possible to base both approaches on the same overlying values and principles. Methods, tools and activities, on the other hand, should be adjusted for each department, based on what Lean approach suits their work best.

5.3.3 Cultural considerations concerning Lean

According to Emiliani and Stec (2005), there may be hinders to the Lean initiative such as failed transformation efforts in the past, management's lack of knowhow and internal resistance. At OEG these three hinders are currently being addressed through the educational series. By introducing employees to the concepts of Lean and letting everyone partake in discussion groups, the organisation hopes that resistance due to not knowing what Lean is will be addressed, and that everyone will be more eager to learn more about Lean. However, regarding past transformation efforts such as Six Sigma it is suggested that OEG communicates what learnings the organisation has brought with them into the Lean initiative in order to address the BOHICA syndrome, something both SKF and RUAG Space have done. To further address the lack of knowhow, it is suggested that managers get education which is adjusted to their own departments.

Remember – BOHICA

"Bend over, here it comes again", abbreviated **BOHICA**, is used to describe a feeling among employees that an unfavorable chain of events is about to repeat itself. The term is often used when "yet another" improvement program is on its way into an organisation (Connell & Waring, 2002).
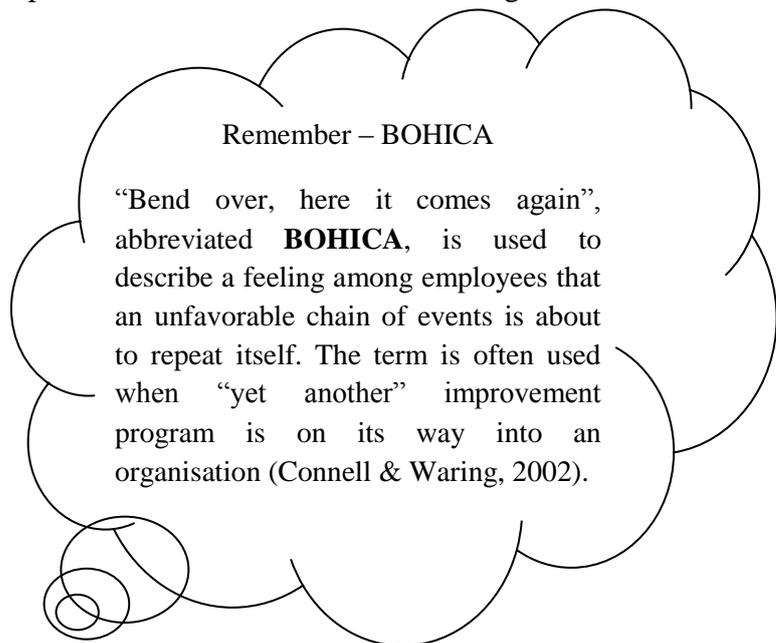
Even though most employees in the interviews have pointed out that they think the Lean initiative is good for OEG, some have expressed that the BOHICA syndrome to some extent is present in the organisation. To address this, many interviewees say that OEG needs to be persistent and continue to give Lean time to settle. This is also evident from the different study visits where all companies talk about the fact that becoming a Lean organisation takes time. Another suggestion in order to lessen the BOHICA syndrome is to keep the focus on those employees that are positive to Lean, in the hope that those that are still uncertain of where they stand will follow the positive ones. However, this does not mean that negative comments should not be addressed, but that they should not become a focus point instead of the positive comments.

5.4 Organisational culture

According to Ahmed (1998) culture can be defined to consist of both an outer, explicit part, which can be said to involve behaviour and actions, and an inner implicit part, which can be said to be the beliefs and values that control the explicit part. So far, OEG has mostly worked on changing the organisational climate, the explicit part, which Ahmed (1998) also describes as the procedures and practices of the organisation. These more visible parts of the culture are more easily affected in everyday work than an organisation's implicit cultural beliefs.

Although it is difficult to change the implicit parts of a culture, it is still possible (Ahmed, 1998). OEG can set up guidelines and a vision for the coming changes, but is up to each employee to decide if he or she can accept the given guidelines as part of his or her job.

According to Schein (1996) there are different cultures in different functions and on different hierarchy levels within an organisation. For OEG it is good to know about this phenomenon and that conflicts regarding Lean occur because of it. Even though different groups might think they have better things to do, Lean is still a joint responsibility and everyone needs to take responsibility if it is to succeed.

5.4.1 The effect of a strong culture

Gordon and DiTomaso (1992) talk about how an organisational culture is constantly forming based on the forces within an organisation and its surroundings. However, Ahmed (1998) suggests that the strength of a culture affects how easily it can change. That could mean that how easy it is to naturalise Lean in an organisation may differ from one organisation to another.

On the way to reaching a naturalisation of Lean in the organisation, there will need to be a cultural change. Currently, some interviewees find that there are walls between different groupings within the organisation. These must be replaced by a united culture over all divisions, departments and sections. The culture at OEG can be defined as strong, in accordance with Gordon and DiTomaso's (1992) views. Most employees have worked in the company for an extended period of time, and values and practices for how things should be done have been created. Johnson (1992) states that a change must be allowed to take time in order for these practices to change.

The employees at OEG have, as previously stated, an average length of service of 21 years. Due to this, one must take into account that the people working in the organisation have developed procedures and ways of doing things that are very well-founded in the organisation. Many interviewees express some sort of feeling that they are already working according to Lean, but people in other divisions have higher improvement potential. So far it seems difficult for the individual employee to see how Lean fits with his or her job.

Johnson (1992) states that when a culture is reinforced time and time again it becomes almost like a safety net that the people can turn to and find answers to how they have acted in similar situations. This might explain the BOHICA syndrome that some interviewees mention. One way of breaking the BOHICA syndrome might therefore be to show that past change initiatives are a part of the new initiative.

6 Conclusion

The purpose of this thesis was to investigate how Lean can become a natural part of OEG. According to Lewin (1947) change will manage itself if it has a direction. Under such circumstances change will be never-ending and occur naturally, which means that the only thing that is certain is that the change will continue. In *The managing of change processes,* Lewin (1947) talks about large and planned changes in an organisation. Moving from a non-Lean organisation to a Lean organisation is in itself a big change which needs to be planned and executed even though many argue that Lean in itself consists of many continuous improvements and that it never in its entirety can be completed. Book and Bükk both arrive to the assumption that an organisation has to be like an organism able to adjust over time; in other words Lean has to become a natural part of the organisation.

To answer the first research question, OEG has worked with the methods and tools of Lean for approximately five years, but it is not until now that they have begun to introduce the employees to the conceptual thinking connected with Lean. To truly make Lean a natural part of the organisation it is a necessity that the way of thinking is encompassed in the culture of the organisation. Furthermore, the knowledge of what Lean will mean in this particular company's context is not yet rooted in the organisation and among the employees. Some issues in the form of, for instance, previous failed change initiatives exist; such issues must be dealt with for the Lean initiative to be successful. The Lean concept is also rather new to the section managers; it is likely that not all of them have bought in to the concept and actively allow their subordinates to become Lean.

In terms of the roles of management and the Lean network, which have been discussed based on the second research question, there is a need to transfer the responsibility for the initiative from the Lean network to the line management. This will ensure the preservation and continuous work with Lean within the organisation even if the Lean network should change members or disappear. Furthermore, the Lean initiative should be a top down effort, meaning that the train-the-trainer principle must apply to, for example, educational efforts. However, the aim should always be to empower the employees in order to achieve a situation where the organisation can be considered the ever-changing organism described in the introduction to this chapter.

The Lean network does, however, have an important role to fill as a supporting function to managers on all levels and as a knowledge base. Compared to the current structure, higher demands should be put on the LAs. The hours spent on working as an LA should be considered a work assignment just as important as any other task they work on. In regards to the LAs, demands should also be put on their managers, who need to accept their work as LAs and allow them the opportunity to work with Lean.

To answer the third research question: in terms of the future of the Lean work, it is felt that the work with Lean must be strategically planned and visualised within all parts of OEG. There needs to be a consensus over all borders within the organisation about what Lean is and where the Lean work is headed. Furthermore, it should be made clear to all employees that it is the senior management who sets the strategy for the Lean work, in order for everyone to

realise that Lean is a top priority for the organisation. In a more long term perspective, the aim should be to make Lean a natural part of the Saab Group in order to realise all potential benefits of working with Lean. More concrete recommendations for the future of the Lean work within OEG are presented in the next chapter.

7 Recommendations

First of all, the **strategy for the Lean** initiative must be communicated to the entire OEG. As part of this work a **vision** that sets the overall direction for the change could be beneficiary. Furthermore, by creating their own **Lean temple** which visualises what Lean at OEG is it is easier for all employees to understand the value of Lean in their everyday work.

The current educational series will provide all employees with knowledge about what Lean is. One suggestion is that this series should be followed by **internal education aimed at different areas** where the employees work. Employees in product development should, for instance, be educated in Lean PD, while those in production could be taught Lean manufacturing. The educations should be carried out in a train-the-trainer manner.

As pointed out by Ulf Näsström in the introduction to the educational series, the Lean initiative is not intended to be yet another improvement program at OEG. Lean is not completely new; many previous initiatives have built a solid ground for the Lean initiative, for instance the Six Sigma program that was carried out in the 2000s and the JIT program that was carried out in the late 1980s. To counteract the negative comment *"We have done this before"* it is suggested that a **historical mapping of all previous improvement programs** is made. This mapping should not only show when the initiatives took place, but also what the main learnings from them were and how those learnings are a part of the organisation today and used in the Lean work.

To really make Lean a natural part of every employees work it is important to **spread good examples** of functioning Lean work within the organisation; this should be communicated through all possible forums. **Gembas** and **practice grounds** are believed to be ways of spreading good examples. Regarding practice grounds, that is a way of making people see how Lean works in another section and, if the practice ground functions well, wanting to try it themselves in their own sections. Practice grounds are believed to be positive in a product development environment, where it is more difficult to focus on creating flow than in a production environment.

Gembas should be made a natural part of every employee's work, whether he or she is a manager or not. Furthermore, the Gembas should be made between different divisions in order for everyone to understand each others' work situations and grasp how OEG functions as a unit. There should be routines for the Gembas. For example, it is important not just to look at what others do, but to also evaluate *why* they do it. When talking to the employees in the visited workplace, open questions should be used – it is preferred to ask *"Why do you do it like this?"* instead of telling others how to do things.

7.1 The Lean ambassador network

As of today the Lean effort at OEG is active in the Lean network and on its way out into the organisation. To help in this transition the Lean network has to follow the vision that the senior management is to set. Throughout the interviews it is clear that there is a confusion regarding who is in charge of the Lean initiative: the managers or the Lean network. According to Kotter (1996), Modig and Lindér, the Lean initiative has to be owned by senior

management all the way down to the section managers. But as Kotter (1996) points out, the change team does not only have to consist of managers, which is where the Lean network at OEG comes into the picture.

At the moment the LA network is very ad hoc. Those that are new to the group do not always know what is expected of them and there are different levels of training of the LAs, which means that the LAs do not always know what is expected of them and have difficulties partaking. The role of being an LA must be considered a job; **all LAs should have a common detailed role description, the LA network meetings should be mandatory and the LAs should work as a group in a common direction**. The LAs need to be promoted and their role in the Lean initiative has to be concretised to everyone in the organisation. It should be remembered that the LA network presents an enormous potential in that they are cross functional and can see problems that are common in many sections; they present an opportunity to truly apply a systems thinking to the Lean work.

For the LAs as individuals to be able to work actively with Lean, they all need to be well-educated on the concept of Lean. This **education** should be **within the field where the LA performs its work**, for example Lean PD if the LA surrounds himself or herself with employees that work with systems design. In the long term the **work as an LA should be a job** that applicants can sign up for, in the same way as it is at Scania. This will ensure that the people working as LAs are fully committed to their assignment.

Regarding the meeting structure at LA network meetings, this could use a clearer structure in that the learnings from the meetings should be possible for the LAs to transform into active usage in their own sections. In other words, if a meeting consists of, for example, a **one-hour education** on some tool, all LAs should be able and necessitated to **use the tool in their own sections** and then evaluate their learnings from the test as a group in the next meeting. An alternative to this structure is that everyone is told to **work with a specific field** for three months: After those three months have passed, the LAs' work is evaluated to see who did best and what the others could learn from that.

7.2 In a long term perspective

In a more general and long term perspective, Lean is not something that can be made a part of OEG and then left to its own devices. The aim should be that the entire **Saab Group has one coordinated Lean effort** in order for the full potential of working with Lean to be realised. As Bükk said, the best way of selling something is to not sell it at all. In the long term, the goal for the Lean initiative must be the same towards the Saab Group's senior management and the employees within, in this case, OEG. The employees will inevitably call the bluff if the long term strategy of the Saab Group counteracts the long term strategy for OEG's Lean work.

The Lean work so far has been focused on improving continuously and incrementally, but in a longer perspective it is worth noting that a successful company, particularly in high technology industries, must be **innovative as well**. It can for example be seen that Scania not only works with small improvements – the change to the Scania Flexible System is a good example of an innovative improvement.

If possible, it would be good if everyone was given the opportunity to **understand what the customer or user requires** from the end product in order to be able to adjust their work to those requirements. It is probably not possible to take Gembas to the customers' sites, but make sure to create an open information environment within the organisation.

Finally, make sure that the **time and space** needed for conducting a fruitful Lean work is provided. Stressed people and people pressed into too small rooms seldom make a good job. The next big step for OEG should be to go from learning what Lean is to use this knowledge and actively work with Lean in their regular jobs.

7.3 Suggestions for future studies

For future studies within the field of Lean at OEG, some different topics could be of interest. Firstly, Lean leadership could be applied to the manager role from a behavioural perspective. Secondly, it would be interesting to see how the projects can be run in a Lean manner, despite the fact that the project members have different functional group belongings; this is an interesting topic when trying to create an even more cross functional organisation.

Lean in different types of work could be studied to see what Lean in product development, manufacturing and administrative work could mean in this company. It would then be beneficial with studies that are focused on one specific field at a time.

For the LAs, it would be beneficial if a clearer role description was created. Furthermore, there is a need to decide on a procedure for appointing LAs. Finally, it would be interesting to see ideas on how the concepts of practice grounds and Gembas could be used at OEG.

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Appendices

Appendix A: The Lean initiative at OEG

Education

	2007	2008	2009	2010	2011	2012	2013	2014	2015
		Two people LPD at Chalmers		2 people LPD at Chalmers	6 people LPD at Chalmers or equivalent	4-6 people LPD at Chalmers or equivalent	4-6 people LPD at Chalmers or equivalent		
				Lean intro for everyone at OEG	Lean intro for the OEG management & Lean Ambassadors	Deeper knowledge of Lean, 200 people	Deeper knowledge of Lean, everyone at OEG		
	LEGO-game the manufacturing personnel	LEGO-game the manufacturing personnel	LEGO-game the product development department	LEGO-game the product development department	LEGO-game the product development department	LEGO-game the product development department	50% of the leaders have a deep knowledge of Lean	100% of the leaders have a deep knowledge of Lean	

Goal

	2007	2008	2009	2010	2011	2012	2013	2014	2015
					A crave for Lean in the organisation	Lean house		Lean culture. A financial model that support learning in the organisation	
					3 completed improvement suggestions / person	4 completed improvement suggestions / person	8 completed improvement suggestions / person	10 completed improvement suggestions / person	

Pre 2007
Financed by FMV
Ericsson

Civil and defenceside
Möndal to Kallebäck
Sold to SAAB
Layoffs
Capacity building
Recruitment peeks
Aging personnel average age 35 -> 45 years
Pressure of higher profits5S and TPM in the manufacturing department

Timeline: 2007 2008 2009 2010 2011 2012 2013 2014 2015

Methods/Tools/Culture

	2007	2008	2009	2010	2011	2012	2013	2014	2015
		Management is introduced in Lean and tests "go to gemba"	EDS is created. Steal with pride	"Go to gemba" Study visit at othe companies Lean network at SAAB Crossfunctional groups for improvements are initiatied	Efforts to change the culture are initiated "right for you" and "improved skills in changing" are introduced in the IMP templet Plans for "go to gemba" Work with Saabs values Pinpoint the Lean principles Spread Best Practice	Collaborating with strategic partners should be a part of OEG's strategy 5 whys are used systematically Start the strategic work needed for a "learning organisation" Value stream mapping introduced	Collaborating with strategic partners as a part of OEG's strategy	Strategy for a learning organisation	Clear a information-, and material flow, that everyone at OEG knows Pilot: Set based design
	Resource pulse Mechanics	PDCA and visual planning in the manufacturing department	PDCA mechanics						

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1. What is your view on the Lean work at OEG?

2. In what way have you been involved in the implementation of Lean?

    -   What has been implemented and why?

3. Is there a specific goal/vision for Lean at OEG?

4. Which hinders have you met in your work with Lean?

5. How is Lean used in employees' everyday work?

6. What is the role of every employee in the Lean work?

1. What do you work with?

2. How would you define Lean?

3. How were you selected to be a Lean ambassador?

4. What does it entail to be a Lean ambassador?

   - Is your role clear to your co-workers?

5. Do you feel supported in your work as a Lean ambassador?

   - What could be improved?

6. What is the role of the Lean team in the Lean work?

7. What motivates you to work with Lean?

8. What do you think is vital if the Lean work is going to succeed?

9. In what ways do you use Lean in your everyday work [apart from when working with it as a Lean ambassador]?

   - How does Lean affect your work positively?

10. In what way do you spread knowledge about Lean to your colleagues?

    - Which way do you think is the best way in order to 'reach out'?

11. What do you think needs to be developed for the Lean ambassadors to be used more efficiently in the Lean work?

1. What is Lean?

2. How have you received information about what Lean is?

3. Do you know what the role of the Lean ambassadors is?

   - Do you have any LAs in your proximity?

4. Do you know what the goal of Lean at OEG is?

5. How do you work with Lean?

6. Have your work and your working environment changed due to the introduction of

   Lean?

   - What has become better/worse?

   - Do you feel that your everyday work has been taken into account when

     introducing Lean?

Appendix E: Simple comparison of the visited companies

	Emballator	Aeronautics	SKF	RUAG Space	Scania
Lean ambassadors		✘	✘	✘	✘
CEO commitment	✘		✘		✘
Own education	✘	✘	✘	✘	✘
Extra training for employees about the product	✘				✘
Call it Lean in the organisation		✘			✘
Build their Lean concept on previous quality initiatives			✘	✘	