Development of the S&OP process at Seco Tools AB
- Aligned with today´s supply chain planning processes

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Development of the S&OP process at Seco Tools AB
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The thesis has been conducted at the company Seco Tools AB during 20 weeks with start in January 2014. We will like to thank everyone involved who have participated with their time and knowledge to make this thesis possible to accomplish. Thanks are directed towards the supervisors Suzann Ackesten and Richard Jansson for helping us conduct the thesis and for the feedback you have given. Also, thanks to Weronicka Widén for driving us to work every morning.

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It has been a challenging and yet fun part to write this thesis. We hope it will come to use at Seco Tools and that any other readers find it as interesting as we do.

Linköping, 2014-06-09

Samuel Jerlström Hultqvist

Sofia Wikberg
EXECUTIVE SUMMARY

Title:
Development of the S&OP process at Seco Tools AB – Aligned with today’s supply chain planning processes

Background:
Companies strive to produce as close to customer demand as possible to reduce the cost, inventories, etc. One process that deals with this issue of balancing demand and supply is Sales & Operations Planning (S&OP). Seco Tools is a company with their head-office located in Fagersta, Sweden, which is experiencing high inventory levels and a need of cutting cost. The ongoing project Supply Chain Planning at Seco Tools resulted in the implementation of a new software which enables them to improve demand, inventory, and supply planning. As a result of the improved planning ability, a new S&OP process is developed and in need for improvement.

Purpose:
The purpose of this thesis is to evaluate the current S&OP process from the Supply Chain Planning project and to suggest future improvements for Seco Tools AB.

Research objectives:
1. Study and describe the current S&OP process at Seco Tools.
2. Analyse and identify differences in Seco Tools’ S&OP process compared to the literature and a benchmark company.
3. Perform deeper analyses within financial integration and the use of KPIs in Seco Tools’ S&OP process.
4. Suggest future improvements to Seco Tools regarding their S&OP process based on the identified differences from research objective 2 and the deeper analysis from research objective 3.

Method:
The planning report set the framework for the carrying through of the thesis. A literature study regarding S&OP and a case study performed at Seco Tools regarding their S&OP have been done in parallel. Seco Tools’ S&OP process has been studied and described with the help of interviews, observations, and internal documents. Analysis was made where Seco Tools S&OP was compared to the theoretical S&OP and the S&OP at AstraZeneca. The analysis led to recommendations to Seco Tools regarding improvements in their S&OP process.

Conclusions:
Two opportunities for improvement were highlighted during the analysis of Seco Tools S&OP. They were financial integration and the use of cross-functional KPIs covering all the departments that were suggested to be involved in S&OP at Seco Tools. Seco Tools should integrate their finance in the process to compare S&OP against the business plan, and the company’s strategy should be well understood by the participants in S&OP. The knowledge of the company’s strategy together with the right authorities in the process will improve the decision making in Seco Tools’ S&OP. Seco Tools also need to implement an S&OP scorecard with KPIs that covers all departments in the company and the strategy as well. This helps to further develop cross-functionality and to early on make root cause analysis of identified problems. Cross-functionality and KPIs are believed to be general recommendations that all companies can use as well, not only something that Seco Tools can take advantage of. A template for an S&OP scorecard especially for Seco Tools has been made. It contains 16 cross-functional KPIs covering all steps and departments involved in S&OP at Seco Tools.
SAMMANFATTNING

Titel:
Utveckling av Seco Tools AB:s process för sälj- och verksamhetsplanering (SVP) – i linje med dagens logistikplanerings-processer

Bakgrund:

Syfte:
Syftet med examensarbetet är att utvärdera SVP-processen som framtogs genom projektet Supply Chain Planning för att sedan föreslå förbättringsåtgärder åt Seco Tools AB.

Forskningsmål:
1. Undersök och beskriv Seco Tools nuvarande SVP-process.

Metodik:

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Chapter 1
Introduction
1. INTRODUCTION

This chapter includes a theoretical background regarding S&OP and a company background of Seco Tools AB. Together these two create a problem description that addresses the broad subject of the thesis. Then the purpose of the thesis is stated. Research questions and delimitations necessary in order to fulfil the purpose of the thesis within the time frame are also presented. At the end of the chapter, a brief structure of the report is presented.

1.1 Background and problem description

This master thesis has been conducted at the company Seco Tools AB. The background of the thesis is divided into two parts, i.e. a theoretical background and a company background. The theoretical background addresses the history and challenges of S&OP where attention is given to why companies should use S&OP. The company background reflects the experiences, problems, and possibilities at Seco Tools regarding S&OP. These two backgrounds will further on be analysed into a problem description. As a result of the problem description, the purpose of the thesis is presented.

1.1.1 Theoretical background

It is a well-known fact that companies in the manufacturing industry are experiencing increasing competition in today’s market. Customers tend to ask for shorter lead times and higher on-time delivery percentages. It has caused many companies trouble in their planning and control. The increasing competition has forced the companies to look for new ways to improve their efficiency in manufacturing planning and control. During the past 50 years the level of planning and control in the manufacturing companies has improved; from the less complex level of planning with shop floor control in the 1960s to today’s more complex planning with increased information and communication technology (Olhager, 2013). The later allows better communication and integration between business functions (Olhager, 2013; Wallace & Stahl, 2008).

During the 90’s a tool to balance supply and demand, called S&OP, started to develop (Sheldon, 2006; Wallace & Stahl, 2008; Olhager, 2013). S&OP is a cross-functional process involving sales, marketing, product development, manufacturing, finance, etc. with support from the head of the business. The process operates at a tactical planning level, working as the link between the strategic business plan and the detailed operational plans (Wallace & Stahl, 2008; Thomé, et al., 2012; Grimson & Pyke, 2007). Tactical planning is done at an aggregated level focusing on volume planning for product families instead of the more detailed mix planning level for individual products (Wallace & Stahl, 2008). Aligning volume and mix and balancing the supply and the demand make it easier to maintain high customer service level with a high delivery speed and reliability (Wallace & Stahl, 2008; Wallace, 2006).

S&OP is usually a monthly five-step decision making process, which consists of the following steps: data gathering, demand planning, supply planning, preparation meeting, and executive meeting. The target is to step by step create an agreed supply plan to meet the expected future demands. The supply plan has to be aligned with the company’s strategic plan as well (Wallace & Stahl, 2008).

S&OP implementation is not always a walk in the park. A challenge with S&OP is to have people across the company to fully understand the process (Milliken, 2008; Alexander, 2013). Lack of top management commitment is another aspect many companies are struggling with (Milliken, 2008; Wallace & Stahl, 2008). The general advantages of S&OP often overcome the disadvantages. With S&OP, the top management is given the possibility to view the business holistically with a better perception of the future (Wallace, 2006; Wallace & Stahl, 2008; Grimson & Pyke, 2007; Thomé, et al.,
S&OP comes with two kinds of benefits, i.e. the hard benefits that are quantifiable and measurable and the soft benefits that cannot be quantified but are equally important (Wallace, 2010). Hard benefits that come with implementing S&OP are higher customer service with less finished goods inventory and stable supply rates (Sheldon, 2006; Wallace & Stahl, 2008; Wallace, 2006; Wagner, et al., 2013; Prokopets, 2012). If managed well, faster and more controlled new product introductions (NPIs) emerge as a result of S&OP (Wallace, 2006; Wallace & Stahl, 2008). The soft benefits are: enhanced cross functional teamwork between executives and middle management which leads to better results due to improved decision making; better financial plans that also are aligned with operational plans; the possibility to foresee potential problems in demand and supply before they arise; better control of the business with the use of one set of numbers (Wallace & Stahl, 2008; Wallace, 2006). One set of numbers means operating with a common game plan for sales, marketing, finance, product development, and general management (Wallace & Stahl, 2008).

### 1.1.2 Company background

Seco Tools is a manufacturer of metal cutting tools for the industry in three areas: milling, turning, and holemaking. In 1974 Sandvik AB made a substantial acquisition of Seco Tools AB’s shares. In 2011 Sandvik took over the remaining part of Seco Tools shares. The reason for the takeover was to share knowledge, technology, and distribution networks in order to become more competitive in the market. Seco Tools head-office is located in Fagersta, Sweden (Seco Tools internal documents, 2014). The authors have been stationed at the head-office during the thesis.

Seco Tools belongs to the Sandvik business area Sandvik Machining Solutions (SMS) together with the other product areas Sandvik Coromant, Walter, and Dormer Tools, as shown in Figure 1. SMS is the biggest actor in the metal cutting industry with earnings before interest and taxes (EBIT) margin around 22% (SMS intranet, 2014). The metal cutting industry is known for high profitability. It makes the big players desperately fighting for increased market share while new smaller players trying to enter the market by offering minimum standard quality products at low costs (Seco Tools internal documents, 2014).

![Figure 1. Organization chart of SMS including the product areas (SMS intranet, 2014)](image)

SMS sets the strategic objectives for the four product areas, Figure 1. Increased market share is the aim with the use of differentiation between the product areas. The purpose of the differentiation is to cover a broader market and to reach a larger customer base. Differentiation means that the product areas should be experts in different metal cutting areas and compete with other brands not belonging to SMS. The product areas share SMS’s strategy but should also have their own strategy, brand attribute, corporate culture, and vision. The product areas remain competitors from a customer’s...
point of view. It means that the product areas do belong to SMS but in the market they should promote themselves as an individual product area (Seco Tools internal documents, 2014).

Seco Tools, from a customer’s point of view, is seen competent and practical. By practical Seco Tools means that the solutions they deliver to the customers should make the customers life easier in the increasing complex world by efficiently eliminating waste and optimising resources for both Seco Tools and their customers. Seco Tools are the experts with the knowledge and skills to enable them to do this with confidence from the customers. Their brand attribute is therefore to be the *practical expert* striving to deliver winning solutions that simplifies the customers’ business needs (Seco Tools internal documents, 2014).

Seco Tools have historically been a company with focus on the production but since Sandvik took over the remaining parts of the shares, they focus more on efficiency and costs. One of Seco Tools ambitions is to reduce the inventory levels while increasing the service level. To fulfil this ambition the project "Supply Chain Planning" started two years ago. The project is responsible for implementing the software called Voyager, which handles demand, inventory, and supply planning. It affects all production units (PUs), distribution centres (DCs), and the supply chain planning organization. A part of the project is also to define a new S&OP process adapted to the changes the new software provides with access to more data. The S&OP handles make-to-stock (MTS) items for the standard product portfolio and not make-to-order (MTO) items (Skog, 2014; Arvidsson, 2014; Jansson, 2014).

### 1.1.3 Problem description

Seco Tools have what they consider a working S&OP process, but they do not know how efficient it is and think they can improve it. They believe they can improve the structure, make the process more standardised, and improve their inventory control. A common opinion at Seco Tools is that they spend too much focus on the product mix to utilise full machine capacities without having control of the big picture, the volume and the demand. The focus on mix has led to high inventories and at the same time out-of–stocks since wrong products have been stored, causing customer service problems (Jansson, 2014).

While preparing for the new software implementation they came to the conclusion that they need to improve their S&OP process in order to maintain their strong market position. The S&OP process at Seco Tools handles their MTS items and now the implementation of Voyager has made the old way of planning the demand and supply for them inefficient. The new software provides more information, enabling them to make decisions with more data available. Seco Tools expects better operational control and more stable production rates with the help of Voyager and an improved S&OP process. This is expected to make significant positive changes on customer service and also on inventory levels (Jansson, 2014).

Therefore, the core team from the Supply Chain Planning project have made a proposal for a new S&OP process. The main goal is to have reduced inventory levels with increased service level at the same time, two of the hard measurable benefits of S&OP (Sheldon, 2006; Wallace & Stahl, 2008; Wallace, 2006; Wagner, et al., 2013; Prokopets, 2012).
1.2 Purpose
The purpose of this thesis is to evaluate the current S&OP process from the Supply Chain Planning project and suggest future improvements for Seco Tools AB.

1.2.1 Research objectives
1. Study and describe the current S&OP process at Seco Tools.
2. Analyse and identify differences in Seco Tools’ S&OP process compared to the literature and a benchmark company.
3. Perform deeper analyses within financial integration and the use of KPIs in Seco Tools’ S&OP process.
4. Suggest future improvements to Seco Tools regarding their S&OP process based on the identified differences from research objective 2 and the deeper analysis from research objective 3.

1.3 Delimitations
Make-to-order products and the production units that are manufacturing them are not studied since they are not integrated in the S&OP process at Seco Tools.

The numbers of benchmark interviews were chosen to be only one due to the limited time frame of the thesis and the fact that it was proven to be a difficult task to find companies with comparable S&OP processes.
### 1.4 Structure

*Table 1* illustrates the structure of the report with comments regarding the content of each chapter.

**Table 1. The structure of the report**

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<td>2</td>
<td>Method</td>
<td>The chapter explains what kind of methods that have been used and why. A description of how the data was collected, how to analyse the collected data, and the method for discussion are included.</td>
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<td>3</td>
<td>Theoretical framework</td>
<td>Theories from books and scientific articles are presented regarding S&amp;OP. First the five steps of S&amp;OP are described and then theory regarding the two areas of financial integration and KPIs are presented.</td>
</tr>
<tr>
<td>4</td>
<td>Current situation</td>
<td>The chapter includes a company description and a complete description of the current S&amp;OP at Seco Tools.</td>
</tr>
<tr>
<td>5</td>
<td>Benchmark at AstraZeneca</td>
<td>The benchmark at AstraZeneca is here presented with a short background of the company and their production. This is followed by a step-by-step description of their S&amp;OP process.</td>
</tr>
<tr>
<td>6</td>
<td>Results &amp; analysis</td>
<td>The chapter presents results and analyses of the current S&amp;OP at Seco Tools compared to the theory and the benchmark. The differences and similarities are uplifted and financial integration and KPIs, two of the opportunities for improvements, are studied more in details to suggest future improvements for Seco Tools.</td>
</tr>
<tr>
<td>7</td>
<td>Conclusions &amp; recommendations</td>
<td>The chapter includes conclusions and discussions of the most important results that fulfil the purpose and the research objectives. Possible areas of further investigations that could be of interest are presented. The chapter ends with a reflection of chosen methods, the validity, and generalisations.</td>
</tr>
</tbody>
</table>
Chapter 2
Method
2. Method

The research process used in this study is first described in detail, explaining all the steps from the planning report to the recommendations. Later on the data collection method is described where discussions regarding observations, interviews, and documents are held. The analysis method that follows presents the framework for the analysis in the thesis, how the current situation can be analysed and compared to theory and to best practice. The chapter ends with method for discussion, to discuss the quality of the research as well as the alternative approaches that could have been used.

2.1 Method approach

The research process can be seen in Figure 2. The first step was to make a planning report to decide on the methods in order to fulfil the purpose of this thesis. A literature study has been conducted to gain an understanding of the theory and to be able to study and describe the S&OP process at Seco Tools with theory from books and academic journals. In parallel with the literature study, a case study has been conducted to study the S&OP process at Seco Tools with focus on the first research objective. Data for the case study has been collected from observations, interviews, and documents. A benchmark has been used as a compliment to the literature in the search for the best practice. An analysis of the current situation based on the theoretical framework and the conducted benchmark has been made in order to fulfil research objective two. From the second research objective, two areas where Seco Tools S&OP differed from theory have been chosen. The second and third research objectives have in the end led to final recommendations to the company according to research objective 4.

Figure 2. The structure of the carrying through of the thesis

2.1.1 Research approach

The work has begun with an analysis of the current S&OP process at Seco Tools. There are two general research approaches to use, i.e. inductive and deductive approach (Soiferman, 2010).

Saunders et al. (2003) suggest the usage of an inductive approach when the current situation first is described and then followed by theory building. An inductive approach has more flexibility compared to a deductive approach; it concerns the way people affect the events where changes can be made as the research progresses (Saunders, et al., 2003). The inductive approach is best used with a qualitative analysis (Soiferman, 2010). The deductive approach however is highly structured and suitable for testing of hypotheses (Saunders, et al., 2003). The deductive approach works in the opposite way of the inductive; from theory to hypothesis. It is confirming the theory rather than exploring it and is best used with the help of a quantitative analysis (Soiferman, 2010). By using both an exploring and confirming approach the issue will be more thoroughly researched (Soiferman, 2010).
The current situation and the theory have been studied in parallel, *Figure 2*; a combination of both inductive and deductive approaches has therefore been used. The first research objective has an inductive research approach since flexibility was needed; changes had to be made along the way of the research when identifying the current process at Seco Tools. Flexibility was also needed for research objective 3, which was to dig deeper into two problem areas that were not decided from the start. The areas had to be chosen depending on what was found in the literature and at Seco Tools. A deductive approach was used once the theory regarding the two focus areas were collected and the current S&OP at Seco Tools had been identified. The deductive approach was used for research objective 2; to analyse the current situation based on theory to confirm it, as opposite of the inductive where the analysis is based on the current situation then followed by theory.

By using a combination of the inductive and deductive approaches, the current situation has been studied and compared to the theory at the same time and the analysis has been conducted from theory. This has led to an understanding of the differences and possible areas to dig deeper into. It has enabled the thesis to focus on areas needed specifically for Seco Tools so final recommendations of how to improve the S&OP could be presented for the company according to research objective 4. The authors’ knowledge of S&OP and the company were limited and also a reason why a combination of the two approaches was chosen. Another benefit has been the fact that the time available for conducting interviews has been extended compared to if the current situation had been studied strictly before or after the theoretical framework.

### 2.1.2 Qualitative and quantitative research strategy approach

When gathering data and information there are two general research strategy approaches in science called qualitative and quantitative approaches (Myers, 1997).

The qualitative approach is based on data that cannot be measured, for example descriptions and judgments. Qualitative research has been developed to study social and cultural phenomena. It is designed to help the researchers understand people and the social contexts they participate in and is favourable to use when investigating processes (Myers, 1997). Hypotheses are usually developed during the study (Kaplan & Maxwell, 2005).

A quantitative approach focuses on data that can be measured in form of numbers. It was originally developed in natural science to study natural phenomena (Myers, 1997). Quantitative research is therefore favourable when numbers are of high importance. It is good to use when a large sample of data exists and statistical tests can be done (Green, et al., 1977).

S&OP is a cross-functional process connecting the company’s strategy with the tactical planning all the way down to operations planning (Wallace & Stahl, 2008). The qualitative method approach has been used to capture the big picture of the S&OP process since S&OP is a process built on the people involved (Schubert, 2011; Wallace & Stahl, 2008). The qualitative method has therefore been favourable to use when studying the process and has helped the authors to understand the people and the social context. It has also been used together with the benchmarking when a deeper understanding of how another company has implemented S&OP was searched for.
2.1.3 Case study

The research strategy to study and identify the current situation, according to research objective 1, at Seco Tools has been based on a case study. Case studies have the ability to investigate a phenomenon in its context without the need of laboratory experiments to gain better understanding (Rowley, 2002). It can be used with any type of mix of qualitative and quantitative data, a strength that enables the use of several sources of evidence to support the empirical investigation (Rowley, 2002; Saunders, et al., 2003). Case studies can be performed as a single case study or with larger number of cases. With a smaller number of cases a deeper level of analysis can be reached. However a sampling of several cases can reach a higher overall accuracy (Saunders, et al., 2003).

A single case study was performed at Seco Tools to reach a deep level of understanding to be able to compare it with theory. Since the purpose of the thesis was to analyse Seco Tools’s S&OP several case studies were not seen as necessary. An overall accuracy of how other companies can work with S&OP has not been the target of this thesis. Generalisations regarding any findings can therefore not easily be made in this thesis since one case study is not enough to prove that the findings can be applied for other companies.

Once the research strategy has been decided, the next step is to decide how to gather and analyse data. Data can be collected in three ways, i.e. textual analysis, interviews, and observations (Remenyi, et al., 1998). In the data collection method subchapter four methods to collect data will be presented; literature/documents, interviews, observations, and benchmarking. These four handle the three different ways to collect data mentioned by Remenyi, et al. (1998).

2.2 Data collection method

Literature and documents have been used for the theoretical framework. The case study that has been conducted at Seco Tools for the empirical investigation has also been based on data collected from documents, through interviews, and observations, Table 2 (Myers, 1997; Trumbull, 2005). A benchmark has been used as well to strengthen the theory and has gathered empirical data from another company.

Table 2. Data collection methods in use

<table>
<thead>
<tr>
<th>Data collection method</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Literature/documents</td>
<td>Literature and documents have been studied in the beginning of the thesis in parallel with the empirical study. It was also done later on in the thesis when differences were pointed out and deeper analyses on 1-2 areas were needed.</td>
</tr>
<tr>
<td>Interviews</td>
<td>Interviews have been held with people involved with the S&amp;OP process to understand the current situation and possible problems Seco Tools experienced. An external interview was held for benchmarking.</td>
</tr>
<tr>
<td>Observations</td>
<td>Observations have been made every day to fully understand the S&amp;OP.</td>
</tr>
<tr>
<td>Benchmark</td>
<td>A benchmark has been done with AstraZeneca with prepared interview questions.</td>
</tr>
</tbody>
</table>
2.2.1 Literature/documents

Literature has been gathered in form of books and research articles from academic journals. It has been important to be critical of validity and reliability regarding the information. Some of the information could be outdated or not trustworthy. Acknowledged databases and academic journals have been used to ensure validity of the research articles.

Secondary data have been gathered from S&OP benchmarking reports published by the Aberdeen Group. The benchmarking reports made by the Aberdeen Group have been conducted on behalf of Logility, the developers of the software Voyager. They are based on surveys answered by the companies that were using Voyager. This secondary data have worked as a complement to the benchmark at AstraZeneca to reach a higher overall accuracy of how companies perform in their S&OP. The benchmarking reports gives an overall standard, crossing over multiple business areas, showing what measures and targets of the chosen KPIs a company needs in order to be successful with their S&OP process. The deeper analysis from AstraZeneca’s benchmark and the secondary data from Logility’s benchmarking reports with more general numbers have together been seen as enough to give a hint of what best practice is for Seco Tools.

The documents gathered from the intranet of Seco Tools and SMS needed to be critically viewed. They have been checked before usage with related personnel to make sure they have been updated and are accurate. Criticism has also been needed for the documents the personnel have shared, such as meeting agendas and the mappings of the S&OP. It was important to keep in mind that documents illustrating the S&OP process and its steps may not be accurate. No documents have therefore been used without making sure they are updated and accurate.

2.2.2 Interviews

Doody & Noonan (2013) say there are two approaches that can be used when conducting interviews, i.e. structured and unstructured interviews.

Structured interviews are conducted with well-prepared questions for each participant. It is time saving and limits the researcher from affecting the interview. Interview comparisons are easy to make afterwards to secure the validity of the interviews (Doody & Noonan, 2013).

Unstructured interviews are the opposite of structured interviews with broad open questions where the follow up questions depend on the participants responses. The unstructured interview is more flexible and often generates rich data, but it is often difficult to compare several interviews to each other (Doody & Noonan, 2013).

Semi-structured interviews, a combination of structured and unstructured interviews, are most commonly used in qualitative research where pre-determined questions starts off the interview but the researcher can vary the order of them and ask additional open ended questions (Doody & Noonan, 2013).

Unstructured interviews have been held in the beginning with the aim to get an understanding of the company, the current process and problems at Seco Tools. Semi-structured interviews have later been used when problems and processes needed to be clarified in detail. In the semi-structured interviews the S&OP process had already been mapped and the participant was asked to explain if there still were any specific unclear parts in it. In addition, a structured interview has been made with an asset planner from AstraZeneca located in Södertälje, Sweden.
Following interviews, Table 3, have been conducted to analyse the current S&OP. A detailed summary of when and where the interviews have taken place can be found in Appendix B.

Table 3. A summary of the conducted interviews

<table>
<thead>
<tr>
<th>Semi-structured interview with Capacity Planner</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gave an initial understanding of how Seco Tools used to work with S&amp;OP before the Supply Chain Planning project started. Provided a background and an understanding of the new S&amp;OP from the Supply Chain Planning project since it was partially based on the old process.</td>
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</tbody>
</table>

<table>
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<tr>
<th>Unstructured interview with Supply Chain Planning project Team Member 1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gave an understanding of the Supply Chain Planning project’s purpose, how the software Voyager worked and how the current S&amp;OP were defined.</td>
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<thead>
<tr>
<th>Unstructured interview with Business Intelligence (BI) Responsible</th>
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<tr>
<td>Provided a better understanding of how the forecasting and demand planning was done both currently and in the past.</td>
</tr>
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</table>

<table>
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<tr>
<th>Unstructured interview with Supply Chain Planning project Team Member 2/Demand planner</th>
</tr>
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<tbody>
<tr>
<td>Gave a deeper understanding of the demand planning at Seco Tools and confirmation of what already was mapped.</td>
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<tr>
<th>Semi-structured interviews with Central Demand Planners</th>
</tr>
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<tbody>
<tr>
<td>Gave a better understanding of how the different planning groups divided the products between them and into product families. Also explained which meetings were held and with whom.</td>
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<table>
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<tr>
<th>Unstructured interview with Insert Team Manager</th>
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<tbody>
<tr>
<td>Introduction to the Inventory &amp; Supply Planning part of the S&amp;OP and all the meetings.</td>
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<tr>
<th>Unstructured interview with the vice president of Supply Chain Management</th>
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<tbody>
<tr>
<td>Inputs of the upper management’s view of S&amp;OP.</td>
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<table>
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<tr>
<th>Semi-structured interview with Financial Controllers</th>
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<tbody>
<tr>
<td>Semi-structured interview with two controllers from the finance department. Focus on finding out how they are involved in S&amp;OP and if they can contribute with information and should be more involved in the S&amp;OP.</td>
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</table>

<table>
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<tr>
<th>Structured interview with AstraZeneca</th>
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<tbody>
<tr>
<td>Structured telephone interview with template sent out a few days before the interview in order for the interviewee to be able to prepare and to make the interview efficient. The interview was audio recorded. The purpose was to find best practice.</td>
</tr>
</tbody>
</table>
2.2.3 Observations

The core of modern knowledge is derived from observations (Remenyi, et al., 1998). Observations can be defined as the “systematic observation, recording, description, analysis and interpretation of people’s behaviour” (Saunders, et al., 2003, p. 483). They describe two types of observation, i.e. participant and structured observation.

*Participant observation* is when the researcher participates in activities to become a member of the organization. This makes it possible to feel what is happening instead of only observing it. There are four types of roles a researcher can take in participant observation. They are based on whether the researcher are revealed or concealed and if the researcher takes part or observe the activity (Saunders, et al., 2003).

*Structured observation* is of the quantitative type where emphasis is put on how often things happen instead of why. It is a way to quantify behaviour, is highly structured and predetermined, and favourable for time-and-motion studies (Saunders, et al., 2003).

In this thesis the researchers have been observing activities and meetings with revealed identity and revealed purpose of the research objectives. Saunders et al. (2003) define it as observer as participant. Furthermore they say that informal discussions are most likely the way to collect data rather than interviews. It is what has been conducted in this thesis. Structured observations have not been made in this thesis, since it does not fit the research objectives.

Saunders et al. (2003) mention that data collection and data analysis are performed simultaneously in observation research. Informal jokes, discriminating discussions, and talking to people with positive and negative thoughts of the process are everyday work. Notes may be taken on the spot or afterwards. All rough notes will in the end build up a framework to make the researcher understand what is going on.

The biggest threat to reliability and validity for the data is observer bias. It is when an observer gives inaccurate information in order to distort the results of the research. The researcher needs to question the gathered data, e.g. to find out if it really was what the person meant, and if there could be alternative ways to interpret the information, etc. (Saunders, et al., 2003). No observed information have been written in the report without making sure the information taken from the observer is correct and that the observer, with the information given, had no intention to distort the results.

Usually a case study research does not involve observations but rather interviews and documentation (Myers, 1997). Observations have nevertheless constantly been a part of the thesis since the research took place in the field during the thesis. The observations have been seen as a good and trustworthy source of data. The observations have been collected during such a long time that they could contribute to a general picture without being too subjective.

Observations have been seen as important especially in the beginning of the thesis, since an understanding of the company and the purpose of the thesis were developed. As the thesis have moved along observations have been mixed with interviews and documents in the search for a deeper understanding. Observations have been conducted by participating as observers in meetings regarding the company’s S&OP to analyse the current situation. Most of the observations have however been conducted by working at the head-office in Fagersta. Since the office was located in an open landscape, unstructured observations have been possible to conduct constantly. Participating in educations of how the software should integrate in Seco Tools processes has also been a way of observing the current S&OP process at Seco Tools.
2.2.4 Benchmark

Wellstein & Kieser (2011) say benchmarking is one way of conducting best practice research, which also works as a complement to strengthen the theory. The purpose of a benchmark is to measure different performances for organizations or organizational units for comparison and to find out what causes differences in performance.

The purpose with the benchmark has been to collect measurements to compare against Seco Tools. For the results of a benchmark to be useful, the compared measurements should be based on the same criteria in both companies. The downside of a benchmark is when not knowing beforehand if the benchmarking company is exhibiting a better performance than the own company. The approach is therefore rather intuitive and not analytical (Wellstein & Kieser, 2011).

Finding a benchmarking company with superior performance within the metal cutting industry has proven to be tough. Therefore the authors chose to search outside the metal cutting industry for companies to benchmark.

AstraZeneca has been chosen as a benchmark since they have a similar type of production; i.e. inserts are made from powder and so are medical capsules, and the production volumes are somewhat similar for inserts and medical capsules. There has still been some uncertainty regarding the downside of the benchmarking and how well AstraZeneca performs in their overall S&OP process. However, AstraZeneca can contribute with their experience from their S&OP implementation. It was by the authors seen as a valuable input to the thesis. Worth mentioning is that no evaluation was made regarding the maturity of AstraZeneca’s S&OP before they were chosen as the benchmarking company.

Benchmarking have worked as a supplement and was used to confirm the theoretical framework. Seco Tools S&OP have been compared to the theoretical and to AstraZeneca’s S&OP. The benchmark has been a help to understand specific problems and sometimes also possible root causes that Seco Tools had.

2.3 Analysis method

To be able to present any results and findings, the theory, case study at Seco Tools, and the benchmarking at AstraZeneca needed to be analysed and compared to each other according to research objective 2. This has all been done in chapter 6. Results & analysis. According to Lekvall & Wahlbin (1993) the theoretical framework should be connected to the analysis part. When analysing the collected data there are several tools to choose from. The data collection methods have all been of the qualitative type. When analysing a qualitative type of data it is important to keep in mind that it is based on words and non-standardised data, numbers and standardised data are of the quantitative type (Saunders, et al., 2003). Analysing words and non-standardised data must be done so that the characteristic of the language is understood and so regularities can be discovered. The data needs to be categorised and unitised to fit the purpose and any relationships need to be recognised. To do this there are a few useful tools, i.e. data display and analysis, template analysis and theoretical framework analysis (Saunders, et al., 2003).

Data display and analysis includes connecting data into matrices and networks, depending on what is most suitable. By doing this the most necessary data from the extended text, which usually exists in qualitative methods, is revealed (Saunders, et al., 2003). A process map/network of the information flow per month from interviews and observations have been created with the help of data display analysis. The map identified the information flow through the company and showed unnecessary or
missing steps such as lead time between activities that could be further analysed. Matrices over meeting agendas and meeting participants have been created to visualise it from the extended text.

*Template analysis* can show the hierarchy, different levels, relationships, and patterns from the extended text (Saunders, et al., 2003). To understand the S&OP process at Seco Tools, the departments and planning groups have been organised in a hierarchical manner. The products and product families have been defined with the help of their relationships.

*Theoretical framework analysis* is a tool to organise the data by linking the research data into the theoretical framework and can be an initial start of the analysis framework. To do this the main variables, components, themes, and issues need to be identified in the research project (Saunders, et al., 2003). The theoretical framework analysis has helped organising all the empirical data collected at Seco Tools. By using the theory and to study the empiric in the same way has made it easier to find opportunities for improvement when the empirics were compared to the theory. All steps in the S&OP have been compared between theory, Seco Tools, and the benchmarking company AstraZeneca.

After analysing the theoretical framework in chapter 6. *Results & analysis*. the most important findings regarding the research objectives have been selected and are presented in chapter 7. *Conclusions & recommendations*. The conclusions presented should answer the purpose (Lekvall & Wahlbin, 1993) so the reader easily can access them without having to read the entire report.

### 2.4 Method for discussion

The planning report delivered in the beginning of the thesis has been considered by the authors to be important. By handing in a time plan, an introduction chapter, and the method it has made the authors to plan the thesis according to methods proven to be useful for this type of research.

Since the authors of this thesis had little experience with S&OP before, the current situation and theory has been studied in parallel in this thesis. There exists a lot of literature regarding S&OP and the theoretical framework has therefore been considered as a solid base to compare the current situation with. By studying theory and the current situation in parallel, the authors were enabled to focus on areas where differences were found early on in the thesis process. The two focus areas, i.e. financial integration and KPIs, were chosen rather early in the thesis as possible areas to dig deeper into. The approach is believed to have been a time saver; therefore the authors find it to be a good way of conducting the case and the literature study.

The usage of multiple sources, also known as triangulation, such as literature, interviews, and observations is a way to secure validity and reliability of the given information. Another way of securing the validity and reliability of interviews and observations is to have the participants review and comment on the notes taken from the event at a later stage (Saunders, et al., 2003).

In this thesis, the literature study has been based on books and information found in academic journals. Multiple sources have been used in order to strengthen the theory and to involve several ideas. Both books and academic journals are classified as secondary sources (Saunders, et al., 2003). Using the secondary data enables the researcher to compare the data collected from books with academic journals. It can be done within a more general context and to triangulate the findings (Saunders, et al., 2003). It means that information taken from one data source can be compared with information taken from another and therefore ensure the validity. Information regarding S&OP has not been difficult to find. Therefore triangulations and comparison have been easy to make. Saunders, et al. (2003) mention that the secondary data usually provide permanent data, i.e. the data is available
for others and checked relatively easy, and is therefore more open to public scrutiny. The literature study is therefore considered as solid.

Seco Tools’ and SMS’s intranet has been used in order to gain company information. The intranets’ information is subjective according to the companies but was only used to gain general background information. It has not affected the study of the S&OP itself. The conducted observations and interviews at Seco Tools have to some extent been subjective. Participants have answered with their own opinion according to their own personal view. Since S&OP is a process driven by the people, the risk of subjective opinions and bias from the interviewees should be considered. Using both observations and interviews with input from as many people as possible have created a solid ground.

The use of several interviews enabled a comparison between them. This minimises the risk of subjective opinions and bias both from the interviewees and the interviewers. The interviewers also had the power to intentionally or unintentionally bias the given information during the interviews. Since the authors worked in pair they had the opportunity to read through each other’s texts and discuss any differences before sending it to the interviewees who then could make sure the information was correct.

Using several sources of evidence, as multiple interviews for example, has not been possible in every situation; experts with special knowledge that no one else can confirm have given some of the information. To make sure the information is accurate the experts have been asked to carefully read through a summary made by the authors after the interviews and observations. This has been done to avoid possible misunderstanding and this method has also been done for the benchmarking interview. This to ensure that the authors have understood the information correctly and that the information is free from assumptions and preconceptions.

The benchmark has also reduced the risk of making suggested improvements for Seco Tools based on inaccurate statements. The benchmark gave new ideas, improved the analysis and has been used for the final recommendations. The benchmarking at AstraZeneca contributed with new ideas of how to deal with the supply planning, but more input of how to integrate financial and KPIs into S&OP had strengthen the final recommendations given to Seco Tools.

One can question the use of only one benchmarking company. It gave valuable input to the analysis but a company that had a more centralised supply planning like Seco Tools would have been better. However, the authors believe the benchmark at AstraZeneca gave valuable information to understand S&OP from another company’s perspective. Only one benchmark takes away the possibility to more easily generalise the results from the report, although the purpose of the report has not been to generalise the results but to suggest improvements for Seco Tools. One benchmark is still seen as a good choice for more inputs. The authors cannot say if more benchmarks would have led to other recommendations, but it would have improved the possibility of generalisation and validity.
Chapter 3
Theoretical framework
3. THEORETICAL FRAMEWORK

In this chapter a wider perspective of S&OP is presented where an initial understanding of S&OP is gained and then the five fundamental steps of S&OP are described in detail according to research objective 1. The chapter moves on with discussions regarding how financial integration and KPIs can integrate with S&OP regarding research object 3, with the purpose of connecting the company’s strategy with operations. This so that future recommendations later on can be presented in the analysis chapter according to research objective 4.

3.1 Sales and operations planning

S&OP can be seen as a tactical business process that enables companies to balance demand and supply by linking the corporate strategic plan to the daily operations plan (Wallace & Stahl, 2008; Feng, et al., 2008; Grimson & Pyke, 2007). Some say S&OP is a process to build a consensus-based operations plan in order to meet the forecasted demand and others define it as a technique to quickly adjust the operations in a changing market (Grimson & Pyke, 2007). Balancing demand and supply is a key to run a business well. If the demand exceeds the supply for MTS products, customer service suffers, cost rises due to overtime in production, and the quality is at risk. If supply exceeds the demand however the inventory costs rise, production rates are cut with layoffs as a result and the profit margins are reduced due to price cuts and increased discounts (Wallace & Stahl, 2008; Wagner, et al., 2013).

All supply capabilities in the supply chain, procurement, production, distribution, and finance, have to be balanced with the demand. Traditionally sales and operations make decisions separately with little coordination (Feng, et al., 2008). A challenge in many companies is the establishing of a plan that is involving each business function and guides the organization in one direction, with one integrated set of plans (Wagner, et al., 2013).

The monthly tactical S&OP process helps the company balancing the demand and supply, ensuring the plans and performance of all business functions are aligned with the strategic plan (Feng, et al., 2008). According to Wallace & Stahl (2008) a disconnection between the strategic and business planning (finance) and the detailed planning exist in companies not using S&OP. In that case, the plans developed by the management are not connected to the actual plans driving the daily operations according to Figure 3. S&OP allows companies to get monthly updates to the business plan, which means better forward visibility. The updates show the visibility particularly on the remaining part of the fiscal year, i.e. the annual budget which is one part of the business plan. S&OP can therefore be seen as an input to the business plan (Wallace & Stahl, 2008). The business plan itself can also be an input to one of the process steps in S&OP, i.e. demand planning (Sheldon, 2006).
To connect the detailed planning with the strategic planning S&OP is often applied to product families rather than individual stock keeping units (SKUs). The products are sorted into product families depending on the products’ type, characteristics, size, brand, market segment, distribution channel, and customers, etc. (Wallace & Stahl, 2008). Every product family needs data such as MTO or MTS production strategy, service level targets, and days in inventory targets. The data needed depends on the demand and supply strategy chosen (Wallace & Stahl, 2008). The families are possible to divide further into subfamilies that can be studied at a lower management level. Subfamilies can work as a supplement between the low-level SKUs and the high-level product families (Wallace & Stahl, 2008).

When planning the demand and supply in S&OP focus should be on volume and not mix for the following 6-12 months or more. It is the tactical planning level and also where S&OP operates. In the tactical planning level it is preferred to plan in families or subfamilies (Wallace & Stahl, 2008). Longer time horizons can often be seen at companies with long manufacturing lead time or high seasonal variability. The time horizon can also shift during the year in companies with high seasonal variability due to the need of a full-marketing cycle (Grimson & Pyke, 2007). For the first year in S&OP, month-by-month is a good way of looking at the demand but after 12 months quarterly planning makes more sense. There will be fewer changes on a month-to-month basis in the second year, which is why quarterly planning is to prefer (Alexander, 2013).

Schubert (2011) characterise S&OP as a process with the three key elements of people, process, and technology as building blocks. People are seen as the most important element in S&OP since they make the decisions, develop, and run the S&OP process. It is important to use the right tools and technology in the implementation to support the people. Too much focus on technology, however, often leads to chaos and inefficiency (Schubert, 2011). There is no single rule of who should attend the different steps in S&OP (Thomé, et al., 2012), but top management commitment is crucial since S&OP is a process that provides the management the ability to direct its business towards a sustainable competitive advantage (Milliken, 2008). Cross-functional participation is one part of making the S&OP successful (Lapide, 2004), with representatives from sales, marketing, operations, research and development (R&D), and finance (Grimson & Pyke, 2007). Each member needs to be active and represents his/her functional area to the fullest extent and contribute to the process. Another part is...
to give the participants the authority to make proper decisions based on their beliefs and interactions on the meetings. The people should be trusted to make the right decisions without double checking with the executives first so the meetings can be held efficiently and reach closure (Lapide, 2004). Focus should be to; teach the involved people in the S&OP so they understand the process, have top management’s commitment, and use a formal process to avoid haphazard decision making (Schubert, 2011).

To avoid people thinking of the S&OP process just as a planning project it is important with a process owner. The process owner should be involved from the demand planning phase to the executive meeting (Wallace & Stahl, 2008). The process owner should preferably be an executive member and not someone from the planning department (Milliken, 2008); it should be someone who could increase the S&OP effectiveness (Grimson & Pyke, 2007) and provide formal targets to reach with accountability (Prokopets, 2012). The finance executive is a good choice since the process is business driven (Milliken, 2008). The supply chain executive is also an option but this person needs to address the process as a business level process and not just a supply planning process (Milliken, 2008). Lapide (2004) states the problem that with a high level executive as process owner there is a risk that the meetings are being dominated by his or her point of view without reaching consensus.

The S&OP process is typically based on five steps illustrated in Figure 4. They are data gathering, demand planning, supply planning, preparation meeting, and executive meeting (Grimson & Pyke, 2007; Wallace & Stahl, 2008; Milliken, 2008).

Figure 4. The five S&OP steps (Wallace & Stahl, 2008, p. 54; Grimson & Pyke, 2007, p. 324; Milliken, 2008, p. 6)

Every month in S&OP starts with collecting data from the previous month regarding actual sales, production, inventories, etc. to create a new forecast and demand plan based on the historical data and the future needs. Once the demand plan is updated the information is sent to the supply planning team who test it to see if the resources in the supply side provide enough capacity. The new plan is modified for families and subfamilies if needed. An updated plan is then sent to the preparation meeting where any problems and difficulties should be resolved if possible so that the plan sent to the executive meeting is correct. If the problems in the preparation meeting could not be solved they are transferred up to the executive meeting where the executives have the authority to make changes and can decide on actions needed. At the executive meeting the decisions made at the preparation meeting are reviewed and either accepted or modified (Wallace & Stahl, 2008). The five steps in S&OP are further described in detail in the next subchapter.
3.2 The five step process

The three first steps, data gathering, demand planning, and supply planning, are all steps where people are contributing to make a good final demand and supply plan according to the company’s strategy and business plan. The preparation meeting and the executive meeting are the two final meetings held to modify and sign off the already created supply plan. For the first three steps things to take into consideration and involved people is described. The meetings are presented with input, output and meeting agendas.

3.2.1 Data gathering

Data gathering means collecting and updating statistical data from the previous month with actual sales, production, inventories, etc. A calculated statistical forecast based on the historical data is generated (Stahl & Wallace, 2012). Sales & marketing together with the IT department should gather the necessary data (Wallace & Stahl, 2008). If possible the data should be gathered automatically by an IT system (Lapide, 2004).

3.2.2 Demand planning

In demand planning the job is to convert the statistical forecast based on history into an unconstrained forecast that also considers future events such as new/declining products (also called phase-in/phase-out), new customers, campaigns, price changes, economic conditions, etc. The demand plan should reflect what the company can sell to the customers without considering what the company can produce (Grimson & Pyke, 2007; Wallace & Stahl, 2008). Primary participants in the demand planning should therefore be from the sales & marketing department (Wagner, et al., 2013; Wallace & Stahl, 2008). Wallace (2006) also states that finance and product development people can be seen as secondary members. Another important person to have involved in all steps in the S&OP is the S&OP process owner as stated in the 3.1 Sales and operations planning subchapter.

Input to the demand plan should be the historical data from the data gathering and future data. Future data consist of the business plan, marketing plans, and sales plans (Sheldon, 2006).

Historical inputs can capture sales cycles for seasonal products. The historical data can be manipulated in many ways and it is important to get the historical input, statistical forecast, as accurate as possible. Companies with lots of new products or services only using historical data from the past and not any of the previous mentioned data will not be very accurate in their future plan (Sheldon, 2006).

The business plan should be delivered from the executives and may be the most important of the inputs in S&OP and to the demand plan. It is the strategy of the company and will affect both the marketing plans and sales plans inputs (Sheldon, 2006). See 3.1 Sales and operations planning subchapter regarding the role of the business plan in S&OP.

Marketing plans is a forecast of the future sales from NPIs, trade shows, customer events and advertising campaigns. It needs to be estimated to see what kind of impact it will have on customers and can include forecasts of the current and the coming months marketing events (Sheldon, 2006). Wallace & Stahl (2008) clarified that the market plan is forecasting in the medium and long-term perspective on volumes. Developing new products is a key for every company and it is therefore crucial to integrate new products as early as possible in the S&OP process. New products could lead to a decline in the demand for the existing products, so called cannibalisation effects, which need to be considered in demand planning (Wallace & Stahl, 2008).

The sales plan is more predictable and therefore the statistics is useful. It can include sales cycles for seasonal products and information of the sales closure rates (Sheldon, 2006). The sales plan focuses
on sales in the mix level. Forecasting is made close to the customer and sometimes on SKU level (Wallace & Stahl, 2008). The sales plan input to the demand plan in S&OP is either calculated using statistics such as seasonal variability calculations (Sheldon, 2006), or forecasts made by the sales department on SKU level in contact with customers (Wallace & Stahl, 2008). Wallace & Stahl (2008) clarify that this forecast is made short term by the sales department and must reconcile with the mid to long term forecast made by the marketing department; the sales plan on SKU level should therefore be aggregated into product families.

The demand planning should be made in units, and then converted into dollars for the finance and accounting people (Wallace & Stahl, 2008). This makes it possible to check how the annual S&OP plan coincides with the budget of the fiscal year (Grimson & Pyke, 2007). By doing this and involving the senior sales & marketing executives they can challenge the numbers and assumptions. Changes can be made from potential new customers, price changes, new products, etc. that are not predictable from the past history via the statistical forecast. This will result in a management-authorized forecast signed off by everyone which can avoid surprises at the executive meeting and hopefully get a better forecast than if it was only based on historical data. It is crucial to possess knowledge and experience within sales & marketing as well as field sales staff to get the best forecast (Wallace & Stahl, 2008). Any assumptions made by the sales & marketing people regarding the future must be documented for everyone to see and to make it possible going back in time for evaluation and reflection. S&OP, as mentioned earlier, is built on people (Schubert, 2011) and by documenting the assumptions, future mistakes can be avoided in the long run (Wallace & Stahl, 2008). To avoid surprises later in the S&OP process some companies have a formal demand planning meeting. Usually larger companies are the ones that tend to have formal meetings (Wallace & Stahl, 2008).

The demand plan outputs will be the product family forecast over the S&OP time horizon (Sheldon, 2006) authorized by sales & marketing executives to avoid surprises at a later stage (Wallace & Stahl, 2008). The forecast developed during demand planning is seen as more accurate than the statistical forecast calculated during data gathering. Once the demand plan is done, the next step is to align the supply (Wallace & Stahl, 2008).

### 3.2.3 Supply planning

The supply plan balances forecast and actual demand with the existing capacity and inventory (Sheldon, 2006). People from operations should be the primary supply planning personnel (Wallace, 2006; Wallace & Stahl, 2008) along with finance and product development staff as secondary resource (Wallace, 2006) and the S&OP owner (Wallace & Stahl, 2008). Once a supply plan is created it is necessary to have competence involved from finance since the goal is to increase the profit of the business. Finance should be present to determine what kind of financial impact the constructed plan might have (Wallace & Stahl, 2008).

The last month’s operations plan needs to be compared with actual performance to find any significant gaps in capacity. Either the root causes for the gaps can be found and solved or the problems can be worked around. It is essential to find existing gaps so the new supply plan is based on the correct available capacity (Stahl & Wallace, 2012).

Inputs to the supply plan are capacity and inventory strategy information. These will together create a new initial supply plan from the given unconstrained forecast (Grimson & Pyke, 2007; Sheldon, 2006).

The inventory strategy, also known as the demand and supply strategy (Wallace & Stahl, 2008), determines at what stage in the supply chain the business store the products. For MTS manufacturing the inventory is finished goods inventory just before shipping and for MTO manufacturing it is usually
some kind of a fabricated inventory. The inventory strategy is the first input to supply planning and needs to be well known for the supply planners. Companies often have several inventory strategies depending on the different types of products. An aligned inventory strategy for each product family is preferred; a product family should only contain products with one inventory strategy. In an MTS strategy a customer service level goal must be set and should then be followed by finished goods inventory level calculations. Necessary actions should be taken regarding the inventory to reach the customer service goal (Sheldon, 2006).

Capacity is the second input to the supply planning; the unconstrained demand plan needs to be tested to see if the resources capacity is enough to execute the plan. There is a risk that the demand exceeds the possible production rate (Wallace & Stahl, 2008). The capacity includes both the external and internal capacity such as plant capacity, skills, available people, etc. (Sheldon, 2006). The supply planning complexity depends on how well aligned the product families are with the supply resources (Stahl & Wallace, 2012). Aligned resources is when one supply resource have only one product family allocated; non-aligned resources is when several supply resources are shared by several product families, i.e. they have to share capacity (Wallace & Stahl, 2008). Stahl and Wallace (2012) stated that products well aligned have resources allocated to them and they are easy to calculate the capacity for. Non-aligned products share the resources, why the complexity of the capacity planning is increased. All plants must also be involved if the business has multi-plants to ensure available capacity is correct (Stahl & Wallace, 2012).

Wallace & Stahl (2008) say that if the capacity is not enough according to the demand plan different scenarios need to be simulated and studied so the most advantageous supply plan can be chosen. It is one part of the term scenario planning. Depending on how well aligned the products are it is possible to change the mix of products with different outcomes. The people in supply planning therefore need to know what decisions they are allowed to make. When people from the supply planning step are not allowed to make necessary decisions they should be presented at the following preparation meeting for the people involved there to decide. The decisions made or recommendations given by the supply people need to have financial information. Whether it is a minor, moderate, or major decision depends on the business and on which people that are involved in each process step. However, according to Wallace & Stahl (2008) minor decisions such as overtime and hiring additional people are normally within the supply planning personnel’s authority. Moderate decisions such as adding an entire shift should only be recommended to the preparation meeting or the executive meeting for decision-making. Major decisions like adding more space to plants should be explored and different scenarios presented in the executive meeting where the executives might take the decision. These are cases when capacity needs to be increased.

Outputs from the supply planning step to the preparation meeting is the initial supply plan and any unresolved issues for the preparation meeting to solve. As with the demand planning, some companies will have a formal supply planning meeting and others will not (Wallace & Stahl, 2008).
3.2.4 Preparation meeting

The preparation meeting is a short meeting to give recommendations to the following executive meeting (Wallace & Stahl, 2008), and handles demand and capacity balancing (Grimson & Pyke, 2007; Wallace & Stahl, 2008). Cross-functional teams are suggested in the preparation meeting. Managers from finance, marketing, operations, product development, sales, and purchasing departments (Wallace, 2006; Wallace & Stahl, 2008) and the S&OP process owner should be involved (Wagner, et al., 2013; Wallace & Stahl, 2008). Other participants could be involved depending on the business, and any people with specific valuable knowledge and those who can add value to the process should be involved. To add value means people who can influence and contribute to decision-making during the meeting (Wallace & Stahl, 2008).

Input to the meeting is the supply plan delivered from the supply planning and unresolved issues from demand and supply planning (Wallace & Stahl, 2008).

The main goal is to prepare as much as possible for the executive meeting by studying one product family at a time and to make decisions within the framework of corporate strategies and the business plan (Stahl & Wallace, 2012). The future is constantly changing and this should be taken under consideration during the preparation meeting to see how well the supply plan can respond to the changes. Scenario planning is needed where the involved people develop alternative scenarios that could for example be tested with different capacity constraints, marketing strategies, and inventory targets. The preparation meeting is a decision making session regarding those scenarios (Bower, 2012), and not only to prepare for the next meeting, i.e. the executive meeting (Wallace & Stahl, 2008). Much of the time consuming hard work in S&OP is during the three first steps, the preparation meeting should only make decisions and recommendations of unresolved issues from demand and supply planning (Wallace & Stahl, 2008).

Output from the preparation meeting to the executive meeting is the final supply plan ready to sign off. Any unresolved issues after the meeting should be brought up to the executive meeting where different alternative plans of the issues should be presented, showing both the financial impacts and differences in units. The plans can include recommendations of layoffs, outsourcing, transferring products between plants, etc. Other outputs are an updated financial view of the business e.g. matching the business plan to the most recent sales proposal, NPI issues, and the development of an agenda for the executive meeting (Wallace & Stahl, 2008).

3.2.5 Executive meeting

The final supply plan for the next period is reviewed and signed off in a formal meeting (Grimson & Pyke, 2007), or modified when the preparation meeting does not have people with authority to make necessary decisions (Wallace & Stahl, 2008). Involved primary resources in the executive meeting should be the executive management members (Wagner, et al., 2013; Wallace & Stahl, 2008), plus the leader of the business unit (Wallace, 2006; Wallace & Stahl, 2008) and the S&OP process owner (Wagner, et al., 2013; Wallace & Stahl, 2008). Secondary resources in the meeting can be key members from the preparation meeting (Wallace, 2006).

Most common is to have monthly scheduled executive meetings because S&OP is designed to be a monthly process, however there can be variations among businesses. It can either be regular or unregular meetings when a more flexible and dynamic process is needed to quickly act on changes (Wallace & Stahl, 2008). Executives should most ideally be involved to sign off the supply plan and it is strongly recommended to postpone the meeting if the business leader cannot participate or attend via internet. The executives’ purpose is to make decisions regarding the product families and to
authorise suggestions from the preparation meeting. It is also their responsibility to relate the financial view of the S&OP to the business plan. If the financial view and the business plan do not merge, the executives need to make adjustment to one of them. Before the meeting is over the executives should also review the existing policies and strategies regarding supply and demand. An S&OP expert could be needed in order to increase effectiveness during this meeting. To increase the meeting efficiency it is preferred to make the meeting agenda visible with spreadsheets and graphs of the product families to the attendees in advance so everyone is well prepared. The executive meeting is not supposed to last more than two hours (Wallace & Stahl, 2008).

Outputs from the executive meeting should be business plan modifications and a spreadsheet of the other changes being made at the executive meeting. Information from the meeting should be available around two working days after the meeting since it forms the company’s game plan (Wallace & Stahl, 2008). Distribution and implementation of the completed supply plan is done once it is signed off at the executive meeting (Grimson & Pyke, 2007). An aligned demand and supply plan is a typical input (Aparajithan, et al., 2011), which means that the demand plan is also signed off.

3.2.6 A summary of the steps
Below is a summary made by the authors of what the theoretical S&OP process steps are and what kind of activities the theoretical framework suggests.

Data gathering
• Generate a statistical forecast

Demand planning
• Update historical data according to business plan
• Update historical data according to marketing plan
• Update historical data according to sales plan
• Convert the plan from units to dollars
• Compare the demand plan with budget

Supply planning
• Compare last month’s operations plan with actual performance
• Inventory planning
• Capacity management
• Scenario planning
• Initial supply plan aligned with demand

Preparation meeting
• Resolve any escalated issues from supply planning
• Study product families
• Study how well the plan can respond to unexpected problems
• Scenario planning
• Final supply plan

Executive meeting
• Resolve any escalated issues
• Authorise suggestions
• Changes in business plan
• Changes in corporate strategy
• Demand and supply strategies
• Financial S&OP view vs. business plan
• Sign off demand and supply plan
An important input in the S&OP is the financial integration. As stated S&OP need to be compared with the financials. The following subchapter will go into details regarding financial integration in S&OP.

### 3.3 Financial integration

As mentioned before, S&OP links together the detailed planning with the business and its strategy. The business (financial) plans need to be represented in the meetings to facilitate the joint determination of budgets and other financial targets. The objective of S&OP is not only integrating and communicating plans across the organization but also to maximize profit (Wagner, et al., 2013).

The organization Logility Voyager Solutions (2010) implies that financial integration is the most critical area to develop for a successful S&OP process. A financial perspective through the process is necessary for S&OP to deliver a strategy and not just a plan (Alexander, 2013), see Figure 3. According to Dougherty & Gray (2013) S&OP is arguably the best tool to align financial plans with operational plans. Without the financial view the overall process of S&OP loses much of its power (Wallace & Stahl, 2008). S&OP should therefore constantly compare the demand and supply plans to the financial plans and targets (Dougherty & Gray, 2013).

Almost all decisions and all the work in the S&OP process are done in the steps before the executive meeting. To be able to make justified decisions before the executive meeting the people involved need to show and use financial information. It is therefore important to have people from the finance department participating in all the steps. When decisions cannot be made, different scenarios with the financial impact should be developed. This can be brought to the next step or meeting in the process. There they can consider the different scenarios and make decisions (Wallace & Stahl, 2008). The participants should be empowered to make decisions and the process should be supported by integrated supply and demand planning technology (Lapide, 2004).

People from the financial department are in most companies developing their own forecast; therefore they are not always connected to changes in demand and supply. An integration of financial planning and the S&OP process makes it possible to focus on one set of numbers both in dollars and units (Wallace & Stahl, 2008). One set of numbers means that finance, operations, and sales have reached consensus of the same type of numbers to focus on in their work (Schneider, 2013). More flexible and dynamic budgets and more efficient work with the annual budget can be expected (Wallace & Stahl, 2008).

Furthermore Dougherty & Gray (2013) say S&OP and financial planning can interact in four different ways: financial plans updated monthly, development of annual plans and budgets, decisions on capital investment, and cash flow management.

*Monthly updates to the financial plans* are possible with an effective S&OP process in combination with highly integrated operating and financial systems. If the projected sales volume changes in the S&OP process, associated plans for purchasing and manufacturing budgets might change as well. The change in sales volume can also affect how management wants to allocate their funds to advertisements or other marketing activities and so forth. Changing these numbers every month is not a small task, even with the help of software systems it still would be time consuming for the human input. Since the factors that change the projected sales volumes in the first place might change again during the year, the monthly updates in all plans would have to be repeated monthly. Another way is therefore to monthly track the fluctuations for each product family and compare with the business and sales plan by converting the S&OP numbers to revenue and cost dollars (Dougherty & Gray, 2013).
There are numerous of ways S&OP can affect financial planning (Dougherty & Gray, 2013). One example is the ability to easily compare the business, sales, and production plan while keeping track of the finished goods inventory (Dougherty & Gray, 2013). An initial financial planning for each product family can involve a dollarized forecast regarding sales, operations cost, and finished goods inventory cost per month the first year and quarterly after 12 months. The average selling price should be viewable, as the target of finished inventory and the unit cost of goods sold (COGS). The financial view should also show the business plan in dollar for that product family (Wallace & Stahl, 2008).

All together financial planning and S&OP gives a good basis to early see warning signals that can spot supply or demand variances affecting the financials. Gaps and big problems can quickly be discovered (Dougherty & Gray, 2013; Wallace & Stahl, 2008).

According to Dougherty & Gray (2013) an S&OP with at least a 16 to 18 months planning horizon is a good starting point for annual budgeting. An S&OP with that planning horizon will help because numbers used in annual planning can be taken directly from the S&OP. They claim that the hours personnel spend on yearly budgeting can be reduced by 50 percent with the use of S&OP, because the numbers are already there. Dougherty & Gray (2013) say that it is especially useful for companies that are a division of a larger company in a complex corporate structure. This is due to the strict timing requirements many of them have when putting all the numbers together. By keeping the demand and supply plans realistic the company in question can avoid making future volume estimations and simply take the numbers directly from the S&OP. It also ensures that investments will be based on the same numbers as the annual financial planning as well as the daily supply and demand plans execution (Dougherty & Gray, 2013).

Wallace & Stahl (2008) suggest that companies implementing financial planning should start with only one product family. Also, the S&OP process should be tested and up and running for at least one month before considering integration of financial planning with the S&OP. A master spreadsheet should be developed where all families can be visualised in a financial perspective (Wallace & Stahl, 2008; Dougherty & Gray, 2013). For companies with MTS families this master spreadsheet projects the planned level of finished goods inventory for the business (Wallace & Stahl, 2008).

When simulating the future with scenario planning and only looking at units the simulation shows if it is possible to produce intended quantity. The important thing to take into consideration is not only if it is possible to produce, but also if it is something that the company want to produce; sometimes the financial impact can be too high for it to be worth it (Wallace & Stahl, 2008).

When looking at the financial parts the focus should be on volume and not mix (Wallace & Stahl, 2008). The volume should be focused on revenues, margins, market shares, etc. instead of the old focus on units, tons, etc. (Alexander, 2013). Simplified assumptions should therefore be made regarding the mix in the product families. The mix needs to be routinely validated for this to be accurate (Wallace & Stahl, 2008).

The financial review can remove the supposed bias in the plan from demand and supply that occurs when the teams keep the company’s overall objective in mind. In the financial integration key performance measures (KPIs) should be balanced against corporate financial objectives and also review what is delivered to the executive business review together with alternative plans. The financial integration includes balancing of KPIs and financial objectives review, as well as the perspective of shared metrics (Logility Voyager Solutions, 2010). A KPI is a financial or non-financial performance measure that is used to define and estimate advancement in a business. Usually a KPI is tied to the corporate strategy (APICS, 2014). The five steps in the S&OP process take the planning and execution into consideration. But as with any business management one must also measure the process to
achieve maximum benefits. KPIs is recommended to be reviewed during demand planning, supply planning, the preparation meeting, and the executive meeting, see Figure 5 (Milliken, 2008).

The monitoring of KPIs is the starting point when financial data need to be recalculated. Also, the sharing of unit, financial, and KPI information to the executives are other ways of how S&OP can affect financial planning (Dougherty & Gray, 2013). The financial integration debouches into KPIs that will be presented in the following subchapter.

### 3.4 KPIs

Structure in the process is a key to success with cross-functional participation (Lapide, 2004; Prokopets, 2012). S&OP brings together all plans for the business from customers, sales, marketing, manufacturing etc. into one integrated set of tactical plans (Milliken, 2008). KPIs in the S&OP process is one of the requirements for success and to help improve the process in the future (Lapide, 2004). According to Chae (2009) it is a daunting task to put the KPIs in place in a company. Many companies usually have a certain numbers of KPIs but not enough to measure their entire supply chain. When monitoring different KPIs in the process it enables low-performing KPIs to be discovered, and once identified the problems and issues can be corrected. An S&OP team responsible for this helps developing strategies for continuous improvements of the supply chain process (Chae, 2009).

By managing KPIs a company can follow if the S&OP process supports the strategy (Milliken, 2012; Kaplan & Norton, 1996), Figure 6. S&OP handles functional area strategies and KPIs; the strategy and business input covers the corporate strategy, competitive priorities, and future direction. The strategy need to be applied to competitive priorities, it is the products’ price or quality for instance that makes them sell. Future direction is also important, how the company should develop in the future to stay competitive. These need to be applied on all functional areas within the business and translated into KPIs to keep track of. Milliken (2012) mentions six competitive priorities where low cost, on-time delivery, and consistent quality are suitable for an MTS strategy. On the contrary delivery speed, customisation, and flexibility are mentioned as typical MTO competitive priorities.
A helping tool is an S&OP scorecard that can be used to make KPIs well-aligned with the company’s vision, strategy, and competitive priorities (Milliken, 2012; Engle, 2013; Kaplan & Norton, 1996), and also for the financial review earlier discussed (Logility Voyager Solutions, 2010). The S&OP scorecard should translate the vision and strategy into KPIs from the following perspectives: financial, customer, internal, and innovative (Kaplan & Norton, 1996; Milliken, 2008). The four perspectives and how they should be connected to corporate vision and strategy can be seen in Figure 7.

Figure 6. How the strategy is linked to KPIs (Milliken, 2012, p. 16)
As stated in the previous subchapter the use of KPIs is good in order to have finance integrated with the S&OP. Kaplan & Norton (1996) mentions that the financial objectives should give a view how the overall status is for the company. It should represent the long-term goal of the organization to grow and the KPIs can indicate whether the company’s strategy, implementation, and execution contribute to profitability. All KPIs from the other perspectives will affect the financial measures in the end.

The customer perspective focuses on customers and on the market in particular. Companies have to be adjustable according to a changing market and customers’ requests. It is important to find out critical factors and competitive priorities to make the customers remain. Customer satisfaction is the key to gain market shares and they are both important measures. Profitability, acquisition, and retention have customer satisfaction as a foundation and are the link to market shares; all of them can be measured as well. Objectives and KPIs should be chosen across the three areas (Kaplan & Norton, 1996):

- Product and service attributes: are in terms of functionality, quality, price, and time.
- Customer relationship: reflects the business’ quality when it comes to personal relationships and the customer’s purchasing experience.
- Image and reputation: embrace what is attracting the customer to the business.

The internal perspective includes KPIs regarding the own companies processes and performance. The internal processes KPIs should be set after the customer and the financial objective measures are chosen since they need to satisfy the customers. The goal for a company is to create as good delivery
service towards customers as possible at a low cost. Usually a required delivery service towards the
customer is set and then followed by the necessary internal cost of logistics within the company.
Keeping a 100 % delivery service would require the cost of logistics to soar and why the internal
perspective need to be adjusted to an accepted level of the customer service (Oskarsson, et al., 2006).
The customer need is set first to make sure the internal processes are connected and support those
perspectives (Kaplan & Maxwell, 2005). Kaplan & Norton (1996) divides the internal perspective in
three processes; innovation, operations, and post sales service.

- The innovation process: needs to be effective, efficient, and timely in order to reach new
  markets, new customers, and customer retention.
- Operations process: stretches from customer order to the delivery of the product or service. It
  involves efficient, correct, and just-in-time delivery of existing products and services to
  customers.
- Post sales service process: reflects the warranty and repair, defect and return, and payment
  process.

The innovative perspective deals with organizational learning and growth. Therefore investments in
employees, systems, and organizational alignment driving the organizational learning forward can be
measured.

The scorecard should not be a controlling system; its intention is for communication, informing, and
learning. The four perspectives allow a balance between hard and soft measures, between short-term
and long-term targets, and between the outcomes and the performance drivers of the outcomes
(Kaplan & Norton, 1996). Cross-functional KPIs should be chosen so they together align all
departments through the organization (Milliken, 2008; Kaplan & Norton, 1996). Milliken (2011)
specialy highlights the need for cross-functional KPIs that are measuring global performance when a
business is using an S&OP process with production units spread globally. He also presents five KPIs for
comparing actual and planned values in a global setting, i.e. gross margin, total system inventory,
demand by product family, production by product family, and overall forecast accuracy.

3.4.1 Different models
When implementing KPIs it is good to start with only a few. The target level of each KPI should be set
and updated periodically (Chae, 2009). In an S&OP scorecard KPIs within finance, demand, production,
inventory, and logistics can be presented with data from the current and previous month, target with
tolerance and trend over a 12-month period (Milliken, 2008). It is beneficial to work in cross-functional
teams in order to keep track of the KPI numbers (Chae, 2009). Each KPI should have an owner
responsible for capturing the values (Milliken, 2008; Kaplan & Norton, 1996).

There exist several models to choose KPIs from in the literature. The Supply-Chain Operations
Reference (SCOR) model is one KPI model for the supply chain. According to the SCOR model all
processes should be measured within two focus areas, i.e. customer or internal focus. The customer
focus involves KPIs focusing on the service related KPIs while the internal focus is on costs and assets.
Measurements can be done in three levels where level 1 is known as the strategic metrics, also called
the KPIs. These metrics, Appendix C, Table 15, can help establish realistic targets to support the
strategic directions. Level 2 metrics also known as the process type metrics can be further divided into
level 3 metrics known as the process category metrics. Level 2 and 3 metrics can be used to identify
problems in the processes and for root cause analysis (Supply Chain Council, 2010).

Chae (2009) provides a similar model based on an earlier version of the SCOR model, but instead of
sorting the KPIs according to customer focus or internal focus they are based on at which department
they can be measured to ensure all areas in the company are represented. Those are planning, source, make, and deliver and can be seen in Appendix C, Table 16. He has also sorted them into first and second degree KPIs and recommends the second degree KPIs to support the first degree KPIs. The second degree KPIs are similar to level 2 and 3 in the SCOR model. They represent potential indicators of why the first-degree metrics are high or low.

Gianesi (1998) & Oskarsson, et al., (2006) both talk about cost vs. service. The internal cost is affected depending on how high the customer service is set. Oskarsson, et al., (2006) divide cost of logistics and delivery service and time into several lower level KPIs which can be seen in Appendix C, Table 17. Milliken (2012) however says delivery speed, as a competitive priority, is important when using a MTO strategy and therefore not the primary focus in MTS. According to Gianesi (1998), production planning and control have a major effect on costs, delivery speed, delivery reliability and flexibility:

- Costs can be divided into labour and equipment costs that are dependent on the determined inventory levels.
- The delivery speed depend on how the inventory levels for finished goods and work in progress are defined in a company and it will change a company’s ability to make fast deliveries. Depending on how a company make strategic plans for excess capacity it can have an impact on fast deliveries.
- The ability to plan the future and resource and operations utilisation control will affect the delivery reliability.
- Flexibility can be in terms of mix, volume, delivery, and robustness flexibility (Gianesi, 1998).

Milliken’s (2008, p. 10) sample scorecard made for the S&OP present focus on both the company process and how the S&OP strategy will be measured. He states that the time aspect mentioned by Gianesi (1998) and Oskarsson (2006) is not important when choosing KPIs for the usage of only MTS products. Examples of KPIs regarding time are delivery speed and flexibility. Focus should instead be on inventory cost and line flow.

Aberdeen Group on the other hand ranks organizations against a current industry standard (Grimson & Pyke, 2007). They have created a KPI scorecard summarising the most important KPIs to compare against other companies on the market. Those KPIs measure how well the company perform compared to the competitors. Aberdeen Group is an organization supplying best practices in form of maturity class indexes for registered members. The maturity class indexes are best-in-class which is the top 20 %, industry average which is the middle 50 %, and laggard which is the bottom 30 %. The performance metrics are self-reported from the survey respondents. Periodic reports are sent out, where analysis are made on an aggregated view of research surveys, interviews, and data analysis. Companies can compare their business according to the analysed KPIs. The latest report provided information regarding four performance metrics, i.e. average customer service level, average cash conversion cycle, gross margin change over the last 2 years, and average forecast accuracy at family level. The data can be seen in Appendix C, Table 18. Aberdeen Group collaborates with Logility, the same organization providing the software Voyager (Ball, 2013).

As just stated, numerous of models with different KPIs exist. The most important thing is for the KPIs chosen to fit into the company. Once decided which KPIs to use they also need to be implemented. The idea when implementing KPIs is to start with translating the vision and strategy into KPIs that are easy to measure. They need to represent all areas; financial, internal, customer focus, and innovation. They also need to be well understood by everyone in the organization and cover all departments involved. Targets and milestones for all KPIs need to be defined as well so the purpose of the measurement is visible (Kaplan & Norton, 1996).
Chapter 4
Current situation
4. CURRENT SITUATION

This chapter explains Seco Tools AB and its strategy, vision, structure, and market position. The S&OP process at Seco Tools is then given a short introduction followed by a detailed description of all steps in the monthly process according to research objective 1. The chapter continues with financial integration and KPIs that Seco Tools uses in the S&OP process, both according to research objective 3.

4.1 Seco Tools AB

Seco Tools is a manufacturer of metal cutting tools for the industry in three machining areas, i.e. milling, turning, and holemaking. They provide powerful machining solutions to leading global companies in seven main market segments, i.e. aerospace, automotive, energy, general engineering, medical, wind power, and oil & gas industry (Seco Tools intranet, 2014; Liljeqvist, 2014). Seco Tools main sales is to mid-large companies, most typically subcontractors to larger companies within the aerospace industry. Their single biggest customer is Rolls Royce with one percent of the total sales, followed by GKN, Airbus, Safran Group, and Tenaris (Liljeqvist, 2014).

Seco Executive Management (SEM) controls the company at the head quarter in Fagersta, Sweden. SEM consists of the president responsible for the business and the vice presidents (VPs) responsible for the different divisions, Figure 8. The orange box in Figure 8 represents the VP responsible for the supply chain management (SCM).

![Figure 8. Organization chart of SEM (Seco Tools intranet, 2014)](image)

Seco Tools´ vision when this thesis took place is described in one sentence as:

“Our vision is to be recognized by our customers as the most dedicated partner of complete solutions for the metal cutting industry”. (Seco Tools intranet, 2013)

To succeed in reaching the vision Seco Tools needs good reliability and fast responsiveness toward customers and colleagues. Their strategy how to achieve the vision is called “The Seco Way”. It presents the overall corporate strategy, which is to reach a fixed strategic turnover goal and to deliver
winning solutions. Winning solutions are to deliver high performance products and to provide excellent services & solutions for customers.

The Seco Tools corporate culture can be explained by three core values, i.e. passion for customers, family spirit, and personal commitment. The core values are not just phrases someone invented; they all have an historical background. This is how customers see Seco Tools, and how personnel at Seco Tools behave. The first core value, passion for customers, is based on building long-term relationships with customer commitment. The second core value, family spirit, comes from respect for the individuals and other cultures, and sharing knowledge with a worldwide network. The third core value, personal commitment, is the idea to take responsibility, to be winners, and to continuously improve and strive for higher quality and creative solutions in order to transform challenges into opportunities (Seco Tools intranet, 2013).

Seco Tools is recognised for its quality and service by delivering high quality products on-time. Longer lead times to secure the on-time delivery is preferred from a customer perspective, rather than having the arrival date postponed along with shorter lead times (Jansson, 2014). Seco Tools is at the time a strong competitor within their market segment but they have noticed an increased competition from low budget brands. The time it takes for the low budget competitors to present a copy of a new product from premium high quality brands such as the Seco Tools brand is constantly reducing. Important for the future is still on-time delivery but they cannot ignore the fact that they need to shorten the lead times and be more efficient (Eriksson, 2014; Jansson, 2014).

4.1.1 Seco Tools manufacturing

VP SCM is responsible for eight departments, where one of them is Supply Chain Planning (SCP), see Figure 9 (Seco Tools intranet, 2014). The SCP department is responsible for the demand and supply planning at Seco Tools and the department is divided into three planning groups, i.e. inserts, tooling, and product centres (PC). The reason for this is the clear distinction in both manufacturing techniques and supply planning (Ackesten, 2014).

![Figure 9. Organization chart of the SCM division and SCP department (Seco Tools intranet, 2014)](image-url)
Figure 10 shows an overview of the production division and how the planning groups, represented as orange boxes, are divided based on the different manufacturing areas. Within the production division the different manufacturing areas have their own PUs. The exception is PU Pune located in India which is the manufacturer of both inserts and tooling products (Seco Tools intranet, 2014).

Figure 10. Organization chart of the Production division (Seco Tools intranet, 2014)

All PUs are divided according to the three planning groups. Within each planning group the PUs manufacture similar products. An exception is Solid Tools Manufacturing that the PC planning group is responsible for in terms of supply chain planning; PU Norrköping cannot manufacture PU Bouxwiller products as an example. For Tooling and Inserts products it is easier to manufacture the same SKU in different PUs. The planning groups are further divided into product families and in some cases several PUs manufacture the same product families.

All production units have to respond to the head-quarter in Fagersta. Some companies are decentralised where all the PUs can decide for themselves how much to produce and if they need to invest in more capacity or not, but at Seco Tools they have a centralised approach. It is at the head quarter that all decisions regarding the company and the capacity is made.

When planning the supply it is sometimes difficult to decide on how much each PU should manufacture in those cases where they manufacture the same products. All PUs have a certain amount of products that they always produce, but depending on the customers need Seco Tools uses a so called flexibility pot. The flexibility pot is a plan for how to reduce risks in supply and how to handle a sudden increase in demand for a certain item. The plan for items that are seen as important to reduce the risk for is to have two or more PUs that are ready for manufacturing of the item. The idea is to back-up production if needed.
4.1.2 Seco Tools products

The production is divided based on the different manufacturing techniques. The MTS products are therefore separated into three different groups, i.e. inserts, tooling, and PC. Inserts are attached to the other tools in the PC and tooling product area, either with screws or any other locking technique. The minimum amount of inserts used in the other tools is one. The maximum amount of inserts used depends on the diameter of the tools. Inserts generate by far the biggest sales compared to tooling and PC since they are consumable goods. The temperature during metal cutting machining is causing abrasion on the tools, where the insert that is in contact with the metal receives the highest temperatures. The tool that is holding the insert can be used for days, months or even years depending on what machining is being made. However, the time span before an insert needs to be changed is a question of minutes (Seco Tools internal documents, 2014). Seco Tools’ production volume for inserts is approximately 1’200’000 inserts per week with 8000 different standard SKUs stored at least in one of the DCs. PU Fagersta is the biggest manufacturer with a production volume of 900’000 inserts per week (Liljeqvist, 2014). An overview of different types of inserts can be seen in Figure 11 (Ackesten, 2014).

![Figure 11. Example of the inserts product area (Seco Tools intranet, 2014)](image)

When manufacturing inserts they are being pressed from a powder produced at Seco Tools to gain the wanted properties. After pressing the inserts, they have a bigger volume than desired, are very brittle, and in need of a sintering process in a furnace during between 12 and 24 hours. The sintering process forms the inserts into a solid mass of material and with desired shape by slowly heating them to a certain temperature and then cooling them down slowly. The final process after sintering is to put coating on the surfaces that makes the inserts wear resistant. The inserts are then packed into boxes and ready for distribution (Seco Tools internal documents, 2014).

For tooling and PC products the production starts from raw material or from blanks. Blanks can be likened to processed raw material in order to fit better for production. The following steps could be milling, turning, grinding, surface treatment, etc. depending on what type of product that will be manufactured. The main tooling products are milling cutters, turning holders, and holding systems (Ackesten, 2014). Figure 12 shows tools from the Seco Turbo range used for square shoulder milling;
the two lying down tools are used for narrow spaces, the milling cutter to the left is used for larger spaces, and the tool to the right is one type of the holding system milling cutters. Square shoulder milling tools are used to mill corner angles to 90 degrees (Seco Tools web page, 2014). Compared to the inserts with a production volume of 1'200'000 per week, tooling only produce 7000 products per week, where around 5000 different SKUs are stored at one of the DCs (Ackesten, 2014).

![Square shoulder milling tools in the tooling product area](Seco Tools internal documents, 2014)

The main types of PC products are drills, solid end mills, reamers, and tooling systems including EPB and capto products (Seco Tools intranet, 2014). PC have five production units where each one of them have an own sales & marketing, and R&D department (Ackesten, 2014). They are subsidiaries to Seco Tools. Figure 13 shows an overview of the holemaking product range which envelopes drilling, reaming, and boring. Here is an explanation of the tools starting from the left in Figure 13; two large-diameter multi-tooth reamers, two indexable insert drills, two exchangeable head reamers, one indexable blade reamer, another exchangeable head reamer, three exchangeable tip drills, two solid carbide drills, one solid reamer, four boring heads for precise and flexible holemaking, and one lying down drill for longer holes (Seco Tools web page, 2014).

![Holemaking products in the PC product area](Seco Tools internal documents, 2014)
Seco Tools main manufacturing strategy is MTS for all the presented products, but they also offer customised tooling, i.e. MTO. This is however outside the thesis scope. The MTS products are stored at one or more of the following finished goods inventories, i.e. DCs (Seco Tools intranet, 2014; Skog, 2014):

- Asia Pacific distribution center (APDC) in Singapore, Singapore
- European distribution center (EDC-H) in Houthalen, Belgium
- China distribution center (CDC) in Shanghai, China
- US distribution center (ADC) in Hebron, USA

Seco Tools has implemented a new supply model in line with the Supply Chain Planning project. All the standard products are stored at EDC-H, which is working as a main/centralised warehouse, while APDC, CDC, and ADC only store the products generating most value for Seco Tools. All PUs supplies to EDC-H which then distributes the products to the other DCs. In the past, stock balancing was a connection between all four DCs where the PUs supplied all DCs (Arvidsson, 2014).

### 4.2 S&OP introduction

The software Voyager was going to be implemented at Seco Tools as a part of the Supply Chain Planning project that started in May 2012 (Skog, 2014). The purpose of the Supply Chain Planning project was to implement the software but also to make the new software a tool to use in an updated S&OP process since Voyager manages demand, inventory, and supply planning. The updated S&OP process was partially implemented at the time when the thesis took place but there is still room for improvements before the process is fully defined (Jansson, 2014).

When this thesis took place the software was supposed to be implemented but the go-live date was delayed, which also caused some trouble in the implementation phase of the updated S&OP process. The S&OP process that is studied and described in chapter 4 Current situation is the updated process that will be used in the future. Some of the parts in the updated S&OP process were up and running when this thesis took place but some were not. Some parts are supposed to be implemented in the future, but the authors have chosen to describe the process as a current state even if some of the processes represent a future state. The demand planning process is almost fully implemented. The only part missing at the moment is the second week where the SU review takes place, only a few of the six SUs are involved. The Inventory & Supply Planning process is a future process since the activities needs Voyager to be implemented. The inventory part of the software will be implemented in June 2014, the supply planning part will be implemented in the end of 2014 or the beginning of 2015.

The updated S&OP process at Seco Tools is divided into two sub processes i.e. demand planning and tactical inventory & supply planning, Figure 14. The demand planning process is by Seco Tools seen as an input to the S&OP process, which they referred to as tactical inventory & supply planning (Skog, 2014; Jansson, 2014).
Figure 14. Overview of the S&OP process at Seco Tools

Seco Tools’ S&OP is in some parts divided into three processes, one for each planning group. Although some of the meetings are held separately the people from the planning groups work close to each other and collaborate. Separate meetings are held since what they discuss during these meetings does not affect what the other planning groups discuss. For instance when the inserts planning group make a supply plan for their production units there is no need to gather the PC planning group; their supply plans do not affect each other. Weekly and daily operational processes support the monthly tactical S&OP process and the strategic process according to this (Skog, 2014):

Operational:
  • Daily process: Refill EDC-H and distribute orders from EDC-H to APDC, CDC, and ADC
  • Weekly process: Order batch release

Tactical:
  • Seco Tools’ S&OP with a planning horizon of 4-24 months in the future

Strategic:
  • Strategic business plans for the upcoming 6 years

The implemented software Voyager is divided into three different databases to support the different time frames; the tactical database with monthly updates and inputs from the strategy, the operational database with weekly updates, and the distribution requirement planning (DRP) database with daily updates. A separate demand planning database exists as well with weekly updates regarding the demand. A strategic database is not needed in Voyager for Seco Tools since the time horizon in the tactical databases was enough in order to plan for investments. Therefore the strategic inputs went directly to the tactical databases. As Figure 15 shows, the tactical, operational, and DRP databases are also divided according to the three planning groups (Skog, 2014).

Figure 15. The divided databases within Voyager (Seco Tools internal documents, 2014)
The operational database has the role of the master database with information regarding resources, products and so on, Figure 16. All historical data of incoming orders, i.e. purchasing orders, distribution orders, and manufacturing orders are weekly uploaded and then stored in the operational database from the central ERP system Movex (Skog, 2014).

The databases that are used in the S&OP are the demand planning database and the tactical database. People working with demand planning collect historical data from the operational database once a month to generate a demand plan. No manual updates are made in the operational databases since it is the master database. The demand plan is copied into the operational databases where automatic calculations are made based on the new demand plan. A copy of the operational databases is then transferred into the tactical database where the supply planning is done. An unconstrained supply plan is made in the tactical database and then updated to a constrained supply plan in the same database. It is to avoid disruption in the operational databases (Skog, 2014).

The DRP database receives weekly batch order releases from the operational database, according to the constrained supply plan, and daily information regarding actual orders from the ERP system. The daily information enables the DRP database to generate orders of moving products from one DC to another DC (Skog, 2014).

Figure 16. How S&OP synchronise with Voyager (Seco Tools internal documents, 2014)

The monthly S&OP calendar with all activities included in demand planning, and inventory & supply planning is illustrated in Figure 17, where the yellow boxes represents working activities and the red boxes represent meetings (Arvidsson, 2014; Seco Tools internal documents, 2014). The following subchapters describe each step in the S&OP calendar in detail.
<table>
<thead>
<tr>
<th>Activity</th>
<th>Week 1</th>
<th>Week 2</th>
<th>Week 3</th>
<th>Week 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Generate statistical forecast</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Forecast review</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>High level adjustment</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PM review meetings</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SU reviews</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SEM meeting</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tactical inventory &amp; strategy input</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Create constrained supply plan</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Preparation meetings</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PU meetings</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Escalated issues</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Global supply chain meeting</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Figure 17. Seco Tools’ monthly S&OP calendar (Seco Tools internal documents, 2014)*

Following figures will further be used to visualise Seco Tools’ information flow:

*Figure 18. The legends for the information flow in Seco Tools S&OP process*

### 4.3 Demand planning

Demand planning at Seco Tools is performed once per month with the duration of two weeks. The first week starts with a generation of a statistical forecast in the demand planning database during the Sunday before week 1, see *Figure 19* (Skog, 2014). The Central Demand Planners for each planning group review their forecasts before the Business Intelligence (BI) Responsible makes a high level adjustment on all product families. Product Management (PM) review meetings are later on held to study the demand for each product family (Widén, 2014).
Figure 19. S&OP information flow week 1

Figure 20 shows an overview of the second week’s demand planning. The second week starts when local planners from six sales units (SUs) make manual forecast adjustments. The adjustments are based on their local knowledge of future sales. The central demand planners for each planning group review their forecast one last time before the SEM Meeting is held with the purpose to sign-off the forecast. Thereafter the demand plan is copied from the demand database to the three different operational master databases. The idea with the demand planning process is that each activity from the initial data generation all the way to the final forecast review would create a demand plan that is in more detail and more accurate activity by activity (Skog, 2014; Arvidsson, 2014).

Figure 20. S&OP information flow week 2
4.3.1 Generate statistical forecast
The first step in demand planning is the generation of a statistical forecast on Sunday week 0. It is generated from the operational database in Voyager into the demand planning database. The statistical forecast is based on historical data, e.g. sales history.

4.3.2 Forecast review week 1
After the statistical forecast is generated the Central Demand Planner from each planning group reviewed the statistical forecast during Monday week 1 in the second step. The reviews are made in order to make sure the statistical forecast is done correctly (Skog, 2014).

4.3.3 High level adjustment
The third step in the demand planning process is to perform a high level adjustment on Tuesday week 1. The BI Responsible from the marketing and product development department is accountable for this BI forecast review. The adjustment being made is within a time horizon of 4-24 months (Östlund, 2014).

The high level adjustment consists of manual updates of the statistical forecast according to business intelligence and market analysis. It is based on the budget for the fiscal year, quarterly made forecasts from subsidiaries, the strategy for the following five years i.e. the business plan, and statistical data regarding sales in the automotive industry, industry production, and steel industry (Östlund, 2014). The adjustment is made on the item level in the product structure pyramid, Figure 21. The item level provides the best forecast accuracy when it is applied up and down on the remaining four levels, i.e. product areas (PAG), product families (PGC), Item – location, and Item – sales units (Östlund, 2014).

![Figure 21. Seco Tools’ product structure pyramid (Seco Tools internal documents, 2014)](image)

4.3.4 PM review meetings
The PM review meetings occur on Wednesday week 1 (Huang & Widén, 2014). People from the previous steps discuss the forecast for each product family with the responsible product managers or someone with deep knowledge of the product family. Video conferences are held if the product managers are not located in Fagersta (Widén, 2014).

The participants required in the meetings are based on product families, Table 4. Some meetings required participants from two planning departments. Milling product area is an example where
Central Demand Planners from both the inserts and tooling planning groups are needed because changes in inserts demand had direct impact on tooling demand (Widén, 2014).

Table 4. The product families sorted by planning groups

<table>
<thead>
<tr>
<th>Inserts</th>
<th>Tooling</th>
<th>PC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stationary tools holding</td>
<td>Stationary tools holding</td>
<td>Solid end mills</td>
</tr>
<tr>
<td>Milling</td>
<td>Milling</td>
<td>Drills</td>
</tr>
<tr>
<td>CBN</td>
<td>CBN</td>
<td>Reamers</td>
</tr>
<tr>
<td></td>
<td>Capto</td>
<td>EPB</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Tooling systems</td>
</tr>
</tbody>
</table>

An overview of the PM review meetings can be seen in Table 5. A 4-24 months demand plan is created once these meetings are finished. The operational databases are updated with input from the demand database in Voyager during the weekend in week 1 (Skog, 2014).

The high level adjustment is input to the meeting. During the meeting discussions regarding actual and forecasted sales, which products that are being phases-in or phased-out due to cannibalisation effects, sales future campaigns, and at last decision on demand plan is made.

Table 5 shows the meeting owner, time of the meeting, input, output, agenda, and which seven meetings that are held. Also showing in the table is the involved planning groups, concerned product families, and the participants for each meeting (Seco Tools internal documents, 2014; Huang & Widén, 2014). The participants should be seen as roles covered by one or more people.

The operational databases are updated with input from the demand database in Voyager during the weekend in week 1 (Skog, 2014).
### Table 5. PM review meetings overview (Seco Tools internal documents, 2014; Huang & Widén, 2014)

<table>
<thead>
<tr>
<th>PM review meetings</th>
<th>Week 1</th>
<th>Wednesday</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Meeting owner:</strong></td>
<td>Central Demand Planner(s)</td>
<td></td>
</tr>
<tr>
<td><strong>Input</strong></td>
<td><strong>Agenda</strong></td>
<td><strong>Output</strong></td>
</tr>
<tr>
<td>1. High level adjustment</td>
<td>1. Actual and forecasted sales</td>
<td>1. Demand plan to SU review</td>
</tr>
<tr>
<td></td>
<td>2. Phase-in/phase-out products</td>
<td></td>
</tr>
<tr>
<td></td>
<td>3. Sales future campaigns</td>
<td></td>
</tr>
<tr>
<td></td>
<td>4. Decide demand plan</td>
<td></td>
</tr>
<tr>
<td><strong>Planning group</strong></td>
<td><strong>Product family</strong></td>
<td><strong>Participants</strong></td>
</tr>
<tr>
<td>Inserts Tooling</td>
<td>Stationary tools holding</td>
<td>BI Responsible</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Market support and admin</td>
</tr>
<tr>
<td>Inserts Tooling</td>
<td>Milling</td>
<td>BI Responsible</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Corporate Product Manager Milling</td>
</tr>
<tr>
<td>Inserts Tooling</td>
<td>CBN</td>
<td>BI Responsible</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Product and Marketing Managers</td>
</tr>
<tr>
<td>PC Tooling</td>
<td>Capto EPB Tooling systems</td>
<td>BI Responsible</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Marketing Manager</td>
</tr>
<tr>
<td>PC</td>
<td>Solid end mills</td>
<td>BI Responsible</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Product Managers</td>
</tr>
<tr>
<td>PC</td>
<td>Drills</td>
<td>BI Responsible</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Product Managers</td>
</tr>
<tr>
<td>PC</td>
<td>Reamers</td>
<td>BI Responsible</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Product Managers</td>
</tr>
</tbody>
</table>

#### 4.3.5 SU reviews

Between Monday and Tuesday the second week of demand planning, all the SUs, make overrides regarding local sales in the demand database on item – sales unit level, *Figure 21*. This is actually done every day of the month, with week 1 of demand planning as an exception. If overrides are done during this week the software will crash due to the work from the high level adjustment and PM review meetings. The overrides cannot be applied on the desired item level until the beginning of week 2 when the software is updated with the previous modifications. As a result of this two days are added in the S&OP process for the SUs to review the forecast (Östlund, 2014). The overrides can be seen on PAG level, *Figure 21*, and this is updated and transferred to item level every Friday. At the time being, six SUs are involved, i.e. Germany, France, India, Sweden, Turkey, and USA. The six SUs represent nearly 80 percent of the global sales. The future plan is to involve all SUs. The local demand planners are responsible for the overrides with input from field sales staff (Skog, 2014).

#### 4.3.6 Forecast review week 2

Between Wednesday and Thursday after all SU reviews are done the Central Demand Planners makes a second forecast review. This step is most likely only to check for large forecast bias. If no errors are found the demand plan is ready for the following SEM meeting (Skog, 2014).

Input to this step is the demand plan changes made during SU review. Output is preffered to be the same as the input or a slightly modified final demand plan (Skog, 2014).
4.3.7 SEM meeting

The SEM meeting takes place on Friday week 2 before the forecast is updated into the operational database during the weekend. The meeting starts with a forecast presentation given by the BI Responsible. SEM receive information about the high level adjustments, trends, speculations, and statistics for the product families before they sign off the plan and make it ready for the upcoming steps. Input to the SEM meeting is the demand plan created in the previous step. Output is an agreed and signed off demand plan ready for inventory & supply planning, Table 6 (Östlund, 2014).

Table 6. SEM meeting overview (Seco Tools internal documents, 2014; Östlund, 2014)

<table>
<thead>
<tr>
<th>SEM meeting</th>
<th>Agenda</th>
<th>Output</th>
</tr>
</thead>
<tbody>
<tr>
<td>Meeting owner:</td>
<td>Input</td>
<td>Week 2</td>
</tr>
<tr>
<td>BI Responsible</td>
<td>Output</td>
<td>Friday</td>
</tr>
<tr>
<td>1. Prepared demand plan</td>
<td>1. BI presentation</td>
<td>1. Agreed and signed off demand plan by SEM</td>
</tr>
<tr>
<td></td>
<td>1. High level adjustment</td>
<td></td>
</tr>
<tr>
<td></td>
<td>1. Trends</td>
<td></td>
</tr>
<tr>
<td></td>
<td>1. Speculations</td>
<td></td>
</tr>
<tr>
<td></td>
<td>1.4. Product family statistics</td>
<td></td>
</tr>
<tr>
<td></td>
<td>2. Sign off demand plan</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Planning group</th>
<th>Participants</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inserts</td>
<td>The president</td>
</tr>
<tr>
<td>Tooling</td>
<td>CFO</td>
</tr>
<tr>
<td>PC</td>
<td>VP Sales &amp; Marketing</td>
</tr>
<tr>
<td></td>
<td>VP Production</td>
</tr>
<tr>
<td></td>
<td>VP SCM</td>
</tr>
<tr>
<td></td>
<td>VP Business Development</td>
</tr>
</tbody>
</table>

4.4 Tactical inventory & supply planning

The tactical inventory & supply planning starts week 3 in the monthly S&OP process, Figure 22. A copy is made from the operational database to the tactical database where the tactical planning is made. The demand plan is modified into a constrained supply plan based on available capacity and actual inventory levels. Future strategic capacity and inventory plans are also taken under consideration. Different scenarios are tested in the tactical databases. Once a scenario is set preparation meetings are held to discuss the constrained supply plan before meetings with the PUs are held (Jansson, 2014).
During week 4, see Figure 23, PU meetings are held to study the capacity in detail. Any issues are escalated up to the supply management who gives their input and then a new PU meeting is held. Once the supply plan is set the global meeting is held where the plan is being signed off. Every quarter a supply chain meeting is held that replaces the global meeting in the S&OP (Jansson, 2014).

**Figure 22. S&OP information flow week 3**

**Figure 23. S&OP information flow week 4**
4.4.1 Tactical inventory & strategy input

The purpose of this activity is to generate an unconstrained supply plan based on the future business strategy, the demand plan, and the tactical inventory plan (Arvidsson, 2014).

The latest business strategy, parts of the business plan, input is updated and shared by the Supply Management in the quarterly supply chain meetings. The business plan extends six years into the future and includes production strategies, machine investments, capacity changes, etc.

The tactical inventory plan input is analyzed and updated by the Tactical Inventory & Supply Planner for each planning group. Aggregated service levels are set quarterly and safety stock calculations are updated if needed according to the latest business strategy input. The service levels are set according to a determined stocking policy. Depending on the number of order lines, the COGS, and how important the products are for Seco Tools in a strategic point of view the products will be given a target service level and a decision on which DC the product is to be stored. The service level is nothing else than a decided stock availability target; the reason for this is that Seco Tools struggle when it comes to measuring customer service level. Instead, they communicate with the customer so the customers know what DC store which products, and what the expected delivery lead time is (Arvidsson, 2014).

The demand plan is updated with those two inputs. The updates are made in the tactical databases based on a copy from the operational databases. Once the demand plan is updated the Tactical Inventory & Supply Planner for each planning group generates an unconstrained supply plan in Voyager. The unconstrained supply plan is the output of this activity (Arvidsson, 2014).

4.4.2 Create constrained supply plan

The already generated unconstrained supply plan is analyzed to identify capacity bottlenecks. A constrained supply plan is generated to match existing capacity when capacity bottlenecks are identified. By looking at different scenarios in the tactical database regarding inventory policies, capacity issues and future strategies, the scenario that generates the best outcome can be found. The constrained supply plan based on the chosen scenario is analyzed once more before being sent off to the different preparation meetings (Arvidsson, 2014).

The constrained supply plan is based on planned production, current inventory levels, stock objectives, actual and target days in inventory metric, capacity utilisation, the quarterly supply plan, and the demand plan from previous step (Arvidsson, 2014).

Once the constrained plan is finished three different meetings are held to secure the supply plan, i.e. preparation meetings, PU meetings, and the monthly global meeting replaced by a more strategic supply chain meeting quarterly (Seco Tools internal documents, 2014; Arvidsson, 2014):

4.4.3 Preparation meetings

The preparation meetings are held on Wednesday week 3. Separate meetings are held for each planning group, resulting in three meetings. The constrained plan generated by the Tactical Inventory & Supply Planners is studied and updated with regards to deviations in forecast, production, stock levels, and stock objectives which were not considered in the previous step. The goal is to reach consensus of the supply plan among each planning group. New recommendations of the supply plan are then made for the PU meetings (Seco Tools internal documents, 2014; Arvidsson, 2014).
Table 7 reflects what is discussed during these meetings and includes participants, the agenda, meeting owners, and planning groups’ involved (Seco Tools internal documents, 2014).

**Table 7. Preparation meetings overview (Seco Tools internal documents, 2014)**

<table>
<thead>
<tr>
<th>Preparation meetings</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Meeting owner:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tactical Inventory &amp; Supply planner</td>
<td>Week 3</td>
<td>Wednesday</td>
</tr>
<tr>
<td><strong>Input</strong></td>
<td><strong>Agenda</strong></td>
<td><strong>Output</strong></td>
</tr>
<tr>
<td>1. Constrained supply plan</td>
<td>1. Deviations in SCP overview</td>
<td>1. Consensus on supply plans</td>
</tr>
<tr>
<td></td>
<td>1.1. Forecasts</td>
<td></td>
</tr>
<tr>
<td></td>
<td>1.2. Production</td>
<td></td>
</tr>
<tr>
<td></td>
<td>1.3. Stock levels &amp; objectives</td>
<td></td>
</tr>
<tr>
<td>2. Study quarterly supply plan</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Comment on KPI status</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. Decide supply plan</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Planning group</th>
<th>Participants</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inserts</td>
<td>SCP Group Manager</td>
</tr>
<tr>
<td></td>
<td>Central Demand Planner</td>
</tr>
<tr>
<td></td>
<td>Operational Inventory &amp; Supply Planner</td>
</tr>
<tr>
<td>Tooling</td>
<td>SCP Group Manager</td>
</tr>
<tr>
<td></td>
<td>Central Demand Planner</td>
</tr>
<tr>
<td></td>
<td>Operational Inventory &amp; Supply Planner</td>
</tr>
<tr>
<td>PC</td>
<td>SCP Group Manager</td>
</tr>
<tr>
<td></td>
<td>Central Demand Planner</td>
</tr>
<tr>
<td></td>
<td>Operational Inventory &amp; Supply Planner</td>
</tr>
</tbody>
</table>

### 4.4.4 PU meetings

The PU meetings are held after the Preparation meetings on Monday week 4. Information used in the PU meetings is gathered from the tactical databases. Input to the meetings is the supply plan (Seco Tools internal documents, 2014).

The purpose of these meetings is to gather all PU Production Managers and PU Production Planning Managers who manufacture the same type of products to discuss the total available capacity in all PUs. A total of six meetings are held. There is no need to gather planning groups and PUs that have no products in common and those who do not affect each other capacities, Table 8 (Ackesten, 2014; Seco Tools internal documents, 2014).
Table 8. PU Meetings overview (Seco Tools internal documents, 2014; Skog, 2014; Jansson, 2014)

<table>
<thead>
<tr>
<th>PU meetings</th>
<th>Agenda</th>
<th>Output</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Meeting owner:</strong> SCP Group Manager</td>
<td><strong>Week 4 Monday</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Input</strong></td>
<td><strong>Output</strong></td>
<td></td>
</tr>
<tr>
<td>1. Supply plan from Preparation meetings</td>
<td>1. Capacity constrains 2. Resolve or escalate issues 3. Decide supply plan</td>
<td></td>
</tr>
</tbody>
</table>

### Participants

<table>
<thead>
<tr>
<th>Participants</th>
<th>Agenda</th>
<th>Output</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tactical Inventory &amp; Supply Planner PU Production Planning Manager</td>
<td>Central Demand Planner PU Production Manager</td>
<td>Purchaser</td>
</tr>
</tbody>
</table>

### Planning group

<table>
<thead>
<tr>
<th>Product family</th>
<th>PUs</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Inserts</strong></td>
<td><strong>Fagersta, Sweden</strong></td>
</tr>
<tr>
<td>Milling</td>
<td>Pune, India</td>
</tr>
<tr>
<td>CBN</td>
<td>Sumperk, Czech Republic</td>
</tr>
<tr>
<td><strong>Tooling</strong></td>
<td><strong>Arboga, Sweden</strong></td>
</tr>
<tr>
<td>Stationary tools holding Milling</td>
<td>Bourges, France</td>
</tr>
<tr>
<td>CBN</td>
<td>Lenoir City, USA</td>
</tr>
<tr>
<td>Capto</td>
<td>Pune, India</td>
</tr>
<tr>
<td><strong>PC Tooling</strong></td>
<td><strong>Bouxwiller, France</strong></td>
</tr>
<tr>
<td>EPB Tooling systems</td>
<td></td>
</tr>
<tr>
<td><strong>PC</strong></td>
<td><strong>Lottum, Netherlands</strong></td>
</tr>
<tr>
<td>Solid end mills</td>
<td>Reynoldsville, USA</td>
</tr>
<tr>
<td><strong>PC</strong></td>
<td><strong>Norrköping, Sweden</strong></td>
</tr>
<tr>
<td>Drills</td>
<td>Reynoldsville, USA</td>
</tr>
<tr>
<td><strong>PC</strong></td>
<td><strong>La Tour du Pin, France</strong></td>
</tr>
<tr>
<td>Reamers</td>
<td></td>
</tr>
</tbody>
</table>

Capacity constraints are discussed during these meetings. Consensus on a supply plan between all PU managers and planning groups is the target. Several PUs manufactures the same products and reduce the risk in supply Seco Tools have a flexibility pot, described in 4.1.1. The products in the pot can be transferred to another PU if needed. By managing the capacity constraints and utilising PUs that are not fully loaded Seco Tools can be more flexible (Eriksson, 2014; Jansson, 2014).

In general PU Managers want to obtain their share of the capacity. They want to be fully loaded to keep their production costs down and to utilise their resources as much as possible. There is an increasing competition since SMS took charge between the Seco PUs and the other SMS PUs. Seco Tools is witnessing an increased pressure of cutting costs (Jansson, 2014).

#### 4.4.5 Escalated issues

Supply plan problems discovered in the PU meetings are either resolved instantly or escalated by the SCP Group Manager to the appropriate people in the Supply Management. Escalations happen when the participants either lack authority to make decisions or do not know what strategy to follow. Supply Management contribute with solutions or decide on necessary actions to resolve the problem. The PU meeting is then rescheduled to decide on the supply plan with the new conditions (Jansson, 2014).

The participants in the meetings need to understand the strategic input from Supply Management to avoid unnecessary unresolved issues. It is preferred to have as much strategic input as possible to
make appropriate decisions during the meetings and not to hamper this process step more than necessary (Eriksson, 2014).

### 4.4.6 Global meeting

The global meeting is planned for Friday week 4 and is replaced by the supply chain meeting quarterly (Seco Tools internal documents, 2014). An overview of the planned global meeting agenda can be seen in *Table 9*.

Input to the meeting is the supply plan proposal with recommendations from the PU meetings. The purpose is to reach mutual agreement and to sign off the supply plan (Seco Tools internal documents, 2014).

Except for the general KPIs the milestones for 2014 are studied as well. They are to reach a high stable level of the net stock availability, reduce the number of inventory days, and to gain more market shares (Jansson, 2014).

The two outputs were decisions on updated supply plans and decisions on change management, i.e. vital actions, resources, and continuous improvement priorities (Seco Tools internal documents, 2014).

Previously before the updated S&OP the PU meetings were held after the global meeting. It is easier to divide the capacity between the PUs after feedback regarding the capacity is given from the PU Managers. The divided capacity can be viewed objectively without the presence of the PU Managers. The new meeting structure in the updated S&OP with the PU Meetings held before the global meeting have been tested twice. It went smoothly the first time but the second time there were some capacity issues. As a result of that, discussions arose regarding which PUs should get the last volume when the managers had not already decided on who would get the flexibility pot. Consensus could therefore not be reached (Ackesten, 2014; Jansson, 2014; Eriksson, 2014).

*Table 9. Global meeting overview (Seco Tools internal documents, 2014)*

<table>
<thead>
<tr>
<th>Global meeting</th>
<th>Week 4</th>
<th>Friday</th>
</tr>
</thead>
<tbody>
<tr>
<td>Meeting owner:</td>
<td>SCP Manager</td>
<td></td>
</tr>
<tr>
<td>Input</td>
<td>Agenda</td>
<td>Output</td>
</tr>
<tr>
<td>1. Comments from PU meetings</td>
<td>1. SCP overview with comments from the PU meetings</td>
<td>1. Decisions on change management</td>
</tr>
<tr>
<td>2. Supply plan from PU meetings</td>
<td>2. Sign off the supply plan</td>
<td>2. Signed off supply plan</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Planning group</th>
<th>Participants</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inserts</td>
<td>Supply Management</td>
</tr>
<tr>
<td>Tooling</td>
<td>Purchasing Manager</td>
</tr>
<tr>
<td>PC</td>
<td>Tactical Inventory &amp; Supply Planner</td>
</tr>
<tr>
<td></td>
<td>SCP Group Manager</td>
</tr>
</tbody>
</table>
4.4.7  Supply chain meeting

The difference from the global meeting is that the supply chain meeting’s purpose is to confirm the strategic baseline for the monthly S&OP process. The purpose of the meeting is to gain a common view for marketing, logistics, production, and R&D. The general forecast needs to be divided into mix rates to align the capacity in production. The meeting also needs to share the tactical production plan, machine capacities, and how bottlenecks in the production should be managed. The objective is to secure a stable and reliable tool for the net stock availability and days in inventory goal (Seco Tools internal documents, 2014).

The meeting have seven different presentations that capture the outcome from the last quarter, i.e. forecast, stock availability, working capital, three planning group presentations, and at last a presentation of the tactical production plan, Table 10. During these presentations issues are being discussed and decisions are being made (Seco Tools internal documents, 2014).

The outputs are similar to the global meeting with comments on future actions regarding management, resources and improvements priorities, and a signed off supply plan (Seco Tools internal documents, 2014).

Table 10. Supply chain meeting overview (Seco Tools internal documents, 2014)

<table>
<thead>
<tr>
<th>Supply chain meeting</th>
<th>Meeting owner:</th>
<th>Week 4</th>
<th>Quarterly</th>
</tr>
</thead>
<tbody>
<tr>
<td>Input</td>
<td>Agenda</td>
<td>Output</td>
<td></td>
</tr>
<tr>
<td>1. Agenda presentation slides</td>
<td>1. Forecast presentation</td>
<td>1. Comments on future actions regarding management, resources, and improvement priorities</td>
<td></td>
</tr>
<tr>
<td>2. PU meetings’ comments</td>
<td>2. Stock availability pres.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. PU meetings’ supply plan</td>
<td>3. Working capital pres.</td>
<td>2. Signed off supply plan</td>
<td></td>
</tr>
<tr>
<td>5. Replenishment cost status</td>
<td>5. Tooling planning group pres.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7. Production tactical plan</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Planning group</th>
<th>Participants</th>
<th>Duration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inserts</td>
<td>SEM</td>
<td>2 hours, 30 minutes</td>
</tr>
<tr>
<td>Tooling</td>
<td>SCP Manager</td>
<td></td>
</tr>
<tr>
<td>PC</td>
<td>BI Responsible</td>
<td></td>
</tr>
<tr>
<td></td>
<td>SCP Group Managers</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Supply Management</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Business Controllers</td>
<td></td>
</tr>
</tbody>
</table>
4.5 Financial integration

The financial planning at Seco Tools has in the past been decentralised but it has shifted towards a more top-down approach since Sandvik took charge. The PUs have in the past produced as much as possible to reduce the production cost per piece, and the centralised SCP department now want the PUs to produce only what is needed, when it is needed. PU managers have the pressure to decrease their production cost. This means they want to produce on a high volume, with stable supply rates, and use large order quantities to reduce the number of set-ups in production. The SCM division strive to a centralised organization where they simple provide the supply rates and send out the production orders to the PUs. After that it is up to the PUs to plan their production according to the rates given by the SCP planning groups (Skog, 2014; Jansson, 2014).

The business controllers in finance make yearly budgets based on the planned yearly production in volumes from each planning group. This is done at the product family level. This budget is also based on the last year’s invoices for inserts and tooling products, which are known as being more accurate when making the budget. By communicating with PU managers and local production planners the yearly numbers are updated with a ratio depending on their intuition. The local production planners base their recommendations on the actual supply rates at their PU (Atarman & Malmén, 2014). Quarterly forecasts work as a supplement to follow up the budget. The quarterly forecast is based on item level regarding how much that will be sold. It shows the product value excluding the profit, i.e. for tooling cost/pocket and for inserts cost/piece. These numbers can suddenly be modified if someone from SCP say there is a difference in the supply planning, if a product is not manufactured or has moved to another PU. The controllers ask each department for the latest production numbers regarding the last quarter of the year and compare with the budget (Atarman & Malmén, 2014).

The yearly supply planning in the S&OP process is not compared to the yearly budget of the products cost even though they are supposed to reflect on the same amount of products. The business controllers have just started a supply chain group where they are planning to participate in the demand planning in the S&OP. The future plan is to have them involved after the PM meeting (Atarman & Malmén, 2014; Jansson, 2014).

In the financial department their own developed forecast have quarterly been compared with the annual budget to see how well the actual production is following the budget. Every month the financial planning also present numbers of how the actual cost is compared to budget. The numbers they look at are (Atarman & Malmén, 2014):

- Cost productivity
- Total variance
- Efficiency and productivity
- On-time delivery
- Production lead time
- Innovation orders
- Production yield
- Cost per pocket or piece
4.6 KPIs
Seco Tools is a global company with a large amount of different KPIs. In the S&OP process there have however been minor discussions about KPIs. This subchapter will present the KPIs Seco Tools focuses on that is related to the S&OP process and to Seco Tools’ strategy. As mentioned in subchapter 4.2 S&OP introduction, Seco Tools divide their S&OP process into demand planning and inventory & supply planning. The KPIs presented here is therefore divided into KPIs for demand planning and then KPIs for inventory & supply planning. The third KPI subchapter presents the Seco Tools KPI Handbook; a total of 20 strategic cross-functional KPIs that were developed in order to get a good view of the business. The purpose of this subchapter is to present KPIs that can be used later on in the results & analysis chapter.

4.6.1 Demand planning KPIs
The BI responsible that provides the high level adjustment on the generated statistical forecast base these adjustments on KPIs regarding for example the forecast. This is however not presented in the PM meetings that the central demand planners or someone else takes part of. A forecast accuracy is calculated for nine months and it is used to see how profitable new investments etc. is for the future. The choice to calculate over a nine months period is because it is how far in the future they feel they need in order to make machine investments; the planned demand could be used in order to support such decisions. This forecast accuracy is therefore calculated when needed for making investment decisions. The forecast accuracy is therefore not updated every month. According to the BI responsible eight out of nine have forecast accuracy above 86 % and one product family is between 68 % and 86 %. The forecast accuracy target has a range of 88-95 % for the different product families with an average target of 93.3 % (Östlund, 2014).

The second week the SUs make overrides to the demand plan. To see how efficient they are, forecast accuracy is measured once per quarter (Skog, 2014).

The SEM meeting has the executives and BI responsible as participants. The BI responsible visualises how the high level adjustment was done. During the demand planning process there are four measurements presented for each product family, i.e. year to year sales difference, forecast error of the previous month, difference between sales one year back and forecasted sales one year forward, and year to year order income change. Year to year order income is displayed as a graph showing past order income and forecasted order income. These are shown in presentation slides at the monthly SEM meeting and the quarterly supply chain meeting but they are not discussed further, the graphs speak for themselves (Östlund, 2014; Jansson, 2014).

4.6.2 Inventory & supply planning KPIs
In inventory & supply planning four meetings exist with the supply chain meeting included. The preparation meeting, the PU meetings, and the global meeting have six KPIs that are supposed to be commented on with actions from a performance review. Those are on-time delivery, stock availability, supply lead time, days in inventory, forecast accuracy, and capacity utilisation. However, they are not fully implemented for root cause analysis. At some meetings they are not mentioned at all (Seco Tools internal documents, 2014).

Presentation slides from real and actual meetings list some KPIs that are studied, and the meetings are the global meeting and the supply chain meeting (Seco Tools internal documents, 2014).

The global meeting have the same four KPIs presented in 4.6.1 Demand planning KPIs, i.e. year to year sales difference, forecast error the previous month, difference between sales one year back and
forecasted sales one year forward, and year to year order income change. Graphs regarding the inventory levels and a figure showing the transferring of products between PUs are brought up in addition to those four KPIs. Those are also presented in the supply chain meeting along with measures for stock availability, days in inventory, and forecast accuracy, see Appendix D for the definitions. Also, the capacity constraints that are used are presented for the people present in the meeting, for every planning group and/or product families (Seco Tools internal documents, 2014).

### 4.6.3 Seco Tools KPI Handbook

Seco Tools has developed a KPI handbook that is not integrated with Seco Tools’ S&OP process and originally based on a KPI handbook made by SMS. The purpose of the handbook is to define a set of important KPIs for Seco Tools with clear ownership, definitions, measuring frequency, and targets. SEM reviews the KPIs on a monthly basis with no connection to the S&OP process (Seco Tools internal documents, 2014).

A total of 20 KPIs are used at Seco Tools within six main categories that can be seen in Table 11. The prioritised and most important goals for Seco Tools for their future are to gain more market shares (No.1), reduce the number of inventory days (No.11), and reach a higher stable level of the stock availability (No.12). These goals are measured with weekly updates for information sharing and reviewed monthly for action taking. Everyone at Seco Tools takes part of these, even if the KPIs are not included in the S&OP process (Seco Tools internal documents, 2014).

Every year the upper management decide on three strategic goals that can be different from the prioritised goals just mentioned. The three strategic goals for 2014 are increased gross margin (No.2), shorter time to money (No.3), and increased production yield (not in the handbook), seen in the category strategic focus area in Table 11 (Seco Tools internal documents, 2014).

The 20 KPIs in the handbook along with the prioritised goals and the strategic goals can be seen in Table 11 with the definitions of the KPIs in Appendix D (Seco Tools internal documents, 2014).

<table>
<thead>
<tr>
<th>Number</th>
<th>KPI</th>
<th>Category</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Market share growth</td>
<td>Strategic focus area</td>
</tr>
<tr>
<td>2</td>
<td>Gross margin increase</td>
<td>Strategic focus area</td>
</tr>
<tr>
<td>3</td>
<td>Time to money</td>
<td>Strategic focus area</td>
</tr>
<tr>
<td>4</td>
<td>Invoiced average sales per item of group standard items</td>
<td>Manage products &amp; services</td>
</tr>
<tr>
<td>5</td>
<td>% Sales new products</td>
<td>Manage products &amp; services</td>
</tr>
<tr>
<td>6</td>
<td>Development projects completed on-time, gate 3-5</td>
<td>Manage products &amp; services</td>
</tr>
<tr>
<td>7</td>
<td>Net Price change</td>
<td>Sales &amp; marketing</td>
</tr>
<tr>
<td>8</td>
<td>Selection Rate</td>
<td>Sales &amp; marketing</td>
</tr>
<tr>
<td>9</td>
<td>Documented cost reduction</td>
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Chapter 5
Benchmark at AstraZeneca
5. Benchmark at AstraZeneca

The benchmark at AstraZeneca consisted of a telephone interview with an Asset Planner working in the PU located in Södertälje, Sweden. The following chapter will first present the production at AstraZeneca in Södertälje. The next part will describe the S&OP process at AstraZeneca involving four steps, i.e. demand planning, supply planning, global supply planning, and exception based reporting.

5.1 AstraZeneca’s production

AstraZeneca is a global biopharmaceutical company specialized in the discovery, development, manufacturing, and marketing of prescription medicines. They are operating in over 100 countries and manufacturing sites in 16 countries (AstraZeneca, 2014).

AstraZeneca manufactured nine billion tablets in 2013 (Nilsson, 2014) at the PU Södertälje and they divide their products into product families according to following therapeutic areas (AstraZeneca, 2014; Nilsson, 2014):

- Neuroscience
- Gastrointestinal
- Cardiovascular and metabolic
- Infection
- Oncology
- Diabetes
- Respiratory, i.e. inflammation and autoimmunity

The product families can further be divided into subfamilies, pharmaceuticals, depending on the active pharmaceutical ingredient (API). An overview of AstraZeneca’s product structure can be seen in Figure 24. An example is the gastrointestinal therapeutic area, which consists of three different pharmaceuticals. Those three are then divided into infusion method, e.g. infusion/injections (drop) and tablets etc. Every item with a specific infusion method has an S&OP process (Nilsson, 2014).

![Figure 24. Product structure pyramid, AstraZeneca](image)
AstraZeneca’s manufacturing process can be seen in Figure 25 and will be further described below. They manufacture the API in-house while other raw materials are purchased from suppliers. These are then mixed together in what is called the formulating process where the product is being manufactured (Nilsson, 2014).

Countries and their governments have specific demands, rules, and restrictions for the usage of pharmaceuticals in their region, which need to be considered in the manufacturing and distribution process. All orders are therefore more or less customer specific and they have ten thousands of individual SKUs. To optimize the manufacturing process they keep a stock in the production where the semi-manufactures, for example plain tablets, can be stored up to two weeks before they are being customized. The production volumes for the semi-finished goods are historically stable with large batches. After this step the products are being custom made, i.e. packed in correct sizes and with correct labels. Entire custom made products with regulatory requirements go straight through the process to packing without being stocked. The lead time from formulating to packing is around 30-45 days. After the products have been packed they are distributed to marketing companies around the world. The marketing companies are distributors to the end customers, the pharmacies. They are both AstraZeneca owned and franchise chains. The distributors are seen as customers but can also be viewed as distribution centres since some of them have vendor management inventory (VMI) solutions, which makes AstraZeneca responsible of the stock-fill (Nilsson, 2014).

The packing process can be performed at a lot of places around the world, while the formulating process only can be done in one main formulating site. A few formulation processes are supported by more formulating sites. Manufacturing of a specific item has a predetermined and fixed flow; it might differ though from plants manufacturing an identical item. All products have almost the same manufacturing speed. Manufacturing of one type of SKU is done in campaigns, i.e. a campaign is in production during approximately one week; one week contains ten batches. Between the campaigns an extensive cleaning of the manufacturing equipment is needed. In order to keep the customers satisfied AstraZeneca need to have ten batches during a campaign; in total all products in an order will be delivered but with smaller quantity and more often. Communication with the customers is therefore important. The products have high contribution ratio so from AstraZeneca’s perspective all products and customers are equally important. This means that stock-outs and missed deliveries have great negative affect on AstraZeneca’s possibilities for pharmaceutical research investments and in the long run, for the survival of the business (Nilsson, 2014).
5.2 S&OP at AstraZeneca

Nilsson (2014) said that the two main focus areas for AstraZeneca have been to increase and maintain sales and high investments in R&D. Over the years the competition has increased in those areas, which addresses the need to cut costs. That is the reason for the implementation of S&OP in 2012. A few years ago AstraZeneca implemented the software SAP. At the same time they were studying their demand and supply planning and also started to define an S&OP process. The organization and the process were designed during the first six months and the current S&OP is running ever since. In the S&OP all subfamilies are studied separately, i.e. they have one S&OP process each. Later they are aggregated up to the product family level. Reports from the different pharmaceutical areas are gathered into one common S&OP report made with the help of global supply planners from each family for the global management to study. Their S&OP process consist of four steps, i.e. demand planning, supply planning, global supply planning, and exception based reporting, Figure 26. This is the global S&OP process; demand planning was made globally; every PU had their own local supply planning process; global supply planning and exception based reports were of a global character (Nilsson, 2014). The process steps will be further described in the following subchapters.

![Figure 26. The S&OP process at AstraZeneca, Södertälje](image)

5.2.1 Demand planning

Account managers are responsible for the demand planning which is a global process. They are working close to the AstraZeneca’s marketing companies around the world, studying the customers’ needs. The account managers gather information from customer relation partners close to the customers in the specific market segment. Europe for example has 3-4 account managers with 3-4 customer relation partners close to the market and customers. Generally they are making monthly forecasts adjustments at the item – infusion method – region – package size level, Figure 24, for the remaining year and the following 24 months; the time horizon is therefore at least 24 months (Nilsson, 2014).

During this step they only take future sales into consideration. The forecast is aggregated up to the semi-manufactures, the APIs, to see if there are any variations, Figure 24. If this differs a lot they can contact the responsible manufacturing site, otherwise the forecast is put into the SAP and then transferred to respective manufacturing site (Nilsson, 2014).

The account managers possess information regarding sales campaigns, which is included in the forecast. Some markets are believed to have very advanced forecasting techniques while others might have less advanced. The forecast is then simultaneously transferred to SAP and to another software which was internally developed. This other software can see deviations in the forecast compared to previous months and compare the forecast with actual sales. Planning and manufacturing is done in pieces, but from a market perspective it is also possible to study the budget compared with actual sales in money (Nilsson, 2014).
5.2.2 Supply planning

The forecast transferred into SAP was converted to planned orders from planning statistics. The semi-manufactures volume is stable so if any variation exists the asset planner is looking at an individual level. For instance, the Italian market might go up in demand while the Turkish is going down, but at an aggregate level the semi-manufactures volume is stable even if the specific SKUs can differ. The account manager might have done changes in the demand plan that is causing the variations at an aggregated level, but if no documentation of the changes made can be found the account manager have to be contacted. There can be a master data error causing the variation and the variation must therefore be validated before the process moves on (Nilsson, 2014).

The planned orders are then compared in Excel; existing capacity in the production have to match the new planned capacity needed. This is a local planning process within each manufacturing site. A local Asset planner is responsible for the supply plan and is working together with production site supply planners. The responsible for each manufacturing site can make decisions regarding short time variations such as overtime, and long-time variations such as more shifts, or other productivity actions (Nilsson, 2014).

Once the supply plan is created it is expected to meet the demand and each manufacturer is expected to produce according to the plan. Any problem that may cause them not to succeed is escalated (Nilsson, 2014).

There is no financial planning in demand or supply planning. However, every third month a business update is made and the fourth time of the year an annual business update is made. They are reports regarding working capital. The reports give an indication of what numbers the business will have regarding the working capitals at the end of the year (Nilsson, 2014).

5.2.3 Global supply planning

If problems are being escalated they are transferred into a global supply planning meeting. To simplify, all therapeutic areas are being represented by one global supply planner each. Separate global supply planning meetings are held with all subfamilies and the responsible global supply planner (Nilsson, 2014).

First local face-to-face meetings are held with the asset planner and the production manager. Following KPIs are then reported to the global supply planner meeting for this subfamily, usually during a telephone conference (Nilsson, 2014):

- KPIs regarding the inventory
- Planned yield - orders compared with manufactured orders
- Robust supply chain
- Stock outs – actions taken for supply oriented causes, refill of VMI
- Capacity utilisation KPIs

All sites that are manufacturers of products from a certain product family are participating in this meeting where the market information is summarized. All planners can daily see the safety stock settings and targets according to SAP. SAP is a help to calculate how much to produce to reach the targets. Other factors regarding inventory, acceptance with customers and so on is monitored and taken care of in these meetings (Nilsson, 2014).

They study the overall capacity and supply to see how well the company performs overall. If there is a trend where actions need to be taken regarding moving production as an example this can be handled
at exception-meetings when needed. It is only capacity and supply risks that are escalated further; inventory risks for example are handled on this level (Nilsson, 2014).

### 5.2.4 Exception based reporting

From the global supply planning meetings, all global supply planners compile monthly exception based reports. Account managers from around the world leave information about market intelligence. All global supply planners are informed about the situation so everyone has the same perception. The account managers and the responsible person for each therapeutic area usually have contact with each other before the meeting and the exceptions are normally known. To make sure no exceptions passes by without notice this is discussed during the meeting (Nilsson, 2014).

This meeting is only held to share information on a tactical/strategical level. It enables the global supply planner to see if any manufacturing site is overproducing and if the trend will continue for years, then they can start to re-allocate the volumes; they do a risk assessment followed by an action plan. Sometimes it is possible to re-allocate the formulation if it is manufactured in more than one place. Most often it is not, however the packing volumes can be moved around (Nilsson, 2014).

All sites strive for a good level in their workload. It is up to the global supply planners to study if the workload really is what the sites report before any re-allocation of volumes is done (Nilsson, 2014).

Scenario planning is done if something happens that can cause a change in the supply plan. This is not done at the meeting; scenario planning is made rather fast because time is of the essence at this stage. An example is when a patent has expired and another manufacturer of that pharmaceutical is having problems with the shipment. AstraZeneca then tries to gain more market shares and have to reschedule their manufacturing to enable fast production and delivery of the product in question (Nilsson, 2014).

To evaluate the S&OP process AstraZeneca has a business process owner. The process owner’s responsibility is to conduct a maturity assessment regarding the S&OP-process. “Yes” and “No” questions are asked regarding the process, where the number of “Yes” decides the maturity of the process. This is done twice a year with the governance team, a work force to their S&OP master. The S&OP master has responsibility of continuous improvements of the global S&OP process at AstraZeneca (Nilsson, 2014).

### 5.3 Summary of the benchmark

AstraZeneca’s’ S&OP starts with a demand planning part made by account managers and their customer relation partners. The result is a demand plan that is generated close to the customer by people with good knowledge of the market.

The next step in AstraZeneca’s S&OP is the supply planning. AstraZeneca is operating their manufacturing with a decentralised approach, which means that each production site is responsible for its own manufacturing. This results in separate S&OP processes for each site where the people involved have good knowledge of the available capacity. With that said each site runs an own supply planning in the S&OP process. No products are transferred between the sites.

Once the supply plan for each site is done responsible supply planners participate in a meeting where they compare the sites and summarises all important factors. This is summarised into an exception based report for the executive to take part of. In this report the executive can see how all sites perform. If the workload is changing during a long time and trends can be seen, they can decide on re-allocation on a strategic level. This however is quite rare.
Chapter 6
Results & analysis
6. Results & Analysis

Seco Tools’ S&OP process is compared to the theoretical framework and the benchmarking company AstraZeneca to be able to analyse it according to research objective 2. The identified differences between Seco Tools and the theoretical framework in subchapter 6.1 are presented in short statements and are later on summarised. Financial integration and KPIs are further analysed in subchapter 6.2 and 6.3 according to research objective 3. Finally, suggested future improvements are presented to fulfil research objective 4.

6.1 The process steps

Figure 27 shows Seco Tools’ S&OP compared to the theoretical S&OP and AstraZeneca’s S&OP. Links, in form of arrows, are drawn from the activities in Seco Tools’ S&OP to the corresponding steps both in theory and at AstraZeneca. All steps will further be discussed regarding similarities and differences, based on the five steps from the theory. For each step Seco Tools is first compared to theory and then to the benchmarking company AstraZeneca. The theory is seen as the correct way of how to work with S&OP and statements where Seco Tools needs to make changes in their S&OP according to theory are presented. The statements are labelled for each step (DP. for demand planning, SP. for supply planning, P. for the preparation meeting, and E. for the executive meeting) to easily follow them in the summary of the chapter. The comparison of how AstraZeneca is working is seen as a possibility to reflect on how others do. Since AstraZeneca is running their business in a different way changes will not necessary be for the better for Seco Tools. Therefore new statements of how to update Seco Tools S&OP according to this are not presented.
6.1.1 S&OP – Theoretical data gathering

Data gathering is the first step in S&OP with the purpose of making sure that historical data is used as a foundation.

6.1.1.1 Comparison of Seco Tools and theory

The demand planning process at Seco Tools includes the data gathering, which is mentioned as one of the five process steps in the theoretical framework (Grimson & Pyke, 2007; Wallace & Stahl, 2008; Milliken, 2008). As Lapide (2004) suggested it is best to let the IT system gather the data automatically in this step. At Seco Tools the data is generated automatically from Voyager and includes the statistical forecast and all necessary history. The forecast review after the data gathering is done by the central demand planners to confirm that the statistical forecast is correct, while Wallace & Stahl (2008) suggest managers from sales & marketing as responsible for the data gathering process step. One reason why the central demand planners are responsible for this at Seco Tools is that they have strong knowledge of Voyager. The central demand planners at Seco Tools also have strong knowledge of the production and what production levels Seco Tools usually have. When they are doing their review they can easily recognise if any master data error exist when the historical data is generated.
6.1.1.2 Comparison of Seco Tools and AstraZeneca
At AstraZeneca the data gathering is done by sales & marketing and this is seen as a part of the demand planning step. The difference between AstraZeneca and Seco Tools in this step is the fact that the responsible for the data gathering at AstraZeneca have no production knowledge at all. However, they have strong knowledge of sales patterns and volumes.

6.1.2 S&OP – Theoretical demand planning
The demand planning followed the data gathering step with the purpose of creating a demand plan that could reflect the customers’ actual need.

6.1.2.1 Comparison of Seco Tools and theory
Central demand planners work close with the BI responsible with forecasting as a link between the PUs and the BI responsible. The central demand planners are attendees in both demand planning and the preparation meeting when the constrained supply plan is reviewed. This allowed the cross-functionality between demand and supply side of the business that Lapide (2004) say is important for a successful S&OP.

Sheldon (2006) states the importance of the historical and future data input in demand planning. The historical data input in form of the statistical forecast is made in the data gathering step at Seco Tools. The job in demand planning is to update historical data with future data to create an unconstrained forecast (Grimson & Pyke, 2007; Wallace & Stahl, 2008). Sheldon (2006) also states that future data should be the business, marketing, and sales plan.

At Seco Tools the BI responsible gathers the business plan input from SEM and updated the data during the high level adjustment. Wallace (2006) suggests finance to be present in demand planning, which is not the case at Seco Tools. According to Wallace & Stahl (2008) the demand planning should be made in units and then converted into dollars, something which is not made at Seco Tools, to further align the business plan with S&OP. Dougherty & Gray (2013) state that constant comparison of the demand plan and the financial plan is needed to see if the plans match, which is not done at Seco Tools. The integration of financial planning into S&OP is by Logility Voyager Solutions (2010) seen as the most important aspect for a successful S&OP process; Wagner, et al. (2013) say the purpose with S&OP should be to maximize profits and Wallace & Stahl (2008) state that much of the power with S&OP is lost without the integration of financial planning. Therefore the authors identified the following two opportunities for improvement.

DP.1. Finance should be integrated in demand planning.

DP.2. The demand plan should be converted into dollars in order to compare the S&OP with the annual financial plan. Numbers and assumptions can then be challenged and the management can authorize the plan based on dollars.

Wallace & Stahl (2008) suggest that the marketing plan input should capture the integration of new products into S&OP. Wagner et al. (2013) and Wallace & Stahl (2008) suggest that product development should be involved with sales & marketing as responsible for the demand planning. Wallace (2006) says that new products should be included early in the S&OP process and cannibalisation effects should be taken under consideration. At Seco Tools the BI responsible considers cannibalisation effects in the business plan but in the S&OP process no NPIs are included. At Seco Tools information is sometimes missing for delayed stock building, marketing of NPIs, etc. It led to inaccurate supply plans which made it hard to predict PU utilisation and delayed NPIs that resulted in loss of sales. Wallace (2006) states the importance of having a product development presence in
the demand planning in form of a person responsible for NPI. The R&D department at Seco Tools is responsible for product development. They need to be integrated in demand planning.

**DP.3. R&D should be present to make sure the demand plan at Seco Tools consider new sales and loss of old sales regarding NPIs.**

According to the theoretical framework the sales plan is seen as an input to demand planning (Sheldon, 2006). At Seco Tools the corresponding to this is the SU reviews that do overrides in order to make the high level adjustments more accurate. Changes can be made whenever sales staff knows there is a decrease or increase in sales of a certain SKU on their market. Like Wallace & Stahl (2008) suggest the sales plan input is made close to the customer on SKU level at Seco Tools. The difference at Seco Tools is that the SU reviews are seen as modifications in the demand plan and not an input to the demand plan as Sheldon (2006) proposes. The sales plan should be an input to the demand planning as Sheldon (2006) states, not just overrides. However, the SU overrides make the demand plan better which is the idea with those future plan inputs.

Seco Tools feels a need to have a SEM meeting at the end of demand planning in order to sign off the demand plan and to get information regarding the demand. According to Wallace & Stahl (2008) a formal meeting can be held at the end of demand planning in order to avoid surprises later on in the S&OP process. Wallace & Stahl (2008) define S&OP as a process consisting of five major steps with demand planning as one of them. At Seco Tools the S&OP process is seen as two sub-processes; one process that handles the demand planning and another one that handles the inventory & supply planning. It is a risk with seeing demand planning as an own process, it has an ending and it makes the S&OP at Seco Tools more of an operations planning process. It will encourage the cross-functional teamwork that is important in S&OP (Wallace & Stahl, 2008; Thomé, et al., 2012; Grimson & Pyke, 2007) by clearly defining the S&OP as one united process.

**DP.4. Seco Tools should avoid seeing their S&OP as two sub processes; S&OP should consist of one integrated process to encourage cross-functional teamwork.**

Wallace & Stahl (2008) suggest that sales & marketing executives should sign off the demand plan. A SEM meeting at the end of demand planning may be needed, with the idea to sign off the demand plan. Focus should be shifted to have a monthly SEM meeting at the end of the supply planning where they are informed of how well the supply plan can meet up with the demand plan. With finance integrated, **DP.2,** and demand converted to dollars, **DP.3,** executives may quickly see the benefits with an executive meeting to sign off the supply plan at the end of S&OP. The top management can authorize suggested changes if supply can not meet up demand or vice versa, sign of the supply plan, and make decisions regarding demand and supply. For this to work properly scenario planning with conversion from units to dollars for both the demand and supply plan is needed. Once the demand planning is done, the highest expected manufacturing level is set. If it is possible to manufacture, the products will be manufactured. The question is at what cost, that is why it is so important to involve finance and translate the demand plan into money just like Wallace & Stahl (2008) suggest.

### 6.1.2.2 Comparison of Seco Tools and AstraZeneca

The benchmark at AstraZeneca is conducted with the asset planner who participates in the supply planning. According to Nilsson (2014) the demand planning is made close to the customer by the sales people on SKU level with the help of an accounting manager for every market. They have great knowledge of the customers’ needs on every market which makes demand planning accurate. If other local forecasting techniques exist, such as statistical forecast calculations or high level adjustments, they are out of the interviewee’s knowledge.
The sales plan is seen as an input to demand planning (Nilsson, 2014) both at AstraZeneca and at Seco Tools. The difference at Seco Tools is that the SU review is seen as modifications to the demand plan and not an input to the demand plan as Nilsson (2014) proposed. This also supports the statement named as $DP.4$.

AstraZeneca does not have a formal meeting with their executives as Seco Tools have with SEM; AstraZeneca’s demand plan is given directly from the account managers to the asset planners at the different PUs without the need for executives to sign off the demand plan (Nilsson, 2014). This is another input that supports the statement $DP.4$, the process should be seen as one process including both demand and supply.

### 6.1.3 S&OP – Theoretical supply planning

The supply planning step converts the demand plan into an actual supply plan possible to execute with consideration to the available capacity and according to strategy.

#### 6.1.3.1 Comparison of Seco Tools and theory

Supply planning consists of inventory planning and setting capacity constraints according to the theoretical framework. Before changing any capacity constraints or inventory, the last month’s operations plan needs to be compared with actual performance to find out if there are any significant changes in the capacity (Stahl & Wallace, 2012). Seco Tools do set capacity constraints but they do not measure actual performance with the last month’s operations plan. It is therefore difficult to validate if the capacity constraints are accurate or not.

$SP.1$. Seco Tools need to validate the capacity each month by comparing the last months plan with actual performance to find capacity changes. This is typically solved with the use of KPIs.

The inventory strategy is seen as the first step in the inventory & supply planning at Seco Tools. The inventory planning and the levels should be set after a specific customer service level, why it is important to know the customer service level. At Seco Tools they have not decided on an inventory level according to a service level. They have set a stock availability while the actual customer service level is unknown.

$SP.2$. The customer service level should be set and visible while KPIs in the S&OP process should show it. The inventory planning need to know how to plan the inventory level and therefore the level should be calculated backwards from the set service level.

The second input in supply planning is the capacity. If the existing capacity is not enough to reach the demand and the inventory goals, different scenarios need to be illustrated so the best scenario can be chosen and the best mix of products set. According to theory once a supply plan is set any problems in capacity should be escalated up to the preparation meeting. The generation of a supply plan at Seco Tools consists of four steps, i.e. tactical inventory & strategy input, create constrained supply plan, preparation meetings, and PU meetings before any issues are escalated. These steps are all necessary to go through before a plan is created. In theory the escalated problems should be passed on after the supply plan is created and based on the right constraints, capacity and inputs. This is not the case at Seco Tools since the right constraints, capacity and input is not reached before the PU meetings are held. Escalation of the problem is then necessary since they do not have the authority themselves to make major decisions. When problem escalations are made they turned to the production manager and then back to the process again to modify the supply plan according to the new input.
SP.3. Seco Tools need to trust their personnel and the capacity input. The people involved need to be able to make the decisions necessary to create the supply plan with correct capacity, mix and inventory levels without the need of escalation and repeating the process.

Once a supply plan is developed accounting should be present to determine what kind of financial impact the plan might have. The supply planning process should consist of people from supply planning (Wallace, 2006; Wallace & Stahl, 2008), finance and product development (Wallace, 2006). In Seco Tools processes people from supply planning is participating but not from finance and product development, also known as R&D.

SP.4. Accounting should be involved in the supply planning to determine the financial impact of the decided plan. This is important since the goal is to increase the profit of the business.

SP.5. R&D should be involved in the supply planning to make sure that the right capacity is allocated to new products and so the capacity constraints are correct.

6.1.3.2 Comparison of Seco Tools and AstraZeneca

At AstraZeneca the supply planning starts with the asset planner checking the demand plan for possible errors, i.e. master data faults or uncommon differences in demand. This step is by Seco Tools performed twice by the central demand planners, once after the data gathering and then once after the SUs overrides in the demand planning. The asset planner at AstraZeneca and the central demand planners at Seco Tools both have the same knowledge of the operations and is believed to be able to make this review in a good way before starting on the supply planning.

At AstraZeneca the supply planning is done separately at each PU. The participants in this step have the authorisation to be able to execute this without the need of discussing it with any executives. The problem Seco Tools have experienced arose in their mix planning since they plan the supply centralised, as opposite from AstraZeneca who do it decentralised at each PU. The people responsible for this do not have the knowledge of possible capacity changes in each PU and therefore they need to discuss this in separate meetings with all PUs. Once this is done capacity problems still exist since the capacity is not always enough. Therefore meetings with the management need to be held, escalation of issues, to hear their response to this and to get recommendations of how to divide the mix between the PUs. At AstraZeneca they do not divide their mix between their production units monthly, only when they see a long going trend. At Seco Tools the capacity can be transferred more easily between PUs. Since the capacity can be transferred more often Seco Tools needed to be able to trust the available capacity from each PU. The people involved should be given more authority and they should be well aware of the strategy necessary to make good decisions on their own. This is the reason why Seco Tools in order to plan their supply need to go through five steps before a plan is created. At AstraZeneca the people responsible for creating the supply plan have the authority they need according to their structure. As stated in SP.3 Seco Tools need to manage their authority according to the steps so necessary decisions can be taken.
6.1.4 S&OP – Theoretical preparation meeting

The preparation meeting should prepare for the executive meeting by solving any unresolved problems from the supply planning or give alternative solutions to them.

6.1.4.1 Comparison of Seco Tools and theory

There is no counterpart at Seco Tools to the theoretical preparation meeting. The so-called preparation meeting and PU meetings at Seco Tools have been more of a supply planning nature as just stated in the previous subchapter 6.1.3 Supply planning. Wallace (2006) and Wallace & Stahl (2008) suggest the presence of managers from finance, sales & marketing, operations, R&D, and purchasing departments at the preparation meeting. There exist no such meeting at Seco Tools. If problems cannot be solved in the PU meeting at Seco Tools they have to be escalated. When escalating, Seco Tools went to the production manager as stated by theory. This clearly states the need of involving the managers in this meeting, which then should respond to the preparation meeting. A concern Seco Tools had is how to handle the problems occurring at PU meetings. The problems are mostly capacity issues when allocating volume between the PUs. A preparation meeting can be the solution to the problem.

P.1. Seco Tools should involve the production manager in the PU meetings to have the right authority to make changes without the need of escalation or have another meeting after the PU meeting. It should correspond to the preparation meeting in theory.

When Seco Tools plans their capacity they have a problem with the planning of mix as stated before. The people in supply planning need to know what decisions they are allowed to make. Wallace and Stahl (2008) say that minor decisions such as overtime and hiring staff are normally within authority and moderate decisions such as adding an entire shift should only be recommended to the preparation meeting or the executive meeting for decision-making. What is needed for Seco Tools when planning the mix is to: present different scenarios at the executive meeting that have financial information (Wallace & Stahl, 2008). It could make it easier for the executives to give people in supply planning and preparation meeting more authority for decision making early on in the process.

P.2. Decisions or suggestions need to be presented in the executive meeting. Scenario planning with financial information is also needed. Therefore the PU meetings should involve managers not only from production but also from finance, sales & marketing, R&D, and purchasing.

6.1.4.2 Comparison of Seco Tools and AstraZeneca

A preparation meeting as described in the theoretical framework is not held at Seco Tools. AstraZeneca have no counterpart of the meeting either and therefore a comparison cannot be made. The global supply planning meeting that follows after AstraZeneca’s supply planning is connected to Seco Tools’ global meeting.
6.1.5 S&OP – Theoretical executive meeting

The executive should solve any still unresolved problems and then sign off the demand and supply plan. They should also contribute with the strategy of how to work in S&OP.

6.1.5.1 Comparison of Seco Tools and theory

The S&OP at Seco Tools ends with the meeting called the global meeting, which respond to the executive meeting in the theory. Participants in the global meeting are the supply management, the purchasing manager, tactical inventory & supply planners, and the SCP group managers. The global meeting is every third month replaced with the supply chain meeting. The supply chain meeting is more of a strategic nature with SEM, the SCP manager, SCP group manager, BI responsible, supply management, and business controllers present. The purpose of both meetings is to sign off the supply plan. Wagner, et al. (2013) and Wallace & Stahl (2008) said that the executive meeting needs to have the president and the executives participating in the meeting to sign off the supply plan. At Seco Tools the SEM is present at the quarterly supply chain meeting and in the SEM meeting, not the monthly global meeting; the supply plan is quarterly signed off by SEM and monthly they are only informed of the supply plan. Wallace & Stahl (2008) say that the executive meeting is supposed to be held in order to resolve any issue from previous steps. At Seco Tools many of the decisions and issues are supposed to be resolved before the executive meeting. Supply management are usually the ones to resolve issues. They have a lot of power and authority at Seco Tools. Both Seco Tools and AstraZeneca want the personnel in supply and demand planning to be able to make important decisions as early as possible in the S&OP process, also supported by Wallace & Stahl (2008).

Demand and supply strategies are supposed to be revised during the executive meeting according to Wallace & Stahl (2008) so everyone gets updated. Demand and supply strategies are not on the agenda of the monthly executive meeting at Seco Tools. The strategies are supposed to be communicated in the process so the tactical inventory & strategy input is known when the supply planning is done.

E.1. Executives, including the CEO, should participate monthly in the global meeting to give input regarding the strategy so the capacity and mix planning problem can be solved early on in the following month’s process.

Wallace & Stahl (2008) suggest that business plan and corporate strategy changes could be made as a result of the executive meeting. The supply chain meeting is of a strategic nature while the global meeting is more tactical and focused on aligning demand and supply. Information regarding those issues is shared on other occasions than the S&OP.

E.2. Changes to the business plan and corporate strategy should be on the agenda since S&OP highly affect this.

Since finance is not included in the S&OP process at Seco Tools no comparison is made regarding the business plan and the financial view of the S&OP. Discussions are ongoing at Seco Tools about how to relate the business plan to the demand plan to clearly see the impact of demand six years into the future.

E.3. Finance should be integrated so a comparison of the financial view of S&OP and the business plan can be made.

6.1.5.2 Comparison of Seco Tools and AstraZeneca

Major decisions regarding supply risks in form of inventory and capacity issues are discussed in the global supply planning meeting at AstraZeneca, while supply management most often decides issues
such as overtime. The PU managers at AstraZeneca have more authority than at Seco Tools. A reason can be that AstraZeneca have aligned resources where every PU had an own supply planning process in their S&OP. At Seco Tools the S&OP is centralised where the SCP department handle the supply planning for all PUs, making the S&OP process at Seco Tools more complex.

The exception based reporting at AstraZeneca is of a strategic nature and is made every month. Other processes at Seco Tools capture corporate strategy and business plan changes.

6.1.6 Summary of the comparison
Following set of tables, Table 12, summarises all statements from the previous chapters, sorted by demand planning, supply planning, the preparation meeting, and the executive meeting.

Table 12. Summary of the improvements for Seco Tools

<table>
<thead>
<tr>
<th>Point</th>
<th>Summary of the demand planning differences</th>
</tr>
</thead>
<tbody>
<tr>
<td>DP.1</td>
<td>Finance should be integrated in demand planning.</td>
</tr>
<tr>
<td>DP.2</td>
<td>The demand plan should be converted into dollars in order to compare the S&amp;OP with the annual financial plan. Numbers and assumptions can then be challenged and the management can authorize the plan based on dollars.</td>
</tr>
<tr>
<td>DP.3</td>
<td>R&amp;D should be present to make sure the demand plan at Seco Tools consider new sales and loss of old sales regarding NPIs.</td>
</tr>
<tr>
<td>DP.4</td>
<td>Seco Tools should avoid seeing their S&amp;OP as two sub processes; S&amp;OP should consist of one integrated process to encourage cross-functional teamwork.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Point</th>
<th>Summary of the supply planning differences</th>
</tr>
</thead>
<tbody>
<tr>
<td>SP.1</td>
<td>Seco Tools need to validate the capacity each month by comparing the last months plan with actual performance to find capacity changes. This is typically solved with the use of KPIs.</td>
</tr>
<tr>
<td>SP.2</td>
<td>The customer service level should be set and visible while KPIs in the S&amp;OP process should show it. The inventory planning need to know how to plan the inventory level and therefore the level should be calculated backwards from the set service level.</td>
</tr>
<tr>
<td>SP.3</td>
<td>Seco Tools need to trust their personnel and the capacity input. The people involved need to be able to make the decisions necessary to create the supply plan with correct capacity, mix and inventory levels without the need of escalation and repeating the process.</td>
</tr>
<tr>
<td>SP.4</td>
<td>Accounting should be involved in the supply planning to determine the financial impact of the decided plan. This is important since the goal is to increase the profit of the business.</td>
</tr>
<tr>
<td>SP.5</td>
<td>R&amp;D should be involved in the supply planning to make sure that the right capacity is allocated to new products and so the capacity constraints are correct.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Point</th>
<th>Summary of the preparation meeting differences</th>
</tr>
</thead>
<tbody>
<tr>
<td>P.1</td>
<td>Seco Tools should involve the production manager in the PU meetings to have the right authority to make changes without the need of escalation or have another meeting after the PU meeting. It should correspond to the preparation meeting in theory.</td>
</tr>
<tr>
<td>P.2</td>
<td>Decisions or suggestions need to be presented in the executive meeting. Scenario planning with financial information is also needed. Therefore the PU meetings should involve managers not only from production but also from finance, sales &amp; marketing, R&amp;D, and purchasing.</td>
</tr>
</tbody>
</table>
### Summary of the executive meeting differences

**E.1.** Executives, including the CEO, should participate monthly in the global meeting to give input regarding the strategy so the capacity and mix planning problem can be solved early on in the following month’s process.

**E.2.** Changes to the business plan and corporate strategy should be on the agenda since S&OP highly affect this.

**E.3.** Finance should be integrated so a comparison of the financial view of S&OP and the business plan can be made.

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*Figure 28 illustrates the steps Seco Tools have as light blue boxes. The dark blue boxes in the figure show the theoretical terms for the process. Wallace & Stahl (2008) state that some companies, often larger companies, tend to have a formal meeting in the end of the demand planning phase process. That is precisely what Seco Tools have. However they do not have a preparation meeting in the way the theoretical framework explains. Seco Tools want to have decision making as early as possible in their S&OP and it might be the reason for not conducting a preparation meeting. By doing so they are trying to decide on problems in the supply planning step instead of in the preparation meeting. That is what is causing the escalation problem. If they decide on this in a preparation meeting they will have the authority to make the changes needed without escalation.*

*Figure 28. Seco Tools’ S&OP in a theoretical approach*

The analysis of the S&OP process is made in this subchapter and differences from the theoretical framework are highlighted. What is seen as missing is the financial integration. Financial integration needs KPIs in order to be effective so the two following subchapters will analyse financial integration and KPIs. The following analysis will fulfil research objective 3.
6.2 Financial integration

_AstraZeneca do not have finance integrated in their S&OP. The following subchapter will therefore only contain the comparison of Seco Tools and the theoretical framework._

People from finance are not involved in the S&OP process at Seco Tools. This leads to limited cross-functional collaboration between the departments in the planning process. Wallace & Stahl (2008) say that the annual S&OP plan should be compared with the budget and create a forecast in dollars more suitable for executives to review. Furthermore they mention that since S&OP is built on people making decisions early in the process the involved people must be able to link the detailed planning with the business and financial plans, therefore finance must be involved in all steps. At Seco Tools all plans are there and available but they are not integrated with each other. Wallace & Stahl (2008) also mentions that a business using S&OP without a financial view in the process loses much of its power. This is something Seco Tools need to take into consideration. An integration of financial planning do not have to be for all product families in the first stage; Seco Tools can start with one product family and then focus on one of the planning groups to ease up the integration.

As Dougherty & Gray (2013) state, the financial planning and S&OP can integrate in four different ways; update financial plans monthly, development of annual plans and budgets, decisions on capital investments, and cash flow management.

_The financial plans_ should according to theory be updated monthly if projected sales are going up or down. At Seco Tools the budget that is made in the end of each year is set and no updates of the financial plans are done. A comparison between the budget and actual sales is done every quarter to see how well they have followed each other. The comparisons every quarter are only used as an indication to see if the yearly budget is turning out as expected or not without any action taking.

_An annual budget_ is done every year at Seco Tools, based on inputs from the planning groups regarding their supply plan and on previous year’s invoices to make it more accurate. According to Dougherty & Gray (2013) the time to do this work can be reduced by up to 50% since the budget and the supply plan both are based on how much that will be produced and sold. Dougherty & Gray (2013) also state that if integrated with S&OP the numbers used for budgeting will be available more easily, and something Seco Tools could benefit from. If these do not coincide, one could at least compare these to validate the numbers calculated. They should be quite similar.

_F.1. Demand and supply planning should be made in pieces or pockets and then translated into dollars in order to make sure the annual budget and the S&OP coincides. It is also needed for the executives and their decision-making._

_Decisions on capital investments_ could also according to Dougherty & Gray (2013) be linked to the S&OP process. The responsible people could take the numbers directly from the S&OP, something that is not applied at Seco Tools.

_Cash flow management_ is important to keep track of as well since one of the benefits with S&OP are reduced inventory levels. This will improve the cash flow once not tied up in the inventory. Seco Tools may therefore find it beneficial to integrate it with the S&OP process.

To integrate these plans it is necessary to translate the plan from pieces to actual cash flow. When looking at numbers and making decisions this is done in pieces. The meeting agendas from the global meeting and the supply chain meeting have involved discussions regarding pieces per month. The budget is not mentioned and the inventory cost is expressed in days of inventory and inventory levels in pieces. Wallace & Stahl (2008) highlight the benefit of S&OP as a connection between operations
and the corporate strategy, something Seco Tools risks losing since they do not have finance integrated in their process. One issue mentioned earlier is the problems they are experiencing with the capacity and mix planning. They do not know which plant to prioritise and with the help of financial integration those decisions might be taken based on cost where the most valuable option can be chosen.

By changing the volumes from today’s pieces to revenues, margins and market shares etc. Seco Tools will be able to take it if it is worth producing or not into consideration. Seco Tools production history is based on keeping production running twenty-four-seven at least for the inserts. It is a belief that as long as the full capacity is used in PU Fagersta, Seco Tools will be profitable. This is due to the fact that Seco Tools is a company that constantly has had high profits. With the changing market and new players offering cheaper products with enough quality, cost reduction is more important than before. By illustrating dollars in the supply plans, the cost of inventory will be made clear and moved in the direction of manufacturing according to demand. Otherwise the inventory costs will continue to rise.

F.2. Supply planning prioritization among the different PUs is difficult. Financial integration could help the planners with decision making, where the supply plans can be expressed in dollars.

Logility Voyager Solutions (2010) indicate that KPIs are needed in order to integrate finance in S&OP. Furthermore Milliken (2008) addresses that in order to achieve maximum benefits, a process like the S&OP process needs to be measured. The next chapter will therefore focus on KPIs and how KPIs can be implemented at Seco Tools.

6.3 Key Performance Indicators

Since the financials are not integrated at AstraZeneca and the fact that KPIs should be company specific the final KPIs recommended for Seco Tools have not been based on AstraZeneca’s, only on theory. At the end of the subchapter the KPI’s AstraZeneca mentioned is discussed however to see the similarities and differences. The KPIs in this chapter do not have to be of a financial manner even though KPIs came as a solution of how to integrate finance.

KPIs are a good help to integrate finance and the finance department in S&OP. This subchapter starts by stating why KPIs are important in a process such as S&OP, how many KPIs are preferred, and how cross-functional they need to be. The analysis is based on Figure 6 by Milliken (2012), in order to decide on suitable KPIs. The analysis starts by stating the corporate strategy followed by connected competitive priorities and future directions and ends with the departments that are involved in S&OP at Seco Tools. The result of the last part is an S&OP scorecard with KPIs well-aligned with the corporate strategy at Seco Tools.

As stated by Milliken (2008) the S&OP process needs to be measured in order to reach maximum benefits. No KPIs are officially involved in the S&OP at Seco Tools at the moment. Even if a KPI handbook existed in the company almost no one knew about it or used it. During the conducted interviews people have mentioned KPIs and some meeting agendas and presentation slides had KPIs stated. However, the KPIs are not implemented in such way that they are a base for root cause analyses and evaluation of the S&OP. Lapide (2004) states that cross-functional participation is important for a successful S&OP, which is why cross-functional KPIs at Seco Tools are needed. Chae (2009) highlights that only a few KPIs should be implemented in the beginning of the implementation; the authors target is therefore somewhere around a total of 10-20 KPIs. Fewer then ten will not capture every department’s strategic goals and to many will make it harder to visualise the scorecard.
and the risk is that departments only will look in their own KPIs. Seco Tools should implement KPIs in their S&OP process but the question is which KPIs.

To start with, Seco Tools have to make sure the S&OP process follows the corporate strategy since S&OP is the link between the detailed planning level and the business and the strategy level, Figure 3. Therefore selecting KPIs based on the corporate strategy is of great importance. The overall corporate strategy is to reach strategic turnover goals, provide high performance products and excellent services & solutions, Figure 29.

Seco Tools is a premium brand with focus on offering high quality products and services. Their competitive priorities are therefore quality and also innovation since they constantly needed to introduce new products to the market in order to stay competitive, Figure 29.

Seco Tools future directions are to have faster NPIs than before so time to money is shortened; they talk about low budget companies closing in, why it is important to be able to speed up their processes in order not to lose important early sales before competitors develop similar products of minimum quality and lower price. Seco Tools needs to be a reliable supplier with fast responsiveness and at the same time lower their costs. The future directions are therefore lower cost, better reliability, and faster responsiveness, Figure 29.

According to Milliken (2012) the competitive priorities and focus areas need to be transferred into functional area (departments) strategies so they fit into their departments and then translate them in a set of KPIs that are well aligned with the corporate strategy. The departments, or by some called divisions or functional areas, in Seco Tools’ S&OP are chosen to be finance, sales & marketing, SCM, production, and R&D. All these departments need KPIs that support the overall corporate strategy and also to ensure cross-functionality, see Figure 29.

Figure 29. Seco Tools’ approach of how the strategy is linked to KPIs
The theory presents several models for using KPIs among which none, except Ball (2013) for the Aberdeen Group, related this to S&OP in specific. Therefore they have all been studied, and according to Seco Tools’ needs they have together created one set of KPIs suitable for Seco Tools according to their strategy.

Since Seco Tools MTS products are studied the flexibility and agility of the supply chain, delivery speed, lead times and such are classified as less important according to Milliken (2012). However the risk for high inventory cost becomes a more important factor with MTS product and this have to be studied. This is also part of Seco Tools strategy, to reduce inventory levels, why KPIs related to cost and working stock has been classified as important by the authors in this case. However, Supply Chain Council (2010) states that responsiveness is a measurement for lead times and since responsiveness is a future direction for Seco Tools it has to be taken into consideration. Another part of Seco Tools future direction is to be reliable and therefore KPIs related to quality and order fulfilment is important. To make sure the customers are satisfied they should have KPIs measuring the customer service level.

The target with the following logical analyses is to choose KPIs that are based on the strategy at Seco Tools. The approach is to start with the strategic goals and then then rest of the KPIs are chosen according to the departments that should be involved with the S&OP at Seco Tools. Focus will be on the competitive priorities, the future direction, and the Seco Tools KPI Handbook. A first glance will then be given to suit the SCOR model and the model developed by Chae (2009). After this the KPIs have to be checked whether they reflect the finance as discussed in 6.2 Financial integration and the other three perspectives customer, learning & growth, and internal processes taken from Figure 7 made by Kaplan & Norton (1996). The result in the end will be an S&OP scorecard.

### 6.3.1 The strategic goals

As stated by Kaplan & Norton (1996) starting with KPIs connected to the financials is a good way to implement KPIs since they should give an overall status of the company. They can indicate if the company’s strategy, implementation, and execution of S&OP contribute to the profitability and all other KPIs will affect them in the end. With consideration to the already existing Seco Tools KPI Handbook regarding the financial strategy, the following KPIs are recommended:

- **KPI 1. Market share**
- **KPI 2. Gross margin**
- **KPI 3. Time to money**

These three KPIs are already defined, had purpose, unit of measure, measure frequency, KPI owner, and target set. The definitions can be seen in Appendix D. They are all seen as overall strategic measures at Seco Tools, Table 11, and necessary in an S&OP scorecard. The financial perspective is therefore taken and aligned with the corporate strategy at Seco Tools. Market share is what Kaplan & Norton (1996) states as the measurement for customer satisfaction; increased market share indicates increased customer satisfaction. The purpose of the gross margin KPI is to measure Seco Tools’ availability to invest in people, products, machines, and market activities; it is a measurement for profitability. Gross margin is a measurement Milliken (2011) mentions that is suitable for S&OP in a global setting. Time to money measures how fast new products are introduced to the market. A certain key product is chosen for every year and a target is set. The goal is to reach sales in dollars of the key product before an earlier set date. The time to money measurement is an indication of how fast new products are introduced and what impact on the market the innovations at Seco Tools had.
6.3.2 Financial
The integration of finance and financial planning with S&OP are, as already mentioned absent at Seco Tools. Grimson and Pyke (2007) state that people from finance should be involved in demand and supply planning in order to capture the financial view of S&OP. Also, comparison of the supply plan in the S&OP process with the financial plan, i.e. the annual budget, is crucial. Furthermore, Grimson & Pyke (2007) especially highlight that those two plans should match. One benefit by integrating financial planning is that the yearly budget can take numbers straight from the S&OP making the budgeting work more efficiently. Sheldon (2006) mentions that the business plan is seen as a very important input to the demand plan. The demand plan can give an indication if the strategic business plan seems to be accurate or not, if the company is developing in the right direction. The comparison between the business plan and S&OP requires that new products are included in S&OP and that the demand plan is converted from units to dollars as Wallace & Stahl (2008) stated. The two measures that are described here make sure that the financial and the R&D department at Seco Tools are integrated with the S&OP. The two KPIs, defined in Appendix D, supporting the financials should therefore according to the authors be:

KPI 4. Annual budget vs. supply plan
KPI 5. Business plan vs. demand plan

6.3.3 Supply chain management
The SCM division at Seco Tools has a strategy based on handling delivery and inventory risks. They need to make sure the customer can order and get the products they want in a reasonable amount of time. Inventories are expensive and tie up money that can be needed for investments, so Seco Tools should not have excessive inventories; they need to have the correct product available at the correct location and time, and with the correct quantity. Therefore the SCM at Seco Tools focuses on stock availability and days in inventory to make sure the supply chain is reliable and efficient. Days in inventory can at Seco Tools be measured in many dimensions, i.e. raw material, semi-finished products, work in progress, and finished products. Stock availability and days in inventory are the two chosen KPIs; they are measures well aligned with the strategy at the SCM function and taken from the Seco Tools KPI Handbook. Responsiveness is chosen as a future direction for Seco Tools and KPIs reflecting this are needed. Supply Chain Council (2010) has order fulfilment cycle time as the performance indicator for responsiveness. The order fulfilment cycle time is a sum of the order fulfilment cycle times for source, make, and delivery in the SCOR model. It is the authors’ recommendation based on the SCOR model to show the total order fulfilment cycle time and use the other for root cause analysis if problems arise to find in which department the problems occur. Since the recommendation by Chae (2009) is to start only with a few KPIs Seco Tools can extend the KPIs later on if necessary to include order fulfilment cycle times for the different source, make, and deliver. The measures, defined in Appendix D, chosen for the SCM are:

KPI 6. Stock availability
KPI 7. Days in inventory
KPI 8. Order fulfilment cycle time

6.3.4 Production
The production at Seco Tools has the pressure of manufacturing at low cost and deliver on-time according to a fixed manufacturing lead time. When aligning demand and supply the capacities at the PUs are important from an S&OP perspective at Seco Tools. By measuring capacity utilisation month by month the supply planners can get a good view of available capacity in each PU. As stated earlier this is also something that needs to be implemented in the supply planning so the capacity constraints
are correctly set. By measuring capacity utilisation the company has the possibility to find and eliminate bottlenecks that most likely will become visible with the help of continuous measurements of the capacity.

Lowering costs are a future direction to focus on for Seco Tools and therefore it has the need to be measured on PU levels. The most useful measurement is seen as cost per piece in the production; it is available in the Seco Tools KPI Handbook and is also well aligned with the strategy at Seco Tools. On-time delivery is the second measurement that is needed. On-time production, Appendix C, is mentioned by Chae (2009) as a secondary measure and is similar to the on-time delivery measure at Seco Tools. It is a measurement of the PU’s ability to deliver to EDC-H on promised date; it is also taken from the Seco Tools KPI Handbook. What is left to measure here is quality, one of the competitive priorities at Seco Tools. Therefore production yield is chosen. It is used at Seco Tools and is seen as suitable in order to ensure high quality. Having an increased production yield with fewer disruptions in production means the quality for the internal processes is improved and should also result in better capacity utilisation.

By using these four KPIs Seco Tools can make sure they measure how efficient the PUs production are, what capacity they actually have, if they can deliver at the correct time, if the quality is maintained at high level, and also keep control of costs by measuring cost per piece.

At last the production needs to be compared with the supply plan delivered from the S&OP. The measure should give Seco Tools an indication of how effective and accurate the supply plans are. The measure is a cross-functional measure where both production and the SCM division are involved. The KPIs, defined in Appendix D, capturing the production are:

- **KPI 9. Cost per piece**
- **KPI 10. On-time delivery**
- **KPI 11. Production yield**
- **KPI 12. Capacity utilisation**
- **KPI 13. Production vs. S&OP**

### 6.3.5 Sales & marketing

Within sales & marketing the choice of measurement is forecast accuracy. Forecast accuracy measures how well the demand plan generation is made and should be presented for all product families. Chae (2009) mentions forecast accuracy as a primary planning measure and Milliken (2011) suggests it as one of the five overall measures for S&OP in a global setting. Ball (2013) also mentions this KPI as one of four measures for S&OP maturity classification in his report for the Aberdeen Group.

The forecast accuracy measure is in use and measured for all product families at Seco Tools. However, no root cause analysis is made or any action taken according to the measurements. Seco Tools have, according to values delivered by Östlund (2014), a best-in-class forecast accuracy when comparing with the results from Aberdeen’s report provided by Ball (2013); Östlund (2014) says that eight out of nine product families have forecast accuracy above 86 % which is considered by Ball (2013) as best-in-class, Table 18. The ninth product family is within industry average. It has smaller sales volume and unpredictable sales patterns. To forecast this product family is therefore more difficult than the other product families.

Forecast accuracy can also be measured on SU level. It should be a measure where the original unconstrained forecast without the SU review input is compared to the final demand plan forecast accuracy. Since Seco Tools have six SUs involved in the SU review and are planning to involve the rest
of the SUs this measure is important to see the development of the demand plan generation made at Seco Tools. Not to forget is to measure forecast accuracy for new products as well. It is not a measure presented here since focus should at first be to integrate R&D in S&OP which can be seen in the following subchapter. However forecast accuracy for new products should be included in the forecast accuracy report every month. The fourteenth and fifteenth KPIs, defined in Appendix D, are therefore:

KPI 14. Forecast accuracy
KPI 15. SU forecast accuracy

6.3.6 Research & development
Wallace & Stahl (2008) clearly state the importance of integrating R&D and new products development into S&OP as early as in the demand planning. Without knowing the expected demand of new products, the capacity constraints needed in supply planning would be inaccurate which makes it difficult to align demand and supply. Innovation is a competitive priority for Seco Tools in order to reach their strategic target. The R&D function at Seco Tools can measure how efficient each new product development project are, so what is important in an S&OP point of view is whether new products are integrated in the process or not. Therefore a good measure is what quantity of the new products that also are integrated with the S&OP process. Cannibalisation effects due to NPIs need to be considered as well. The better new products will be integrated into S&OP the easier supply planning will become resulting in more stable supply rates, which should result in lower production cost as well. The amount of new products launched will also be a good measure and can be implemented at a later stage once new products is integrated successfully in Seco Tools’ S&OP. Focus at this stage should be to integrate new products into S&OP and thereafter replace the measure once the process of integrating new products is fully working. The KPI, defined in Appendix D, for the R&D is:

KPI 16. NPI integrated with S&OP

6.3.7 Seco Tools S&OP scorecard template
In order to evaluate if the KPIs have captured the financial, customer, internal, and learning & growth perspectives, Figure 7, an analysis is made and can be seen in Table 13. The financial perspective contains a total of six KPIs, the customer perspective by four, the internal by eleven, and the learning and growth perspective by five KPIs. Some KPIs are by the authors seen to capture more than one perspective.
The competitive priorities and the focus areas need to be considered as well. The following analysis is illustrated in Table 14. Market share is seen as an indicator of high quality and satisfied customers. Also, production yield ensures that high quality is maintained. Innovation is captured by two measures. One of them is the time to money measure which should capture how big the sales are for new products during a set time frame. The next one is the percentage of new products integrated with S&OP because it suited the S&OP better than other choices which can be the total number of innovations and NPIs to the market. So the two competitive priorities high quality and innovation have KPIs aligned with the corporate strategy.

The future direction of low cost is measured by gross margin, days in inventory, and cost per piece. The future direction reliability involves measurements of eight different KPIs regarding the inventory, the production, the financials, the demand planning, and the supply planning at Seco Tools. Responsiveness is a customer focused attribute and is captured by the measurement of order fulfilment cycle time.
The analyses made above can now be presented as an S&OP scorecard made especially for Seco Tools. It involves previous month data, targets, upper and lower limits, reporting month status, trend of 12 month rolling and owners, all according to Milliken’s (2008) suggestions. However, no numbers is presented since it should be done in another project. Some of the KPIs already have targets set, e.g. the ones taken from the Seco Tools KPI Handbook. The Seco Tools S&OP scorecard template consists of a total of 16 KPIs, subchapter 6.3.1-6.3.6, that are well aligned with Seco Tools’ strategy along with its competitive priorities and future directions can be seen in Figure 30. The KPIs are chosen with input from different theoretical models, the current situation analysis, and the Seco Tools KPI Handbook. The chosen KPIs are checked so they capture the four perspectives Kaplan & Norton (1996) say is needed. They are also chosen to ensure cross-functionality in the S&OP process.
The measures at AstraZeneca are not considered when choosing the KPIs since they should be company specific. However, they are compared to Seco Tools and a discussion is held regarding the following KPIs that Nilsson (2014) mentioned:

- KPIs regarding the inventory
- Planned yield - orders compared with manufactured orders
- Robust supply chain
- Stock outs – actions taken for supply oriented causes, refill of VMI
- Capacity utilisation KPIs

KPIs regarding the inventory are captured in the S&OP scorecard for Seco Tools. The planned yield measure matches the Production vs. S&OP measure. The purpose of the measure for a robust supply chain AstraZeneca uses is to make the supply chain “bullet-proof”, i.e. disruptions in the supply chain are believed to occur and the supply chain should work even with those disruptions. Seco Tools focuses more on a reliable supply chain that should be designed to avoid disruptions instead. Therefore comparisons of robust and reliable supply chains are difficult to make. Stock outs are measured at AstraZeneca where lost customers and lost sales due to stock outs are unthinkable. The sales are needed so they can afford to invest in R&D. At Seco Tools stock availability measure should capture the stock outs. When it comes to KPIs for capacity utilisation the same measure is made at Seco Tools. To summarise, the inputs from AstraZeneca have strengthen the choices of KPIs for Seco Tools’ S&OP scorecard.

The next chapter contains conclusions & recommendations. They are based on the analysis chapter and the research objectives.
Chapter 7
Conclusions & recommendations
7. CONCLUSIONS & RECOMMENDATIONS

In this chapter the purpose of the master thesis and its research objectives are repeated and a summary of the research is presented. Conclusions regarding all the research objectives are presented with future recommendations and studies. Finally a reflection of the thesis is presented with discussions regarding the methodology and the results of the study.

7.1 Summary of the research

The master thesis’ purpose has been to examine Seco Tools’ S&OP to see how well it performs against theory and to find where the opportunities for improvement are. The research objectives, presented in chapter 1.2 Research objectives, were stated as:

1. Study and describe the current S&OP process at Seco Tools.
2. Analyse and identify differences in Seco Tools’ S&OP process compared to the literature and a benchmark company.
3. Perform deeper analyses within financial integration and the use of KPIs in Seco Tools’ S&OP process.
4. Suggest future improvements to Seco Tools regarding their S&OP process based on the found differences from research objective 2 and the deeper analysis from research objective 3.

Theory regarding the five steps in S&OP and the case study of the current situation at Seco Tools regarding their S&OP has been presented. A benchmark at AstraZeneca has been done to see how another global company translates the theory of S&OP into practice. Seco Tools’ S&OP have further on been compared to the theoretical framework and AstraZeneca. The purpose with this comparison has been to find possible areas of improvements.

Two differences that have been found as the result of the comparisons are then chosen for further analysis, financial integration and KPIs. These are not present in the S&OP at Seco Tools as they should have been according to the theoretical framework. More theory and deeper analyses of these two areas have therefore also been presented. Following chapter, 7.2 Conclusions of the research, will present conclusions made from each and every one of the research objectives.

7.2 Conclusions of the research

The first research objective was to study and describe the current S&OP process at Seco Tools. The result can be seen in chapter 4. Current situation, where Seco Tools’ current S&OP is mapped and described. The process is based on the two sub processes demand planning and tactical inventory & supply planning. These have been illustrated in a map of the information flow week by week with detailed descriptions of each step and meeting agendas. By identifying the process, an understanding of the process has been gained to be able to suggest improvements. It has also helped the people involved to understand how the processes are connected and how the new implemented software at Seco Tools integrates with the existing processes. Things they are aware of that needed to change and that they chose to ignore has been harder to deny now that it has been clearly visualised.

The second research objective was to analyse how well aligned Seco Tools’ S&OP is with theory and the benchmarking company AstraZeneca. The overall picture shows that the structure of the S&OP process at both companies are similar; an initial data gathering, demand planning, and supply planning existed as suggested by theory. The meetings held to create the supply plan in the different companies however varied a lot, both which meetings that are held and participants in the meetings. The reason for this seems to depend on a few different things.
One factor that is seen as different is that people involved and responsible for the different steps varies between the companies and from the theory. This have a large influence on how well each step performed. As an example, AstraZeneca has no problems with the capacity planning in their supply planning phase since the supply planners have all the authority they need to make necessary changes. If more capacity is needed to secure the demand there is no problems to conduct overtime etc. No extra meeting or problems occurred, unless there are remarkable volume changes. At Seco Tools the supply planners have to escalate the problems and talk to the responsible manager monthly to be able to create the supply plan, causing more meetings in the supply planning.

When comparing the steps it also became clear that the way a company is operated affects the S&OP. A decentralised planning and control is seen at AstraZeneca where each PU create their own S&OP supply plan. Seco Tools with centralised planning and control has several PUs in their S&OP. Seco Tools therefore runs into more challenges in their capacity planning since they transfer products (in terms of production capacity) between their PUs more often than AstraZeneca. In those cases where AstraZeneca has two PUs they have decided on a set capacity mix to eliminate this problem. Seco Tools has therefore more flexibility and less risk in their supply chain than AstraZeneca. A clear strategy is necessary to be able to speed up the process and make it efficient. Before implementing S&OP it might be a good idea to consider whether the supply planning should be centralised or decentralised. If there are changes in the capacity it might be a good idea to keep the supply planning centralised in order to take advantage of the flexibility of transferring products. However one should be aware of the increasing complexity with centralised planning if the capacity is constantly changing.

The theoretical framework points out that integration of the finance and the R&D department is crucial in the S&OP process. Seco Tools is lagging in both areas. Demand or supply is not translated from units to dollars and new products are not fully integrated with the S&OP.

Another thing that separated Seco Tools’ process from theory however is the fact that there are no KPIs or any other results and measurements to keep track of how well the process performed. To make it efficient and to maximise profit the plans should be compared to budget and aligned with the strategy. Therefore the two focus areas were chosen to financial integration and KPIs.

The third research objective to perform deeper analysis within two areas is defined due to the found differences in the financial integration and KPIs in the S&OP. As just stated the people involved have a huge effect on the efficiency of the process steps. From theory the authors understood that the financial integration is of great importance but exactly how to involve finance is limited described in the literature. The benchmark at AstraZeneca was not of much help either since their S&OP does not handle financial integration. The conclusions drawn from the financial integration analyses are that the S&OP plays a huge part in a company’s way of making money. The process is supposed to look at how to maximise profits and not just how to produce. By implementing financial integration, translate plans from units to dollars, and then make different planning scenarios, the S&OP can help companies to choose the option with lowest cost and/or the option that will generate a higher profit. As for example when Seco Tools is having trouble choosing how to divide their capacity between the different PUs, it would be favourable if they could see the possible outcomes in dollars. It would make the decision of where to produce much simpler to make. But if all PUs have available capacity and request more orders, and the financial part is not integrated, capacity discussions that could have been avoided would arise. To easily keep track of these things the suggestion is to implement a set of KPIs intended for the S&OP. KPIs does not only cover the financials but also the overall process. By building a KPI scorecard for the S&OP based on the company’s strategy the executives and the participants in the S&OP can easily monitor the process and see how well they followed the strategy. A recently implemented KPI handbook is used at Seco Tools. However, the personnel had little
knowledge of the KPI Handbook’s existence. This handbook has proved to be a good start to choose which KPIs they should implement in the S&OP. By using KPIs from the handbook and to only generate a few new ones the idea of the authors has been that the S&OP scorecard could be implemented easily. A general conclusion is that most companies today have similar issues, meaning that KPIs do exist but they are not visualised and distributed for everyone to use. The need for cross-functionality is fundamental and problems like this, where knowledge is stuck in each department, can be avoided.

The fourth research objective was to suggest future improvements for Seco Tools. By comparing the steps in the S&OP process at Seco Tools with theory the conclusion is that Seco Tools needs to implement financials in the process in order to align the demand and supply planning with the budget. Since the budget should be based on how much products Seco Tools will produce and sell they are built on the same foundation. S&OP should not be seen as an operations planning process but a process that runs through the entire business.

Seco Tools also needs to involve the managers in the PU meeting. The problems they are having today with escalation of issues would be solved if the managers are involved. This would respond to the preparation meeting in theory. In order to have efficient meetings it is not only important that the managers are involved, and that finance is integrated as just stated, the strategy needs to be well known as well. This is the third recommendation; SEM need to monthly participate in the global supply meeting to discuss the strategy and inform everyone of what is going on. Everyone must not know all there is to know, but the participants in the supply planning for example need to know enough in order to plan the capacity and inventory target for example. By translating pieces to dollars and keeping the global meeting short, up to two hours, upper management will see the benefit a successful S&OP could bring. It will be beneficial for all people involved with the S&OP process.

Another recommendation to Seco Tools is that they have to start monitoring their process with KPIs. An S&OP scorecard template for Seco Tools containing 16 cross-functional KPIs have been made and it is now up to them to use the delivered scorecard, Figure 30, change it a bit, or develop a new one. The authors suggest starting with the already made scorecard in order to save money and time. By having cross-functional KPIs it will be possible to measure all departments and how they in S&OP work towards the strategy.

NPIs should be integrated in Seco Tools’ S&OP process. They need to be fully integrated into the demand plan in order to make supply plans that are aligned with demand. Therefore a KPI intended for the R&D department and demand planners is introduced in the S&OP scorecard template to get them involved. Monitoring of KPIs will also give a heads up when something has gone wrong somewhere and it enables Seco Tools to start looking for root causes early. Considering the fact that today’s market is becoming more and more competitive it is of great importance that the company can be agile and that they quickly can respond to changes. Since their target is to reduce their inventory and cutting cost they should have KPIs visualising the cost of the inventory.
7.3 Reflections of the research

All producing companies do in some way connect demand and supply to each other. This thesis has in particular studied how Seco Tools is handling this issue and with respect to S&OP. When studying this topic the insight has come to the authors that depending on how the company operates the business the outcome of possible problems can vary. The findings and future recommendations are directed to Seco Tools since it is their S&OP that has been analysed. However other companies may gain an understanding of how different issues could affect their company and might find this report useful as well. Aligning S&OP with financial integration and KPIs is not something that is specific only for Seco Tools but something all companies can take advantage of.

Since the literature regarding financial integration in S&OP is not extensive the authors believe this report might be useful for others. The combination of financial integration and KPI scorecard development is not something that the authors have found in other reports.

To fully understand the current situation interviews, observations, and documents from the intranet are used. When the thesis first took place the goal at Seco Tools was to implement the new software and to start working according to the updated S&OP. However the software has not gone live yet so the current S&OP process described in the thesis is based on a theoretical approach. Since only some of the process steps had been implemented, some of the information in chapter 4. Current situation, is not as solid as the authors would have wanted it to be. When conducting the interviews it was sometimes difficult to understand the S&OP process, mostly because the people involved did not always know exactly how it would turn out in the end and this is seen as a weakness in the report.

The fact that it has not been possible to watch the S&OP since it is not up and running as it should has been seen as one of the biggest problems when writing this report. The risk of missing out on things or people involved is higher. It is therefore seen as the highest risk in this report. To minimize the risk people involved has been asked to read through parts of the report to make sure everyone feels it is accurate. Cross referencing has also been used where several people had to answer the same questions. Their answers have also been compared with the available documents to further improve the accuracy.

Many of the documents that have been used are recently updated, but since the process is not up and running, changes in the plan has constantly been made. By having the involved people reading through selected parts of the report the validity can still be ensured. Since the thesis has been written at the company observations has constantly been a part of the data collection, when things have changed this has often been noticed by observations.

The biopharmaceutical company AstraZeneca provided similar production for medical capsules as Seco Tools did for production of inserts. As discussed earlier in the report AstraZeneca’s S&OP are decentralised and Seco Tools more centralised in the supply planning. It would have been interesting to see how a company with a more centralised supply planning solved their capacity issues, however this highlighted that there are other ways of working as well and is seen as just as important. When doing the benchmark the ideal had been to do more than one benchmark to get input from several companies. But it has proven to be a difficult task to find companies with better S&OP with the limited time frame.
7.4 Future research

For the future the authors recommend to conduct researches like this in companies with already well-known processes such as S&OP that is defined and preferably also up and running. Otherwise the research should have the purpose of creating a process and not analysing it compared to theory. Analysing the process has sometimes been difficult for the authors since it is difficult to compare the parts that have not been implemented yet. It is also the authors’ recommendation to do more than one benchmark. The benchmark gave valuable input to further understand the process and a few more benchmarks can contribute with more valuable insight of how Seco Tools could have updated their S&OP processes.

Seco Tools should focus on defining a formal S&OP process. They can have a pilot for one product family or one of the planning groups where the S&OP process is tested. In this process they should make sure that the financial integration is made and that the R&D department is integrated. In the supply plan, units have to be translated to dollars and compared to the annual budget. The demand plan needs to be compared with the business plan as well. This is seen as the starting point. When the pilot is working they can implement the formal S&OP process in the whole business for every product family.
**BIBLIOGRAPHY**


Seco Tools internal documents, 2014. n/a. Fagersta: Seco Tools AB.


Appendix
# Appendix A - Glossary

<table>
<thead>
<tr>
<th>Term</th>
<th>Brief</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Asia Pacific distribution centre</strong></td>
<td>APDC</td>
<td>Seco Tools´ DC for customers located in Asia and the countries that are closer to APDC than any of the other DCs.</td>
</tr>
<tr>
<td><strong>Active pharmaceutical ingredient</strong></td>
<td>API</td>
<td>A substance or combination of substances used for drug manufacturing. The active or central ingredients that cause direct effect on the intended treatment (Nilsson, 2014).</td>
</tr>
<tr>
<td><strong>Business intelligence</strong></td>
<td>BI</td>
<td>Information regarding customers, competitors, products or services, and processes. A person responsible for BI may gather and analyse data and also provide and present the data in a useful manner for the organization (APICS, 2014).</td>
</tr>
<tr>
<td><strong>Capto</strong></td>
<td>n/a</td>
<td>A flexible and modular tool holder system made for turning or milling operations.</td>
</tr>
<tr>
<td><strong>CBN</strong></td>
<td>n/a</td>
<td>High performing cutting tools based on polycrystalline cubic boron nitride, CBN.</td>
</tr>
<tr>
<td><strong>Chief Executive Officer</strong></td>
<td>CEO</td>
<td>The person with the most important position in a company (Cambridge University Press, 2014).</td>
</tr>
<tr>
<td><strong>Chief Financial officer</strong></td>
<td>CFO</td>
<td>The manager of the finance department in an organization (Cambridge University Press, 2014).</td>
</tr>
<tr>
<td><strong>China distribution centre</strong></td>
<td>CDC</td>
<td>Seco Tools´ DC for the Chinese market.</td>
</tr>
<tr>
<td><strong>Cost of goods sold</strong></td>
<td>COGS</td>
<td>An accounting classification useful for determining the amount of direct materials, direct labour, and allocated overhead associated with the products sold during a given period of time (APICS, 2014).</td>
</tr>
<tr>
<td><strong>Demand planning database</strong></td>
<td>DP</td>
<td>A database in the software Voyager made specifically for demand planning. Manual adjustments can be made and the information in the database is later used in the inventory &amp; supply planning process step.</td>
</tr>
<tr>
<td><strong>Distribution centre</strong></td>
<td>DC</td>
<td>A warehouse used to store inventory (APICS, 2014).</td>
</tr>
<tr>
<td><strong>Distribution requirement planning</strong></td>
<td>DRP</td>
<td>A process that takes place in a database in the software Voyager. The job is to daily handle customer orders updated from the ERP system. Distribution orders are then used to fill APDC, CDC, and ADC from EDC-H. Every planning group has a DRP database.</td>
</tr>
<tr>
<td>Term</td>
<td>Acronym</td>
<td>Description</td>
</tr>
<tr>
<td>------------------------------------------------</td>
<td>---------</td>
<td>----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Earnings before interest and taxes</td>
<td>EBIT</td>
<td>Net operating income before interest and taxes are subtracted (APICS, 2014).</td>
</tr>
<tr>
<td>Enterprise resource planning</td>
<td>ERP</td>
<td>Framework for organising, defining and standardising the business processes necessary to effectively plan and control an organization so they can use its internal knowledge to seek external advantage (APICS, 2014).</td>
</tr>
<tr>
<td>EPB</td>
<td>n/a</td>
<td>A flexible and modular tool holder system made for milling operations.</td>
</tr>
<tr>
<td>European distribution centre</td>
<td>EDC-H</td>
<td>Seco Tools’ main DC located in Benelux, Belgium. EDC-H stores the entire standard product portfolio. All products are distributed from EDC-H to the other three DC’s according to an inventory policy. Stores products for Europe and countries close to EDC-H.</td>
</tr>
<tr>
<td>Key performance indicator</td>
<td>KPI</td>
<td>A measure used to define specific organizational goals in order to work with progress. It can be either a financial or nonfinancial measure. It is usually tied a business’ strategy and stakeholders. A KPI should not be contradictory to other performance measures (APICS, 2014).</td>
</tr>
<tr>
<td>Make-to-order</td>
<td>MTO</td>
<td>Production or service made after receipt of a customer’s order (APICS, 2014).</td>
</tr>
<tr>
<td>Make-to-stock</td>
<td>MTS</td>
<td>Production or service usually made before receipt of a customer’s order. Customer orders are usually filled from existing stock, and production orders are used to fill the stock. (APICS, 2014)</td>
</tr>
<tr>
<td>New product introduction</td>
<td>NPI</td>
<td>The development and release of a product or service that is new in a company’s product portfolio (APICS, 2014).</td>
</tr>
<tr>
<td>Product area</td>
<td>PAG</td>
<td>The highest level in Seco Tools’ product structure pyramid. A PAG example is <em>milling inserts coated</em>.</td>
</tr>
<tr>
<td>Product centres</td>
<td>PC</td>
<td>One of the planning groups in the supply chain management department. They plan demand, inventory and supply for the PUs that is manufacturers of solid tools.</td>
</tr>
<tr>
<td>Product family</td>
<td>PGC</td>
<td>The second highest level in Seco Tools’ product structure pyramid. It is where the product areas are divided into product families. A PGC example is <em>milling inserts xxx-coated</em>.</td>
</tr>
<tr>
<td>Product management</td>
<td>PM</td>
<td>The managers responsible for specific types of products at Seco Tools.</td>
</tr>
<tr>
<td>Production unit</td>
<td>PU</td>
<td>A manufacturer of specific Seco brand products.</td>
</tr>
</tbody>
</table>
| Research &                                     | R&D     | The R&D department at Seco Tools is responsible for product
<table>
<thead>
<tr>
<th>Term</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>development</td>
<td>development mentioned in the theoretical framework.</td>
</tr>
<tr>
<td>Sales unit</td>
<td>An office located in a market, country, or region that is strategically chosen either according to large sales volumes, to support key customers, to increase sales or brand marketing. A SU often have an inventory of important items that is often needed by key customers. A SU may have sales &amp; marketing personnel as well as on-the-field sales men.</td>
</tr>
<tr>
<td>Sandvik machining solutions</td>
<td>A Sandvik AB business area focused on products and solutions for the metal cutting industry. The business area is divided into products areas, i.e. Dormer Tools, Sandvik Coromant, Seco Tools, Walter.</td>
</tr>
<tr>
<td>SAP</td>
<td>n/a</td>
</tr>
<tr>
<td>Seco executive management</td>
<td>The top management team at Seco Tools responsible of the business. It consists of the president, VPs and the CFO. They report to the SMS executives.</td>
</tr>
<tr>
<td>Stock keeping unit</td>
<td>An inventory item (APICS, 2014).</td>
</tr>
<tr>
<td>Supply chain council</td>
<td>A global non-profit consortium who is the founder of the supply-chain operations reference model. (Supply Chain Council, 2010)</td>
</tr>
<tr>
<td>Supply chain management</td>
<td>One of the divisions at Seco Tools. The responsible person for the division is the vice president of supply chain management.</td>
</tr>
<tr>
<td>Supply chain operations reference model</td>
<td>A tool for organizations to make supply chain process improvements. It is based on that a company and its suppliers and customers can be divided into five primary processes, i.e. plan, source, make, deliver and return. They can be divided into measures of five performance attributes, i.e. reliability, responsiveness, agility, costs, and assets (Supply Chain Council, 2010).</td>
</tr>
<tr>
<td>Supply chain planning</td>
<td>One of the departments at Seco Tools´ SCM division.</td>
</tr>
<tr>
<td>Sälj- och verksamhetsplanering</td>
<td>The Swedish term for S&amp;OP.</td>
</tr>
</tbody>
</table>
| US distribution                           | Seco Tools´ DC for customers located in USA and the countries
<table>
<thead>
<tr>
<th>centre</th>
<th>that are closer to ADC than any of the other DCs.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Vendor managed inventory</strong></td>
<td><strong>VMI</strong> A means of optimizing supply chain performance in which the supplier has access to the customer’s inventory data and is responsible for maintaining the inventory level required by the customer.</td>
</tr>
<tr>
<td><strong>Vice president</strong></td>
<td><strong>VP</strong> A person responsible for one of the main parts of an organization (Cambridge University Press, 2014). A VP at Seco Tools is responsible for a division, e.g. SCM division.</td>
</tr>
</tbody>
</table>
## Appendix B - Interviews

### Unstructured interviews

<table>
<thead>
<tr>
<th>Interview</th>
<th>Location</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Supply Chain Planning project Team Member 1</td>
<td>Hällaren, Fagersta.</td>
<td>2014-02-05</td>
</tr>
<tr>
<td>BI Responsible</td>
<td>BI Responsibles’ office, Fagersta.</td>
<td>2014-02-13</td>
</tr>
<tr>
<td>Supply Chain Planning project Team Member 2/Central Demand Planner</td>
<td>Kunden, Fagersta.</td>
<td>2014-02-12</td>
</tr>
<tr>
<td>VP SCM</td>
<td>VP SCMs’ office, Fagersta.</td>
<td>2014-02-05</td>
</tr>
<tr>
<td>Insert Team Manager</td>
<td>VP SMCs’ office, 2014-01-08</td>
<td></td>
</tr>
</tbody>
</table>

These four meetings were held to get an initial understanding. A presentation of their work was given and following questions were asked:

1. What do you work with?
2. Who else are involved in your work?
3. Who do you get information from and who do you give information to?
4. What meetings do you attend (if any)?
   a. What is the agenda and purpose of those meetings?

### Capacity Planner – Inserts, semi-structured interview

<table>
<thead>
<tr>
<th>Interview</th>
<th>Location</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spånan, Fagersta.</td>
<td></td>
<td>2014-02-13</td>
</tr>
</tbody>
</table>

1. Tell us about the as is and to be S&OP process, how much of the new process is implemented?
   a. How was the old process defined?
   b. How is the new process defined?
   c. What will be different?
   d. Why did you consider a new process?
2. What are you responsibilities regarding S&OP?
3. How does the product mix and flexibility pot work?
4. Who else are involved?
5. What are your inputs/outputs in the S&OP process?
Central Demand Planners - Inserts, Tooling & PC, semi-structured interview


1. Which meetings do you attend?
2. Who else are participating in the meetings? (People, PUs, departments?)
3. Which products (product families) do you study?
4. Do you follow-up on any KPIs?

Supply Chain Planning Team Manager – Inserts, semi-structured interview


1. Have we mapped the meetings correct?
   a. How does the escalation at the PU meetings work?
   b. What causes the most frequent escalations?
   c. Why do you have the meeting with SEM in the demand planning?
   d. What happens in the Global Meeting and Supply Chain Meeting?
2. Do you look at the financial part in the S&OP?
3. How does the NPI work in the S&OP?

Controllers – financial department, tooling, semi-structured interview

Kunden, Fagersta. 2014-04-03

1. Are you participating in the monthly S&OP process?
   a. Is someone else from finance/accounting involved?
2. Do you quarterly compare the budget with the S&OP?
   a. What do you compare?
   b. KPIs?
   c. Do you follow a guide/template, or how?
3. Balanced scorecard?
   a. Customer perspective
   b. Internal perspective
   c. Innovation perspective
   d. Financial perspective
      i. Return on assets
      ii. Days sales outstanding
      iii. Cash to cash cycle time
      iv. Total supply chain cost
      v. Sales vs plan
      vi. Revenue per employee
      vii. Earnings before taxes and interest, EBIT
AstraZeneca – Asset Planner, freezried & pump spray, structured interview

Röda rummet, Fagersta. 2014-04-03.

Following questions were sent to Håkan Nilsson at AstraZeneca a week before the interview, based on Grimson & Pykes (2007) suggested interview questions.

About you:
- Who are you and what is your background?
- What is the asset planner’s role in S&OP?
- How many asset planners are there?

Products:
1. How many product families do you have and how are they defined?
   - What defines the families?
   - How many SKUs do you have per family?
2. How many customers do you have?
   - What is your typical customer/market?
   - Where is your “KOP”? Do you have MTS or MTO?
   - How do you distribute your products?
3. How large volumes and mix do you have?

Operational:
1. How many steps are involved to manufacture a typical product?
2. How long is the manufacturing time?
3. Do all products follow the same process?
   - Is there a set flow in the plant?
4. How are the resources divided to the products?
   - How long are the set up times?

The S&OP process:
1. Describe how the forecast and demand planning?
   - What level; product families, SKUs etc.? Aggregated, top down or bottom up?
   - Who are involved, in what organizational level?
   - What time frames?
   - How often is the demand plan generated/updated?
   - What tools/software do you use?
   - Are the customers involved?
2. Describe your supply planning?
   - Who are involved?
   - What input are you using from the demand planning?
   - Who takes part of the supply plan once it is done?
3. How do you integrate the demand and supply?
   - Is there any meetings held with both demand and supply
   - How much is prepared before the meetings
   - Is there a formal process? With which steps?
   - What time frames are in focus?
4. What IT systems do you use?
   - Do you use spreadsheets?
   - Do you have any specific software?
   - Are demand and supply linked to each other in the software?
   - Simulation and scenario planning?
5. What measurements and KPIs do you have to follow up the S&OP and the effectiveness?
   a. Financial, operational etc. and evaluation of the S&OP process?
   b. Does an S&OP scorecard exist?
   c. Frequency for NPI, time to market etc.?
   d. How often do you measure?

6. How do you respond to disturbance?
   a. Peak orders?
   b. Separate process or a part of S&OP?
   c. How often generates the operation plan to the manufacture?
   d. Time frame?

7. How does the meeting happen?
   a. Global meetings?
   b. Customer and suppliers?

8. Organizational?
   a. Is there a responsible for the S&OP?
   b. S&OP champion?
   c. S&OP team?
   d. Who from the senior management participate?

Deeper questions
1. NPI how are they involved in your process?
   a. How do you work with NPI?
   b. Where do they enter the S&OP process?
   c. Someone responsible for NPI?

2. How do you study your capacity?
   a. In hours/pieces?
   b. How do you divide the capacity between products?

3. How do you take part of the strategy from the management?
   a. Per quarterly meetings?
   b. How much can you decide on without their involvement?
   c. Does someone sign off the demand/supply plan?

4. Describe how the financial planning is integrated in the process?
   a. Do you look at the capacity/demand/supply in money?
   b. Which KPIs do you have related to finance?
   c. Are financial people involved in the process?

5. Do you have one S&OP for all products or are there several S&OP?
### Appendix C - KPI tables

**Table 15. Level 1 KPIs in the SCOR model (Supply Chain Council, 2010, p. 1.2.5)**

<table>
<thead>
<tr>
<th>Performance Attribute</th>
<th>Metrics (level 1 - strategic)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Customer</strong></td>
<td></td>
</tr>
<tr>
<td>Reliability:</td>
<td>Perfect order fulfillment</td>
</tr>
<tr>
<td>The process ability to deliver right product to the correct place at the correct time.</td>
<td></td>
</tr>
<tr>
<td>Responsiveness:</td>
<td>Order fulfilment cycle time</td>
</tr>
<tr>
<td>The speed the supply chain provides products to the customer with.</td>
<td></td>
</tr>
<tr>
<td>Agility:</td>
<td>Upside Supply Chain Flexibility</td>
</tr>
<tr>
<td>How quickly the supply chain can respond to changes to the market to gain or maintain competitive advantage.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Upside Supply Chain Adaptability</td>
</tr>
<tr>
<td></td>
<td>Downside Supply Chain Adaptability</td>
</tr>
<tr>
<td>Costs:</td>
<td>Overall Value At Risk</td>
</tr>
<tr>
<td>Costs associated with operation the supply chain.</td>
<td></td>
</tr>
<tr>
<td>Assets:</td>
<td>Cash-to-cash Cycle Time</td>
</tr>
<tr>
<td>The ability to efficiently utilize the assets, can include inventory reduction and in/outsourcing for example.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Return on Supply Chain Fixed Assets</td>
</tr>
<tr>
<td></td>
<td>Return on Working Capital</td>
</tr>
</tbody>
</table>

**Table 16. Primary and secondary layer of KPIs (Chae, 2009, pp. 424-427)**

<table>
<thead>
<tr>
<th>Planning</th>
<th>Source</th>
<th>Make</th>
<th>Delivery</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Forecast accuracy</td>
<td>• Supplier Fill Rate</td>
<td>• On-time departure from manufacturing subsidiaries and original design manufacturer/original equipment manufacturer</td>
<td>• On-time departure from sales subsidiary</td>
</tr>
<tr>
<td>• Total Inventory Days of Supply</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Cash-to-cash Cycle Time</td>
<td></td>
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<tr>
<td>Secondary</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Forecast vs Order</td>
<td>• Rate of automatic Purchase Order release</td>
<td>• On-time production</td>
<td>• On-time arrival to sales subsidiary</td>
</tr>
<tr>
<td>• Forecast Volatility</td>
<td></td>
<td>• Order fill rate</td>
<td></td>
</tr>
<tr>
<td>• Days of Finished Goods</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Rate of Obsoleted Inventory</td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>
Table 17. KPIs according to Oskarsson, et al. (2006, pp. 179-182, 184-191, 194-196)

<table>
<thead>
<tr>
<th>Working stock</th>
<th>Time</th>
<th>Delivery service</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average inventory levels</td>
<td>Lead time</td>
<td>Delivery reliability</td>
</tr>
<tr>
<td>Average stock value</td>
<td>Cycle time</td>
<td>Stock availability (orders/order lines)</td>
</tr>
<tr>
<td>Work in progress</td>
<td>Inventory turns</td>
<td>Service level</td>
</tr>
</tbody>
</table>

Table 18. Metrics used to define maturity class from Logility index (Ball, 2013, p. 3)

<table>
<thead>
<tr>
<th>KPI</th>
<th>Best-in-class</th>
<th>Industry average</th>
<th>Laggards</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average customer service level</td>
<td>95%</td>
<td>89%</td>
<td>79%</td>
</tr>
<tr>
<td>Average cash conversion cycle (days)</td>
<td>46</td>
<td>73</td>
<td>85</td>
</tr>
<tr>
<td>Gross margin change over last 2 years</td>
<td>3%</td>
<td>1%</td>
<td>0%</td>
</tr>
<tr>
<td>Average forecast accuracy at family level</td>
<td>86%</td>
<td>68%</td>
<td>25%</td>
</tr>
</tbody>
</table>
## Appendix D - S&OP scorecard KPI definitions

<table>
<thead>
<tr>
<th>#</th>
<th>KPI</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Market share</td>
<td>Percentage of sales from the “selection” portfolio relative to the total sales of standard products in a given period of time (Seco Tools KPI Handbook 2.0, 2014).</td>
</tr>
<tr>
<td>2</td>
<td>Gross margin</td>
<td>Measures the gross profit divided by sales. The gross profit is the difference between sales and the cost of making a product or providing a service, before deducting overhead, payroll, taxation, and interest payments (Seco Tools KPI Handbook 2.0, 2014).</td>
</tr>
<tr>
<td>3</td>
<td>Time to money</td>
<td>Sales of selected key products, i.e. grooving/parting off products for 2014 (Seco Tools KPI Handbook 2.0, 2014).</td>
</tr>
<tr>
<td>4</td>
<td>Annual budget vs. supply plan</td>
<td>The relationship of the annual budget in dollars and the supply plan that is translated from units to dollars.</td>
</tr>
<tr>
<td>5</td>
<td>Business plan vs. demand plan</td>
<td>The relationship of the business and the demand plan translated from units to dollars.</td>
</tr>
<tr>
<td>6</td>
<td>Stock availability</td>
<td>Percentage of the order lines received for stocked standard products that are available for delivery to the customer on requested day from the DC receiving the order (Seco Tools KPI Handbook 2.0, 2014).</td>
</tr>
<tr>
<td>7</td>
<td>Days in inventory</td>
<td>Measures the average number of days a product or a group of products are kept in a sales inventory prior being consumed (Seco Tools KPI Handbook 2.0, 2014).</td>
</tr>
<tr>
<td>8</td>
<td>Order fulfilment cycle time</td>
<td>It is approximately the sum of the cycle time for three processes, i.e. source, make, and deliver or more precise the sum of actual cycle times for all orders delivered divided by the total number of orders delivered (Supply Chain Council, 2010).</td>
</tr>
<tr>
<td>9</td>
<td>Cost per piece</td>
<td>The cost of manufacturing inputs per unit produced (Seco Tools internal documents, 2014).</td>
</tr>
<tr>
<td>10</td>
<td>On-time delivery</td>
<td>The measurement starts when the PU receives the purchase order or the manufacturing order. An order delivered on the promised day or two weeks early is considered as a hit. An order not fulfilling these criteria is considered as a miss (Seco Tools KPI Handbook 2.0, 2014).</td>
</tr>
<tr>
<td>11</td>
<td>Capacity utilisation</td>
<td>Measure of how intensively a resource is being used to manufacture a product or service (Supply Chain Council, 2010).</td>
</tr>
<tr>
<td>12</td>
<td>Production yield</td>
<td>Percentage of approved number of pieces after the last operation</td>
</tr>
<tr>
<td></td>
<td>Production vs. S&amp;OP</td>
<td>A measure of planned orders relative to actual manufacturing orders during the planning horizon.</td>
</tr>
<tr>
<td>---</td>
<td>---------------------</td>
<td>-------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>13</td>
<td>Forecast accuracy</td>
<td>Calculated from product families. It is the difference of the sum of actuals and the sum of variance divided by the sum of actuals and is expressed in percentages (Supply Chain Council, 2010).</td>
</tr>
<tr>
<td>14</td>
<td>SU forecast accuracy</td>
<td>Calculated from product families. It is the difference of the sum of actuals and the sum of variance divided by the sum of actuals and is expressed in percentages (Supply Chain Council, 2010). It is made on SU level for the demand plan overrides they perform.</td>
</tr>
<tr>
<td>15</td>
<td>NPI integrated with S&amp;OP</td>
<td>The amount of new products that are fully integrated in the demand and supply planning phases in S&amp;OP.</td>
</tr>
</tbody>
</table>