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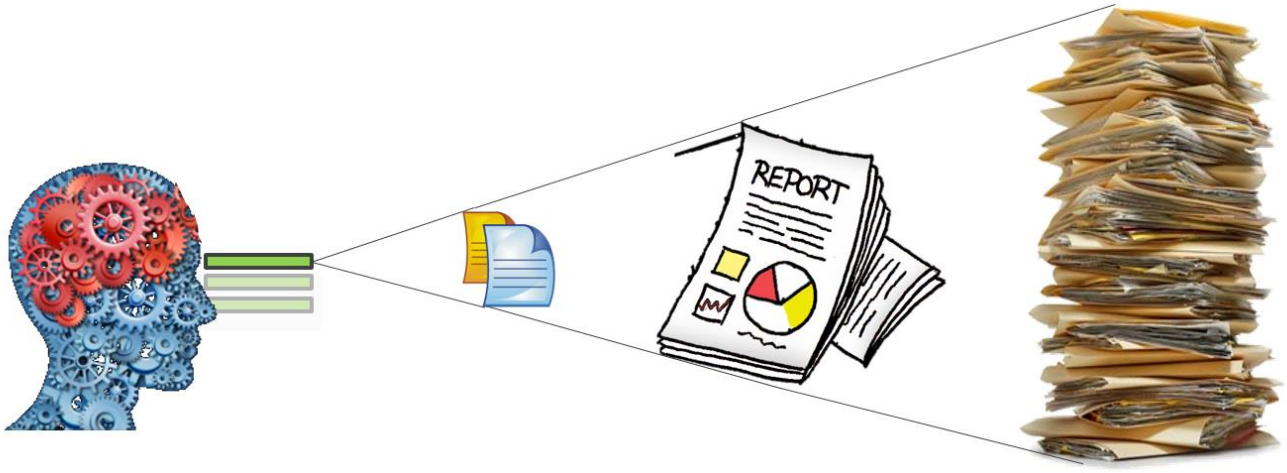


# Creating supporting documents

## A method for surveying knowledge within a Product Development Process

Thesis work within Mechanical Engineering

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Gothenburg, Sweden 2016

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# ABBREVIATIONS

ADP – Architecture Development Process

BPM – Business Process Management

KM – Knowledge Management

Nevs – National Electrical Vehicle Sweden

PL – Process Leader

SI level – Supplier Integration Level

SOR – State of Requirement

VDP – Vehicle Development Process

# ABSTRACT

This thesis work was executed at National Electric Vehicle Sweden AB at the department of Business Process Management. The company's vision is to shape mobility for a more sustainable future, and to design and produce electrical vehicles who will provide an overall great experience including quality and performance. This is a goal that the organization is eager to accomplish with the help from about 800 employees located both in Sweden and China.

The main task of this project was to compile supporting documents for a sub process within the Product Development Process and consisted of an acclimatization period, interviews with suitable employees and the compilation of supporting documentation for the Statement of Requirements Process.

Overall this is a method we could recommend in similar situations. The method has shown itself to be useful when it comes to involving the employees in the project and mapping their way of work. A result that fulfills the request from Nevs have been presented. It resulted in a first draft that the majority of the involved employees though reflected what was said during the interview regarding the way of work, which we thought of as an indication of them feeling involved in the process.

# ACKNOWLEDGEMENTS

We would like to start by saying a great thanks to Nevs for giving us the opportunity to perform our Bachelor Thesis at their company. Thank you for providing with your commitment, time and space.

The team at Nevs department of Business Process Management have been giving us the support and answers needed during our time at their office. Thanks to Dan Lennartsson, Joakim Sjögren, Lennart Talp & Josefina Helstad.

During the project we have been given the privilege to be working alongside with a consultant from another company. Thank you Daniel Warme for the help and the patience you have shown all this time.

Furthermore we would like to thank Dr. Amer Catic for providing us with his research, knowledge and experience.

Last but not least a special thanks to Dag Bergsjö our mentor at Chalmers University of Technology who not only steered us in the right direction but provided us with ideas, experience and other helpful tools.

**Ida Larsson** **Marika Thorén**

# CONTENTS

# 1 INTRODUCTION

*This part is about providing the reader with a delineation of the starting point including purpose, limitations and a clarification of the issue.*

## 1.1 BACKGROUND

### 1.1.1 National Electric Vehicle Sweden AB

On August 31, 2012 National Electric Vehicle Sweden AB (Nevs) acquired the main assets of the Saab Automobile bankruptcy estates. Immediately the work started to implement and form the work that Saab earlier had used to Nevs electric vehicle.

Stakeholders, market, customers, governments and Nevs is demanding a product that is good looking, safe, convenient to use, good economy and a strong sustainable profile. Therefore Nevs started from day one to develop a process that supports all the things mentioned above. They have gathered all their competence and experience to create Nevs Business System, which is based on decades of experience within Automotive Development Industry. The starting point was to pin down the best way to develop a vehicle, with a flexible and modular Architecture as result. Nevs Architecture Development Process (ADP) and Nevs Vehicle Development Process (VDP) are designed to support the Architecture, Platform and Vehicle development. They are constantly trying to improve their processes and methods in order to achieve the most optimized way of developing and manufacturing vehicles.

### 1.1.2 Starting Point

In the current situation Nevs has chosen to use a computer system SharePoint where they internally publish their process maps and steering documents for the entire business. A process map is a tool where a company visually describes their way of working in order to reduce double work and to introduce new employees. The steering documents are a help to maintain the alignment of the process to reduce unnecessary work and make sure that everyone are working in an expected way which leads to success of the company.

The processes are divided into different levels where level zero illustrates an overview of Nevs operations. When you click on the symbol of the sub processes, in level zero, you will be directed to a new map showing this particular process. In this way one can guide their way down to the last level, which contains a concrete activity. The symbol of an activity is a link to a document which contains detailed work description of the activity. If the process, regardless of level, contains checklists or other steering and supporting documents they will also be linked to the map.

A request made from the company is that the employees will be included in the project as much as necessary to make them feel involved in the making of these documents.

### 1.1.3 Limitations

There are many development processes that need supporting documents but because of the time limitations the project will only focus on one of the sub processes within the *Develop, Procure & Industrialize Process*, see figure 1. It is called the Statement of Requirements Process (SOR Process).

The project will focus on compiling supporting documents for an already established process map. It is not within the projects scope to try to change the way of working within the process.

The thesis work extends over a ten week period and will be executed both at Nevs office and Chalmers University of Technology. How the time is planned to be spent is shown in a gantt-schedule, see appendix.

### 1.1.4 About the SOR Process

The SOR Process is a gateway for Nevs to convey all the relevant requirements and information to the purchasing department which is in charge of the contact with the suppliers. It is a technical contractual document that is used to source parts and related engineering work with an outsider supplier. The SOR Process specifies all necessary assembly and quality requirements to the part and the engineering business requirements.

The purchase of parts and related engineering services from suppliers creates critical interfaces. To capture the intent and expectations from Nevs a transparent set of documents is required. The content of the SOR Process is intended to meet Nevs requirements of; high quality, functionality, designed to cost, timely.

## 1.2 PURPOSE

Nevs wants to have a standardized way of working to ensure that they do not repeat mistakes and prevent double work. The background above gives the framework, but they are still missing the details for their engineers to follow. This can be written down in routines, instructions, checklists and/or templates.

## 1.3 CLARIFICATION OF THE ISSUE

Simple questions were formulated to clarify the issue and the goal of this project is to answer them.

The question summarizing our project:

> *How do we summarize all the information that is important and internal to the regarding process in to supporting documents that still are understandable to adjacent parties?*

On a request from Nevs we also have to answer this question:

> *How do we involve the employees in a way that makes them feel involved throughout the survey of the process?*

# 2 FRAME OF REFERENCE

*This chapter is in a way a benchmark to give a perspective of how others handle knowledge and what knowledge really is. The assignment can be decomposed to its main task, which is to manage knowledge.*

## 2.1 FORMING WORK

When a company starts to form the organizational structure it is recommended to describe the work in segments, this inclines that you should divide the work at the company in processes and describe the way of work for one sub process at a time. The reason of this is that when describing the way of work for a whole process instead of dividing the instructions for each activity it gives a holistic perspective. This give the employers an overview that helps steering the work. (Bruzelius, H L. and Skärvad, P-H. 2011)

## 2.2 PROCESSES

### 2.2.1 Processes in Theory

A process can be identified and described as following:

> *"A process is a repetitive use of the network in order linking activities that use information and resources to transform input to output from identification to satisfaction of customer needs."*

This definition gives a good understanding of what a process is and how it is related to the outside world. If a company have not defined what a process is, it might cause problem already at the important mapping of the process. It is not easy to describe and identify something when you do not know what you are looking for (Ljungberg, A. and Larsson, E. 2001).

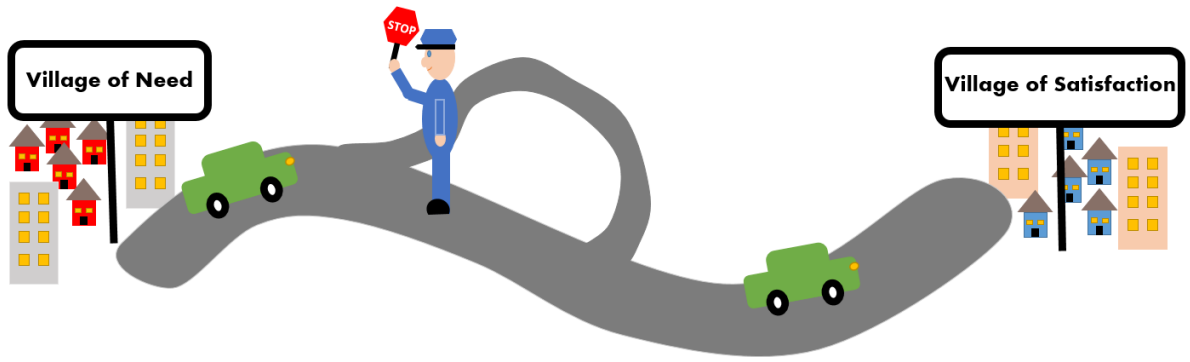



*Figure 1. Illustration of a process. Illustration: Larsson, I. and Thorén, M. (2016)*

A useful metaphor Ljungberg and Larsson (2001) use is that a process can be compared with a road, see figure 2. The road starts at "the village of need" and ends at "the village of satisfaction". Observe that this metaphor does not refer to a specific process. It can be used in any situation, like a sick patient who wants to become healthy or a defective product that must be redesigned. People drive vehicles on the road which is the competence and resources that are necessary for the vehicles to be able to get from start to end. During the trip the vehicles

need to pass an amount of obstacles or traffic police. It is not always possible to take the straight path, sometimes you encounter obstacles which you have to take count of to keep your journey towards "the village of satisfaction". In real life a traffic police that shows that a detour is necessary can be a steering process that set demands on the core process.

### 2.2.2 Processes at Nevs

To support the product development Nevs chose to work with processes and process mapping. A process map is supposed to describe and give an overall view of the way of work within the process. It illustrates important steps which are needed to perform the work in the process. Within a process you can have either sub processes or activities. An activity is a mission which gives a direct result in the product and is illustrated as a rectangular box in the map. A sub process is a new process within a process and is illustrated as an arrow like box. In difference to a sub process an activity is at the lowest step and should be described in specific detail in supporting or steering documents.

The figure below is an example of how a process map at Nevs could be designed. Before you can start working in the process you need a number of input (to the left in figure 2), which are outputs from previous processes. Above the map there are steering processes and each of their output is an input that must be taken in account in at least one of the activities within the process. The process below is a supporting process which is there to help the work within the process if needed. When the work within the process is done you get an output (to the right in figure 2), this will become an input for the following process. During some processes there are certain information that is required to be stored in a special database, when and where in the process this happens is described using a cylinder. If there is a decision to be made, often regarding the current status of the project, it will be illustrated with a rhomb.

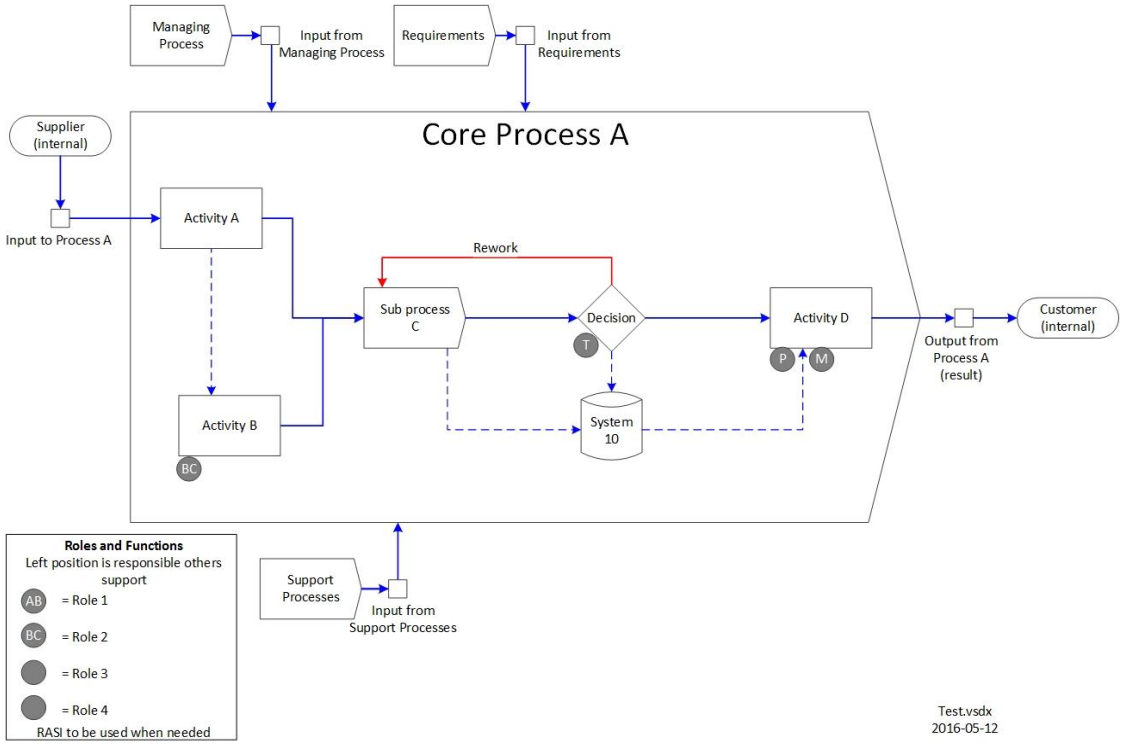



*Figure 2. An example of a process map. Source: Internal document at Nevs.*

## 2.3 KNOWLEDGE MANAGEMENT

There are many theories on how to work with knowledge management (KM) and several of them start with dividing knowledge itself into different categories. Without digging too deep into the philosophical world of debating what knowledge is and how to divide it into several different categories the conclusion was the following.

Knowledge can be divided into explicit and tacit knowledge and is describes as knowledge that you either can or cannot share using words. Explicit knowledge is things you know which you can put on paper e.g. recipes or assembly instructions, while tacit knowledge is things you know how to do but cannot explain why e.g. how to hit a basketball in the hoop or balance a spoon on your nose (Alvesson, M. and Sveningsson, S. 2007). In order to transfer explicit knowledge you can write it down and save it in a database as a way to assure that everyone in the organization has easy access to relevant information and instructions. The process of expressing the knowledge in words is referred to as codification.

## 2.4 CODIFICATION OF KNOWLEDGE

When you write down what you know and share it with your colleagues you prevent possible situations where the company might be harmed due to lack of relevant information. An example of a situation like this would be if a person at the company possesses uncharted crucial information and then becomes sick or for some other reason is unable to show up for work. This situation of obviously unwanted and you could say that the main purpose to codify knowledge is to make the company less vulnerable (Jonsson, A. 2012). Therefore it is very important to make sure that you capture all knowledge in order to make a proper instruction of how to work within the process. If something is left out it might occur errors which might affect the quality of the product which in the long term might affect customer satisfaction.

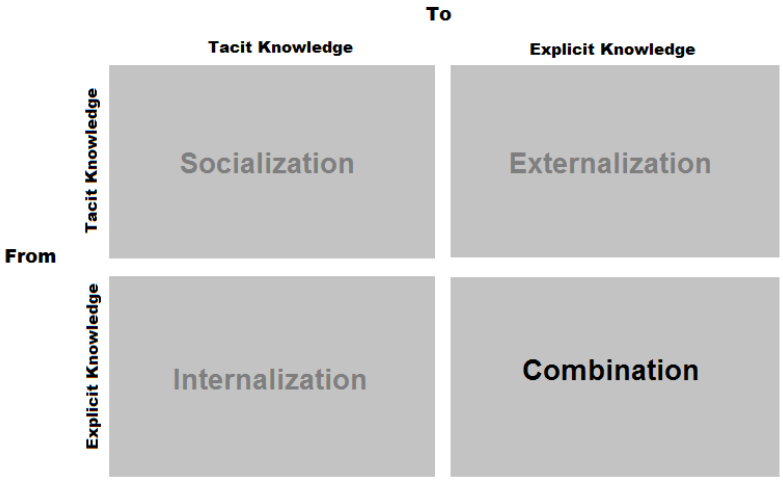



*Figure 3. SECI-model. Source: Nonaka s.19 (1994).*

A theory that has established is that if you convert knowledge in between tacit and explicit knowledge you actually create new knowledge. So by taking one kind of knowledge and converting it you might fill the gaps that could occur. Figure 4 illustrates Nonaka's SECI-model which describes four modes of knowledge conversion; Socialization, Externalization, Internalization and Combination. The last one Combination is adaptable to the situation and is

converting explicit to explicit which is when you reconfigure the given information either through adding, paraphrasing or recategorizing (Nonaka, I. 1994). The theory is that when you change the words describing already known knowledge you might interpret it into explaining something you did not know before. This theory becomes clearer when you put it in a situation where two people with different opinions regarding a certain matter have to find a way to establish a solution together. They might not settle with either of their suggested solutions but have to compensate and use their knowledge to come up with a new solution. Then new ways are defined and through it new knowledge is created.

# 3 METHOD

*This chapter will describe the performed work throughout the project. The goal of the method is to achieve good results.*

## 3.1 EXECUTION

### 3.1.1 Problem Analysis

A short problem analysis was already made by Nevs before the start of the project. After being presented with the company's concerns it came natural to survey what other issues that may occur. This was made by brainstorming and asking people with experience of similar work what type of problems they have been in contact with.

### 3.1.2 Acclimatization

There was some time assigned to acclimate to Nevs organizational structure and way of working with processes. This was paramount since no organizations are structured or run exactly alike. First there were several meetings in order to get a good understanding for the organizational structure of Nevs and how they work both within the specific process but also processes in general. Attendant at these meetings were people with different insight and knowledge regarding the process in mind. Some of the meetings were with people who worked at the company before the reformation and some with people who started after. During this stage of the project the questioning regarding the way they work within the processes were held to a minimum and focus were at understanding abbreviations and other company specific linguistic differences. Note that trying to understand details were done later on and this part is circumscribed to give an overview of the projects starting point.

### 3.1.3 Interviews

To gather information regarding various types of supporting documents a meeting with the external KM expert Dr. Amer Catic was arranged.

As stated before, it is important to gather as much relevant information as possible to be able to make sure no gaps occur in the way of work within the process. One method to cover everything in relevance is to interview several people with various assignments to make sure you receive a width in the activity descriptions. Though before sitting down with the relevant people an interview template were assembled.

After the questions regarding the way of work appropriate methods for managing knowledge found during the literature research were presented in the interviews in the form of an example or question to receive a response regarding its utility in the process. These opinions and reactions shown when being presented with these suggestions were the foundation to what type of supporting documentation will be used to describe the process.

Every interview was booked with one person at the time so that they would not feel restricted in any way to express their true opinion, unless they requested to bring someone else along. A second meeting was established if needed and the main purpose of it was to fill eventual gaps in the way of work and/or give an opportunity to ask further questions in specific areas.

After the interviews the answers were compared to the process map since it is supposed to show the actual way of work within the process.

### 3.1.4 Choice of Supporting Documents

Alongside with the startup of the project there was a search for all possible varieties of supporting documents. One purpose of our literature research and the meeting with the external KM expert was to gather all sort of information on how other organizations work with KM and codification of knowledge in order to find relevant methods for this project.

The actual decision of what type of documents that would be most helpful was discussed with the Business Process Management (BPM) team with the SharePoint system in mind. Their goal is to create a helpful system for their employees that should be easy to navigate and still provide all the relevant information needed to produce high quality and environmentally friendly vehicles.

### 3.1.5 Detailed Instruction

After the interviews the answers were patched up into an instruction which describes the way of work within the process.

During the review of the answers it became clear that the process map were not accurate according to how people actually were working in the process. Therefore a new version of the process map was made that were consistent with the actual way of work and presented to the respondents and the BPM for evaluation.

### 3.1.6 Generic Routine

Once the detailed instructions was formulated the information was shortened into what is called a routine. A routine is supposed to give an overview of the whole process and help giving a small amount of information regarding every activity. It should explain more than the process map but less than the instruction. When creating it the process map was used as a guideline.

The layout chosen for the routine was the same structure as for the instruction with the hope to give an impression of unity. Regardless of what supporting document you choose to look at you will be provided with the same information though in various levels of elaboration.

### 3.1.7 Reference Check

Once the supporting documents where formulated they were sent back via email to people we had interviewed, the PL and to the department of BPM. They got a chance to get back to us with comments.

Besides from feedback via email we set up a meeting with the group of people who together had the assignment to assemble the process map. This group were given the chance to approve the new process map that were established since the results of our interviews indicated inaccuracies between the map and the reality. Also they got the supporting document by email to read before the meeting and was given an opportunity to question the content.

After receiving everyone’s opinions the process map and supporting documents were corrected and then sent back again for approval.

# 4 RESULTS

*Here you will find descriptions of the results of our method which we presented to Nevs hoping to help them in their BPM and to support the employees working within the process. Also a part will describe unwanted situations that occurred during this time.*

## 4.1 EXECUTION

### 4.1.1 Problem analysis

When we began the project the only recognized issue was that the employees working within the process might not feel involved in the making of the steering and supporting documents.

Another recognized possibility was that if people working within the process would have too much differences in opinion regarding the most appropriate way of work. The solution to this problem had already been established by Nevs by providing every process with a PL. This person has the final word in case the situation would not be solvable by letting the disagreeing parties to come up with a solution together.

While talking to different people at meetings and spontaneously at the office it became clear that everyone had a different approach to the organization. Some were hired by the former owner and had therefore a vision of what had been and wanted to revive that. While some newly hired had a different vision of what could be and worked really hard to make the best of that. Depending on how long ago the person was employed the greater the impression of loyalty to the former ways of work they showed. When a variation of these types of employees are put in a conference room and asked to agree on how the work is supposed to be executed they will have different opinions and it complicates and delay the requested results.

### 4.1.2 Acclimatization

People at the office are not working with the same deadline as the project so for them a week is not a great amount of time and answering an email is rarely something they see as urgent, though for us a week is 1/10 of our total time spent on this project. The difficulty is to receive the information we need within a reasonable amount time.

In the planning of the project there was one week set aside to acclimate to Nevs as an organization, see gantt-schedule in appendix. This time was stretched out to two weeks. Also when these two weeks had passed there still occurred situations where there was trouble understanding since it would take even more time to learn all the abbreviations and other internal linguistic differences. The terminology at companies of this size is usually very internal and rarely the same at different companies. This was a bit problematic for us due to our short time-limit. In an attempt to solve this problem Nevs provided us with an abbreviation list.

### 4.1.3 Interviews

The questions in the interview template were divided into groups depending on their theme. This resulted in the following template structure:

- *Theme: Intro* - Since there has been a reformation in the company due to a change of owner we wanted to establish whether the respondent were employed before or after Nevs ownership. So an introducing part with questions regarding

time of employment, role at the company and any previous roles were established.

- *Theme: Way of Work* - Following was a chapter which gathered information on how employees are working within the different activities, so a question about the way of work in each activity was formulated.
- *Theme: Change* – Last but not least was a part which raised the question of if the respondent had any wishes regarding changes in the way of work today. This was to gather information for eventual recommendations to Nevs on how to proceed after this project.

Though before the question regarding "Change" people were eager to express their opinions on what could and needed to be improved regarding the way of working within the process.

Many of the interviewed expressed a quite distinct dissatisfaction when it comes to document management in the SOR Process. For the time being the routine looks like the following:

1. Depending on how involved the supplier is in the production of the specific component there are several documents to fill out. If the Supplier Integration level (SI level) is low the company have to create more documents in order to guard itself in the event of failure or flaws regarding quality of the product. So first the people working in the SOR Process have to find out how many documents they need to fill out for a component.
2. Download the templates needed depending on SI level from the database to your computer in order to amend them.
3. When the appendices are ready they need to be converted to PDF's so that the suppliers will not have a chance to amend them. Also the group of appendices are zipped to make sure that no documents will be left out when sending the whole bunch to the suppliers. Then upload the zip file, the finished SOR, on to the hard drive in the database. As a whole one SOR can end up somewhere around 90-240 pages in total depending on SI level.
4. Then the person have to do this for all the various components they have order to develop. Some of the employees might have to do this for as many as 30 components.

Afterwards they download all the requested documents to their private hard drive and then use the same template for every component in one project.

### 4.1.4 Process Map

The SOR Process's map was originally created through brainstorming by a group of people working within the process and the Process Leader (PL). This was done at Nevs before the start of this project and it has been updated several times during this project by the same group.

Even though the process map was defined before the interviews began it soon became clear that the results of our interviews would affect the map. The way of work described at the interviews differed from the layout of the map and therefore we presented a reconstructed map to the BPM. Together with a reference team a complete but also dynamic process map of the work within the SOR Process was defined, see figure 4 below.

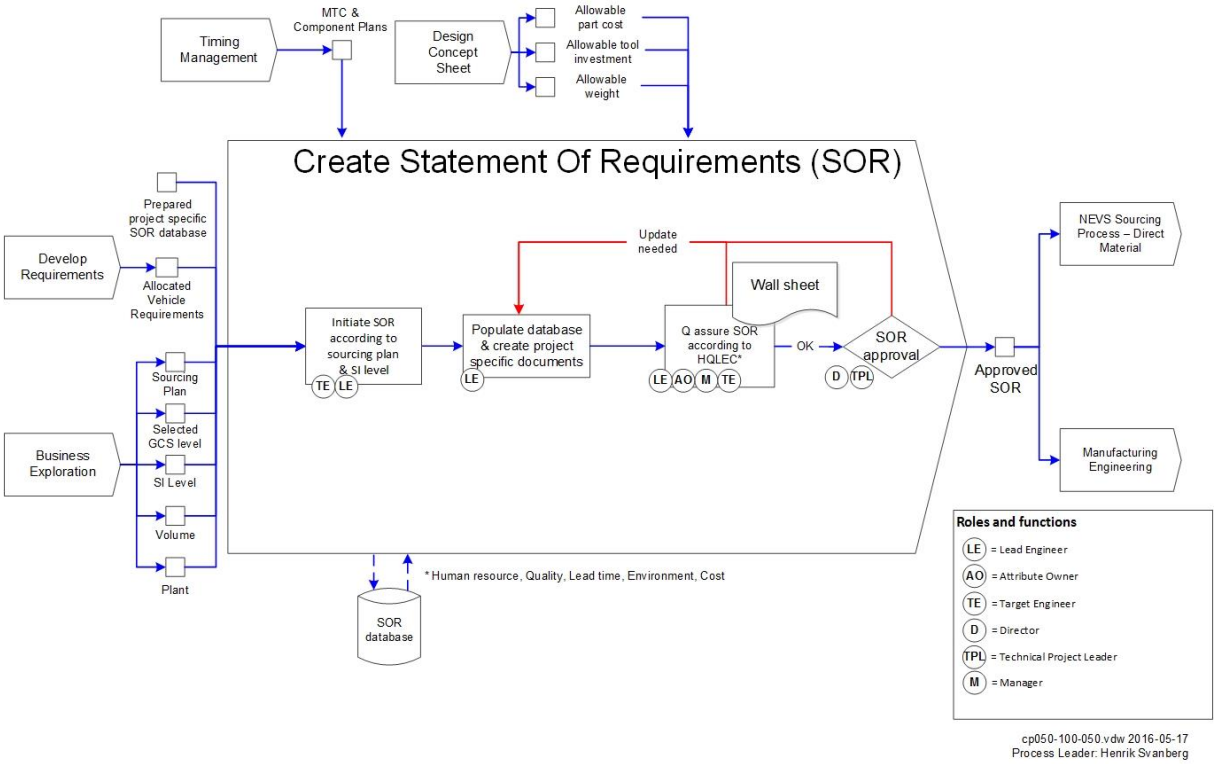


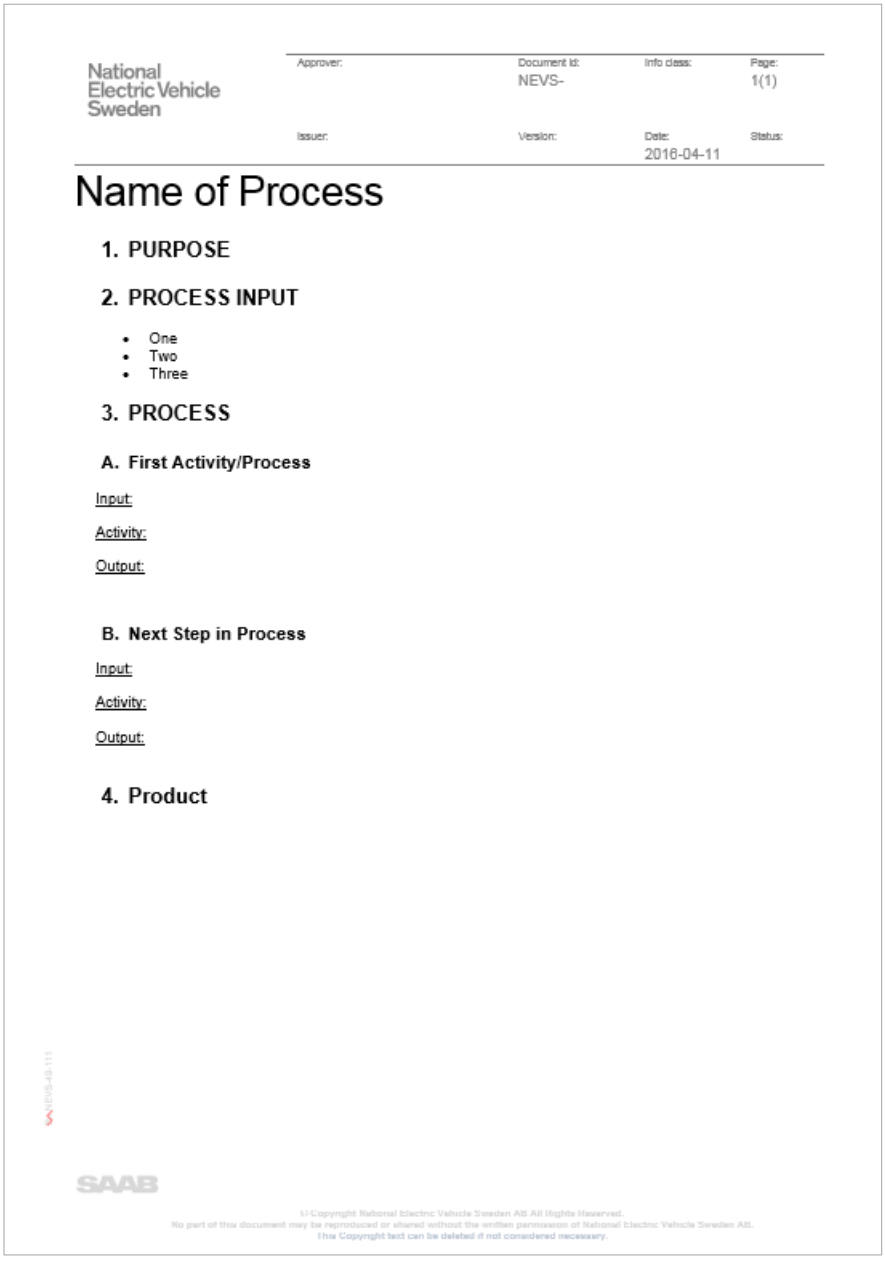

*Figure 4. Process map of the SOR Process.*

### 4.1.5 Supporting Documents

At the beginning the project chose not to use any finished template for Nevs processes because there was an ambition to create a template based on the results of the literature research and interviews. Although on the purchasing department they have been using a template for documenting their process which in their experience worked very well. As a starting point these templates were adapted to give an overview of the SOR Process.

The supporting documents are designed with a chronological order and influences by bulleted lists, with a purpose that give you possibility to choose what information you are interested in receiving. For example if you are just uncertain of the strategy of a specific activity you can easily go down to the activity in mind and read only about that due to the headlines.

This template contains input, output and what to do for each activity. The numbered headlines (1, 2, 3, etc.) describes the substance of the steering document, what type of information you might expect to find underneath. The subheads labeled with uppercases (A, B, C, etc.) contains the description of the different activities within the process. See figure 5.



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Name of Process

1. PURPOSE
2. PROCESS INPUT
   - One
   - Two
   - Three
3. PROCESS

A. First Activity/Process

Input:

Activity:

Output:

B. Next Step in Process

Input:

Activity:

Output:

4. Product

SAAB



*Figure 5. Routine/instruction template.*

### 4.1.6 Routine

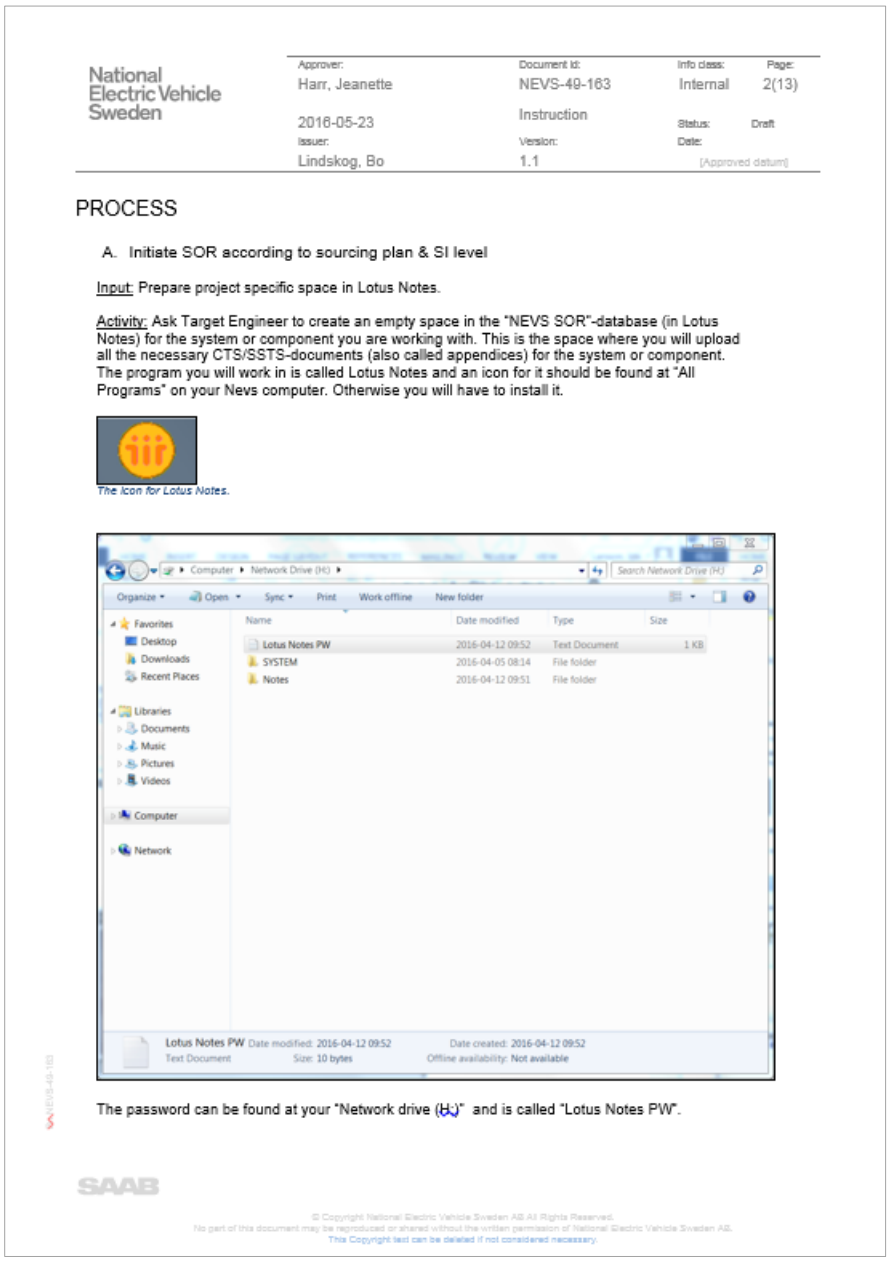
The routine contains input, activity explanation and output for every activity box in the process map. This is a document which might help if you want to brush up on you knowledge of the

process without reading all the details. The goal with the routine was to get an easy overview of the process.

### 4.1.7 Instruction

The design is identical to the routine though the instruction is a more elaborative document than the routine. The biggest difference is that there is enabled figures and illustrations in the instruction to help clarifying the operation.

The description is very detailed and contains both describing texts and images. The images are step by step visualizations of the way to operate in the SOR database. Today Nevs uses a database that is a bit inefficient but the future holds a more interactive database where the employees supposedly will be able to amend the documents directly online instead of downloading Word documents one by one as they do today.



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PROCESS

A. Initiate SOR according to sourcing plan & SI level

Input: Prepare project specific space in Lotus Notes.

Activity: Ask Target Engineer to create an empty space in the "NEVS SOR"-database (in Lotus Notes) for the system or component you are working with. This is the space where you will upload all the necessary CTS/SSTS-documents (also called appendices) for the system or component. The program you will work in is called Lotus Notes and an icon for it should be found at "All Programs" on your Nevs computer. Otherwise you will have to install it.

*The Icon for Lotus Notes.*



The password can be found at your "Network drive (H:)" and is called "Lotus Notes PW".

SAAB



*Figure 6. Part of the Instruction for SOR Process.*

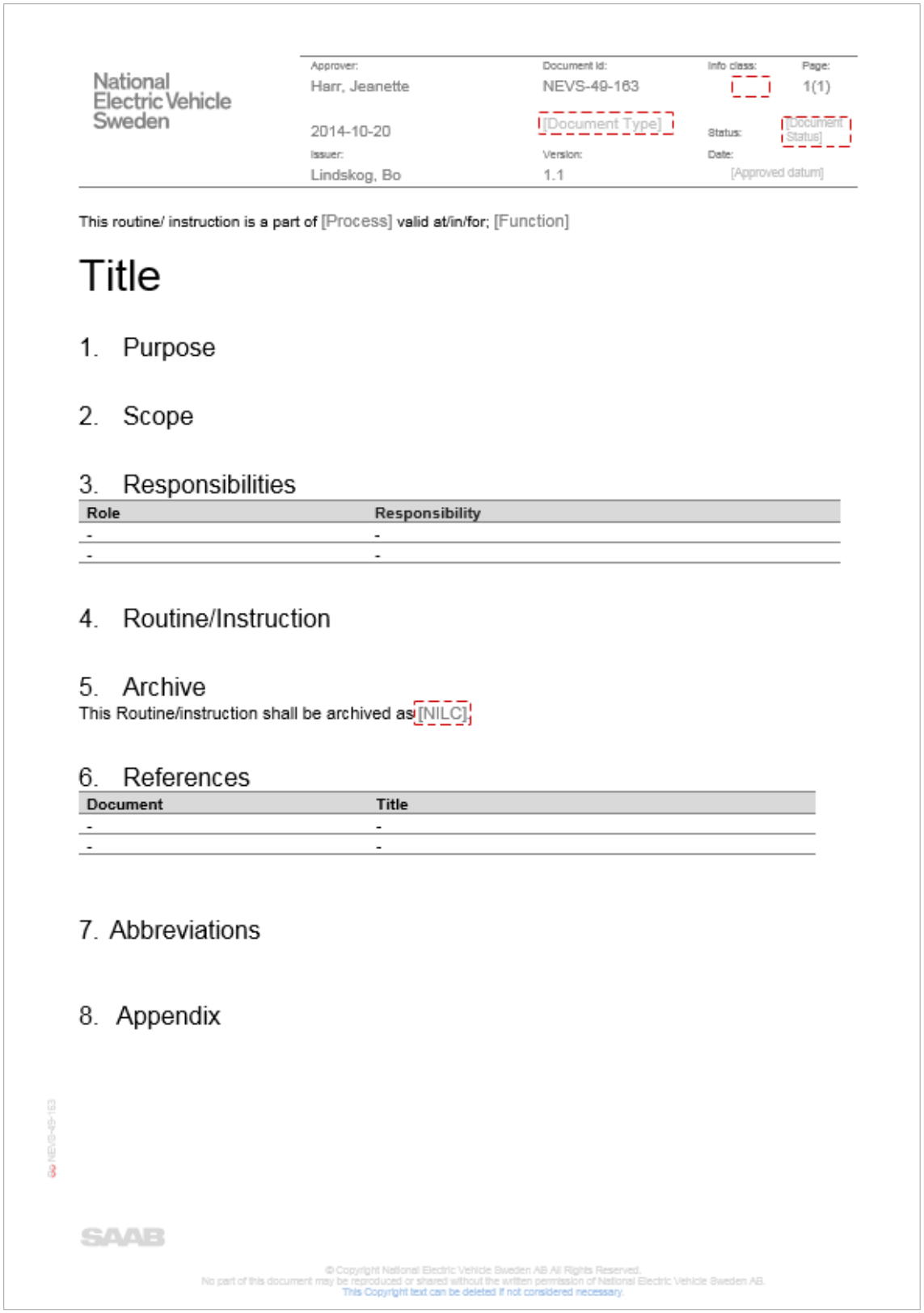
### 4.1.8 Reference check

According to the reference group the first edition of the supporting documents was a success. They thought that the instruction was thorough enough and would be very useful especially for new employees.

Though when summoning the group in charge of establish the process map they saw a change that needed to be done. One of the activities within the process were moved to another process and therefore this affected the supporting documents.

One reply from the reference check was a request to use an already established instruction/routine template. It contained the same things as our supporting documents and more to it, such as:

- *Purpose*: The purpose of this document.
- *Scope*: Describes what will be described in this document.
- *Responsibilities*: A list of who is responsible for what.
- *Routine/Instruction*: This part is a description of the way of working within the process.
- *Archive*: A special code describes how long this document will be stored in the database.
- *Reference:* Here you could refer to any other documents which might be of interest for the person working within the SOR Process.
- *Abbreviations:* Here various abbreviations in the document might be described.
- *Appendix (if needed)*: In the end there is a part for eventual appendices.



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This routine/ instruction is a part of [Process] valid at/in/for; [Function]

# Title

## 1. Purpose

## 2. Scope

## 3. Responsibilities

| Role | Responsibility |
|---|---|
| - | - |
| - | - |

## 4. Routine/Instruction

## 5. Archive

This Routine/instruction shall be archived as [NILC].

## 6. References

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## 7. Abbreviations

## 8. Appendix



*Figure 7. Nevs template for instruction/routine.*

Another response from the reference check was that it is important to establish a detailed instruction of how to work while filling out the various templates requested within the activity *Populate Database & Create Project Specific Documents*. This would supposedly help the newly employed engineers by providing them with a quality assured instructions to follow.

## 4.2 Interview With External Expert

A meeting with Dr. Catic who is working as Knowledge Management Specialist and KM implementation leader in Volvo Group Trucks was arranged in order to give a greater understanding about his research regarding what he calls “checksheets” and to see if this was something that could be beneficial for the work at Nevs. A checksheet is a mixture of the formality of a checklist in form of a bulleted list and the descriptive ways of a manual without needing to read just as much as you might need in similar elaborative documents. Dr. Catic is working with a method called “thin slicing” which helps getting over the obstacle of the brains limited capacity to take in relevant and/or critical information (Catic, A. 2015). To divide a large amount of information into smaller parts makes it possible to choose what part of the total that are most relevant for your current situation. When trying to take in too much information at once you are at risk of overloading your brain. With thin slicing you can provide the company a document in which they can storage their knowledge in large volumes but still not overload their employees with crucial information.

# 5 ANALYSIS AND DISCUSSION

*This chapter is for analyzing and discussing the frame of reference, method and results with suggestions for possible improvements.*

## 5.1 ACCLIMATIZATION

Every time you have to start working at a new place it is like you have to learn a new language. Therefore it is good that Nevs provided us with an abbreviation list, though it was not completed. It would have been good to provide new employees or other outsiders such as ourselves with a more thorough explanation rather than what words the letters stand for in every abbreviation.

## 5.2 INVOLVING EMPLOYEES

The importance of feeling involved in your daily work is common known by now. People need to feel like they make a difference and that is accomplished by letting them be a part of change and decision making. If they are unable to feel involved in this project, no matter what reason, then they might oppose our finished product and it would all have been for nothing if they do not want to use the documents. Though the ambition people shown during the interviews and the eager to tell what could be improved shows that they thought they were given a true chance to make a difference in the daily routine.

## 5.3 SUPPORTING DOCUMENTS

Bruzelius and Skärvad (2011) say that it is important to give an overall view rather than dividing it into smaller bits and pieces. According to Catic's (2015) research it is important that you do not overload the brain by giving it a large text of crucial information without thin slicing it and give the reader a choice to read only the bits that is of relevance right now. Therefore the choice to describe the whole process's work in one document and then divide the information into subtitled according to the activities seemed like the best compromise. The fact that each activity had an output which most often became relevant as an input in the next activity might give the reader an understanding for the flow that is required when working with processes.

The goal with the instruction was to be as elaborate as possible, rather describe too much than too little. Imagine being newly employed at Nevs and being new to the linguistics and abbreviations, then an elaborate document may be the one thing you need.

One thing that yet have not been brought to attention in this project is that in these situations there often might be reformation requests in the way of work which in that case would require more work. It is hard to survey the way of work without issues being brought up by employees during the project and when these issues are brought up there would be a good idea to act on them. Though our time limit restrain us to keep our focus on just surveying the process and how the work actually looks like today. If time had not been as much of a limitation maybe some focus would be laid on develop more solutions to these issues.

After the feedback from the reference group and a short discussion with the BPM the decision was made that the newly provided instruction/routine template would be used. Therefore we converted our information and structure to the new template and filled out the other headlines according to what had been described to us during the interviews.

The request for a detailed instruction for the engineers to follow while working within the activity *Populate Database & Create Project Specific Documents* was interpreted as a need of a handbook for only a certain group working within the SOR Process, see figure 5. Therefore the choice was made not to include it in the supporting documents for the whole process that this project established. Though it is something that could benefit the company a lot by giving the newly employees (or people who are uncertain of the way to work in general) a help to work independently and save a lot of time in the end since the employee can find the information they need on their own and are not relying on anyone else to help them.

## 5.4 INTERVIEWS

When sending out the invitations to attend an interview there should have been a clear purpose attached to help clarify what the scope of the assignment was in order to give the respondent a chance to prepare thoroughly. If the intention of the meeting is unclear it might lead to wasted time which is unwanted, especially where time already is scarce. Depending on your intentions the purpose explanation should not be too elaborate because it might restrict what the respondent choose to tell you. In our situation it would have benefited to keep the discussion to our topic in mind due to lack of time.

When interviewing several people the prediction was that there would be some time spent on weighing different people's answers against each other's in order to come up with a good result. Though people's answers more filled each other's gaps than crossed paths. The times where they described the same step they described it the same way so there was not much time spent on mediating between disagreed parties.

## 5.5 DOCUMENT MANAGEMENT

The issue that were raised during the interviews regarding the document management is something that might affect the end result and its quality. The problem here is that the templates that are accessible at Lotus Notes are supposed to be downloaded for each and every component since they are continuously updated in order to help the employees guarantee quality of the delivered product. Therefore it is important that everyone have the latest updated version of the templates when starting a new SOR.

# 6 RECOMMENDATIONS

*In this chapter recommendations of reformation possibilities at the company will be presented and can be seen as a way to take this project further.*

### 6.1.1 Document Management

If the company is going to use the system Lotus Notes and have a specific group of document that needs to be filled out depending on how much they are planning on design and produce on their own or integrate the supplier which in total results in a large amount of pages, then they would benefit from rearranging the part where the employees download the necessary templates. They should provide finished sets of templates to download depending on the SI level. This means that you only have to go in to Lotus Notes and download a group of documents for every new SOR instead of comparing SI level to the checklist which documents you need and then download every one of them one by one. It saves time and by making things easier for the people using the documents and therefore persuade them to download the most recently updated ones for every component.

### 6.1.2 Checksheets

Check sheets is a tool that got a positive response at the interviews, unfortunately the time limit made it impossible to ask everyone. Right now the employees have no system for sharing relevant experiences other than by conversations in the break room and that is not the best way to seize knowledge. By using checksheets people would have a natural source to seek information/help regardless of how occupied the coworkers are. Unfortunately it seems a bit unrealistic to believe that employees will have much time to help one another if required, therefore some are forced by these time limitations to put their work on hold or do something else for a while. To skip in between assignments can lead to unfocused work and in the long term have a negative effect on the quality of the result. Therefore integration of the checksheet system which is always available and it is adaptable in different processes is recommended.

### 6.1.3 Work in Progress

Processes and instructions are supposed to reflect the actual way of work within the process and therefore if any changes are made over time the documentation and the map should be updated accordingly.

### 6.1.4 Further Documents

Another document that could benefit the company is a handbook for the engineers to follow while working within the activity *Populate Database & Create Project Specific Documents* since there are a lot to be done at this stage in the process, see figure 5. The quality of the result is depending on the engineer to work properly and in a good way to give the engineers all the tools needed to do a thorough job is to provide them with a handbook for this specific activity. In the handbook they should be able to find a detailed instruction of how to fill out the templates and information about other things that could be important to have in mind during the work, e.g. tips from other engineers. A good way to keep track of these tips would be to integrate the handbook and checksheets.

# 7 CONCLUSION

*This chapter is a summary of the substance in this thesis report. Here you will also find the answers to the questions formulated in the beginning of the report.*

## 7.1 QUESTIONS ANSWERED?

In the beginning of this project there was two questions formulated.

> *How do we summarize all the information that is important and internal to the regarding process in to supporting documents that still are understandable to adjacent parties?*

By following the method described in chapter three there is a good chance to end up with accurate information regarding the way of work as it is executed for the time being. It is a way to map an accurate version of the truth. Through interviewing different employees with various roles in the process established a good understanding for the path in every activity were established. Thanks to our novice knowledge regarding the company and its internal linguistic differences the description was made in a way that will be understandable for both newly employed and adjacent processes.

> *How do we involve the employees in a way that makes them feel involved throughout the survey of the process?*

To involve the employees interviews were held with the ones who actually is working within the process, otherwise the group who first developed the process map could have put together an instruction as well but now the instruction is in a way formulated by the employees performing the actual work.

The fact that this project is executed by outsiders (people who does not work at the company usually) can reassure employees that there are no preconceptions involved and that everyone are given the same amount of time and focus.

## 7.2 SUMMARY

Overall this is a method we could recommend in similar situations. The method has shown itself to be useful when it comes to involving the employees in the project and mapping their way of work. A result that fulfills the request from Nevs has been presented. The supporting documents resulted in a first draft that the majority of the involved employees though reflected what was said during the interview regarding the way of work, which were thought of as an indication of them feeling involved in the process.

# 8 REFERENCES


Alvesson, M. and Sveningsson, S. (2007) *Organisationer, ledning och processer*. Edition 1:1. Lund: Studentlitteratur AB.

Bruzelius, H L. and Skärvad, P-H. (2011) *Integrerad organisationslära*. Edition 10:3. Lund: Studentlitteratur AB.

Catic, A. (2015) Capturing actionable knowledge: when less IS more. *CeLean Research in Lean Digitalization.* http://www.projectvisit.org/wp-content/uploads/2015/05/Actionable-knowledge.pdf. (2016-04-25).

Jonsson, A. (2012) *Kunskapsöverföring & knowledge management*. Edition 1:1. Malmö: Liber AB.

Ljungberg, A. and Larsson, E. (2001) *Processbaserad verksamhetsutveckling.* Edition 1:13. Lund: Studentlitteratur AB.

Nonaka, I. (1994). A dynamic theory of organizational knowledge creation. *Organization Science,* 5 (1), p.14-37.

# 9 APPENDICES

**Appendix 1 – Interview Template**

**Appendix 2 – Gantt-Schedule**

**Appendix 3 – The Routine**

**Appendix 4 – The Instruction**

# Appendix 1 - Interview Template

## Intervjufrågor
*- Kartläggning av SOR-Processen*

**INTRO**

1. **Har du jobbat här under GM tiden?**

2. **Vilket är ditt nuvarande ansvarsområde?**

**TEMA ARBETSGÅNG**

3. **Beskriv din arbetsgång i de olika aktiviteterna, nämn gärna vilken/vilka input som krävs för att starta aktivitet.** *Se processkarta*

   A. Prepare SOR database

   B. Initiate SOR according to sourcing plan & SI level

   C. Populate database & create project specific documents

   D. Q assure SOR according to HQLEC

   E. SOR approval

**TEMA FÖRÄNDRING**

4. **Är det något du spontat önskar ska förbättras i hur man arbetar med SOR-processen?**

# Appendix 2 - Gantt-Schedule

*Version 1: Before starting the thesis work*

| Nr | Activity | v 11 | v 12 | v 13 | v 14 | v 15 | v 16 | v 17 | v 18 | v 19 | v 20 | v 21 | v 22 | v 23 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | Write planning report | | | | | | | | | | | | | |
| 2 | Work starts at Nevs | | | | | | | | | | | | | |
| 3 | Formulate questions | | | | | | | | | | | | | |
| 4 | Interview process leader | | | | | | | | | | | | | |
| 5 | Evaluate answers | | | | | | | | | | | | | |
| 6 | Literature research (processes) | | | | | | | | | | | | | |
| 7 | Review reformation possibilities | | | | | | | | | | | | | |
| 8 | Survey process | | | | | | | | | | | | | |
| 9 | Set up templates | | | | | | | | | | | | | |
| 10 | Reference check | | | | | | | | | | | | | |
| 11 | Literature research (checklists) | | | | | | | | | | | | | |
| 12 | Produce checklist | | | | | | | | | | | | | |
| 13 | Write final report | | | | | | | | | | | | | |
| 14 | Present results | | | | | | | | | | | | | |
| | Estimated workload at NEVS | | | 60% | 80% | 100% | 100% | 100% | 100% | 100% | 100% | | | |

**at Chalmers**
**at Nevs**

Date: 2016-03-28

Version: 1

*Version 2: After a few weeks work*

| Nr | Activity | v 11 | v 12 | v 13 | v 14 | v 15 | v 16 | v 17 | v 18 | v 19 | v 20 | v 21 | v 22 | v 23 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | Write planning report | | | | | | | | | | | | | |
| 2 | Work starts at Nevs | | | | | | | | | | | | | |
| 3 | Introducing meetings | | | | | | | | | | | | | |
| 4 | Formulate questions | | | | | | | | | | | | | |
| 5 | Interview | | | | | | | | | | | | | |
| 6 | Evaluate answers | | | | | | | | | | | | | |
| 7 | Literature research (processes) | | | | | | | | | | | | | |
| 8 | Review reformation possibilities | | | | | | | | | | | | | |
| 9 | Survey process | | | | | | | | | | | | | |
| 10 | Write steering/supporting documents | | | | | | | | | | | | | |
| 11 | Reference check | | | | | | | | | | | | | |
| 12 | Literature research (checklists) | | | | | | | | | | | | | |
| 13 | ~~Produce checklist~~ | | | | | | | | | | | | | |
| 14 | Write final report | | | | | | | | | | | | | |
| 15 | Present results | | | | | | | | | | | | | |
| | Estimated workload at NEVS | | | 60% | 80% | 100% | 100% | 100% | 100% | 100% | 100% | | | |

**at Chalmers**
**at Nevs**

Date: 2016-04-28

Version: 2

# Appendix 3: The Routine

National Electric Vehicle Sweden

| Approver: | Document id: | Info class: | Page: |
|---|---|---|---|
| Harr, Jeanette | NEVS-49-163 | Internal | 1(3) |
| | Routine | Status: | Draft |
| Issuer: | Version: | Date: | |
| Lindskog, Bo | 1.1 | [Approved datum] | |

This routine is a part of [Process] valid at/in/for; [Function]

# Create Statement of Requirements

## 1. Purpose

The purpose of this document is to describe Nevs process Create Statements of Requirements (SOR process). This is a steering document that will give a more detailed description of the process and its activities.

## 2. Scope

Valid for all Nevs projects

## 3. Responsibilities

| Role | Responsibility |
|---|---|
| *Lead Engineer* | Creator of the SOR and responsible to handle the SOR in the different decision points and process steps, to ensure all necessary steps are taken to successfully move the SOR into Nevs Sourcing Process and Manufacturing Engineering. |
| *Process Leader* | Owner of this particular process. |
| *Attribute Owner* | In charge of validating a certain part of the content in the SOR. |
| *Target Engineer* | In charge of the Component Workspace and Wall Sheet. |
| *Manager* | The person in charge of the Lead Engineers. |
| *Director* (VP Engineering and Product Development) | A part of the SOR Approval committee. |
| *Functional Director* (e.g. Director Interior) | A part of the SOR Approval committee. |
| *Technical Project Leader* | A part of the SOR Approval committee. |

## 4. Routine

### PROCESS INPUT

- Allocated Vehicle Requirements
- Sourcing Plan
- Selected GCS level
- SI level
- Volume
- Plant
- Prepared project specific SOR database

### PROCESS

A. Initiate SOR according to sourcing plan & SI level

Input: Prepare space in Lotus Notes.

NEVS-49-163

SAAB

Activity: Target Engineer prepares an empty space in SOR database (Lotus Notes) for the system or component. Download all the templates that is necessary according to your chosen SI level. Start working on information needed for key stakeholders.

Output: All current templates.

B. Populate database & create project specific documents

Input: All current templates.

Activity: Create the documents required according to SI level. Start with the documents needed by key stakeholders (yellow section). Next step is to fill out and attach the documents specific for the part you are working with (pink section). Last step is to download and attach the generic documents (green section).

Output: Complete SOR database, all required documents created.

C. Q Assure SOR according to HQLEC

Input: Complete SOR.

Activity: Send all the required documents to Target Engineer who will send the forward to all Attribute Owners and Manager. If the SOR is not approved rework is required. If the targets for the SOR was exceeded a Change Order has to be initiated. After approval save as .ZIP file and PDF.

Output: Complete SOR approved by Attribute Owners and Manager in .ZIP file and PDF.

D. SOR Approval

Input: Complete SOR approved by Attribute Owners and Manager in .ZIP file and PDF.

Activity: Send the complete SOR to Technical Project Leader and Directors. If approved, include electronic signatures in document.

Output: Approved SOR.

## PRODUCT

Approved SOR.

## 5. Archive

This instruction shall be archived as *BPM5*.
Document (records) produced in accordance with this routine shall be archived according to NILC code.
(select suitable code and specify in the instruction) *(link to document handling routine)*.

## 6. References

| Document | Title |
|---|---|
| *Instruction ID* | The instruction for the SOR Process. |
| *BPM5 handling routine* | |
| *Guideline* | SI level |

## 7. Abbreviations

| Abbreviation | Definition |
|---|---|
| *SI level* | Supplier Integration level |
| *GCS* | Generic Component Specific |
| *CTS* | Component Technical Specific |
| *SSTS* | System Technical Specific |
| *PDT* | Product Development Team |
| *RFQ* | Request for Quote |
| *RFI* | Request for Information |
| *HQLEC* | Requirements according to: Human resources, Quality, Lead time, Environment and Cost |

## 8. Appendix

N/A

# Appendix 4: The Instruction

National Electric Vehicle Sweden

| Approver: | Document Id: | Info class: | Page: |
|---|---|---|---|
| Harr, Jeanette | NEVS-49-163 | Internal | 1(13) |
| 2016-05-23 | Instruction | Status: | Draft |
| Issuer: | Version: | Date: | |
| Lindskog, Bo | 1.1 | [Approved datum] | |

This instruction is a part of [Process] valid at/in/for; [Function]

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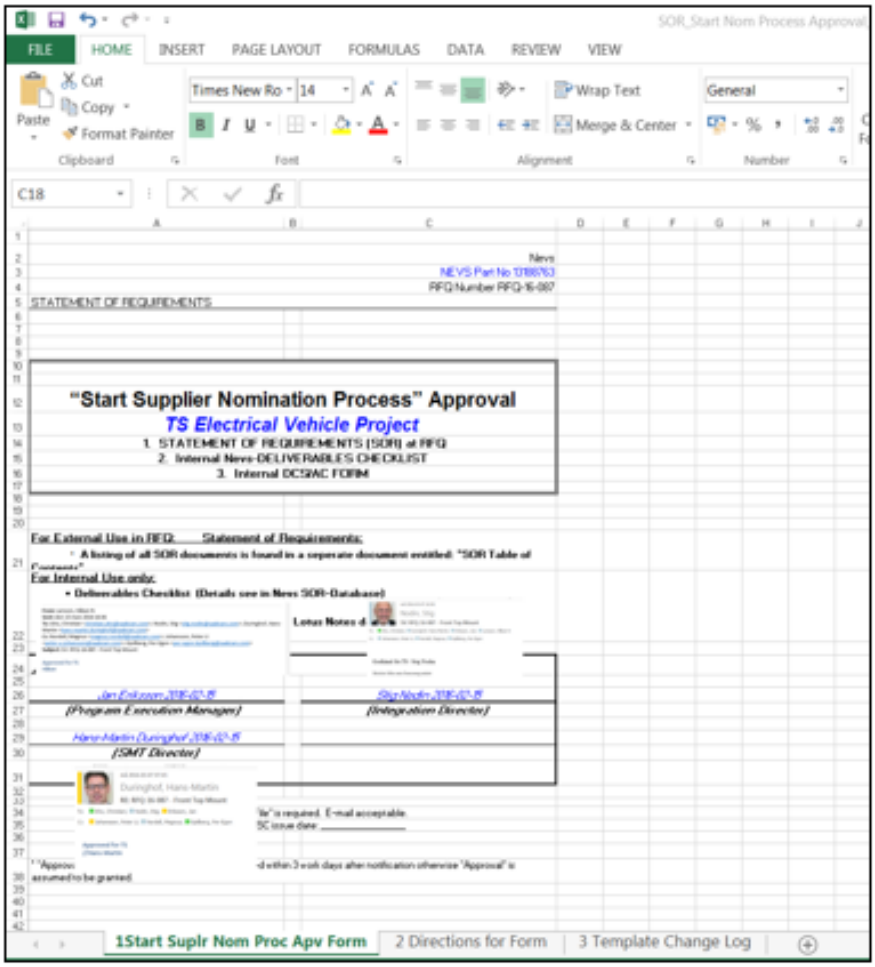
| *Attribute Owner* | In charge of validating a certain part of the content in the SOR. |
| *Target Engineer* | In charge of the Component Workspace and Wall Sheet. |
| *Manager* | The person in charge of the Lead Engineers. |
| *Director* (VP Engineering and Product Development) | A part of the SOR Approval committee. |
| *Functional Director* (e.g. Director Interior) | A part of the SOR Approval committee. |
| *Technical Project Leader* | A part of the SOR Approval committee. |

## 4. Instruction

### PROCESS INPUT

- Allocated Vehicle Requirements
- Sourcing Plan
- Selected GCS level
- SI level
- Volume
- Plant
- Prepared project specific SOR database




This is an example of how the excel-document with the electric signatures can be formed.
Also attach the "Deliverable Checklist"-document to the "SOR for RFQ"-part. This part is also only for internal use.

Your SOR package is now approved and can now move on to the next process.

Output: Approved SOR

## PRODUCT

Approved SOR

"Assessment"-box). This will give you an easier overview of what appendix you have uploaded and not.

Output: Complete SOR database, all required documents created.

C. Q Assure SOR according to HQLEC

Input: Complete SOR.

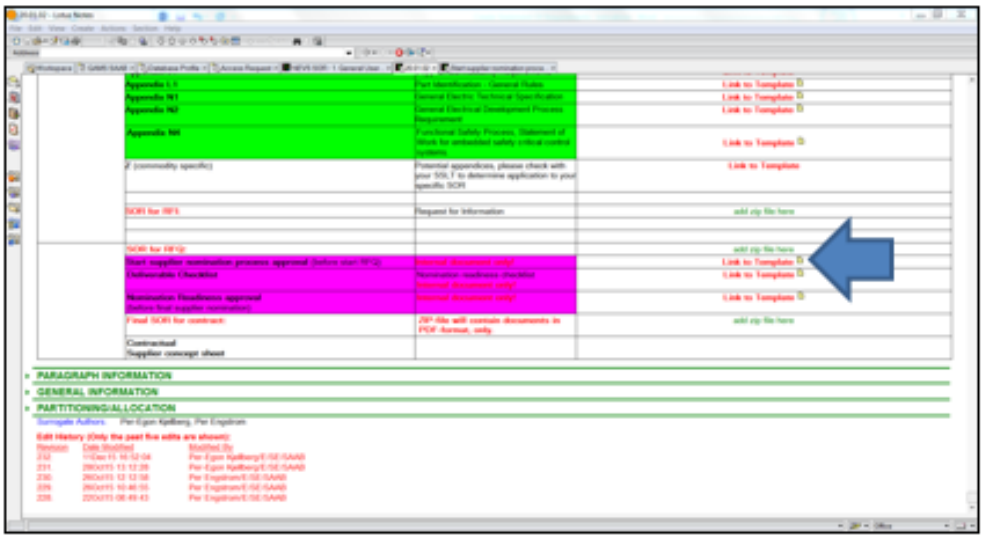
Activity: Send all the required documents to Target Engineer who will send them to all Attribute Owners and Manager so they can review their own section. If they do not approve, go back to the required document and update to right information. To get the SOR-package signed and approved the CTS/SSTS-documents has to be reviewed by the Attribute Owner or Manager again. Make sure that Target Engineer also gets the approval so that the wall sheet gets updated. Next the files will be saved as .ZIP file or PDF.

Output: Complete SOR approved by Attribute Owners and Managers in .ZIP file and PDF.

D. SOR Approval

Input: Complete SOR approved by Attribute Owners and Managers in .ZIP file and PDF.

Activity: When all the Attribute Owners and Managers have approved the documents the next and last step is to ask for approval for the complete SOR from the Functional Director, Technical Project Leader and Director. This is done by sending an email to them. They in turn will go in to your Component Workspace and review all appendix in their concern. They are also going to check with Manager and Target Engineer so everything is correct according to them too. If they, after this check, approve to what is written they will send an electronic signature of their approval. Otherwise update of the not approved appendix is needed.




Include these signatures in the "Start supplier nomination process approval"-document. This excel-document also includes an instruction over how to attach the electric signatures.

Next step is to find out what SI level (Supplier Integration level) you will work with in this specific project. Contact your Lead Engineer and/or Group Manager.

Then you mark in the "Deliverable Checklist" document what SI level you have. (See figure above for example, blue marking).
According to what SI level you have you can see, in every line but still in the same column, where you need to upload and fill out a template for every different appendix, it is marked with a black "X", and where it is not necessary it is empty.

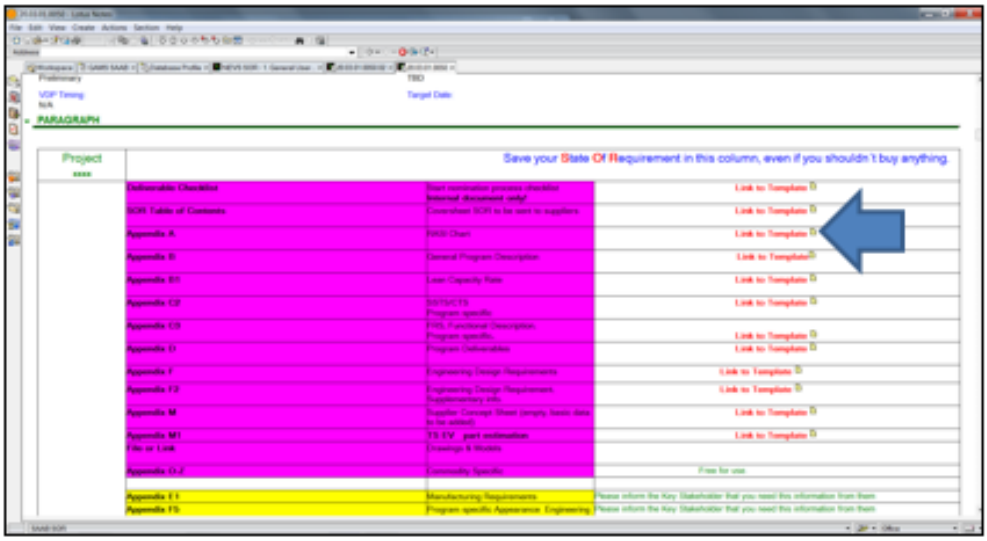
Start downloading all the templates that is necessary according to your chosen SI level. If you are going to repeat this process it is important that you download these templates for every component or system (new SOR). Because these templates are continuously updated.

Output: All current templates.

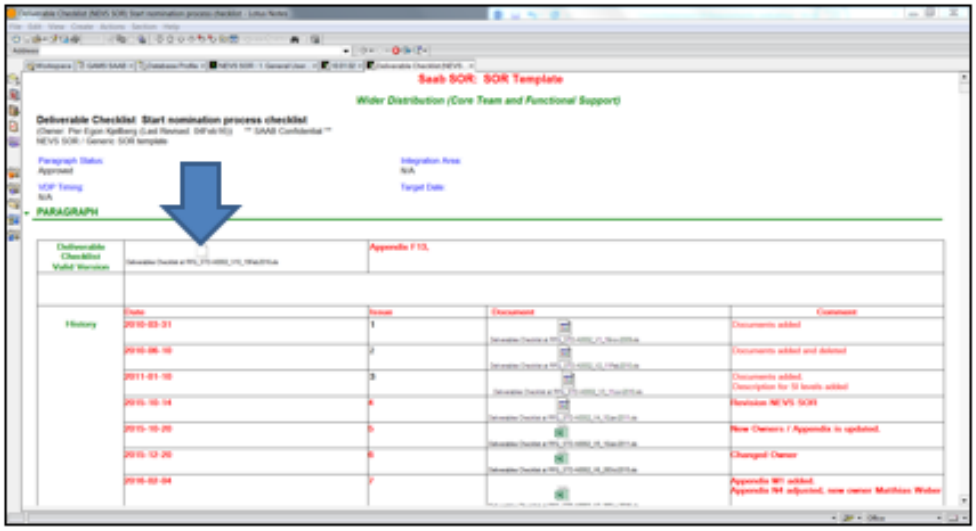
B. Populate database & create project specific documents

Input: All current templates.

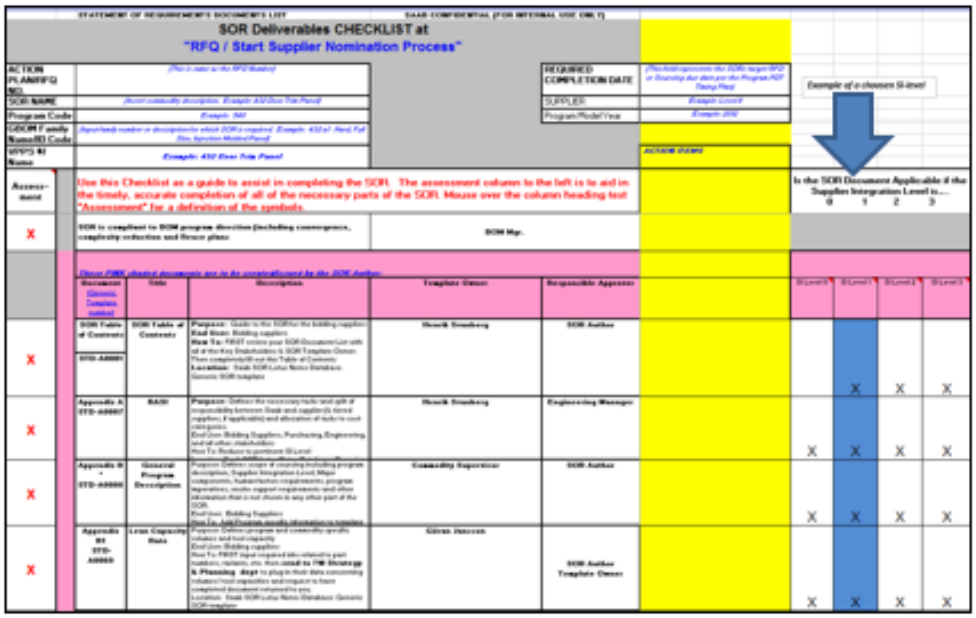
Activity:




Start fill out all the templates that are required according to your SI level.
First step is to send out requests to get the needed information from the key stakeholders (yellow section).
Then fill out all the component or system specific templates (pink section).
Finish off with the generic templates (green section).
After you have created the templates, which now is a finished appendix, you upload them to your Component Workspace.
After every uploaded appendix go to the checklist and change the column "Assessment" from a red **X** to a green ●. (Find a more detailed explanation of you hold your marker on the



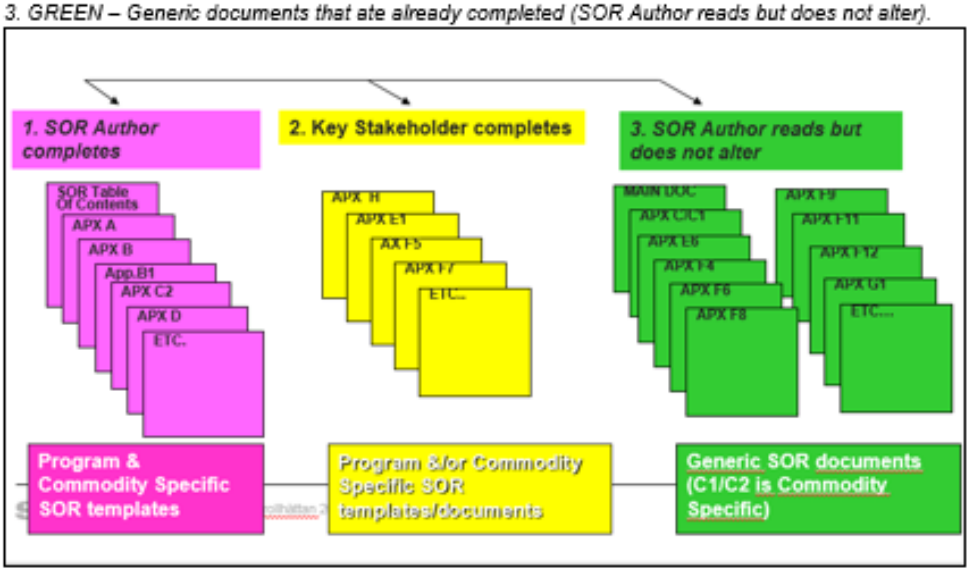

Click on "Deliverable Checklist Valid Version" to get to the latest updated version of the checklist.

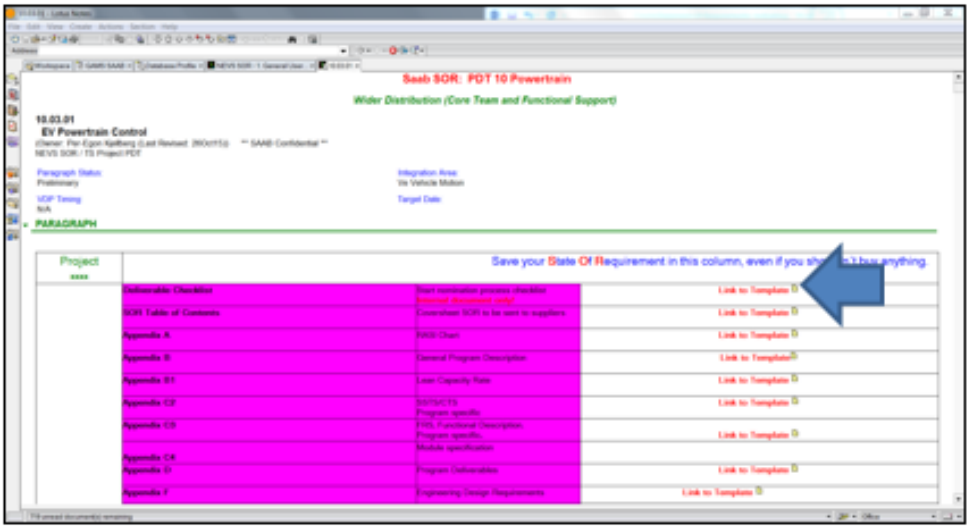



Here is an example of how the checklist can be formed. This checklist describes the purpose of each document and the document owners and must be included in the SOR package for the SOR-RFQ.

Scroll down and you can now see that the document is divided into different sections/responsibilities.

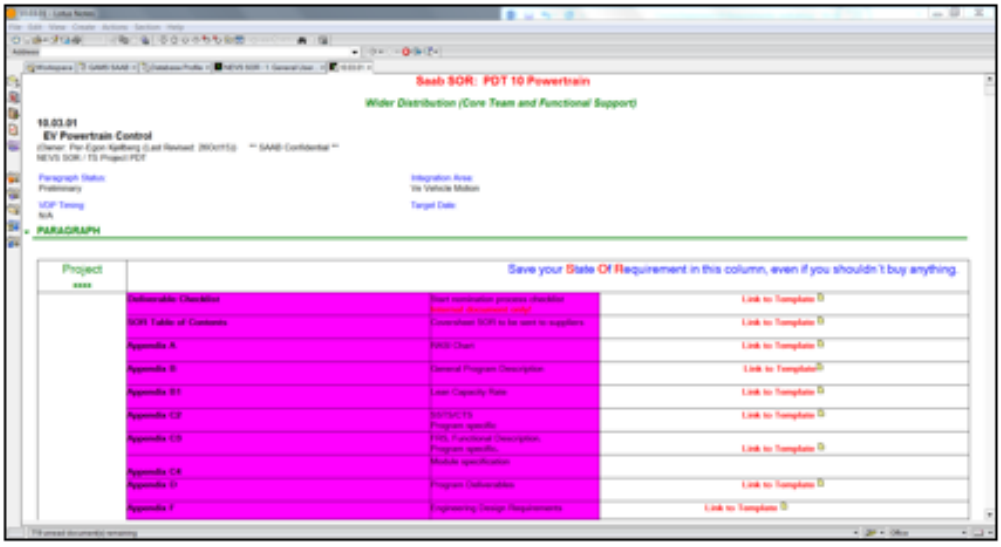
*The responsibilities are identified by the colors below as;*
*1. PINK – SOR Author Completed documents.*
*2. YELLOW – Key Stakeholder Completed documents.*
*3. GREEN – Generic documents that ate already completed (SOR Author reads but does not alter).*



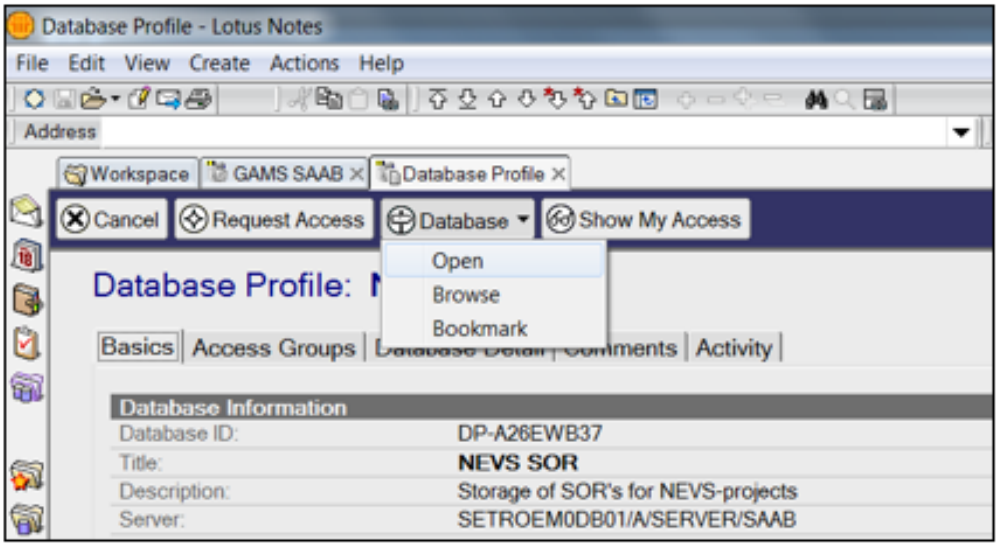




Start by click on "Link to template" on the first line called "Deliverable Checklist".

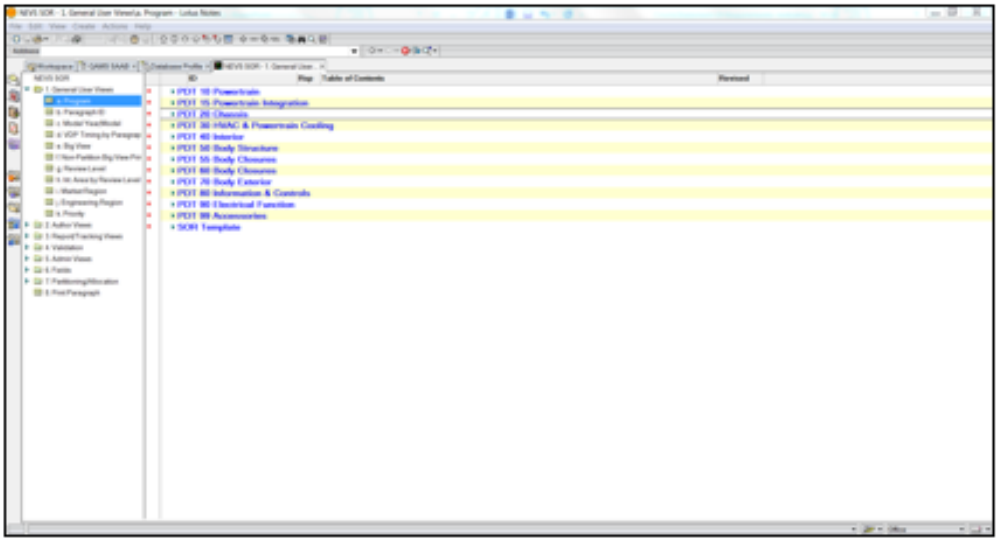
Open your project specific GCS-line.



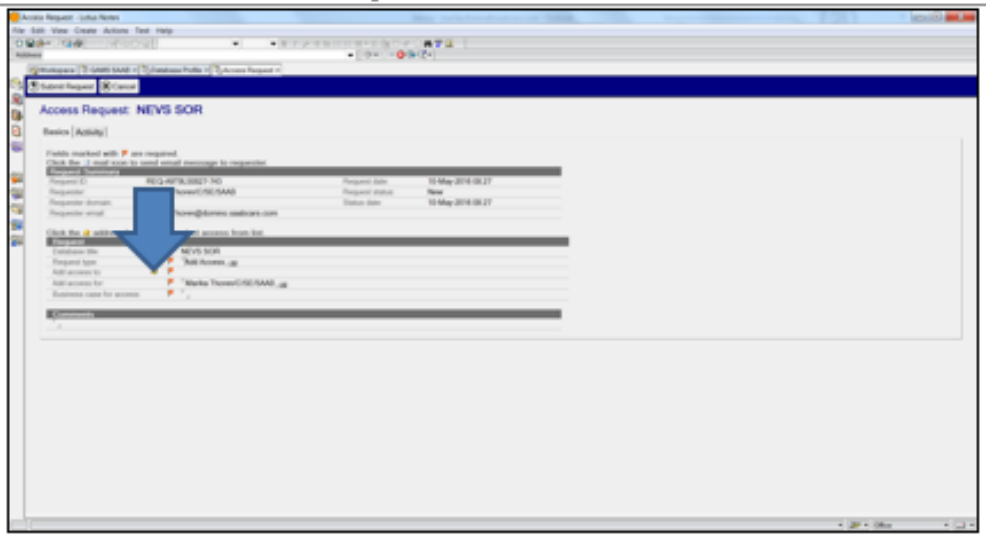

This is what your workspace will look like and it is called Component Workspace.



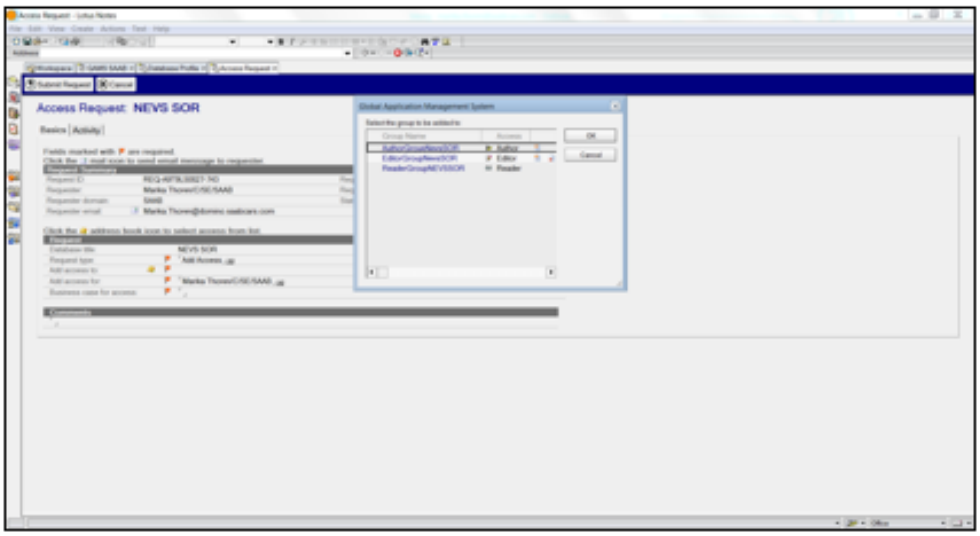

Click on "Database" and choose "Open" to get in to the PDT-area.



This is the PDT-area. Here you will find your earlier request for updated GCS-line for your specific system or component (in PDT & Commodity Specific Template-Area).

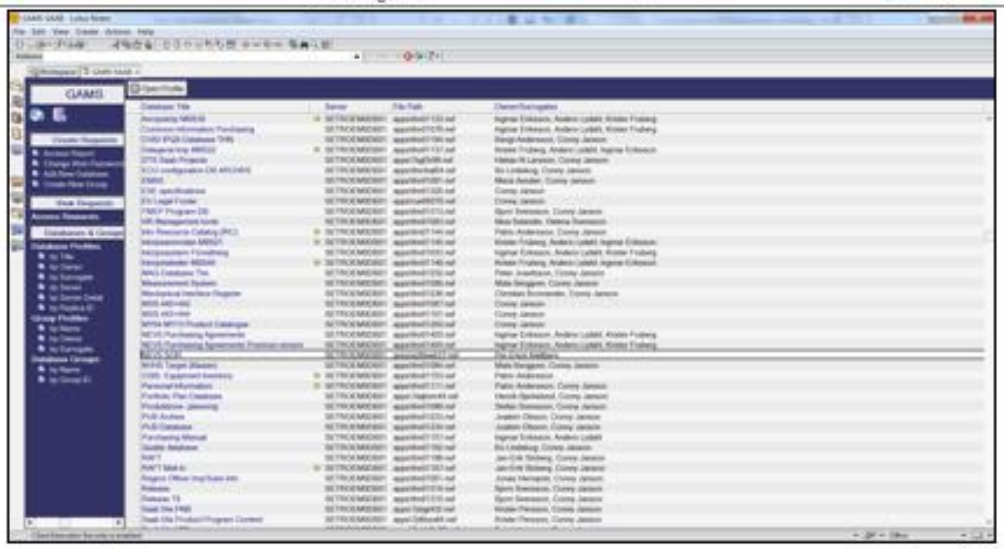



Click on the address book icon to select access from the list.

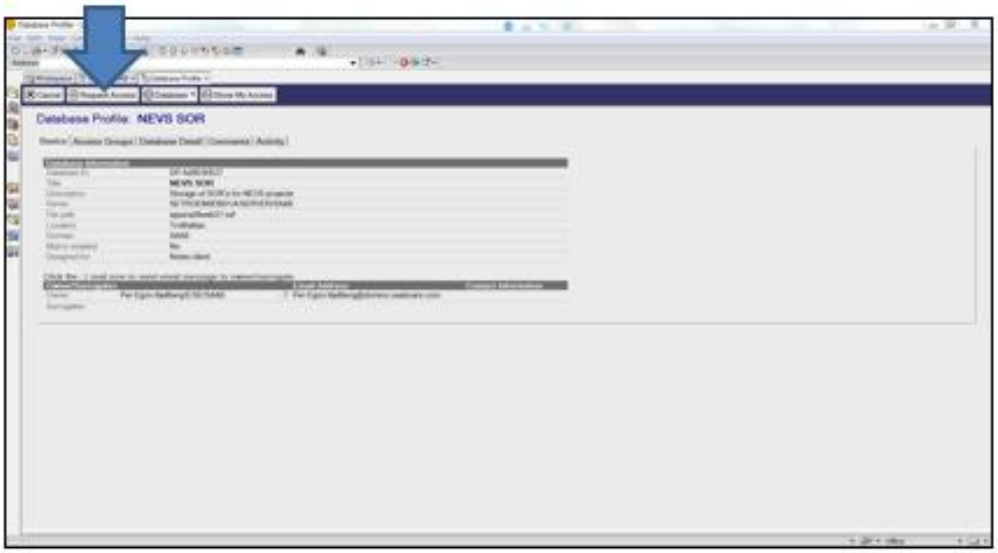



As Project Engineer, you should seek access to "NEVS SOR" as "Author".
This request will now be sent to Target Engineer. The approval will be sent to your mail.

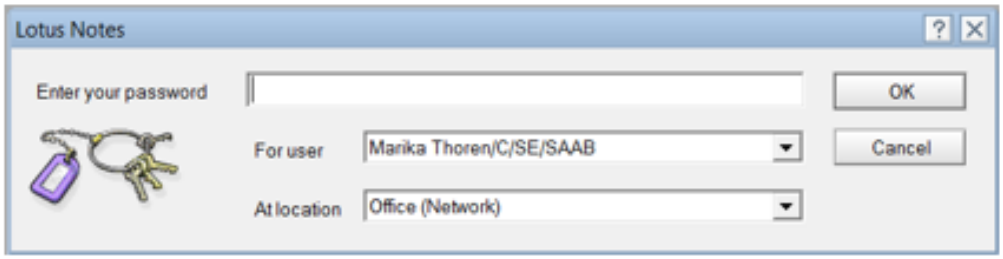
When you have got the mail from Target Engineer with approved access to the database "NEVS SOR" you can log into the "NEVS SOR"-database.



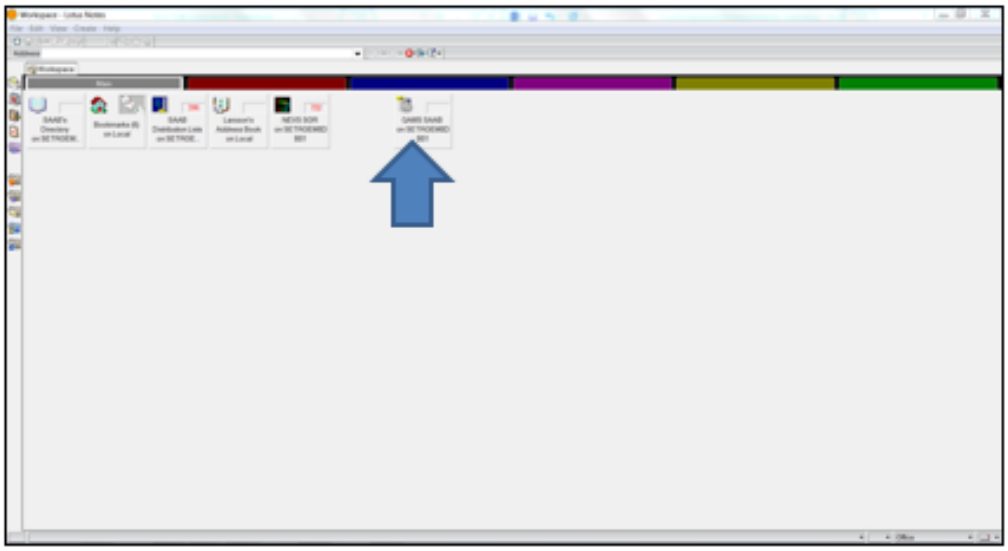

Click on the "NEVS SOR" link.




This is where you request for access to the "NEVS SOR"-database. Click on "Request Access".




Log in with your password.



The next step is to send a request for access to the "NEVS SOR"-database via "GAMS" in the program Lotus Notes.

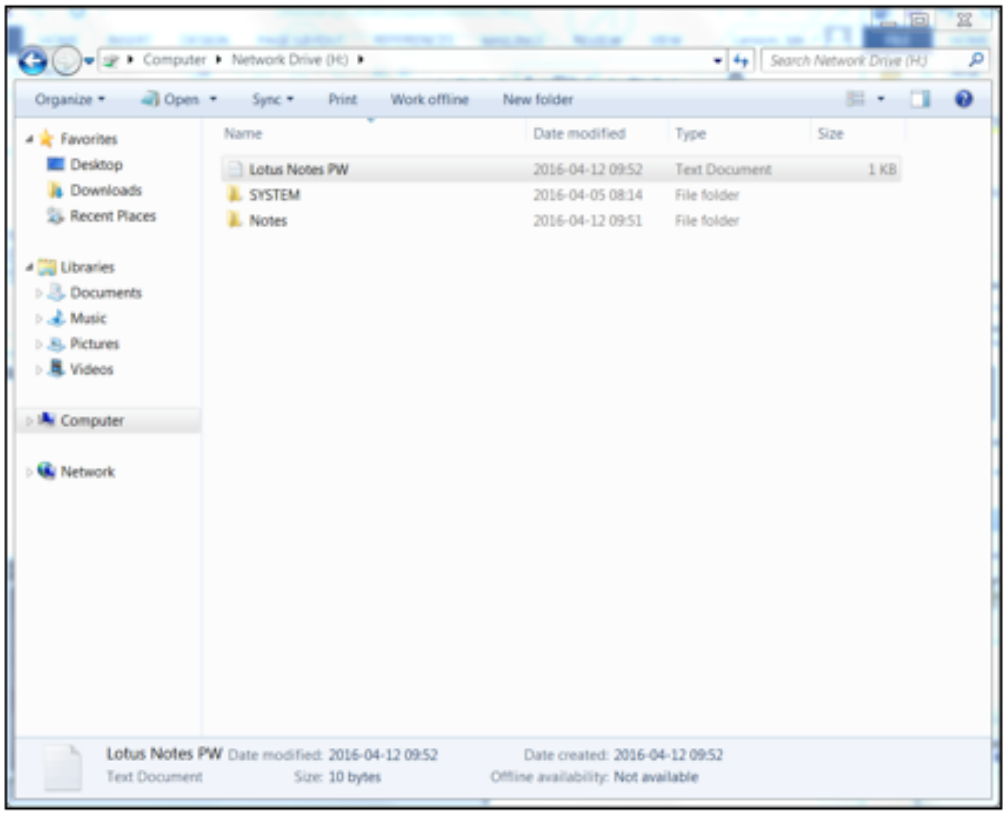
# PROCESS

A. Initiate SOR according to sourcing plan & SI level

Input: Prepare project specific space in Lotus Notes.

Activity: Ask Target Engineer to create an empty space in the "NEVS SOR"-database (in Lotus Notes) for the system or component you are working with. This is the space where you will upload all the necessary CTS/SSTS-documents (also called appendices) for the system or component. The program you will work in is called Lotus Notes and an icon for it should be found at "All Programs" on your Nevs computer. Otherwise you will have to install it.

*The icon for Lotus Notes.*




The password can be found at your "Network drive (H:)" and is called "Lotus Notes PW".

## 5. Archive

This instruction shall be archived as *BPM5*.
Document (records) produced in accordance with this instruction shall be archived according to NILC code; (select suitable code and specify in the instruction) *(link to document handling routine)*.

## 6. References

| Document | Title |
|---|---|
| *Routine ID* | The routine for the SOR Process |
| *Guideline* | SI levels |

## 7. Abbreviations

| Abbreviation | Definition |
|---|---|
| *SI level* | Supplier Integration level |
| *GCS* | Generic Component Specific |
| *CTS* | Component Technical Specific |
| *SSTS* | System Technical Specific |
| *PDT* | Product Development Team |
| *RFQ* | Request for Quote |
| *RFI* | Request for Information |
| *HQLEC* | Requirements according to: Human resources, Quality, Lead time, Environment and Cost |

## 8. Appendix

N/A