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A Customer Oriented Lean Traffic Information Flow:

A Study of a Swedish Railway Passenger Transportation Company

Master's thesis in Management and Economics of Innovation and Production Engineering

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Abstract

The traffic information flow from SJ Traffic Control reaches SJ's customers through different information channels. Today, the customers do not know where to find the most updated traffic information during a disturbance and hence, it is hard for SJ to make them satisfied. In this study, the current traffic information flow was mapped out and analyzed, from SJ Traffic Control towards SJ's customers. Based on the research findings, different areas of improvement were identified and improvement suggestions were created. Finally, the relationship between the improvement suggestions and different constructs concerning a customer and a company point of view were analyzed in House of Quality, to determine the total impact on channel and job satisfaction. The findings of the study are improvement areas and suggestions of the traffic information flow, as well as key drivers of channel and job satisfaction.

Keywords

Traffic information; information flow; lean information, QFD, customer oriented, survey

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List of Abbreviations

ATC = Automatic train control
AVE = Average variance extracted
bc = bias-corrected
CE = Communication, external
CI = Communication, internal
CTS = Communication and teamwork satisfaction
EV = Emotional value
HoQ = House of Quality
HTMT = Heterotrait-Monotrait ratio
JS = Job satisfaction
LI = Loyalty intention
M = Management
PLS-PM = Partial Least Squares Path Modelling
POCVL = Perceived Online Channel Value
PV = Service performance value
QFD = Quality Function Deployment
RSV = Relations and support value
SAT = Channel Satisfaction
SC/SCS = Scheduling satisfaction
SFC = Support and feedback, colleagues
SFM = Support and feedback, managers
SR = Social relationships
STA = Swedish Transportation Administration
SWEA = Swedish Work Environment Authority
TAM = Technology Acceptance Model
TAM1 = Perceived usefulness
TAM2 = Perceived ease of use
Text = The function sending out text messages to the customers in the Control Room
TILEN = Traffic and information manager at the STA (Trafikinformationsledaren)
TCO = Traffic co-ordinator
TICO = Traffic and information co-ordinator
TWE = Teamwork, external
TWI = Teamwork, internal
Web = The function updating the website towards the customer in the Control Room

1. Introduction

Until 2009, SJ AB (SJ) had monopoly of the railway for transportation of passengers, regarding commercial traffic (Torstensson, 2009). When the market opened up for new entrants, new actors came to the market, creating an era of competition. For SJ to keep its position in the market and to keep its market shares, it is of importance that they satisfy their customers, in order to make them loyal. Due to the fact that SJ is a passenger transportation company it is important to bear in mind that SJ is not in charge of the railways, but the Swedish Transport Administration (STA) is. SJ is responsible for their customers, personnel, and trains, while STA is responsible for the infrastructure, signals, and switches, states Function Manager¹.

A company can create value adding experiences for their customers in different ways (Grant, 2010). As a train company, where the customers are being transported from position A to position B, value added experiences can be created in many ways, and during disturbances the information provided to the customers is essential. SJ Traffic Control is the department at SJ dealing with and solving the disturbances that affect their customers and trains. The room which these employees work in is called the control room. The employees are dealing with urgent disturbances and their work is purely operational, i.e. they only focus on day zero, which is defined as today and 24 hours forward¹. The employees whom work in the control room have different responsibilities depending on which function they work at, from making decisions regarding the technical parts of the trains to sending out information to their customers. But they have the same main goal: making sure their customers make it to their end destination, providing them with the traffic information needed.

Furthermore, the traffic information can reach the customers through different information channels, creating an information flow from SJ Traffic Control to the customers. For SJ to create a value adding experience, in form of traffic information, to their customers' there is a need to improve the information flow in order to not lose customers. The aim of the thesis is to identify, analyze, and discuss areas of improvement for the traffic information in the control room to SJ's customers.

1.1 Research Questions

Based on the problem formulation and the delimitations of the research, four research questions have been formulated:

1. What does the traffic information flow, from SJ Traffic Control Stockholm to SJ's customers, look like?
2. What areas of improvement can be identified and connected to the traffic information flow?
3. What are the key drivers of channel satisfaction regarding traffic information?
4. How should improvement suggestions be prioritized?

The research questions will be investigated from two perspectives; the customers' and SJ Traffic Control's, resulting in areas of improvements and an implementation plan. The improvement suggestions will result in an improved traffic information distribution from SJ Traffic Control Stockholm to SJ's customers, while keeping or improving the quality of the information. Furthermore, the thesis will prove that the methods can be used in other contexts. Furthermore, a stakeholder analysis can be found in Appendix A, and a dictionary, and definitions in Appendix B.

¹ Function Manager 1 (Function Manager and Chief Operating Officer, Traffic Control, Division of Planning and Traffic Control, SJ AB) interviewed by Jennie Boérius and Sara Helmrot, 2015-12-18.

1.2 Delimitations

No other information than traffic information going through SJ Traffic Control Stockholm towards the customers is considered in the thesis. Traffic information regarding changes in the customers' journeys caused by disturbances is evaluated. Only customers travelling at the high speed trains between Stockholm and Gothenburg, and vice versa, are analyzed. The different customer segmentation will not be taken into consideration, but seen as a whole. IT systems at SJ will not be analyzed in detail, but included. Scheduling of the employees in the control room will be mentioned but no future suggestions will be compiled, since a new IT system is under development. Furthermore, the cost of implementing the suggested improvements will not be evaluated. The master's thesis was executed between January 18th and June 7th, 2016.

2. Methodology

The following chapter explains the methods which were used throughout the project. The connection between the methods and how they led to the outcomes of the study are illustrated in Figure 1. The different methods were used in parallel.

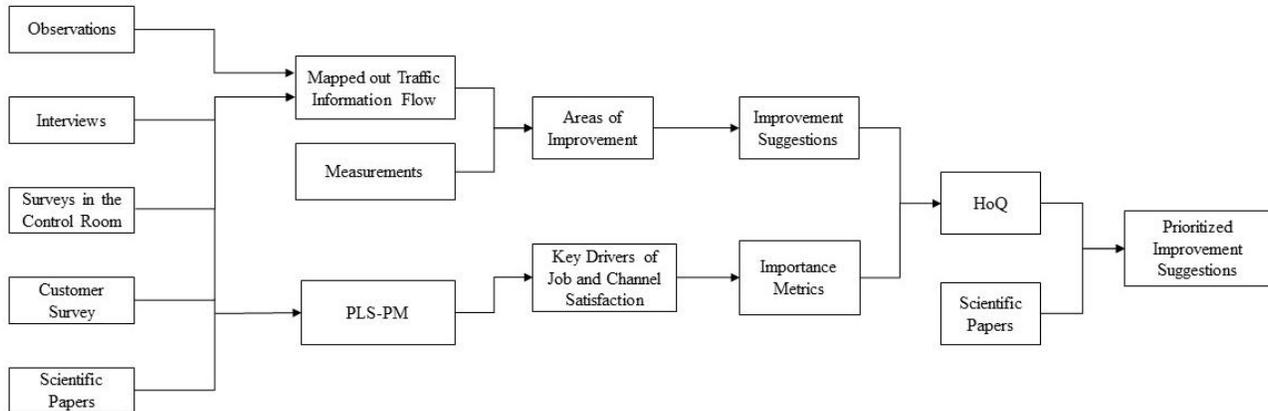


Figure 1. Connection between the applied methods.

2.1 Scientific Papers

The authors searched for articles at ScienceDirect and Google Scholar by using specific search words, see Figure 2. When it was done, 27 articles that appeared to be of relevance were chosen. Then, the authors read through the abstract of the articles and if it fulfilled the following criteria, read through the conclusions. The criteria for the first search words; customer information channels, was being in line with the third research question. The criteria for the second; measure job satisfaction, was concerning service providers, and the third; method interviews, was concerning interviews in general. After this, five articles still were relevant. Next, the authors searched for the search words in the articles or started to read the five articles which were considered to be applicable, resulting in three articles that became the base of the thesis.

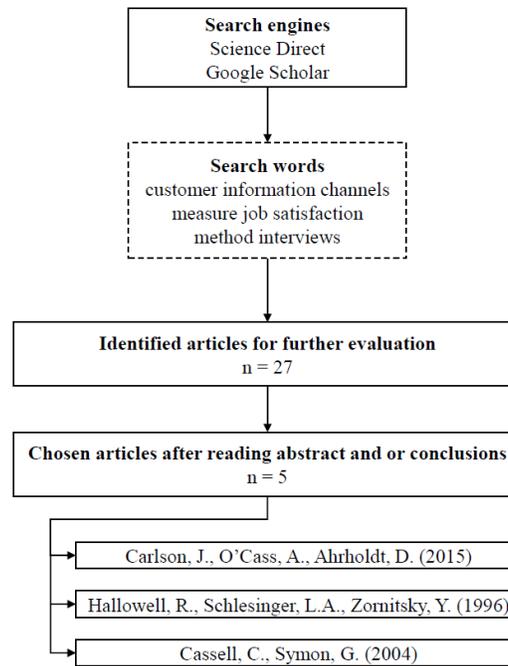


Figure 2. Method of searching for scientific articles in literature search engines.

2.2 Interviews

The interviews were semi-structured, conducted in Swedish and summarized in English. All planned interviews were recorded, summarized, and controlled by the interviewees. The interviews which were not planned, e.g. shorter interviews with employees in the control room and the interviews with the customers taking part in the customer survey, detailed notes were taken. The questions asked and the summarized interviews can be found in Appendix C. Furthermore, for the conversations performed through email, see Appendix D.

The objective of the interviews with the employees in the control room was to understand their work tasks, what was working well, and not well in the room. To obtain a representative view from them, several employees from different functions were interviewed. The employees in the control room were individually interviewed and some in group. During the group interviews, both authors were asking questions. The individual interviews have mainly been performed by one of the authors, but sometimes by both. Before interviewing any of the employees in the control room, the purpose of the thesis was explained to them, increasing the chance for them to be honest. It should also be mentioned that their managers were not present during any of the interviews. To control that no misinterpretations during the interviews were made, the employees have controlled and approved the text which has been written based on their interviews. Regarding the interviews with other departments at SJ, the summaries of the interviews have been sent to the interviewees and been approved by them.

Questions and topics were prepared before the interviews and were intended to be investigated. The most important aspect in qualitative interviews is flexibility (Cassell & Symon, 2004). Therefore, the order of the questions were not fixed and the authors were open to let the interviewees influence the interviews by discussing topics emerging throughout the interview. This was a way for the interviewees, who are experts within their areas and know more than the authors, to have an impact. The interviews started with more general and easy questions to make the interviewees and

interviewers relaxed for more specific and sensitive questions to be asked (Cassell & Symon, 2004). To make sure that the answers were useful and correct, multiple and leading questions were avoided, while interviewees' answers sometimes were repeated for them. All interviews were ended with a question asking the interviewees if something had been missed which they would like to add. Creating an opportunity for the interviewers to reduce the risk of missing something essential.

2.3 Observations

During the preparation and the data collection of the Significance Analysis of Microarrays (SAM), the information co-ordinators were observed while performing their work tasks. Before each observation, the purpose was explained to the employees and it was also asked if it was okay for the authors to observe them. The information co-ordinators were told that the purpose of the observations was to understand what actions that were included in their work tasks, to later being able to use this knowledge when trying to find areas of improvement in their work tasks.

2.4 Surveys in the Control Room

During the project, three surveys were sent out through email to all employees in the control room to obtain a better understanding of the work they were performing as well as to obtain feedback on some suggestions. Since there were sensitive and personal questions in the surveys, the employees were left to answer the surveys themselves, without the authors explaining questions to them or sitting next to them. All surveys were performed in Swedish and translated then into English, see Appendix E for the first survey, Appendix F for the second, and Appendix G for the third. The setup of the surveys is the same as in the interviews, with easy questions to answer in the beginning and more sensitive questions or questions which are more difficult to answer, in the end.

The purpose of the first survey was to obtain a better understanding of the work tasks of the employees in the control room as well as who they were communicating and sharing information with during disturbances. Another interest of the first survey was to understand where the employees believed the largest improvement potential in the control room was and if they believed in their own information provided to the customers. Before sending out the first survey, two employees checked the questions making sure they were understandable. After getting the approval from the two employees and making changes based on their feedback, the survey was sent to all employees in the control room. The survey was open for one month, and a reminder was sent out after ten days to all functions. Additionally, some managers in the control room and the authors reminded employees verbally. A total of 58 employees participated in the first survey. A summary of the first survey can be found in Appendix H.

The aim of the second survey was to obtain a deeper understanding of the employees' opinions of the communication in the control room and how to improve it, how they were positioned, and their opinions about the different furniture. Most questions were based on the answers from the first survey, as well as inputs from the observations, and interviews. The purpose of this survey was to get wider and deeper information about different suggestions as well as to understand how open minded the employees in the control room are; both towards changes and towards learning from colleagues. Before the survey was sent out, three employees from the control room checked the questions to make sure that they were understandable and correct in order to exclude misunderstandings. After receiving the feedback from the three employees, the survey was sent out to everyone in the control room. A total of 59 employees participated. However, even though three employees checked the survey, three errors were found from the first employees participating in the

survey; *Skifteschef* instead of *Skiftesledare*, some misunderstanding in the question regarding incoming phone calls, and an error in the question regarding which function one understands or not. The errors were directly changed when pointed out and with only the last error that might have an impact on the result. Furthermore, a reminder was sent out after ten days to all functions. After additionally seven days, a second reminder was sent out to the rolling stock managers and the traffic and information co-ordinators. Some of the managers in the control room have reminded the employees verbally. A summary of the second survey can be found in Appendix I.

To identify the key drivers of job satisfaction, a third survey was performed in the control room. The questions in the survey were borrowed from the study by Hallowell et al. (1996) and formulated by the authors. Three key drivers were investigated with three statements belonging to each key driver. The survey was available for the employees to answer during 15 days and a reminder to all functions was sent out after five days. In total, there were 50 employees participating in the survey with questions and answering alternatives from strongly disagree, one, to strongly agree, five. A summary of the third survey can be found in Appendix J.

2.5 SAM

The time for the information co-ordinators' work tasks was measured in whole seconds, with a cell phone. Before the data were collected, a description of the work tasks was written down. Based on the interviews, the different activities for each work task were written down. The information co-ordinators were asked to further explain what they did when they performed their work tasks. In this way, the description and level of detail of the described activities could be improved and refined. During the trial run for measuring the different activities, it was noticed that some activities were performed very quickly. Hence, to be able to measure them, some needed to be grouped. Before the author started to measure the time, the employees were told that the purpose of the timing was to map out their work tasks to understand how it works and to see if the required steps to send out information could be improved. Data were collected between February 10th and March 4th, 2016. Different information co-ordinators with different experience were timed at the functions; XOD, website, and text message. All data were rounded off to whole seconds, since the accuracy of the measurement was a second.

2.6 Illuminance Measurement

When evaluating the environmental factor lighting, three different areas of a desktop are of interest; outer surroundings, immediate surroundings, and work area. The lighting of the area outer surroundings was measured at each group of desktops and the other two areas were measured at each desktop. The work area was defined as the keyboard since the employees in the control room perform most tasks behind the computer. The measurements for the immediate surroundings were conducted where the employees have their notes, which was to the right or left of the keyboard. The photodetector was hold horizontally, facing upwards, over the respective measurement points.

To reduce the variation in the measurements caused by the author, making sure the way of measuring was correct, the author measured all measurement points once before the main data were collected, as a trial. The illuminance was measured at four occasions; at a cloudy day around 14:40, when the sun had set and it was a bit cloudy around 19:40, at a cloudy grey morning around 07:20, and at a sunny day with clear skies as well as with turned off ceiling lights around noon. To include more employees and their lighting habits, the measurements were taken during different shifts and during different hours of the day. All measurements were taken at approximately the same spots. The

measurements were conducted with a lux meter called LX1330B. The lux meter has the measurement range; 200, 2,000, 20,000, and 200,000 lux, with the accuracy 3 %, plus 0.5 % of the measurement area. It has a sampling speed of two times per second and the photodetector consists of a silicon photo diode with filter.

The light at the different desktops vary depending on how close they are located to a window and the location relating to the ceiling lights. The factors which affect the light at the desktops which vary each day are the weather, the blinds, and the lighting in the room. The lighting in the room consists of three types of lamps; lamps located in the ceiling, lamps attached to the ceiling hanging down above each desktop, and spot lights at each group of desktops.

2.7 Sound Pressure Level Measurement

The noise in the control room was measured by using one representative measurement point, in the center of the room. For each measurement occurrence the sound level was registered every 30 seconds during 20 minutes, resulting in 40 measurements per time interval. Seven time intervals were measured during different times and operating levels, see Table 1. The measurements were performed during the weekdays, since the most disturbances happen during those days.

Table 1. Measurement occasions.

Measurement occasion	1	2	3	4	5	6	7
Date	2016-04-06	2016-04-06	2016-04-07	2016-04-07	2016-04-12	2016-04-14	2016-04-14
Day	Wednesday	Wednesday	Thursday	Thursday	Tuesday	Thursday	Thursday
Time	15:30-15:50	19:53-20:13	08:08-08:28	15:53-16:18	11:20-11:40	08:09-08:29	09:52-10:12
Operating level	Green	Green	Green	Green going towards yellow	Yellow	Changed from green to yellow	High yellow
Comment	Little activity in the room	Little activity in the room	Little activity in the room, TICO's talk about private matters	More activity in the room, more than 50% of the employees work	All functions work	More activity in the room than during the first three measurement occasions but less than the fourth	Frequent activity in the room, the chief operating officer was present to oversee the situation

A sound level meter from Sagitta was used to measure the noise. It had been designed according to the IEC651 Type 2, ANSI S1.4 Type 2 and had a response frequency of 31.5Hz to 8kHz. The accuracy for measurements between 30-60dB was plus minus 3dB and for measurements between 60-120dB it was plus minus 2dB. Furthermore, the resolution is 0.1dB while the measurement range was 30-60dB, 50 - 80 dB, 70-100dB, and 90-120dB. The response time was 125ms for the analogue bar and 750ms for the digital. Moreover, the microphone was an Electret Condenser microphone.

To reduce the measurement variation, a trial run was made before starting with the main measurements. The sound level meter was placed on two stools, at the same spot in the room, facing the same direction. The sound level meter was placed 104cm above the floor. For the measurement occasions to be affected in the same way, the author sat in a chair at the same spot, facing the same direction. The author's presence might have blocked some of the sound waves, but the presence would have had the same effect on all of the measurements. The desktops right next to the measuring

point, could be raised and lowered and depending on their height it might affected the sound waves which reached the measurement device.

2.8 Customer Survey

To get a better understanding of the customers' opinions of the traffic information provided by SJ's information channels a customer survey was performed. The information channels which were investigated in the survey were the cabin crew, the website, and the app. It was concluded that the text messages should not be investigated since the customers cannot choose when they want to receive text messages or not. Neither Facebook, Twitter, nor Instagram were investigated since traffic information is not regularly posted there. SJ's Ticket Office were not evaluated either, due to that they are only placed at a few train stations. Control questions were used to as a mean for the customers to relax before they started to answer more difficult questions. Appropriate constructs were chosen from POCVAL and three statements were formulated for each construct (Carlson et al., 2015). The constructs were; service performance value and emotional value. As in the study performed by Carlson et al. (2015), channel satisfaction and channel loyalty were also measured. The perceived usefulness and the perceived ease of use were believed to have an impact on the customer satisfaction and therefore, two statements based on the Technology Acceptance Model (TAM) were also made. For the customers to rate the statements, a Likert-type scale ranging from one to five was used, where one corresponds to strongly disagree and five to strongly agree.

A pilot test was performed which enabled the authors to evaluate if the time it took to participate in the survey was acceptable and if the customers understood everything. Due to that the questions were directly taken from POCVAL, they have been tested before and are therefore presumed to fulfil internal reliability and measurement validity. After the pilot test, the survey was improved and then the survey was conducted. The survey will be seen as a pilot study due to the fact that 16,000 customers normally are participating in SJ's surveys.

2.8.1 Translation

To ensure the validity of the translation the questions were first made in English to then be translated into Swedish by the authors, to later be translated back into English by a professional Swedish and English translator, with both Swedish and American citizenship. Further, a linguists together with the professional translator compared and confirmed the Swedish version with the two English translated versions. Furthermore, some words and questions might have been modified in order to make them clear, consistent, and understandable, but without changing the purpose of the questions. The questions asked in the customer survey can be found in Appendix K, both in the original language and in English.

2.8.2 Conducting Survey

The customer survey was conducted at trains instead of at the platforms, since the probability of the customers properly answering and thinking through the questions increase at the trains. The pilot study was performed at the platform. It was noticed that the respondents felt stressed and just wanted to get rid of the survey to not miss their train, due to that the questions were asked at the platform. Another disadvantage of asking customers at the platform, during the pilot study, was that there is only a small time interval when it is possible to ask the customers to participate in the survey. To obtain a wider spread of customers, all customers on board the trains were asked to take part in the survey. However, to make sure the participants were relevant for the study, they were also asked if their train journeys in the close past had been affected by a disturbance. If they had not, they were

thanked for their attention but did not take part in the survey. Some customers filled in the survey on a tablet and some in a printed survey. This, to be able to ask more customers on each train and because of the insecurity of the tablets' batteries. To show gratefulness to the respondents and to make a more professional impression, the customers were thanked with a voucher with a ten percent discount when booking their next journey with the new app. Furthermore, the authors wore their SJ cards with SJ's official logo, visually for the customers. The background of the survey and the meaning of traffic information were explained by the authors, to the participants. Traffic information was defined as information received during a disturbance, when something happens with a train, for instance that it is late. When the respondents came to the section called *Traffic Information* they were told to only answer the questions regarding the information channels which they have used to retrieve traffic information. Furthermore, the authors stood next to the customers when they were performing the survey.

The survey covers customers travelling at two different times during a Tuesday March 22nd, 2016. It was performed at two high speed trains, one departing from Stockholm to Gothenburg at 08:25 and the other departing from Gothenburg to Stockholm at 13:30. A total of 100 customers took part in the survey, where 46 respondents were on the train from Stockholm towards Gothenburg and 54 on the train from Gothenburg towards Stockholm. Out of these, 43% were women and 57% men. The age spread was the following; 17% of the respondents were 16-25 years old, 20% 26-35 years old, 32% 36-50 years old, 20% 51-66 years old, and eleven percent 66-99 years old. Regarding their occupation, 55% were employed, one percent unemployed, 15% self-employed, 15% students, ten percent retired, and four percent had another occupation. Furthermore, 22% were travelling in first class and 78% travelling in second. Seven percent of the respondents travel three to seven times a week, eight percent travel one to two times a week, 36% travel one to three times a month, 45% travel two to five times per six months, and four percent travel one to two times a year. See Appendix L for a summary of the customer survey.

2.8.3 Analyzing Survey

The main part of the group of customers travelling to and from work were probably not included since they are travelling earlier and later during the day. Some customers stated that they were travelling in second class but normally travel in first class and vice versa. However, since there are fewer seats in first class compared to second, the cabin crew working in first class has the opportunity to deliver more detailed traffic information compared to the cabin crew working in second class. Consequently, the class the customers travel in might affect their perception about the cabin crew.

According to Szwarc (2005), the gap between the customers' expectations and perceptions may vary depending on whether the customers have had a positive experience or not. The scholar also states that people tend to understate their expectations when they have experienced a positive service and overstate their expectations when they have had a negative one. Since the trains were on time when the survey was conducted, a more positive result can be expected compared to if the trains would have been delayed. Even though the respondents were asked to think about a time when there was a change in their train journey, the current mood affects their answers. Questions which were not answered and the answering alternative *Do not know* were changed to 99. The do not knows were changed because the authors were not sure if the respondents did not know what to answer or if they did not want to answer the questions. To be useful, the 99s were changed to the mean of that question for all respondents, by the software SmartPLS.

2.9 Partial Least Squares Path Modelling

Two structural models needed to be tested; one concerning the customer survey and one regarding employee survey three. Partial Least Squares Path Modelling (PLS-PM) was used since it is a technique useful when wanting to analyze a structural model, which describes the relationship between latent, unobservable, variables and measured variables, as well as the relationship between latent variables (Hair et al., 2014). The statistical software SmartPLS 3 was used to test the construct reliability and construct validity, as well as to evaluate the structural models. The PLS algorithm was used to estimate the path model. The statistical significance was tested with a bias-corrected (bc) bootstrap with 5000 subsamples and a significance level of 0.05. To understand what needs to be improved first, based on the key drivers of channel and job satisfaction, the importance values for the constructs, regarding channel and job satisfaction, were produced and later used in the House of Quality (HoQ).

According to Bryman (2012), the reliability and validity of the quantitative research should be evaluated. To make sure that a multiple indicator measure is reliable, the internal reliability should be tested. Reliability is about if the results of a study are repeatable and hence, if the measures are consistent or not. Moreover, reliability means that there is internal consistency, that customers are consistent in their answers. If there is no internal consistency, the multiple indicator measure is measuring different things. The measurement validity, or construct validity, means that the question measures what it is supposed to measure hence, that it measures the construct and nothing else. Furthermore, it should be kept in mind that if a measure is not reliable, it cannot be valid. Because if it is not reliable, it does not consistently measure the construct and for a measure to be valid, it needs to reflect the construct it is measuring.

To control the construct reliability, the internal consistency was evaluated with composite reliability. The internal consistency reliability is satisfactory when the composite reliability is between the limits 0.70 and 0.95 (Hair et al., 2014). To evaluate the convergent validity, the Average Variance Extracted (AVE) was examined. The AVE was used to evaluate if the variables which measure the same construct correlates positively. The recommended benchmark is 0.50 and an AVE value above 0.50 means that more than half of the measure variables' variance are explained by the construct (Hair et al., 2014). The indicator reliability was decided with the outer loadings of the measure variables. They should be above the threshold of 0.70 (Hair et al., 2014). The t-values were used to see if the data were statistically significant. If they are higher than 1.96, the data are statistically significant for a significance level of 5% (Hair et al., 2014). To check the discriminant validity, the Heterotrait-Monotrait Ratio (HTMT) was evaluated and should be lower than 0.90 (Henseler et al., 2015). HTMT was found with bc bootstrap and the upper confidence interval limit at 97.5%. With the HTMT it can be concluded if the measure variables distinctively measure the construct they are supposed to measure. To find out how much the endogenous constructs are explained, the R-square value was used. The benchmark value is 0.35 (Hair et al., 2014). The higher the R-square value is, the better the endogenous construct is explained by its exogenous constructs. If the value is 1.0, it means that 100% of the endogenous construct is explained by its exogenous constructs (Hair et al., 2014). To evaluate the predictive relevance of the exogenous constructs, f-square was used. The exogenous construct has for the f-square values of 0.02, 0.15, and 0.35 respectively, a small, medium, and large effect on the endogenous construct (Hair et al., 2014).

2.10 House of Quality

A relationship matrix is created between the Whats, the customer attributes, and the Hows in the HoQ. To create the matrix, different relationship values are selected, see Table 2. An example of how the relationship matrix can be selected is shown in Table 3. The Whats have a value called Degree of Importance (DoI) which shows the impact they will have on the Hows. In Table 4 are the corresponding relationship values.

Table 2. Definition of the symbols for the relationship values.

●	Strong relationship	9
○	Medium relationship	3
△	Weak relationship	1

Table 3. Example of the relationship matrix.

		DoI	Hows		
			A	B	C
Whats	1	30%	●	○	●
	2	20%		△	
	3	50%	△		○

Table 4. Example of the relationship values for the relationship matrix.

		DoI	Hows		
			A	B	C
Whats	1	30%	9	3	9
	2	20%		1	
	3	50%	1		3

The next step is to calculate the impact the different Whats will have on the Hows. This is performed as Table 5 visualizes, and with the result in Table 6. The last row in Table 6 also show the sum of how the Whats affect the different How.

Table 5. Example of the how the calculation is performed.

		DoI	Hows		
			A	B	C
Whats	1	30%	$9*0.3$	$3*0.3$	$9*0.3$
	2	20%		$1*0.2$	
	3	50%	$1*0.5$		$3*0.5$

Table 6. The result of the calculations.

		DoI	Hows		
			A	B	C
Whats	1	30%	2.7	0.9	2.7
	2	20%		0.2	
	3	50%	0.5		1.5
Sum			3.2	1.1	4.2

The sum of how all the Whats affect the Hows is calculated to be 8.5 and how the different Hows are affected in total is calculated below, and shown in Table 7.

$$A_{impact} = \frac{3.2}{8.5} = 38\%$$

$$B_{impact} = \frac{1.1}{8.5} = 13\%$$

$$C_{impact} = \frac{4.2}{8.5} = 49\%$$

Table 7: Outcome of the House of Quality.

	A	B	C
Total sum	38%	13%	49%

3. Theoretical Framework and Hypothesis

This chapter consists of the models and theories which have been used in the thesis. Due to that the information flow is analyzed from two perspectives, from a customer's point of view and from a company's point of view, the theoretical framework is divided in two parts; management and quality theories as well as production theories.

3.1 Management and Quality Theories

Several different theories and models concerning management and quality have been used in the research and will therefore be explained to a level which is needed for the reader to follow and understand the main purpose of their concepts.

3.1.1 Perceived Online Channel Value

POCVAL is a method used for evaluating the customers' perception of the interaction with technology driven service processes and the customers' perceived channel value. The general channel satisfaction and the perceived channel value are investigated in POCVAL (Carlson et al., 2015). The perceived channel value is divided into five constructs; service performance, emotional, monetary, brand integration, and convenience. The first construct concerns service features of the channel. The second corresponds to the emotional response of the channel. The third construct refers to the channel's price levels compared to competitors'. The fourth evaluates if there is a seamless brand experience across the different channels. Lastly, the fifth construct concerns the convenience compared to other channels in the company. The five constructs are distinct in nature, where one or several of the constructs may influence a decision. Distinct in nature means that if one of the constructs changes, it does not mean that the other ones do.

Apart from the constructs, the channel satisfaction and the channel loyalty intention should be measured. The channel loyalty is used to control if the respondents have answered contradictory. In POCVAL, it is believed that the constructs affect the perceived channel value, which affects the channel satisfaction. Furthermore, the perceived channel value and the channel satisfaction have an impact on the customer behavioral intentions, or the channel loyalty intention. Retrospective sampling should be used and the respondents should reflect on their recent experiences. When using POCVAL, a Likert-type scale can be used for each statement and ranges from strongly disagree to strongly agree. Additionally, control variables are one part of the POCVAL method. The control variables should be measured with single item questions.

3.1.2 The Technology Acceptance Model

According to TAM, the perceived ease of use affects the attitude towards adopting a new technology and consequently, the technology acceptance (Davis, 1989). It is assumed that external factors affect two perceptions of the users; the perceived usefulness and the perceived ease of use. Furthermore, the two perceptions have an impact on the users' attitudes toward adopting a new technology. The behavioral intention to use the new technology determines the actual use. As can be seen in Figure 3 below, the perceived ease of use affects the perceived usefulness and the perceived usefulness have a direct impact on the behavioral intention to use the new technology. Both the perceived usefulness and the perceived ease of use affect the customer's attitude towards adopting the technology.

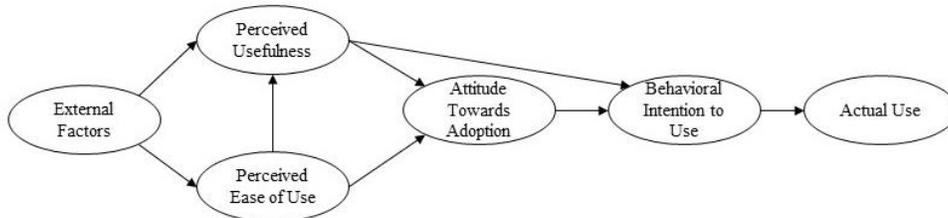


Figure 3. The concept of the Technology Acceptance Model.

To be able to explain why a new technology will or will not be adopted, the external factors need to be understood. To determine user acceptance, the perceived usefulness and the perceived ease of use should be measured. The perceived usefulness is defined as the degree a person believes that using a particular technology can improve one’s performance. Furthermore, the perceived ease of use is defined as the degree to which a person believes that a technology is easy to use. Meaning that if users believe that the technology is easy to use, they will be more positive toward adopting it. However, the usage behavior is more influenced by the perceived usefulness than by the perceived ease of use.

3.1.3 House of Quality

One way to translate customer demand into company requirements is by introducing Quality Function Deployment (QFD). One tool that can be used is HoQ which is a diagram for finding the relationship between the customers’ demand, Whats, and the company’s requirements, Hows, see Figure 4 below (Hauser & Clausing, 1988). The Whats will be improved to the degree which the requirements are met. Symbols are visualized to represent weak, medium, and strong relationship in a relationship matrix. To be able to apply QFD, a number of steps are needed; identify customer demands, identify product and engineering design requirements, draw a relationship matrix, rank technical characteristics’ importance, and analysis of the correlation among the various technical characteristics. The roof of the house corresponds to how the company requirements correlate with each other and can have either no, a positive, or a negative correlation.

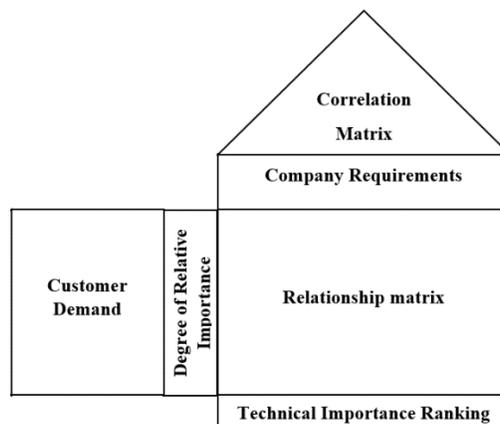


Figure 4. A visualization of the HoQ.

However, when this was applied in the thesis, the customer demand was represented by both the channel satisfaction from a customer point of view and the job satisfaction from the employees’ point of view. The company requirements were represented by the provided improvement suggestions.

3.1.4 The ServQual Model

For a company to increase the customer value, the customers' perception of service quality needs to be identified. Service quality is defined as the difference between the customer's perception of the service and one's expectations (Parasuraman et al., 1988). Furthermore, customer satisfaction reflects how well the end service is together with the process which the customer went through to acquire that service, meet the customer's expectations. The extensively adopted ServQual Model can be used to measure customer satisfaction through service quality. The evaluation of the dimensions of service quality result in the measured services' quality, which have a positive effect on, and partly determines the customer satisfaction of those services. Further, they explain that it is evaluated if the service quality and the customer satisfaction lead to customer behavioral intentions. Customer behavioral intentions are measured through customer loyalty.

Brown et al. (2001) explained five dimensions of service quality; tangibles, reliability, responsiveness, assurance, and empathy. They describe tangibles as the physical appearance of employees, equipment, facilities, and communication material. Reliability is explained as the ability to deliver the promised services, on time and as specified. Furthermore, responsiveness is defined as the willingness to help customers and quickly meet the individual's specific demands. Moreover, assurance is described as the personnel's knowledge and courtesy as well as their ability to convey confidence and trust in being able to perform the task. The last dimension, empathy, is explained as the staff's ability to provide personalized service in a caring manner. It should be noticed that some of the service quality aspects can be measured and observed in the company and through customers while others, like empathy, only can be measured through the customers' perception. According to Parasuraman et al. (1988), one issue which can lead to failures concerning service quality is that the company creates too high expectations which cannot be met.

3.1.5 Rogers' Diffusion of Innovation Theory

Rogers' theory explains how a product diffuses over time, through a certain population or social system. It is about the process for how the population adapts to new innovations. The theory explains how, why, and to what rate new ideas and technologies are spread through cultures. The four main factors affecting the diffusion process rely on human capital and are; communication channels, the innovation itself, the social system, and time (Roger, 2003). In order for the innovation to become self-sustained it has to be commonly used and widely adopted. There are five different groups of adopters; Innovators, Early Adopters, Early Majority, Late Majority, and Laggards. Furthermore, there are three gaps which keep these groups divided; two cracks and a Chasm.

3.1.5.1 Innovators

This group of people is defined by their interest in being the first to experience new ideas and products. The Innovators' primary motivation is to learn about new technologies, purely for their own sake. The group has a strong aptitude towards technique, wants to be included in new products' alpha test, and can disregard missing elements of the new product (Roger, 2003). They are also described as risk-takers due to that the innovation they are adapting to can be both unprofitable and unsuccessful. Therefore, they usually obtain a high level of uncertainty (Sahin, 2006). Furthermore, since the Innovators bring innovations into the system, they are also called the gatekeepers to Early Adopters.

3.1.5.2 Early Adopters

Rogers (2003) argue that the people belonging to this group usually have a leadership role in the social system. This means that other people in the system ask them for advice or information about the innovation. For the product to be further diffused on the market it is important for the innovation to be positively adopted by the Early Adopters (Sahin, 2006). They are characterized by having great imagination for strategic applications, being attracted by high-risk and high-reward propositions, and informing the owner of the innovation about lacking elements. Their primary motivation is to gain a large competitive advantage through a revolutionary breakthrough. For them to adopt, it is important that they know how to use the innovation. Furthermore, the Early Adopters fund the development of the early market.

3.1.5.3 Early Majority

Rogers (2003) defines Early Majority as the people who have good contact with other people within the social system, but they do not have a leadership position. However, they do adapt to new innovations before the average person does and are therefore an essential part of the innovation diffusion process (Sahin, 2006). Their main drive for adopting a new innovation is acquiring sustainable productivity enhancements through radical changes. The Early Majority understand real issues and trade-offs, focus on proven applications, and like to buy from the market leader. Their role in the diffusion process is to break trends in the mainstream market. In Figure 5, it can be seen that the Early Majority is one of the largest groups and they are neither the first nor the last to adapt to the innovation, which is due to that they make some decisions before adapting to it.

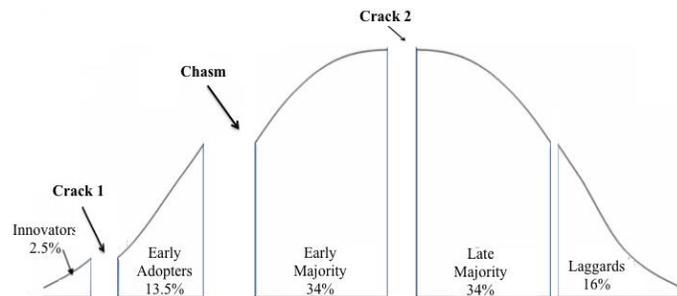


Figure 5. Rogers' Diffusion of Innovation Theory.

3.1.5.4 Late Majority

These people are the ones who wait until almost everyone in their circle of friends has adopted the innovation, due to that they are skeptical to change and are only willing to adopt innovations which they know work and have been tested by the majority (Sahin, 2006). They value information regarding how many who have tried and successfully adopted to the innovation. Their main motivations to adapt to innovations are to avoid competitive disadvantages of not adapting to the innovation and to just stay at the same level as competitors (Roger, 2003). The key characteristics of the Late Majority are that they are better with people than with technology, risk averse, price-sensitive, and highly dependent a single but trusted advisor. Their role in the diffusion process is to extend the product life cycle of the innovation.

3.1.5.5 Laggards

The people categorized as Laggards are traditional and very skeptical to change as well as to innovations in general. This is the group which is the hardest to convince of adapting to a new innovation because some of them have a limited amount of recourses and others lack of knowledge

for innovations (Sahin, 2006). The few things which can make them adapt are statistics which show that the majority of the population actually has adopted and sometimes even pressure from people in the other groups who have already adopted. The primary reason to why they adapt to new innovations is to maintain status-quo (Roger, 2003). The Laggards are characterized by disbelieving arguments about productivity improvements, taking a contrarian position, and seeking to block purchases of the new technology. The main impact the Laggards have on the diffusion process is to delay the development of high-tech markets.

3.1.5.6 The Two Cracks and the Chasm

Since there is a big difference between the people in the groups, the adoption is interrupted at the transitions between them. Even though the Innovators and the Early Adopters talk to each other, Crack 1 is created. It arises because the Innovators appreciate new cool technology products which, at an early stage, cannot be easily adopted in a major business (Moore, 1991). Moreover, the Early Adopters want the competitive advantage. To diminish this crack, for the product to keep moving in the diffusion process, the product needs to enable a strategic leap forward.

The largest and hardest gap to pass is called the Chasm. It is created because the Early Adopters do not talk to the Early Majority. There are a couple factors which differentiate the two groups from each other; the delivered value and their buying behavior (Moore, 1991). The delivered value for the Early Adopters can be that the product is new to the market, it is the fastest product, it is the easiest product, it has a stylish architecture, and a unique function. On the other hand, the delivered value for the Early Majority is that the innovation has de facto standard, is the most commonly used, has a great quality support, and has a low cost of ownership. The Early Adopters' buying behavior can be explained by their willingness to take risks, being reliant on references from other industries, wanting to buy from new firms, and wanting high tech-support. The Early Majority's buying behavior can be explained by that they want to take a very little risk, only relying on references within their own industry, wanting to buy from the market leaders, and wanting one point of contact. Furthermore, Early Majority do not trust the Early Adopters when it comes to referring to new technologies.

There are two main ways to cross the Chasm, through the conventional solution and through the *D-day* solution (Moore, 1991). The conventional solution includes working towards the most common improvement requirements and never entirely satisfying any of the customer segments' needs. Nevertheless, this solution usually tends to fail. The second solution, D-day, is more likely to succeed and includes four steps; target the point of attack, assemble the invasion force, define the battle, and launch the invasion. First, target the point of attack means separation, which includes isolating the target customers and their reason to buy. Second, to assemble the invasion force means differentiation, which is finishing the development of the innovation and choosing partners which understand the innovation. Third, the meaning of define the battle is positioning, which includes creating, instead of copying the competitors. Lastly, launch the invasion defines the distribution and pricing. In this step, the company select the correct distribution channels for the right price.

The second crack, Crack 2, is located between the Early and Late Majority. These two groups talk to each other, but the problem is that the Early Majority are willing and able to adopt a new technology and become technically competent when needed, while the Late Majority are not (Moore, 1991). To be able to pass Crack 2, the technology needs to be easy to adopt, which a high user friendliness ensures.

3.1.6 Collect Correct Data

For a company to improve and become better on what they are doing or want to do it is important to collect data. When collecting data in a company, it is of high importance that the metrics are critical to the business. Otherwise, the collected data are of no use or, even worse, trick the company in believing that their business is going better than it actually does. There are four factors which can make a metric qualified; comparable, understandable, it is a ratio or a rate, or it changes the way the company behaves (Croll & Yoskovitz, 2013). A comparable metric is defined as a metric that can be compared to earlier events, e.g. metrics which show an increase or decrease are more useful than metrics that only state a percentage. However, it is considered to be a useful metric if the two are combined. Moreover, a metric is concluded to be understandable if employees can discuss and remember the collected data. In other words, different companies have different cultures and the data collected must fit the company. Ratios are usually preferable because they are easier to act on, they are characteristically comparable, and they are useful when comparing factors which are somehow different. Lastly, a useful metric is a metric which changes the way the company behaves, which is the most important factor. There are two different types of this factor; accounting and experimental. The accounting considers metrics like daily sales revenue and similar, and are usually a habit for larger companies. However, the experimental considers results of tests, and helps to optimize the market, pricing or, product.

To choose the right metrics, five types of metrics are important to bear in mind; qualitative versus quantitative, vanity versus actionable, exploratory versus reporting, leading versus lagging, and correlated versus causal (Croll & Yoskovitz, 2013). Qualitative metrics are anecdotal, hard to collect, imprecise, informative, and unstructured. On the other hand, the quantitative metrics contain numbers and statistics, which are easy to understand but provide less insight. Vanity metrics do not make a company change its behavior, but they might make it feel good. There are eight vanity metrics which are dangerous due to that they make data look good but in reality it does not explain anything; number of hits, number of page views, number of visits, number of unique visitors, number of followers/friends/likes, time on site or number of clicked pages, number of collected emails, or number of downloads. Before collecting data, the company needs to consider what the collected information can result in, but primarily what it can change. This kind of data should rather be actionable. For example, instead of expressing that a company has X numbers of active members, it is preferable with data which explains that X percent of the total number of members are active. Another metric which would be of interest for a company is, for example, the number of members acquired over a certain time period. Furthermore, explanatory metrics are both theoretical and high-risk metrics which can be used to find insights that can give a company the overhand in a market. Moreover, the reporting metrics are metrics to keep the company in line with the traditional, managerial, day-to-day operations to make sure they are working as they should. Moreover, both leading and lagging metrics are useful but have different purposes. Leading metrics give a company a foreseeable understanding of the future while lagging metrics clarify the past. Lastly, the correlated metrics are metrics which change together and causal metrics are when one metric causes another to change. It is usually preferable to have causal metrics because future happenings can be controlled and changed with them.

3.2 Production Theories

When analyzing the traffic information flow and the work tasks in the control room, theories which are used in production were applied. Hence, the information flow is seen as a production flow.

3.2.1 Lean Manufacturing

Lean Manufacturing includes philosophies which originate from Toyota and can be used to improve processes by eliminating waste. The idea in Lean Manufacturing is that everything always can and should continuously be improved. They explain that costs should be decreased, there should be no defects, and no inventories. They also state that the products should be produced with high quality at a low cost. In Lean Manufacturing, nothing unnecessary which does not add value to the product should be performed. Thus, continuous reflection is needed. Furthermore, to ensure flexibility, teams of multi skilled employees are used. To increase the employees' skills, additional training and job rotation are suggested (Suzuki, 1987).

3.2.1.1 Poka-Yoke

The later the errors in the process are discovered, the more expensive it gets to fix them (Suzuki, 1987). A proactive way of handling errors is to prevent operators from making mistakes, which can be realized with Poka-Yoke, or mistake proofing. According to scholars (Shingo, 1988; Plonka, 1997; Grout, 2007), Poka-Yoke is a method for creating a mechanism that either can be used to prevent, detect, or correct errors at their source. The objective of a Poka-Yoke can be to act reactively or proactively, where being reactive is to detect errors and being proactive is to prevent errors from happening. The goal can be to control or to warn the operator. Controlling the operator can be realized by blocking the continuation of the process or by not letting the operator decide how to perform the task. Then, the aim is to enforce a correct way of executing an operation, by setting limits on the way the task is performed. Moreover, light and sound can be used as ways of warning the operator about the occurrence of an abnormality.

3.2.1.2 Waste

At Toyota, three types of activities were found to be connected and contributing to bad performance; Mura, Muda, and Muri. Mura, unevenness, is any variation in the process that is caused by imbalance. Muda, waste, is any activity in the process which does not add value to the product. Muri, overburden, is an activity that puts unreasonable stress on employees or equipment. Furthermore, there are two types of Muda; waste that does not add value to the customer and waste that does not add value but is necessary for the customer.

Suzuki (1987) concludes that if an activity or subject does not add value to the product, it is waste. The scholar presents six different types of waste; overproduction, waiting time, unnecessary transportation, double and triple handling, over-processing, and inventory. Waste in form of overproduction happens when work is done before it is needed and it is one of the worst types of wastes. Overproduction leads to additional work, more defects, higher consumption of raw materials, and more material handling. Moreover, overproduction distracts employees from performing instant tasks and confuses them regarding what tasks which needs to be prioritized. It is important to understand that as long as the customer demand is met, the utilization of equipment and operators do not always have to be maximized. Moreover, an example of double handling and unnecessary transportation is when material or components temporarily are stored before they are transferred to the production line where they are used. In that example, double handling consists of the actual handling of the components and the unnecessary transportation of the components. There is also processing waste, which happens when there are problems in the processing method or when some aspects are superfluous regarding to be able to meet the customer requirements. Other types of wastes are defects and unnecessary movements.

3.2.1.3 Standardized Work

Operators often perform the same operation in different ways. To reduce the variation in a process, Standardized Work can be applied. Standardized Work is a method where the best practices are identified and applied to all operators performing the same task. Implementation of Standardized Work will result in positive effects and are essential for continuous improvement. When the method is applied, the operators do not need to choose between several different ways of performing the work task. They add that after a while, the new method has been ingrained in the operator's memory. Consequently, less time and energy need to be spent on recalling how the work task should be performed. Hence, applying the method can increase the efficiency and productivity of the work task, e.g. more efficient and productive production system (Zandin, 2001).

Standardized Work can be used to take advantage of the potential in the current working process, prior to making capital investments (Zandin, 2001). Before making any decisions on new capital investments, it is important to evaluate the capability of the current processes to determine its potential and to understand if it is maximized. The current process is then objectively compared with new alternatives to decrease the risk of investing in bad solutions and to make sure the new process results in attractive paybacks. Another outcome is the decrease in overall operational cost. The implementation of Standardized Work decreases the cycle-time due to an increase in productivity, which results in a reduced operational cost. Furthermore, an improved productivity will lead to more satisfied customers which will give the company a better image.

To make all employees understand that standardized work tasks will benefit them, the manager in charge needs to make sure that the employees, both operators and managers, are educated in the concept of Standardized Work and that they are included in the implementation process (Zandin, 2001). By doing so, the probability for them to understand the positive effect is higher. Moreover, employees should be encouraged to identify improvement areas (Berlin & Adams, 2015).

The managers should correct the operators work so that it follows the working standards. In addition to this, clarifications of positive effects for the implementation should be described in detail to the operators. However, to make the operators' work more productive and effective, it is also important that the operators obtain feedback in order to understand what can be improved (Zandin, 2001). When the operators receive feedback, they will obtain a feeling to be a part of the company. Short weekly meetings can accomplish this as well as positive comments from managers and colleagues. The operators need to have the opportunity to give their reflections of the standards. An important task for the managers is to listen to the operators' opinions and make them feel part of the progress, partly by adding their suggestions for improvements in the new standardized system (Berlin & Adams 2015). Furthermore, the method normally includes documentation, which can be beneficial during training of new employees.

3.2.2 Environmental Aspects

There are several factors which can affect an employee's health. Work environmental factors can affect the employees at a workplace by causing psychological and physical loading on their bodies (Berlin & Adams, 2015).

3.2.2.1 Lighting

Berlin and Adams (2015) explain that lighting is a key factor when designing a workplace. According to them, studies have shown that good lighting settings can have a positive effect on

workplace productivity. They also state that insufficient lighting makes the employee's vision worse which may influence their posture. They explain that if the vision becomes impaired, the employee will bend forward to see better, which will increase the load on the lumbar spine and neck. Out of all sitting postures, bending forward has the greatest musculoskeletal loading impact on the structures of the body. When sitting in an ergonomically bad posture for a long period of time, even though the load on the body is not high, can create a musculoskeletal disorder.

Berlin and Adams (2015) have summarized a list of recommendations to design the workplace with the vision in mind and it is clearly stated that large light differences in a room should be avoided. It is also stated that there should be lighting for both general and specific work tasks. Moreover, the direction of the light should not create shadows on the work desks, and there should be as much daylight as possible. However, there should also be blinds to reduce the glare for the days when the sun is bright. To enable the light to reflect on walls and ceilings, they should be in bright colors. Lastly, the working area should be brightest in the middle and darker towards the edges, where a light ratio of 5:3:1 is recommended. Illuminance is a measure of how well a surface is lit and is measured in lux. The Swedish Work Environment Authority (SWEA) recommends that a normal work task at an office require a general lighting of 300 lux and a task lighting of 500 lux (Arbetsmiljöverket, 2015). When these requirements are translated into the 5:3:1 luminance ratio, the lighting in the work area of a desktop, which is the inner field of vision, is recommended to be 500 lux, the middle 300 lux, and the outer 100 lux (Berlin & Adams, 2015). This is displayed in Figure 6 below.

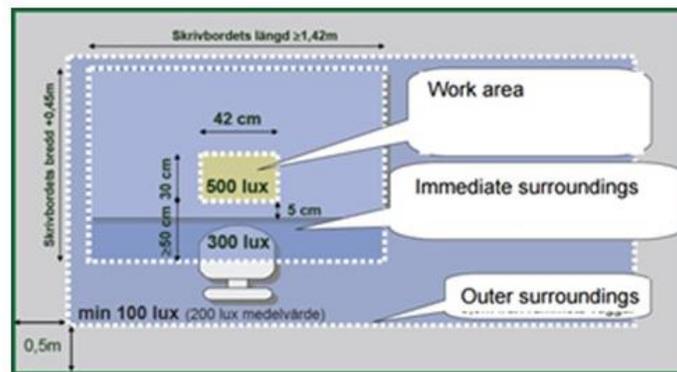


Figure 6. Recommended illuminance at a work station (Berlin & Adams, 2015).

3.2.2.2 Sound

According to Berlin and Adams (2015), sound is an effective complement to vision, particularly when the vision is overloaded. It should be noticed that there is a difference between sound and noise. Sound is desirable and carries a meaning, while noise is unwanted, creates discomfort and distracts. Noise is subjective. Background sound, or ambient sound, should also be taken into consideration. The ambient sound can be filtered out by the employees to be able to notice meaningful sounds. Ambient sound can be considered as noise. An example of ambient sound that can be experienced as noise is people talking in an office landscape. According to the scholars, this is a common issue, and the severity depends on the employee's ability to filter out the noise. Noise is a threat to the employees' health since it can cause stress, hearing loss, and distraction. Another drawback of a noisy work environment is that it can be challenging to communicate with colleagues. Three factors influence the physiological effects on how stressed an employee feel by the noise are the loudness - measured in decibels, the exposure time, and the distance to the source of the sound.

Furthermore, they state that sound can be measured with sound level meters but also state that interviews should be made with the employees in the workplace. Because the measured sound does not always give an indication of the disturbing effects the noise creates.

The noise limit is defined as the maximum equivalent A-weighted sound pressure level exposure, measured in dB, during a normal working day. The equivalent sound pressure level is the same as the average sound pressure level, or the average sound level, during a specified period of time. The SWEA has set noise limits for four types of work environments (Bullerbekämparen, 2005). In the first work environment, the working conditions need to enable continuous concentration and secure speech intelligibility. An example is where teaching is performed. In the first level, the maximum allowed noise level is 35dB. In the second type of work environment, the working conditions need to enable continuous concentration and people should be able to, effortlessly, have conversations, e.g. during office work as well as doctor and patient conversations. The maximum noise level for this type of work environment is 40dB. The next work environment includes working conditions where it is important to be able to have conversations or where there are continuous demands on precision, speed, or attention, e.g. process control and remote controlling. The maximum permitted noise level for this work environment is 55dB. The last type of work environment is where there are noisy machines and equipment. The maximum allowed noise level in this type of work environment is 75dB. Furthermore, hearing protection devices can be used to protect the employees against noise (Berlin & Adams, 2015). Sound absorbent and insulation materials can be used to reduce the amount of reflected noise in the room, e.g. absorbing panels on walls and ceilings.

3.3 Hypothesis

Two perspectives will be considered in this research; SJ Traffic Control's and the customers'. Key drivers of job satisfaction for the employees in the control room and key drivers of channel satisfaction for the customers will be identified. This, to be able to prioritize the improvement suggestions concerning the traffic information flow from SJ Traffic Control Stockholm to the customers, which will be the outcome of this research, by taking both perspectives into consideration. The improvement suggestions will have the potential to increase the awareness of problem areas in the control room and to improve the traffic information flow. The hypothesis of job and channel satisfaction and the backgrounds to them are explained below.

3.3.1 Job Satisfaction

To acquire high customer satisfaction, the internal service quality needs to be high (Hallowell et al., 1996). If the service quality is high, the employees' service capabilities increase, which enables an increased customer satisfaction. The authors also state that to get satisfied customers, the service providers, i.e. the employees, need to be satisfied. Hence, service quality affects both the employee satisfaction and the customer satisfaction. Even though job satisfaction does not directly lead to customer satisfaction, it is known that service companies do not often get satisfied customers without having satisfied employees (Hallowell et al., 1996). The theory that satisfied and loyal employees lead to satisfied and loyal customers is also supported by Heskett et al. (1994). Hallowell et al. (1996) identified six internal service quality components; tools, appropriate policies and procedures, teamwork, management support, goal alignment, and training. They investigated if the internal service quality components recognition and rewards as well as communication have an impact on customers' satisfaction and job satisfaction, but the results were inconclusive.

The method used was Perceived Online Channel Value (POCVAL) and the hypothesis was based on a study made by Hallowell et al. (1996) but also on results from interviews. From their study, teamwork and management support were chosen to be a part of the hypothesis to investigate what impact the management has on job satisfaction. Even though the study of Hallowell et al. (1996) was inconclusive regarding communication as well as rewards and recognition, they were included in the survey based on the results from interviews with the employees. Interview results also indicated that scheduling, feedback, and social relationships were of importance for the employees. A total of three constructs were created based on the components identified as being possible key drivers of job satisfaction, both from the study by Hallowell et al. (1996) and from interviews; communication and teamwork, scheduling satisfaction, as well as relations and support. The hypothesis of survey three was that these components are key drivers of job satisfaction, see Figure 7.

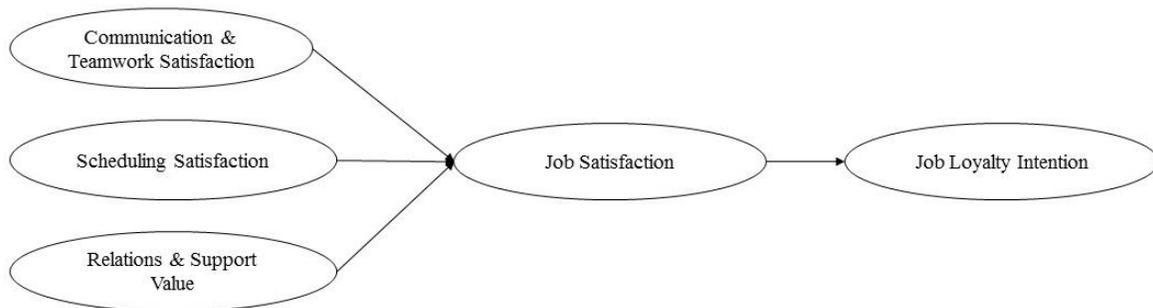


Figure 7. Hypothesis of survey three in the control room.

3.3.2 Channel Satisfaction

The customer survey was presumed to analyze if the constructs were key indicators leading to channel satisfaction and finally, channel loyalty intentions, for the three information channels. The hypothesis is illustrated in Figure 8.

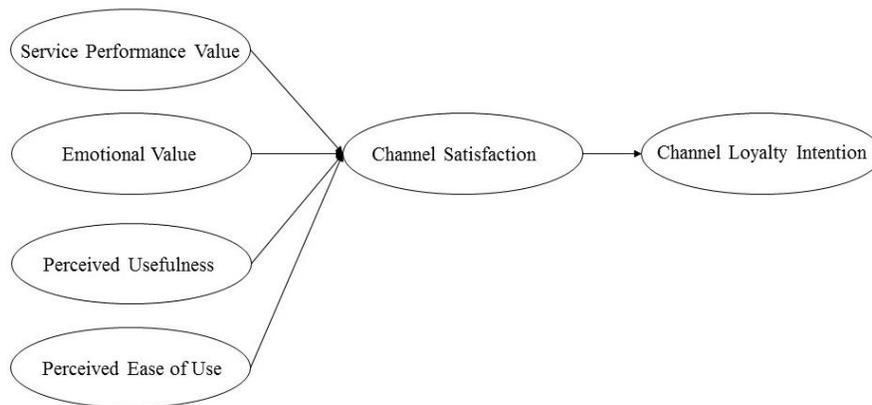


Figure 8. Hypothesis of the customer survey.

The questions regarding service performance value were assumed to evaluate how large importance the quality of the information provided in the different channels have. The service performance value was assumed to have an equally large importance for the three channels, because the quality of the information is believed to have the largest impact on channel satisfaction out of possible factors. The authors believed that the questions regarding emotional value would show if there is anything emotional having an impact on channel satisfaction when receiving or acquiring traffic

information. It was assumed that the emotional value would be more important when acquiring traffic information from the cabin than when using the app or the website. The reason for this was that emotions are more present during human contact compared to during a non-human one. Two questions concerned the customers' perception of whether the information channels were able to provide them with traffic information during their journey. Thus, if they thought the information channels would be able to help them and the information channels would be easy to use. It was assumed that the perceived usefulness and perceived ease of use would be more important for the app and website than for the cabin crew. This is due to that customers are more used to ask the cabin crew than to use the app or website. Hence, for them to use those channels and be satisfied with them, they need to be perceived as useful and easy to use. Furthermore, channel satisfaction was investigated in the survey since it was evaluated if the four constructs lead to channel satisfaction. The loyalty intentions were presumed to show if the customers were satisfied enough to reuse the information channels. It was evaluated to test if channel satisfaction leads to channel loyalty intentions.

4. The Case Company

SJ is Sweden's largest train company for passenger transportation and is responsible for around 850 departures each day consisting of approximately 100,000 customers (SJ Trafikledning, 2015; SJ AB:1, 2016). Below, SJ's business mission is stated.

“SJ shall offer the market's most customer-oriented and sustainable travel, both independently and in cooperation with others.

This means that we are to be the leaders when it comes to fulfilling the customer's needs – while ensuring that social, environmental and economic responsibility permeates our entire organization.”

- SJ's Business Mission (Trademark Manager, 2016)

SJ has four core values for how they want to be perceived by their customers and how the employees are supposed to perform their work tasks; *reliable, simple, caring, and joyful* (SJ AB:1, 2015). However, the meaning of the words slightly differ depending on if they are directed towards the customers or the employees (SJ AB:2, 2015). Concerning the customers, the words are supposed to reflect the customers' experience with SJ, in everything SJ is and in everything SJ does. In this context, the core values have the following meaning. The first word, *reliable*, means that the customers should be able to trust SJ in all situations. *Simple* is defined as everything with SJ should create a feeling of self-explication, it should be easy for the customer to get in touch with the company and it should be located where the customers want to find them. SJ should be *caring*, meaning that SJ should be helpful and be honest to their customers. The last word, *joyful*, means that SJ should create a smile on people's lips by remembering that their customers have more expectations than just being transported from point A to B.

For the employees at SJ, the core values have a different approach. The first word, *reliable*, means that the employees trust each other, by keeping what they have promised and trust that everyone know their work tasks. *Simple* means that it should not be difficult, even if SJ in some ways, have a complex business. *Caring* implies that they care about each other by remembering that behind each action, function, and part in the organization, there are humans. Lastly, *joyful* means that they encourage each other by understanding that everyone need “a pat on the back” in challenging situations and that they do a better job if they can laugh. Consequently, if SJ can create a company which is reliable, simple, caring, and joyful they will obtain their vision; *SJ - to rely on and look forward to* (SJ AB:2, 2015).

4.1 SJ Traffic Control

All problems similar to train defects and dealing with sick-listing for the on board personnel to handling and rebooking customers' journeys are solved by the employees working at SJ Traffic Control. In other words, they are the ones responsible for the customers making it from point A to point B². During a disturbance this includes re-routing trains, helping to solve technical problems with the trains, coordinating personnel, booking and organizing busses and hotels for their

² Traffic and Information Co-Ordinators Group 1 (Traffic Control, Division of Planning and Traffic Control, SJ AB) interviewed by Jennie Boérius and Sara Helmrot 2016-01-21.

customers. Furthermore, there is no difference between sending out traffic information to different customer segments or to the members of the customer program, SJ Prio^{3,4}.

4.1.1 Actors in the control room

In the control room, there are six main functions and a chief operating officer. However, the role of the chief operating officer is only activated during large disturbances. The main functions are; operating supervising, customer information managing, traffic and information coordinating, rolling stock managing, technical support, and train crew coordinating. Since the disturbances occur without a warning in advance, the employees in the room are already behind when they start the process of solving the problem. Therefore, they need to be able to endure stress and make fast decisions¹. Another important factor is that the functions depend on each other and the need of communication is essential. The different functions are responsible for different work areas and the employees within the same function do not perform the tasks in the same way². The functions in the control room are using different software tools, but the main one is called Xpider. Furthermore, XOD is a part of Xpider and is used for documenting disturbances, information, and decisions which are made in the room.

The employees working in the control room are mainly working in shifts which are divided in three; morning, afternoon, and night. However, there are some daily tours as well. The number of employees per function, for each shift, is shown in Table 8 below. All employees have a different schedule each week⁵. Apart from the mentioned staffing, there are reserved employees scheduled as well. The objective of the reserve employees is to cover for holidays, sick leaves, and work meetings.

Table 8. Numbers of employees per function for each shift⁶.

Function	Morning	Day	Afternoon	Night (Sunday)
Operating supervisor	1		1	1
Customer information manager	1		1	0
Traffic co-ordinators	5		5	1 (2)
Information co-ordinators	3		3	
Rolling stock managers	2	1	2	1
Technical supporters	1	1	1	1
Train crew co-ordinators	3		3	1

According to the Personnel Planner⁵ a challenge with the scheduling in the control room is that the load varies substantially. There is a minimum occupancy required during a small load but the occupancy in the room is scheduled higher, to be able to cope with disturbances. According to Function Manager 1⁷, the number of employees needed during the shift is based on the estimated number of trains which can be handled by one employee each during a disturbance. The idea is that

³ Traffic and Information Co-Ordinators Group 2 (Traffic Control, Division of Planning and Traffic Control, SJ AB) interviewed by Jennie Boérius and Sara Helmrot, 2016-01-21.

⁴ CRM Manager (Responsible CRM Campaign Logic and Result, Customer Insight and CRM, Division of Market and Sales, SJ AB) interviewed by Jennie Boérius and Sara Helmrot 2016-02-05.

⁵ Personnel Planner (Personnel Planner, Traffic Control, Division of Planning and Traffic Control, SJ AB) and Operating Supervisor 3 (Traffic Control, Division of Planning and Traffic Control, SJ AB) interviewed by Jennie Boérius, 2016-04-14.

⁶ Operating Supervisor 2 (Traffic Control, Division of Planning and Traffic Control, SJ AB) interviewed by Jennie Boérius 2016-02-23.

⁷ Function Man[70(Function Manager and Chief Operating Officer, Traffic Control, Division of Planning and Traffic Control, SJ AB) interviewed by Jennie Boérius and Sara Helmrot 2016-02-22.

the employees should be able to manage the operating level which requires the most resources. According to the Personnel Planner, the control room has not the required staffing to deal with the largest disturbances. Excluding the technical supporters, there are in total 62 full time employees working in the control room, see Table 9 (Function Manager 1:1, 2016).

Table 9. Numbers of full time employees in the control room (Function Manager 1:1, 2016).

Function	FTE
Operating supervisor	8
Customer information manager	4
Traffic and information co-ordinators	29
Rolling stock managers	9
Train crew co-ordinators	12

4.1.1.1 Operating Supervising

The operating supervisor is responsible for all actions and decisions made concerning traffic in the control room and has the main contact with the STA⁸. During a disturbance, the operating supervisor is in charge of making sure that the employees in the room know what is going on, which is realized by gathering and sharing information between them as well as by distributing the work tasks between them^{8,9}.

The main communication with the STA is with two functions. When the operating supervisor needs general information about a disturbance the communication is with regional operating manager and when more detailed information is needed the communication is with the train manager⁹. This communication can be both through the phone or the chat. The information flow for the operating supervisor is illustrated in Figure 9. The black lines and boxes refer to communication and functions in the room, the grey ones to other department at SJ, the blue to other companies such as STA, and the green ones symbolizes the communication direct towards the customers and the green oval the customer. Moreover, the arrow denotes whether the functions give or deliver information.

⁸ Operating Supervisor 1 (Traffic Control, Division of Planning and Traffic Control, SJ AB) interviewed by Jennie Boérius 2016-02-12.

⁹ Operating Supervisor 3 (Traffic Control, Division of Planning and Traffic Control, SJ AB) interviewed by Jennie Boérius 2016-04-07.

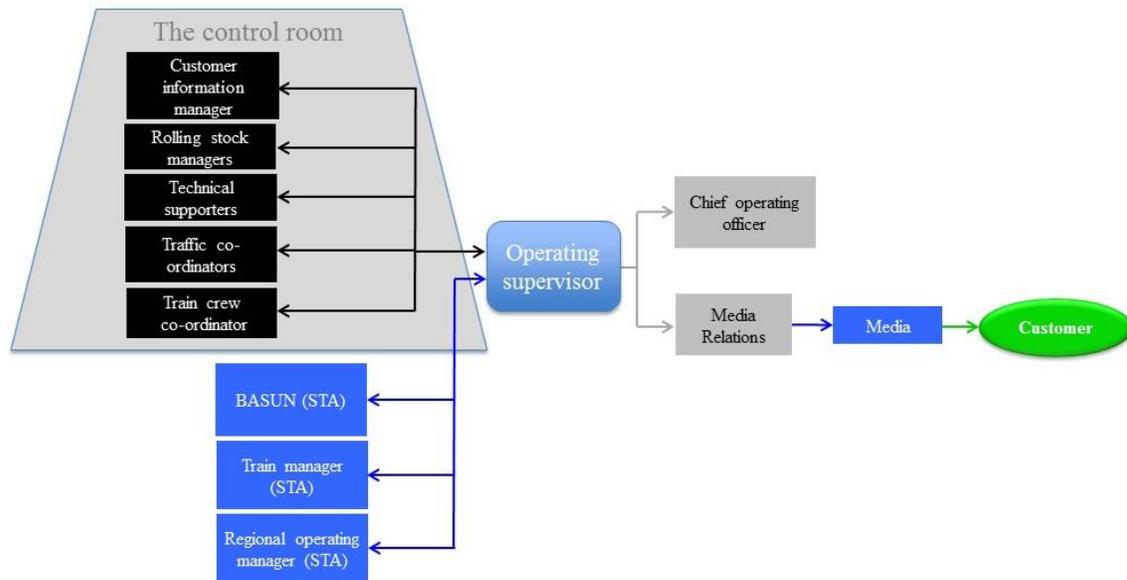


Figure 9. Information flow for the operating supervisor.

During the morning and afternoon shifts, the operating supervisor has a briefing meeting with all employees in the control room⁹. During the briefing meetings, the operating supervisor informs the shift team about current track works and reductions of speed limitations from the STA, which will affect the trains' punctuality or similar. After the operating supervisor has informed the team, each function explains what information they received from the employee working during the previous shift and what is currently happening at their function. The information includes the current situation, personnel, and trains⁹. Another work task of the operating supervisor is the rolling stock meetings, which take place twice a day⁹. The participants are the chief operating officers of depot for both Hagalund and Gothenburg, and the operating supervisor from Traffic Control Gothenburg. During the meetings, they discuss how the trains will be distributed in the upcoming hours and how the parties have been affected by disturbances, over the phone. The operating supervisor is also the one responsible for the communication with the chief operating officer. During a yellow operating level, the operating supervisor or the customer information manager sending text messages with information to the chief operating officer⁹.

4.1.1.2 Customer Information Managing

The main difference between the customer information manager and the operating supervisor is that the operating supervisor is responsible for the traffic, while the customer information manager is responsible for information, both internally and externally. The main objective of the customer information manager is to facilitate the operating supervisor's work by making sure that the correct information reaches the right channels within the company; both within the control room and to other departments at SJ. The employee sends traffic information to the other departments at SJ and text messages to different managers. The customer information manager is also responsible for all traffic information transferred in to and out of SJ Traffic Control¹⁰. It is only the customer information manager and the operating supervisor whom have the authority to update SJ's Intranet during a disturbance, which is available for SJ's employees. The employees working closest to the customer information manager, except the operating supervisor, are the traffic and information co-

¹⁰ Customer Information Manager 1, 2, 3, 4 (Traffic Control, Division of Planning and Traffic Control, SJ AB) interviewed by Jennie Boérius and Sara Helmrot 2016-01-20.

ordinators. The customer information managers oversees the information distributed by the information co-ordinators towards the customers and through XOD, and is continually in contact with Service Center and Media Relations through the phone. The most time consuming task for the customer information manager is to answer and talk on the phone, mostly talking to the STA and SJ Traffic Control Gothenburg¹¹. The customer information manager and the STA update each other about the current state of the disturbance and what has happened. When talking to SJ Traffic Control Gothenburg they update each other about the current situation and daily operations. Figure 10 below visualizes the customer information manager's information flow.

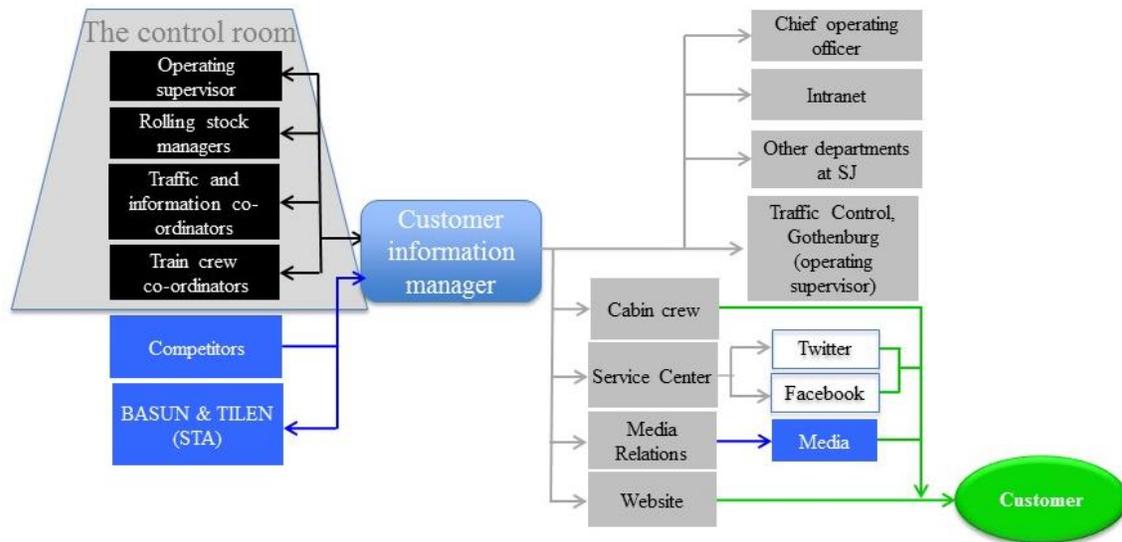


Figure 10. Information flow for the customer information manager.

To simplify the communication within the control room, there is a disturbance board which can be used. It is the customer information manager and the operating supervisor who are responsible for updating it. The board is used to display what has been done and what needs to be done, so the employees in the room do not have to walk around and ask^{11, 12}. It is mainly used during disturbances with an operating level categorized as orange or red¹¹. The disturbance board is displayed at the employees' computer screens and is also displayed at the TVs in the room¹². All information from the STA and the control room is inserted into the disturbance board¹¹. Apart from the customer information manager, the traffic and information co-ordinators (TICOs) and the operating supervisor have access to add information to the disturbance board¹¹. If the rolling stock managers or the train crew co-ordinators want to share information, they tell the operating supervisor who adds it to the disturbance board.

4.1.1.3 Traffic and Information Coordinating

The employees working as TICOs are divided into two groups; one which is dealing with traffic coordinating and the other one is distributing information. The TICOs rotate between the work tasks. However, some employees only have skills for information coordinating.

¹¹ Customer Information Manager 5 (Traffic Control, Division of Planning and Traffic Control, SJ AB) interviewed by Sara Helmrot 2016-04-07.

¹² Traffic and Information Co-Ordinator 14, (Traffic Control, Division of Planning and Traffic Control, SJ AB) interviewed by Sara Helmrot, 2016-04-14.

Traffic Coordinating

The traffic co-ordinators are dealing with traffic coordinating, booking buses, hotels, and in rare occasions airplane tickets for the passengers who are affected by a disturbance. The traffic co-ordinators are divided in four different positions which are based on geographical areas; West, North, Regional, and South¹³. There is one employee working at each position except for Regional, where there are two employees. The traffic co-ordinators book the hotels in different ways. The first survey performed in the room, the traffic co-ordinators answered a question regarding how they book hotels, being able to choose more than one answers, see Figure 11 below.

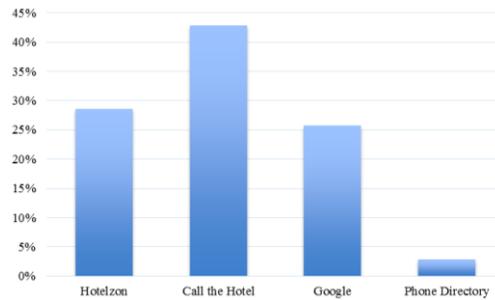


Figure 11. How the traffic co-ordinators book hotels.

Moreover, when they book buses they always use Björks, which is SJ's supplier of replacement transportation service¹⁴. To book a bus, the traffic co-ordinator fills in a form with the number of passengers, the time, and route. After that, the form is sent to Björks. When a bus has been booked, it is automatically displayed in TrAppen, visualized for the train drivers and cabin crew. However, it is the cabin crew's responsibility to book cabs and solve connections for the customers¹⁴. Sometimes the traffic co-ordinators help the cabin crew to book cabs, even if this is not included in their work tasks.

The traffic co-ordinators are also in contact with the cabin crew, to inform them about changes. Though, in most cases, it is the cabin crew who call the traffic co-ordinators because they need information². Furthermore, the traffic co-ordinators obtain information from the STA through emails in BASUN and during large disturbances through phone calls. The traffic co-ordinators are also in charge of making sure that all disturbances which affect SJ's trains are logged in XOD. This is done either by telling their coworker at XOD to log it or they can log the information themselves if they have the time¹⁵. It depends on the operating level, because the traffic co-ordinators do not have time to log in XOD during a large disturbance^{12,15,16}. However, there are gaps during a large disturbance when traffic co-ordinators could log in XOD¹⁵. The traffic co-ordinators receive and provide information to all functions in the control room, which can be seen in Figure 12.

¹³ Traffic and Information Co-Ordinator 1 and 12 (Traffic Control, Division of Planning and Traffic Control, SJ AB) interviewed by Jennie Boérius 2016-02-17.

¹⁴ Traffic and Information Co-Ordinator 7 (Traffic Control, Division of Planning and Traffic Control, SJ AB) interviewed by Sara Helmrot 2016-02-12.

¹⁵ Traffic and Information Co-Ordinator 8 (Traffic Control, Division of Planning and Traffic Control, SJ AB) interviewed by Sara Helmrot, 2016-04-14.

¹⁶ Traffic and Information Co-Ordinator 9 (Traffic Control, Division of Planning and Traffic Control, SJ AB) interviewed by Sara Helmrot, 2016-04-12.

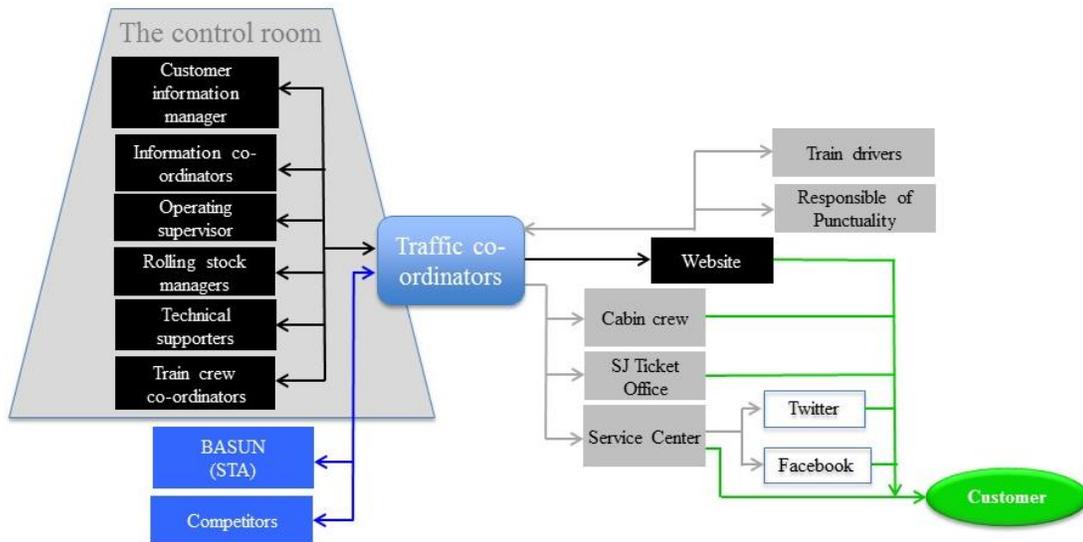


Figure 12. Information flow for the traffic co-ordinators.

Information Coordinating

The information co-ordinators are divided into three areas of responsibilities; text message (Text), website (Web), and XOD. The work tasks of the employee working at Text include informing the customers directly regarding their journey, e.g. if a train is cancelled or delayed. For a text message to be sent to a customer concerning a delay, the train has to be assumed to be at least 30 minutes late and the text message has to be sent at least 15 minutes before departure¹⁷. The most text messages are sent to the subscribe service text message Mälardalen, where commuters receive text messages about certain train lines. Those text messages are sent to the customers if the train is at least 10 minutes late and they have to be sent out at least 15 minutes before departure.

Since the customers on board a train have different destinations, they need different information and consequently need different text messages¹⁸. The employee can only send text messages to customers at one train at a time. Therefore, the need to send different text messages to different customers at one train is needed. Text messages are useful when SJ wants a customer to take an earlier train, for the customers to be able to catch their last connection. SJ would not be able to reach this customer only through the website³. The information co-ordinator working at Text receives information from most functions in the control room but only delivers information directly to the customers, see in Figure 13 below.

¹⁷ Information Co-Ordinator 1 (Traffic Control, Division of Planning and Traffic Control, SJ AB) interviewed by Jennie Boérius 2016-02-12.

¹⁸ Traffic and Information Co-Ordinator 2 (Traffic Control, Division of Planning and Traffic Control, SJ AB) interviewed by Sara Helmrot 2016-02-11.

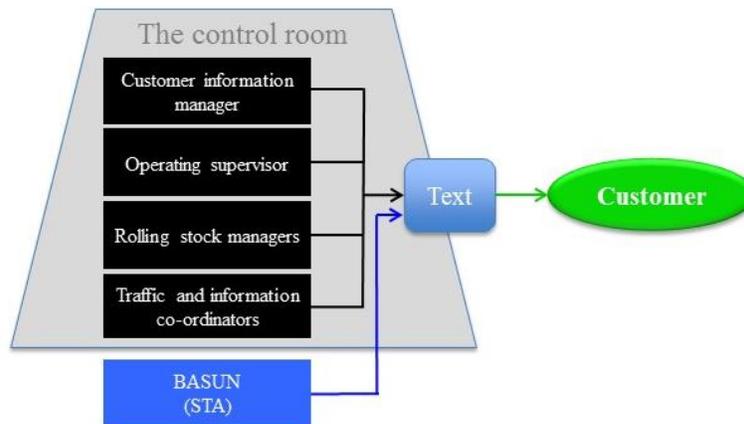


Figure 13. Information flow for the information co-ordinator at text message.

The employee working at Web is in charge of updating sj.se/trafikinfo, which is the page of SJ's website where traffic information is displayed. This employee updates information about disturbances at the website, including the time span when the information should be available². The traffic information about disturbances are automatically updated in the app, when the employee at Web upload it at the website. However, traffic information to customers regarding the time of arrival and departure as well as change of tracks are updated by the STA, both at the website and at the app. The information co-ordinator working at Web receives information from most employees in the control room, see in Figure 14 below.

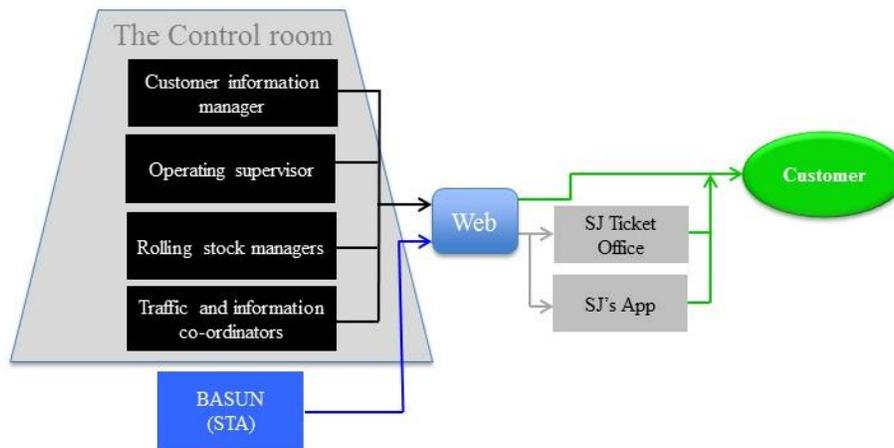


Figure 14. Information flow for the information co-ordinator at Web.

The employee working at the function XOD is responsible for logging and sending all the information regarding disturbances affecting SJ's traffic, in the software XOD. Two different actions can be logged; *create an occurrence* or *make a decision and appropriate action*. An occurrence is created based on the geographical area to be able to connect more than one train to the disturbance in that certain area, e.g. when an overhead contact line has been torn down, an occurrence is created and connects all trains that will be affected to this disturbance. This is beneficial when several trains at a route are affected. A decision and appropriate action is logged when decisions regarding how to tackle the disturbance have been made or when the disturbance is affecting only one train. The traffic information logged in XOD is visualized for Service Center, SJ Ticket Offices, STA and other department at SJ. When something is logged in XOD, the information

can also be published in TrAppen¹⁹. TICO 1³ explained that to make sure the cabin crew receive the information before the customers, the information should first be logged in XOD and when this is done, the information should be distributed to the customers. However, it has happened that the customers receive the information before the cabin crew, which does not create an easy situation for the cabin crew.

Additionally, an email can be sent to the STA, SJ Ticket Offices, and to almost all train operators from XOD¹⁹. The information flow for the information co-ordinator working at XOD is visualized in Figure 15.

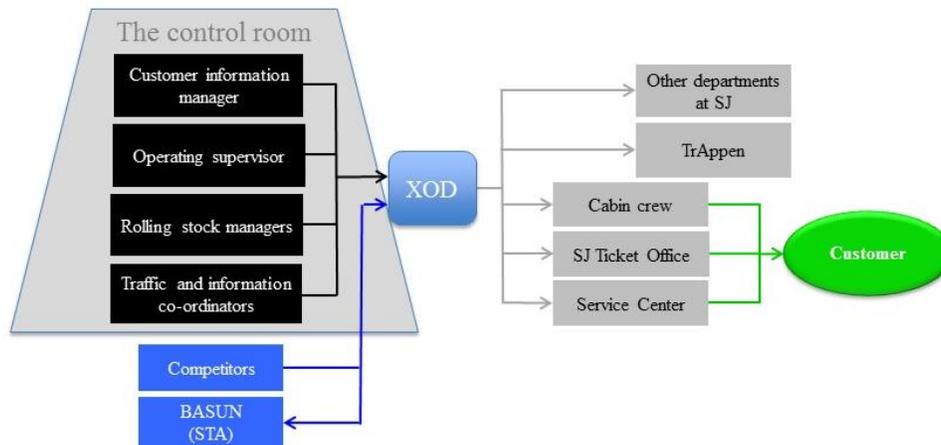


Figure 15. Information flow for the information co-ordinator at XOD.

When there is a large disturbance, the information co-ordinators working at Text and XOD need to decide what information that is important for the customers to receive and what information that is not³. TICO 3³ stated that a problem is that they are too fast in sending out information. After a while, the circumstances change and then a new text message has to be sent out. TICO 2³ explained that by sending out incorrect information, the trust of their customers is damaged. Though, it is difficult to know when the information will stop changing, added TICO 6³. For instance, a train can be changed from being cancelled to not cancel when the correct cabin crew has been found. TICO 16²⁰ explained that the prognoses from STA are usually wrong. TICO 4³ explained that they act upon the information they receive and that information may change in 30 seconds, but they do not know if or when it is going to change. Therefore, at some point, the information co-ordinator has to make a decision.

When there is less to do, the information co-ordinators have time to inform the customers about less crucial matters. XOD has the highest workload during a disturbance^{12,15,16}. Generally, Web has the lowest workload, while sending out text messages is a bit more time consuming^{15,16}. The information co-ordinators' responsibilities are not fixed during a large disturbance and generally, Web helps both the traffic and information co-ordinators. Furthermore, if Text does not have time to send out all text messages, Web helps¹².

¹⁹ Traffic and Information Co-Ordinator 5 and Customer Information Manager 2 (Traffic Control, Division of Planning and Traffic Control, SJ AB) interviewed by Sara Helmrot 2016-02-10.

²⁰ Traffic and Information Co-Ordinator 16 (Traffic Control, Division of Planning and Traffic Control, SJ AB) interviewed by Jennie Boérius, 2016-04-14.

4.1.1.4 Technical Support

The employees working at technical support are essentially train drivers who are experts on trains and have been train drivers for at least five years. This position can be compared to a helpdesk for train drivers and cabin crew when technical problems occur with the trains²¹. During disturbances regarding SJ's trains, it is usually the technical supporter who receives the information first in the control room. In Stockholm, the technical supporters are in charge of the train models X40, X2000, as well as locomotives and coach, while Traffic Control in Gothenburg are in charge of the models X12, X50, and X3000. The employee working as a technical supporter should inform the operating supervisor right after the train driver has made the call regarding the problem. Technical Supporter 4²² explained that their main communication concerning the trains is with the rolling stock managers and the communication concerning train drivers and cabin crew is with the train crew co-ordinators. Figure 16, below, show the functions which technical support communicates with.

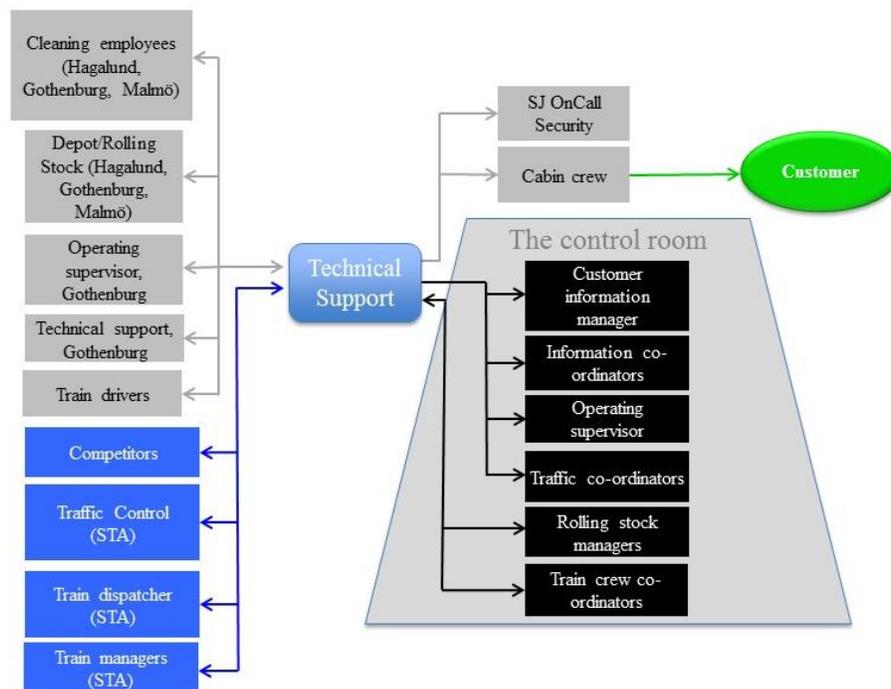


Figure 16. Information flow for technical support.

Work tasks for the technical supporters are to give permission to train drivers to drive a train without some system fully working. These decisions are made entirely by the technical supporter, without any other functions involved. Technical supporters are also the ones making decisions if a train can drive or if it should be switched or cancelled due to safety reasons. Furthermore, decisions made concerning the conditions of the train, like limitations of speed, are also included in their work tasks. Other responsibilities are error reports regarding urgent technical maintenance of the trains, as well as announcements and notifications about how the coaches are functioning, for example with vibrations²². They are also in charge of reporting safety defects to SJ OnCall Security, like smoke development and derailment. In other words, all technical decisions regarding the trains are included

²¹ Technical Supporter 8, 9, and 10 (Traffic Control, Division of Traffic and Service, SJ AB) interviewed by Jennie Boérius 2016-05-04.

²² Technical Supporter 4 (Traffic Control, Division of Traffic and Service, SJ AB) interviewed by Jennie Boérius 2016-04-01.

in the technical supporters' responsibilities, e.g. the fire alarm can only be out of function for six days, and then the train needs to be transported to a workstation. The main decision, regarding to tell the Rolling Stock Managers to stop driving these trains, are made by the technical supporters²².

Technical support has worked in a software called Ford. However, they are currently changing software to EAM-SAP²². Technical Supporter 4²² believes that the new system is more complicated than the earlier one, due to that everything needs to be logged in the system to send the information. Consequently, more time is needed. But if the new software can collect interesting data it is a good reason to switch.

4.1.1.5 Rolling Stock Managing

The rolling stock managers in the room are responsible for the same train models as the technical supporters in Stockholm. The main work tasks for the rolling stock managers are regarding to the trains. They are responsible for putting train, personnel, and qualifications together for the journeys¹. The rolling stock managers are also responsible for making sure that the trains are in the right place at the right time as well as that they are going to the correct destination²³. For different train models, the cabin crew and train drivers are required to have certain qualifications. The rolling stock managers have the qualification for all three models and are working with the different train models at different shifts.

The most important responsibility the rolling stock managers have is to make sure that the trains do not exceed their safety interval²⁴. They have to keep track on how many kilometer each train has driven, both in total and during each day²³. After a certain kilometers, the train has to be sent to the workstation for service. Due to safety reasons, it is of high importance that the trains do not run longer than the certain kilometers. They are also responsible for the error reports regarding comfortability. Comfortability includes everything inside the trains; cleaning, air conditioning, etc. They have communication with the cabin crew since the cabin crew provide them with error reports regarding comfortability²⁴.

The rolling stock managers mostly work with exchanging trains and changing the direction of trains; re-routing the trains²⁴. They need to exchange a train when it is broke and re-route it when the track is blocked. To find an available train, the rolling stock managers use the software RPS²⁴. Further, they need to cooperate with the depot in Hagalund because they are in charge of the trains there, while the rolling stock managers are responsible for the trains on the track²⁴. When the rolling stock managers are short on trains, they ask the depot in Hagalund how many trains they have and which they can be put in use. When the rolling stock managers find a new train, they briefly check if the cabin crew and the train driver have the required qualifications to work at that train model. The functions which the rolling stock manager communicates with is visualized in Figure 17 below.

²³ Rolling Stock Manager 1 (Traffic Control, Division of Planning and Traffic Control, SJ AB) interviewed by Jennie Boérius 2016-04-01.

²⁴ Rolling Stock Manager 2 (Traffic Control, Division of Planning and Traffic Control, SJ AB) interviewed by Sara Helmrot 2016-04-06.

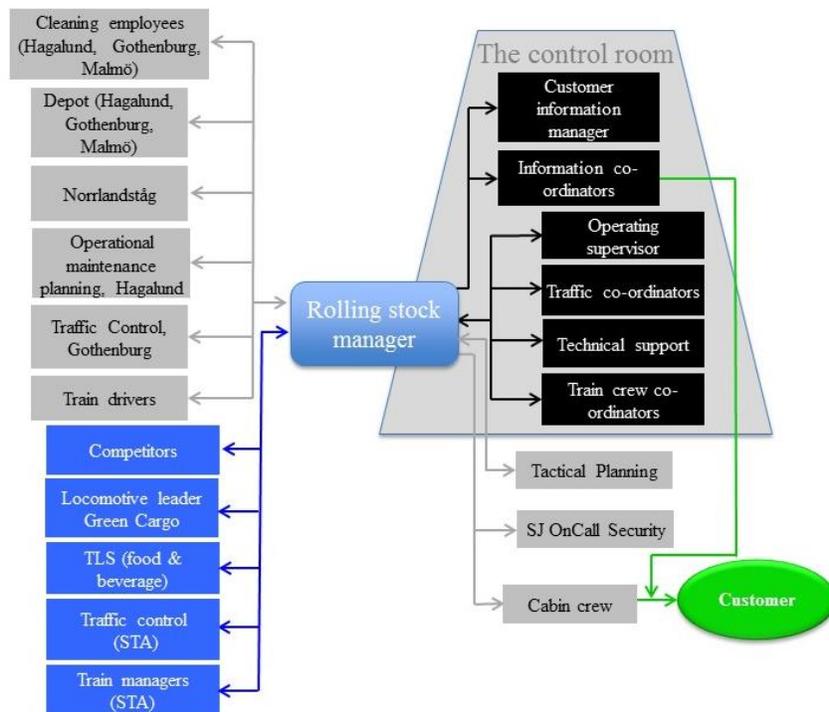


Figure 17. Information flow for the rolling stock managers.

The traffic co-ordinators always receive an email in BASUN from the STA when a train needs to be re-routed. Then they need to communicate with the rolling stock managers for them to put that information in RPS, in order to obtain a new train time table²⁴. The rolling stock managers and the traffic co-ordinators make decisions regarding when and where the trains should change direction²⁴. Then, it is the rolling stock managers who send an inquiry through Xpider to the STA of permission to re-route their trains to acquire a new train numbers. When the new number is received, the train acquire a new driving plan, e.g. planned route which the train should take. Without the driving plan, the train is not allowed to drive. When they have the new train number, they call the train driver giving an okay to drive again. Rolling Stock Manager²⁴ explained that where there is a stop at one part of a track they can re-route two trains going at each direction and switch train numbers between them. For instance, if there is a problem in Timrå at the line Stockholm - Umeå, train 580 going towards Umeå can drive all the way to Sundsvall and train 587 towards Stockholm to Härnösand. Then they re-route the trains and the customers take a bus between Sundsvall and Härnösand and vice versa. When they re-route the trains they also switch the train numbers, so that train 580 receives the number 587 and train 587 becomes 580, see Figure 18. For this action SJ does not need the STA's permission to switch the numbers between the two trains.

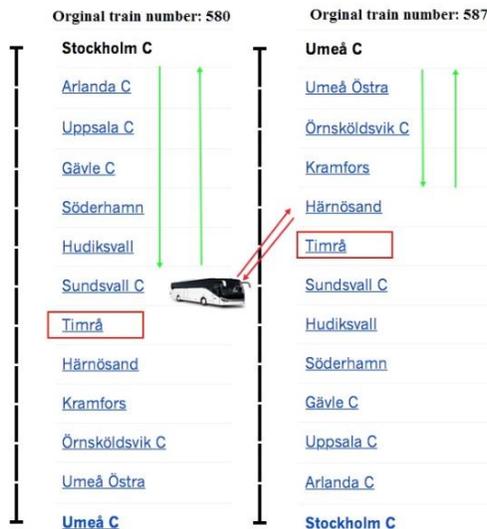


Figure 18. Example of how to switch train numbers.

4.1.1.6 Train Crew Coordinating

The main work task for the employees working with train crew coordinating is to shift train drivers and cabin crew between different trains and routes. This includes dealing with absence due to illness as well as managing personnel during disturbances. It is complex due to that the cabin crew have different qualifications for the different train models¹. The difference between rolling stock managing and train crew coordinating is that the rolling stock managers focus on the trains, while the train crew co-ordinators focus on the personnel on board the trains.

When a train is exchanged to another train model, the staff whom are supposed to work at the train need to have the required qualification for the new train model²⁵. The rolling stock managers are responsible for checking with the train crew co-ordinators that the cabin crew have the needed qualifications. When no available personnel with the required qualifications is found, the rolling stock managers have to find another train. When something has been determined, it is logged in RPS and the information is sent to Xpider²⁵. The logged information can be seen in TrAppen as well.

An exchange of train model, re-routing a train, a sick listing, or a late train are examples that might cause shortages in staffing. If a train is late, a member of the staff might not make it to the next train²⁵. If there is a shortage in staff on a train, the train crew co-ordinators are looking for available reserves with the required qualifications²⁵. If they do not find anyone there, they call the staff which are employed by the hour and have signed up for certain working hours²⁵. The train crew co-ordinators can also send out text messages to staff working at the trains, asking if they want to work overtime.

The information flow for the train crew co-ordinators is illustrated in Figure 19. The most communication is with the rolling stock managers, the traffic co-ordinators, cabin crew, and train drivers. If a train will be late because of the personnel, the train crew co-ordinators inform the traffic co-ordinators. While if a train is re-routed, the traffic co-ordinators inform the train crew co-ordinators about it, so that they can check if the decision is in line with the staff's contracts, regarding

²⁵ Train Crew Co-Ordinator 3 (Traffic Control, Division of Planning and Traffic Control, SJ AB) interviewed by Sara Helmrot 2016-04-06.

brakes etc.²⁴. They have continuous communication with the cabin crew, for instance to inform them about re-routing of the train. They also inform the cabin crew about route changes which lead to changes in their shifts. When a train has been in a collision, for example a personal accident or if it has run over something, they ask the staff on board the train if they need support in form of counselling²⁴. Additionally, the train crew co-ordinators inform the information co-ordinators when, for instance, there will be no cabin crew working in the Bistro.

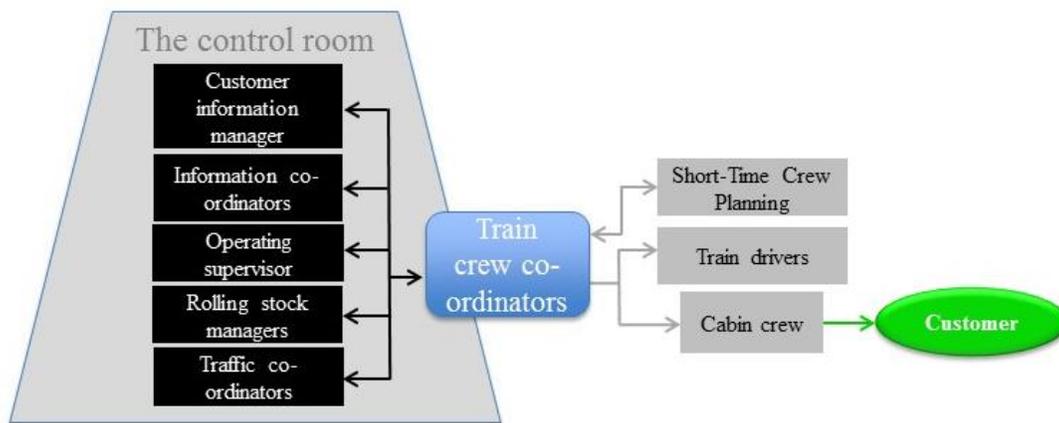


Figure 19. Information flow for the train crew coordinating.

4.1.1.7 Chief Operating Officer

This position is only activated during large disturbances, when the operating level is orange or red²⁶. A chief operating officer is a readiness function, meaning that the employees who are chief operating officers also have another function at SJ Traffic Control. According to the Punctuality Manager²⁷, the employee who is chief operating officer for the week, is that for the whole company, and has the main contact with the office in Stockholm and Gothenburg. According to Function Manager 1²⁶ the chief operating officer makes large decisions concerning both traffic and information in the control room, but not at a detailed level. The operating supervisor can discuss with the chief operating officer when making decisions which have a large impact on the production. The main objective of the chief operating officer is to support the operating supervisor as well as work with the other departments at SJ through two readiness groups, with representatives from different departments^{26,27}. This is done to get the whole company involved in the decisions made and to make the whole company work with the disturbance. By letting the chief operating officer handle this communication, the functions in the control room can take care of their own work tasks and focus on solving the problem²⁷.

When the chief operating officer is handling a disturbance, this employee has communication with the STA. The most communication is with the national operating manager, who works within the Operative Management Department²⁸. If the chief operating officer is in the office, the communication is verbal, otherwise it can be through text message or through phone calls²⁷. During

²⁶ Function Manager 1 (Function Manager and Chief Operating Officer, Traffic Control, Division of Planning and Traffic Control, SJ AB) interviewed by Jennie Boérius and Sara Helmrot 2016-04-21.

²⁷ Punctuality Manager (Punctuality Manager and Chief Operating Officer, Traffic Control, Division of Planning and Traffic Control, SJ AB) interviewed by Jennie Boérius 2016-03-04.

²⁸ Chief Dispatcher (Chief Dispatch and Chief Operating Officer, Traffic Control, Division of Planning and Traffic Control, SJ AB) interviewed by Jennie Boérius 2016-04-07.

the larger disturbances, the chief operating officer is in charge of the communication with Björks²⁷. The information flow for the chief operating officer is visualized in Figure 20.

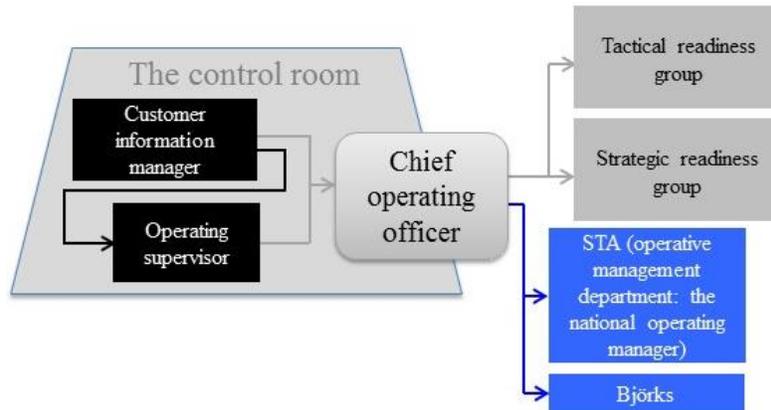


Figure 20. Information flow for the chief operating officer during a large disturbance.

4.1.2 Placing in the Control Room

The control room is designed as an open office, see Figure 21. Currently, the employees are positioned according to the different functions.

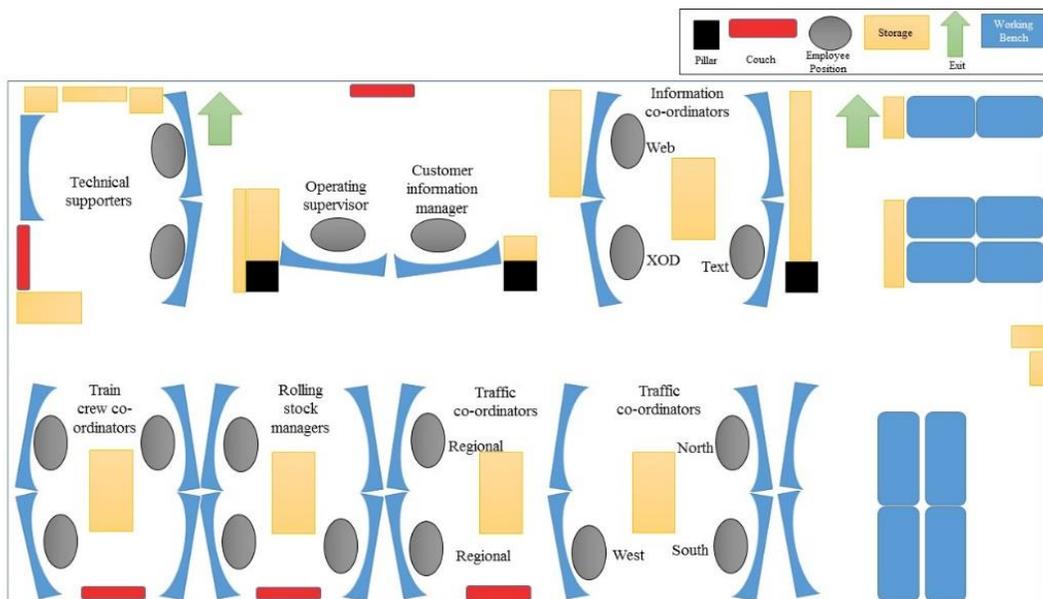


Figure 21. The control room.

There are reasons why the different functions have the current positions. Function Manager 1⁷ explained that the traffic co-ordinators working at Regional have more departures and faster changes than the other geographical areas and to obtain a faster decision making process, they are located close to the rolling stock managers. Furthermore, the train crew co-ordinators are located close to the rolling stock managers and technical support due to that they work a lot together. The technical support and the rolling stock managers are working quite close together as well and therefore, they need to be positioned close to each other.

4.1.3 Known Future

In the beginning of 2016, SJ got responsibility over Tåg i Bergslagen (TIB) for the next ten years. This means that in December 2016 SJ will take over this traffic. According to Rolling Stock Managers 1²⁹ and 3²⁹, the traffic co-ordinators will have the highest increase in workload due to that there are three new lines and they are currently not familiar with these lines. However, they added that the workload in the control room will also increase for most other functions, namely the train crew coordinating and rolling stock management. There will be a difference for the rolling stock managers but it will not be too complicated since TIB have two train models which are similar to SJ's²⁹.

²⁹ Rolling Stock Manager 1 and 3 (Traffic Control, Division of Planning and Traffic Control, SJ AB) interviewed by Jennie Boérius, 2016-04-14.

5. Result and Analysis

All findings presented in this chapter are made at the case company. First, an analysis of the current state including a visualization of the information flow and an identification of the areas of improvement are made. Second, findings regarding improvements to the problem areas, named improvement suggestions for future state, are analyzed.

5.1 Current State

In this part the traffic information flow, from SJ Traffic Control Stockholm to SJ's customers, for a certain scenario is mapped out and different areas of improvement are identified and analyzed.

5.1.1 The Information Flow

To map the information flow, a scenario of a disturbance was created. It is of importance to know that depending on what kind of disturbance there is, the traffic information flow will be different. The main difference is depending on if the reason behind the disturbance is because of SJ, another train operator, or STA. Then, the beginning of the information flow and which function in the control room that receives the information first will differ.

This scenario was based on the following assumptions; a train driver has a problem with the train and is standing still somewhere between Stockholm Central and Katrineholm, the train is of model X2000, the train is going in the south direction towards Katrineholm, and customers are on board. The train needs to be exchanged and the change will take place in Katrineholm. The complete information flow and how the information is transferred between the different functions is mapped out and visualized in Figure 22.

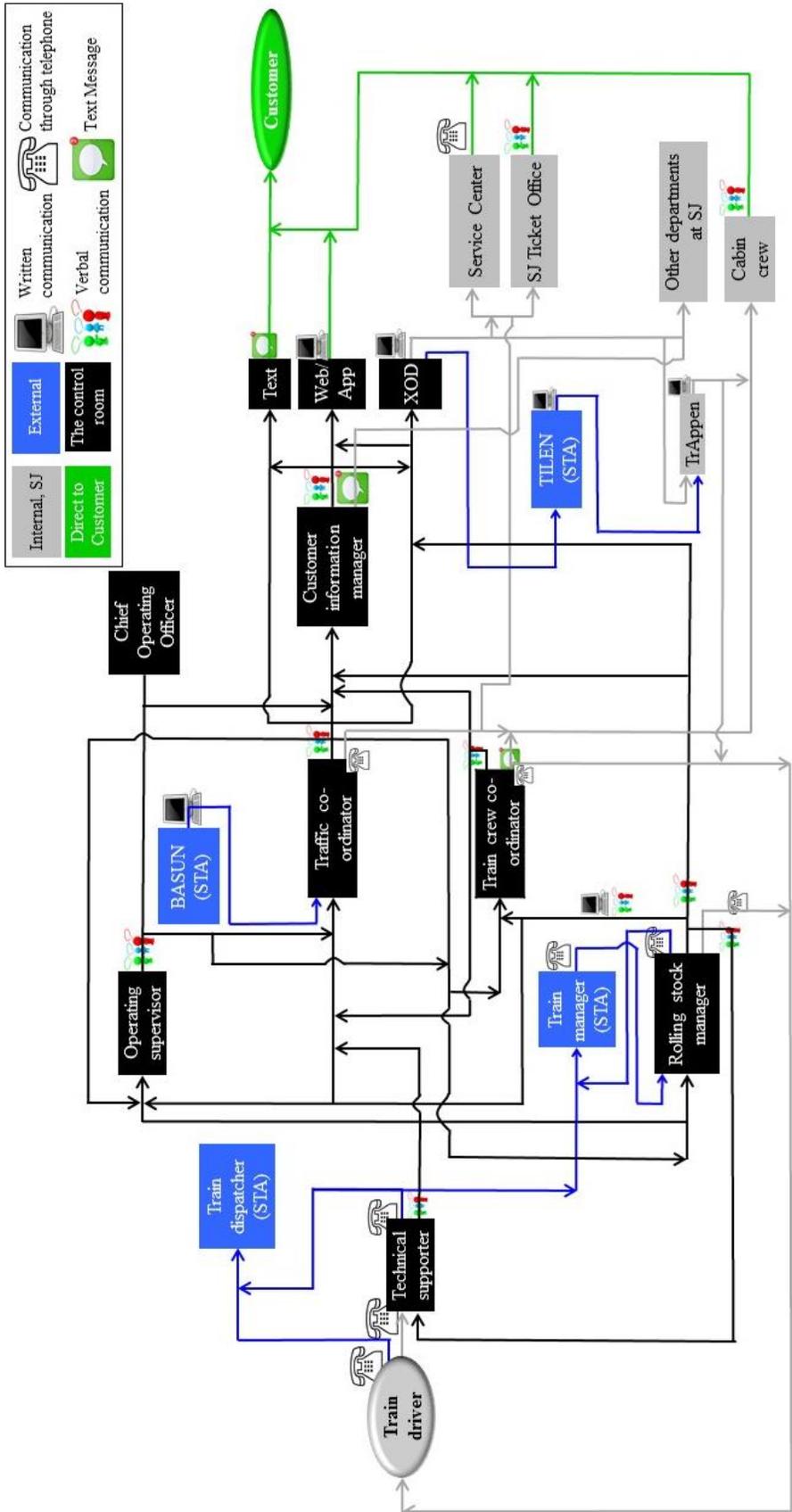


Figure 22: The information flow during a disturbance.

The first step in the process is for the train driver to call the train dispatcher at STA, who is responsible for a line in a certain geographical area, to inform that they are standing still due to technical problems³⁰. Then, the train driver calls the technical supporter to inform that there is a defect in the automatic train control (ATC) and that help is needed. Furthermore, whether they should keep going with the same train or change to another is decided by the technical supporter³¹. Due to that it is a problem with the ATC, the decision making process goes relatively fast. Already after 15 minutes, the technical supporter can give the train driver the permission to keep driving towards Katrineholm, but at a limited speed. In Katrineholm, they will exchange trains. In this process, where the technical supporter is commanding the train driver of what is going to happen, an agreement called *Notification from technical support* needs to be filled in by both parties, before the train can keep going. When the papers are signed, the technical supporter informs the operating supervisor about the situation. Then, the technical supporter walks to the rolling stock managers to inform them verbally both about the disturbance and that a back-up train is needed to Katrineholm³². The technical supporter also tries to make sure the train crew co-ordinators overhear the conversation so they are prepared, if new personnel with different qualifications than the current ones are needed.

When the operating supervisor receives the information, they informs everyone in the control room about the disturbance by either telling everyone to listen up or by going to each function to distribute the information verbally and making sure everyone understand what is going on³³. It is of large importance that everyone in the room know that there is a disturbance, especially the traffic and information co-ordinators. If the disturbance is getting worse, it occurs fast and therefore, they need to be prepared. Furthermore, the operating supervisor is also in charge of informing the chief operating officer to keep that employee updated regarding the current situation. When the operating supervisor receives new information these steps are repeated. Furthermore, the operating supervisor is also included in all traffic decisions made during the disturbance.

When the rolling stock managers have received the information from the technical supporter, they need to locate the train and try to find available back-up trains. The best possible solution would be if the new train is of the same model as the current one, X2000. However, in this case, there are no X2000 available but a X40. Therefore, the rolling stock managers need to communicate with the train crew co-ordinators to see if the personnel on board have the required qualification for the X40 and if they do not, they need to find a new train driver or a new cabin crew. Furthermore, the communication between the technical supporters and the rolling stock managers only concerns the defected train, while the communication between the rolling stock managers and the train crew co-ordinators is regarding the new train and available personnel. The communication between the rolling stock managers and the train crew co-ordinators is mainly verbal, but since there are a lot of numbers to keep track on, the rolling stock manager usually sends the train crew co-ordinator an email with the correct information as well. However, during stressful situations, this communication

³⁰ Technical Supporter 5 (Traffic Control, Division of Traffic and Service, SJ AB) interviewed by Jennie Boérius 2016-04-06.

³¹ Rolling Stock Manager 1 (Traffic Control, Division of Planning and Traffic Control, SJ AB) interviewed by Jennie Boérius 2016-02-12.

³² Technical Supporter 3 (Traffic Control, Division of Traffic and Service, SJ AB) interviewed by Jennie Boérius 2016-02-12.

³³ Operating Supervisor 2 (Traffic Control, Division of Planning and Traffic Control, SJ AB) interviewed by Jennie Boérius 2016-02-12.

is only verbal, consequently the train crew co-ordinator needs to write it down. The train crew co-ordinators are responsible for finding cabin crew whom have the required qualification for the back-up train and maybe even a new train driver who has the required qualifications for the new train model, if needed³⁴. In this case, the train driver do have the required qualifications for driving a X40 and two out of the three cabin crew members do. According to the collective labor agreement, it is enough with only one member of the cabin crew, having the correct qualification and the title departure signaler. This means that the current train driver and cabin crew can change train and the train crew co-ordinators can go back to their normal work after they have sent a text or called the train driver and the cabin crew to share the information³⁴. They text the affected personnel if the workload in the control room is high, and they call them if they have more time.

The rolling stock managers have both phone and email contact with the train manager at the STA. The train manager is responsible for all lines within a geographical area³⁰. From the train manager they receive information regarding the new train number, for the new train they have changed to, in this case the X40. Without the new train number, they cannot drive the train since the planned route is included in the train number. The rolling stock manager needs to keep the customer information manager and the traffic co-ordinators updated. In rare cases, the rolling stock manager walks directly to the information co-ordinator who is working at XOD to publish the traffic information directly. If there is time, the rolling stock manager can publish the information³¹.

The traffic co-ordinators can either receive verbal information about the disturbance from the cabin crew, technical supporter, or from the operating supervisor³⁵. A fourth way to find out about the disturbance is through BASUN, by the STA. However, if this is the case, it means that the train has been standing still for at least ten minutes. The traffic co-ordinators and the customer information manager continuously communicate verbally to keep each other updated. The traffic co-ordinators usually provide the cabin crew with information through the phone. Though, they can also receive information from them, e.g. the train is standing still and what the situation at the train looks like. However, information from the cabin crew neither help in the process of solving the disturbance nor facilitating the traffic co-ordinator's work, only if they call directly when the train has stopped³⁵. The traffic co-ordinators receive information from either the rolling stock managers or the train crew co-ordinator about the decision made regarding a new train model and what time it is estimated to reach Katrineholm. They also check how the disturbance affects the trains which are located behind the train on the track, to see if they will be delayed or not. Moreover, the traffic co-ordinators is keeping their colleagues who works at Text, Web, and XOD updated through verbal communication. However, it can happen that the traffic co-ordinators send an email with information to Web and XOD. But in this case, the communication is first verbal, which means that it can be confirmed that the information has been received³⁵. Furthermore, personnel working at the Service Center and SJ Ticket Offices receive the information from XOD but sometimes also call the traffic co-ordinators to confirm that the information is correct. The information from Service Center and SJ Ticket Office is directly transferred to the customers, by phone or in person respectively³⁵.

The customer information manager has continuously verbal communication with the operating supervisor. They exchange information to keep each other updated about the disturbance and what

³⁴ Train Crew Co-Ordinator 1 (Traffic Control, Division of Planning and Traffic Control, SJ AB) interviewed by Jennie Boérius 2016-02-12.

³⁵ Traffic and Information Co-Ordinator 16 (Traffic Control, Division of Planning and Traffic Control, SJ AB) interviewed by Jennie Boérius 2016-02-12.

decisions are made. When a decision is made regarding a change of two train models, the information needs to reach the cabin crew and customers currently on board the train, as well as the customers who will board it. The customer information manager distributes the information through verbal communication to the information co-ordinators³⁶. Furthermore, this employee is also responsible for making sure that the information co-ordinators are sending out correct information through the different information channels, some which reach the customer directly. In this scenario, traffic information will be sent to the customers who will board the train through a text containing information regarding that they will travel with a different train model from Katrineholm and consequently, there will be free seating and no bistro.

When the employee at XOD receives information, this information co-ordinator updates information in the software which then is available for everyone whom have access to Xpider³⁷. The employee at XOD receives information regarding all decisions and logs them. Additionally, the app TrAppen is updated by the employee working at XOD. When the employee who works at Web receives information, this information co-ordinator updates the website so the customers themselves can find traffic information about the train at sj.se/trafikinfo³⁸.

5.1.2 Decision Making Concerning the Operating Level

There are four different operating levels, or level of disturbances; green, yellow, orange, and red. There is always an operating level in the control room. There are two factors to take into consideration when changing the level of disturbance; how severe the disturbance is at the train lines and the workload in the room⁷. During a green level there are small or no disturbances. There are always diversifications in the traffic but the level can still be green since SJ Traffic Control has it under control. The operating level in the control room oscillates a lot between green and yellow and it is the operating supervisor together with the customer information manager who make the decision whether the operating level should be green or yellow²⁷. To move from the yellow operating level into the orange is a decision which the chief operating supervisor makes together with the operating supervisor. The reasons behind the operating level do not need to be traffic related²⁷. Just because the operating level is orange it, does not mean that there are disturbances in the traffic. It can be because an important software is down or similar, and therefore, SJ can only drive their trains for a few more hours. If the chief operating supervisor estimates the effects of the disturbance to be large, they move into the orange operating level^{27,10}. This is also a signal to the other departments at SJ that the company currently has problems and they need to involve other divisions. Other divisions at SJ are involved through the readiness groups and includes; depot, traffic and service, sales, and communication. To move into the red operating level, the disturbance needs to have very serious impact on SJ's production²⁷. Even though the operating level is orange or red, it does not mean that the customers are affected, it means that there is a critical situation at SJ Traffic Control²⁷. SJ Traffic Control can handle the yellow operating level pretty good, but when it goes up to orange or red it gets more stressful and it is harder to make decisions of what to do¹⁰. During an orange operating level the tactical readiness group is activated²⁶. The members of the group are displayed in Figure 23. The group's objective includes practical work concerning the disturbance²⁶.

³⁶ Customer Information Manager 2 (Traffic Control, Division of Planning and Traffic Control, SJ AB) interviewed by Jennie Boérius 2016-02-12.

³⁷ Traffic and Information Co-Ordinator 12 (Traffic Control, Division of Planning and Traffic Control, SJ AB) interviewed by Jennie Boérius 2016-02-12.

³⁸ Traffic and Information Co-Ordinator 4 (Traffic Control, Division of Planning and Traffic Control, SJ AB) interviewed by Jennie Boérius 2016-02-12.

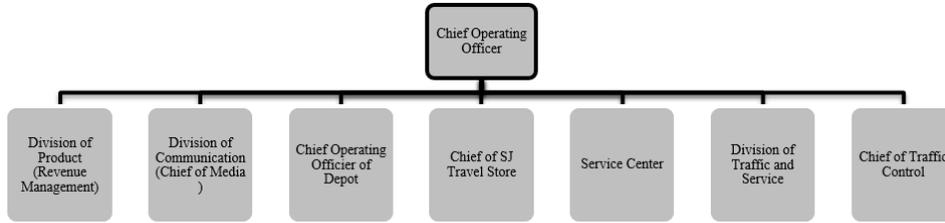


Figure 23. The organization of the tactical readiness group²⁸.

The strategic readiness group is involved when the disturbance has an extreme impact on the company's production, hence a red operating level²⁷. It has a longer time perspective than the tactical readiness group. This group consists of employees at a director level and makes general decisions which have a large impact on the production, to maintain SJ's trademark²⁶. The members included are visualized in Figure 24.

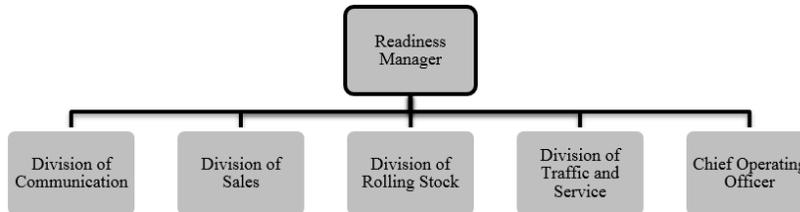


Figure 24. The organization of the strategic readiness group²⁸.

5.1.3 Communication in the Control Room

Three surveys were performed in the control room where the first one included a question regarding to where the largest improvement potential was, see Figure 25. 30% of the participants answered communication or collaboration and 14% answered information. The hardware and software were also rated to have large improvement potential, but will not be considered since they are outside the scope of the study.

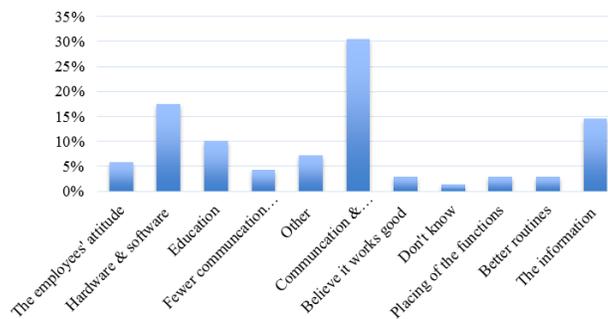


Figure 25. The largest improvement potential in the control room according to the employees.

This was investigated further in the second survey. The employees stated many different reasons why there are problems with the communication; the information does not reach the correct employee or function, vainglorious and ungracious employees, lack of knowledge regarding the other functions, employees do not make sure that the receiver has received the information, and the distance between the functions. However, suggestions how this could be solved were also mentioned; changing the placing in the room, introducing better educations, introducing collective meetings between the different functions, and having more double competencies. Another

suggestion was to stop screaming information and start walking to the function who needs the information and making sure that they receive it.

During a disturbance, the information needs to be transmitted to the right employee as soon as possible and a solution needs to be found quickly, which is stressful. Information within the control room is usually transferred verbally, and sometimes by screaming the information to each other. Since the employees constantly are at the phone during large disturbances, the employees are not always available to listen to the one who wants to deliver the information². Then, the employee who needs to deliver the information can write a note to the employee who is on the phone and should receive the information³. Though, when it is stressful, it happens that the employee receiving the information tells the employee providing the information that they have a lot to do for the moment and wants the information to be sent on the chat instead¹⁰. The TICOs³ argue that oral communication is less time consuming than writing down the information and since they need to make fast decisions, oral communication is preferable. Additionally, there are usually supplementary questions that immediately can be answered when speaking. Two more advantages why sending information verbally is better than writing it down are that the one providing the information can deliver it to more than one employee and a confirmation that the one receiving it has understood the information is provided¹⁰. However, Customer Information Managers 1¹⁰, 3¹⁰, and 4¹⁰ explained that some of the verbally expressed information is forgotten during a stressful situation, but they still believe that a verbal information flow inside the control room is better than a written. Furthermore, it happens that the employees in the control room make a decision and forget to tell the colleagues. This result in that the employee at XOD do not log it, and the following decisions are not taking that decision into consideration. TICO 8¹⁵ states: “During disturbances, it happens that the information is queued before it is logged in XOD”. Hence, XOD is a bottleneck in the traffic information flow.

It has happened that information has been missed in the room due to that employees send an email or write on the chat without also telling the employee receiving the information verbally. When using the chat or email it is important that the one transmitting the information also orally tells the receiver that something has been sent on the chat or by email, otherwise it is easy that the information will be missed^{10,35}. However, the chat is useful when a booking reference or a link needs to be sent, and when sending information to SJ Ticket Offices³.

Miscommunication can result in that the wrong decisions are made. According to TICO 19³⁹, there are two reason why decisions regarding traffic coordination sometimes are wrong; because the traffic co-ordinators both forget to tell the information co-ordinator to log the information and to tell the other employees in the room. Furthermore, TICO 20⁴⁰ explained: “The flaw with the communication in the control room is between the functions, due to that employees believe they know what a function does, but they really do not”. In the second survey, a question regarding the understanding of the different functions’ work tasks and responsibilities in the room was performed. The result is showed in Figure 26 below. 80% or more of the participants believe that they understand the work tasks and responsibilities of the traffic co-ordinators and the rolling stock

³⁹ Traffic and Information Co-Ordinator 19 (Traffic Control, Division of Planning and Traffic Control, SJ AB) interviewed by Jennie Boérius, 2016-04-13.

⁴⁰ Traffic and Information Co-Ordinator 20 (Traffic Control, Division of Planning and Traffic Control, SJ AB) interviewed by Jennie Boérius, 2016-04-14.

managers. However, only 42% believe they understand the work tasks and responsibilities of the chief operating officer.

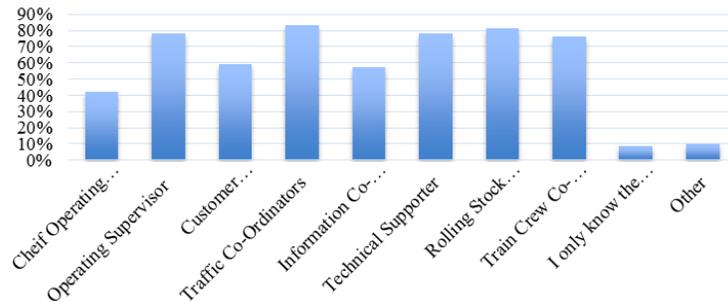


Figure 26. Understanding of the different functions work tasks and responsibilities.

Another issue regarding the communication in the control room is new train numbers when a train has been re-routed. This new number is not easy to connect with the planned train number, which results in that both the traffic and information co-ordinators frequently ask the rolling stock managers for it. The IT Co-Ordinator's⁴¹ vision is that the relationship between the planned train number and the new one is easily visualized in XOD for all the employees. If this would be possible, it would facilitate the work for both the rolling stock managers and the TICOs.

The communication to the train personnel regarding re-routing of a train can be questioned. Since the traffic co-ordinators make the decision to re-route the train, they call the cabin crew to provide them with the information. However, they then obtain questions from the cabin crew regarding what is going to happen with their shift and if they will have time for their planned brake before going on the next train. These are questions which the train crew coordinators need to answer. However, if the train crew co-ordinators would call the cabin crew to inform them about a re-routing, they would obtain questions regarding the customers, which the traffic co-ordinators need to answer. Therefore, it is important that when a decision is made regarding a re-routing, both the traffic and the train crew co-ordinators need to be involved before transmitting the information to the personnel on board the train. It has happened that the traffic co-ordinators make a decision to re-route a train without telling the train crew co-ordinators. Then, the train driver and the cabin crew call the train crew co-ordinators and ask them what is going to happen with their next journey, but due to that they are not aware of the decision they have no information to deliver⁴².

The positioning of the function in the room affects the communication. Operating Supervisor 3⁵ explained: "The train crew co-ordinators are often end up left out from the information sharing because they do not hear what the employees at the other functions are discussing, both due to the sound level in the room but mainly because of the distance. The customer information manager and the operating supervisor cannot hear what the traffic co-ordinators at North, West, and South, discuss."

⁴¹ IT Co-Ordinator 74 (IT Co-Ordinator, Traffic Control, Division of Planning and Traffic Control, SJ AB) interviewed by Jennie Boérius, 2016-04-14.

⁴² Train Crew Co-Ordinator 2 (Traffic Control, Division of Planning and Traffic Control, SJ AB) interviewed by Jennie Boérius 2016-04-06.

5.1.4 Incoming Phone Calls

Technical Supporter 8, 9, and 12²¹ explained that when they are train drivers and need to make an error report regarding something that considers the safety, e.g. broken doors, it is confusing to know where to call. In TrAppen, there are numbers to technical support, rolling stock managing, and error report. However, the error report is only connected to comfortability and not safety, see Figure 27. Due to that it is the technical support which is in charge of the error report regarding safety questions and rolling stock managing who is in charge of the error report regarding comfortability this is confusing. However, they added that it can easily be solved by adding an extra number called error report - safety and changing the name of the current error report to error report – comfortability, to decrease the number of calls to the wrong function. Another issue is that the train drivers sometimes call the rolling stock managers when they are going to park their trains, due to that they do not check the parking plan themselves²⁴. Creating unnecessary calls.



Figure 27: What it looks like in TrAppen for the train driver driving an X2000.

To get a better understanding of the load of the incoming phone calls to the control room, data were analyzed. In January 2016, SJ Traffic Control Stockholm answered 20,495 phone calls, for the distribution of the calls depending on the functions, see Table 10 (SJ AB:2, 2016). The information co-ordinators are the only ones who do not receive phone calls, since they focus on distributing information from the other functions in the room. The technical supporters had the longest average conversation time while the rolling stock managers had the shortest. During the same month, SJ Traffic Control Stockholm lost 3,462 calls, meaning that they did not answer the calls (SJ AB:2, 2016).

Table 10. Incoming phone calls to SJ Traffic Control (SJ AB:2, 2016).

	Answered phone calls	Average answering time	Average conversation time	Lost calls
Operating supervisor	3%	18sec	1 min 38sec	3%
Customer information manager	2%	20sec	1 min 58sec	2%
Traffic co-ordinators	32%	33sec	1 min 46sec	20%
Technical supporters	23%	55sec	2 min 41sec	32%
Rolling stock managers	22%	28sec	1 min 26sec	19%
Train crew co-ordinators	18%	1 min 9sec	1 min 56sec	24%

The total time spent on the phone per employee at a function is visualized in Table 11. It can be seen that the technical supporters have by far the highest time consumed on the phone, and the customer information manager has the lowest. To calculate it, the following formula was used:

$$\text{Time per employee spent on phone} = \frac{\text{total time on phone}}{\text{average employees at the function}}$$

Table 11. Total time spent on the phone per function (SJ AB:2, 2016).

Function	Total time on phone (h)	Numbers of employees	Time per employee spent on phone (h)
Operating supervisor	46	1	46
Customer information manager	23	1	23
Traffic co-ordinators	282	5	56
Technical supporters	243	2	122
Rolling stock managers	184	3	61
Train crew co-ordinators	197	3	66

During a disturbance, the traffic co-ordinators are receiving phone calls from cabin crew and train drivers. TICO 12² explained that in most cases the cabin crew are calling because they want to acquire information from the traffic co-ordinators. The traffic co-ordinators need to answer the phone when someone is calling from a train because they do not know the reason behind the call. Furthermore, the phone call can be regarding something important. However, the incoming calls from the cabin crew are time consuming. To obtain a better understanding of the situation, both the traffic co-ordinators' and the cabin crew's perspectives are investigated.

5.1.4.1 The Traffic Co-Ordinators' Perspective

According to TICOs 9, 12, 14, and 17², the cabin crew often want information which the traffic co-ordinators do not have or information concerning something which will occur more than 24 hours forward, e.g. track work. During large disturbances, the traffic co-ordinators receive a lot of phone calls which forces them to spend most of their time answering the phone. According to the TICOs, they spend too much time on the phone, which prevents them from trying to find a solution to the problem. TICO 3³ stated: "That the main part of the phone calls from the cabin crew are about information which is available in TrAppen". The TICOs³ explained that it is an old habit and easier for the cabin crew to call and ask for the information than to search for it themselves. Furthermore, TICO 8¹⁵ stated: "The better the quality of the information in XOD, the fewer phone calls the traffic co-ordinators receive from the cabin crew. Consequently, the time the traffic co-ordinators get to solve the problem increases and the phone calls they receive are more relevant. Also, the sooner we distribute the information, the lower the load becomes at our phone lines."

TICO 11² explained that the cabin crew have between 300 and 400 passengers on a train, and they want information during a disturbance. Due to that the cabin crew do not know when the information will be updated, they call the traffic co-ordinators. Another reason why they call is because they want help with the customers' connections. However, if the cabin crew are not satisfied with the information provided during the phone call, they will call back to ask the same questions again². During large disturbances, the traffic co-ordinators do not have time to help the cabin crew and therefore, they explain that they for the moment do not have enough time to help them. Furthermore,

the sooner the cabin crew or train driver call the traffic co-ordinator to inform them about the problem, the better, so that the employees are aware of the problem and can come up with a solution as soon as possible³⁷. The type of information the traffic co-ordinators want from the cabin crew is why the train is standing still, to be able to create a prognosis.

In the first survey, a question regarding how the traffic co-ordinators estimate the relevance of the incoming phone calls was performed. The traffic co-ordinators which participated had three different categories to choose from; necessary, unnecessary, and superfluous. A call is considered to be unnecessary if the wanted information is not yet available, e.g. if the cabin crew call before a solution to the disturbance is found or a decision has been made. A call is considered to be superfluous if the wanted information is already logged in TrAppen. Furthermore, a call is considered to be necessary if it is not unnecessary or superfluous, e.g. a train which cannot leave from the platform due to defects with a door and is therefore delayed, which is why the cabin crew call the traffic co-ordinator to inform about it. On average, 62% of the total incoming telephone calls were necessary, 19% unnecessary, and 19% superfluous, see Figure 28. The average conversation time on the phone for the traffic co-ordinators in January 2016 was 106 seconds and the number of answered phone calls during the same time period was 6,402 (SJ AB:2, 2016). This results in 35.8 hours spent on unnecessary phone calls and 35.8 hours spent on superfluous phone calls.

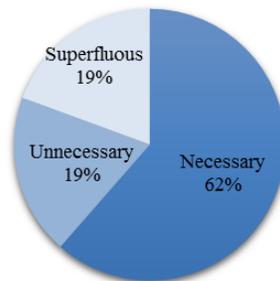


Figure 28. Estimated distribution of the incoming phone calls for the traffic co-ordinators.

Previously, similar studies have, two to three times, been performed at the different functions in the control room. According to the IT Co-Ordinator⁴¹ there were three main purposes; to understand if the information provided from the control room to the different channels were understandable and useful for the cabin crew, to see if the cabin crew knew where to find the information, and to see if the call was made to the correct function. Based on the result, better system support was made to make sure the quality of the information is correct.

5.1.4.2 The Cabin Crew's Perspective

Cabin Crew 1⁴³ explained: "When I am not sure if a customer will catch its connection, I call the traffic co-ordinator to ask if the other train can be held. Also, instead of using the app for reserved replacement transportation services to find out if SJ Traffic Control have booked a bus, I call them and ask". Once SJ Traffic Control Gothenburg informed the interviewed cabin crew member that they had booked busses by sending a regular text message one hour in advance, which was appreciated.

One aspect which Cabin Crew 1⁴³ does not like is when the traffic co-ordinator explains that they need to find the information and call back when they have found it, but then they call back after a

⁴³ Cabin Crew 1 (Service, Division of Traffic and Service, SJ AB) interviewed by Jennie Boénius and Sara Helmrot 2016-04-04.

long time. The cabin crew believes that it is unprofessional to give the costumers the traffic information in the last minute, just before they arrive to their station.

A survey which was performed with the cabin crew showed that 75.5% of the 400 participants admit that the app TrAppen usually provides them with the traffic information needed, but that they usually call SJ Traffic Control in order to get the information confirmed due to uncertainty (SJ AB:3, 2016). When it comes to the app concerning replacement transportation services, 49.5% admit that the app usually provides them the required information but they call the traffic co-ordinators anyway (SJ AB:3, 2016). Furthermore, the same survey showed that 15.4% of the 400 participants thought that they had been very well treated during the conversations with SJ Traffic Control Stockholm (SJ AB:3, 2016). 70.4% stated that they use TrAppen each day concerning deviations of traffic or changes in journeys. Operating Supervisor 3⁵ explained that the distribution of traffic information from the office in Gothenburg is better than the one from Stockholm, partly because Stockholm is responsible for a larger geographical area including more lines and because the employees in Gothenburg make more exceptions from the rules, regarding for instance booking cabs, than the ones in Stockholm do.

5.1.5 Education

To obtain deeper knowledge about the different functions, one alternative is to acquire a double or triple competence. An employee who has a double or triple competence has the knowledge and skills to work at two or three functions. However, there is currently an unevenness in the distribution of double competences, e.g. there are more traffic co-ordinators whom have competence within rolling stock managing, but almost no train crew co-ordinators whom have competence in another function. There are three ways of acquiring a double or triple competence; asking for it, applying for it, or being asked by the managers. Multi Competencers 1⁴⁴, 2⁴⁵, 3⁴⁶, and 4⁴⁷ stated that since they got more competences they have obtained a wider perspective resulting in wiser and better decisions for more than one function. None of them regret their choice of obtaining more competences, rather the opposite, they only find positive aspects with it. Train Crew Co-Ordinator 4⁴⁸, who only has competence for one function, explained: “When I am working with someone who has more than one competence, I can tell that they have a different way of solving problems and they make their decisions based on more than one function’s point of view”. According to TICO 16²⁰, 19³⁹ and 20⁴⁰, which do not have a double competence, the advantages of obtaining one are mainly to get a better understanding of the work in the control room, and to be able to keep more aspects in mind during the decision making process. Further, more than one competence results in faster decision making, less re-decision making, correct decisions sooner and solutions which are economically beneficial for SJ.

⁴⁴ Multi Competencer 1 (Traffic and Information Co-Ordinator and Rolling Stock Manager, Traffic Control, Division of Planning and Traffic Control, SJ AB) interviewed by Jennie Boérius 2016-04-07.

⁴⁵ Multi Competencer 2 (Traffic and Information Co-Ordinator and Customer Information Manager and Operating Supervisor, Traffic Control, Division of Planning and Traffic Control, SJ AB) interviewed by Jennie Boérius 2016-04-11.

⁴⁶ Multi Competencer 3 (Traffic and Information Co-Ordinator and Rolling Stock Manager and Operating Supervisor, Traffic Control, Division of Planning and Traffic Control, SJ AB) interviewed by Jennie Boérius 2016-04-11.

⁴⁷ Multi Competencer 4 (Traffic and Information Co-Ordinator and Rolling Stock Manager, Traffic Control, Division of Planning and Traffic Control, SJ AB) interviewed by Jennie Boérius 2016-04-11.

⁴⁸ Train Crew Co-Ordinator 4 (Traffic Control, Division of Planning and Traffic Control, SJ AB) interviewed by Jennie Boérius 2016-04-07.

Multi Competencer 1⁴⁴ stated: “After I received my second competence I became more independent. When I am working with traffic coordinating there is no need for me to ask the rolling stock managers where the re-routing of the train can take place, because I have that knowledge. This saves both time and increases the quality of my work”. Multi Competencer 4⁴⁷ explained that the second competence contributed to versatility and deeper understanding, resulting in a better decision making process. Multi Competencer 4⁴⁷ and 5⁴⁹ stated that many employees believe they know what the other functions do, but they really do not until they get a competence for the other functions. The more functions the employees understand in the control room, not just knowing what they do but really understand them, the better they will be at their own job. If more employees in the control room would have a double competence they would have a deeper understanding in what the other functions do, which would contribute to better communication^{46,49}. Multi Competencer 3⁴⁶ stated: “When I work as an operating supervisor I know what information the rolling stock managers and the TICO’s need, which leads to faster and a more clear communication in the room”.

TICO 16²⁰ stated that the ones who have a double or triple competence are more stable than the others during the stressful situations. The interviewed employees with double or triple competence explained that more competences are good and more employees in the control room should have it^{44,45,46,47,49}. Multi Competencer 1⁴⁴ stated that it should be voluntary and not be obruded; the employee must make the decision not the managers. TICO 19³⁹ explained that a disadvantage is that the ones which have multi competences are exploited by SJ because they do not obtain an increased salary. Double or triple competences do not give an increase of the employees’ salaries (Office Manager of Traffic Control Stockholm, 2016). However, The Personnel Planner⁵ explained that the employees in the room get individual wages which means that those who are hardworking get higher salaries. Therefore, the employees with double or triple competence have a higher chance of negotiating higher salary.

In a survey which was performed in the control room, two questions regarding what effect more employees acquiring a double or triple competences would have in the room as well as what the employees wanted in return for obtaining another competence. To the first question the majority, 60%, answered a positive effect, and 19% answered both positive and negative, due to that the front edge competence will be lost. Figure 29 shows the result. To the second question the majority, 52%, answered that they wanted an increase in their salary. Included in the answering alternative “Other”, for the second question were comments like; more feedback from function managers and better software.

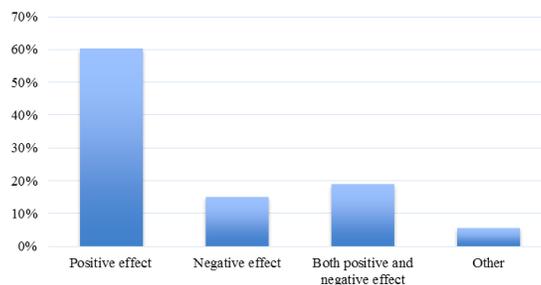


Figure 29. What the employees want in return for a double or triple competence.

⁴⁹ Multi Competencer 5 (Traffic and Information Co-Ordinator and Train Crew Co-Ordinator, Traffic Control, Division of Planning and Traffic Control, SJ AB) interviewed by Jennie Boérius 2016-04-11.

A disadvantage of having more than one competence might be they will not have a front edge competence at neither of the functions which the ones who only work at one function can achieve, due to that there is a lot to remember and keep track on²⁰. However, this depends on that the software are continuously updated and they have to relearn the details^{46,47}. Multi Competencer 2⁴⁵ explained: “I work as a TICO once a month, and do not find it hard to remember the work tasks”. All employees are not made for having multi competences⁴⁹. TICO 20⁴⁰ explained that it depend on who the employee is, some do not completely remember their work tasks of one function and those employees should not have a double competence. For employees that cannot make decisions or are sensitive to stress, a double competence is not appropriate. Operating Supervisor 3⁵ explained that everyone in the room do not want to obtain a double competences.

For Multi Competencer 2⁴⁵ 4⁴⁷ and 5⁴⁹ it took approximately one year to learn a function and feel comfortable with it. It takes a year due to that disturbances occur differently and affect the work in different ways, as well as that the employees has to learn from their mistakes. Multi Competencer 4 explained: “During my training as a rolling stock manager, I did not receive useful feedback regarding the tasks I performed and the training was poor. Today the feedback is better, but it can be improved”. Multi Competencer 2⁴⁵ stated that the feedback and support needed during the education was lacking, both from the colleagues and managers, and even today the need of feedback should be improved.

The third survey showed that the employees were not satisfied with the education they have received, dating back to 2011. Currently there is no formal education for employees at a new function. They are following a colleague according to the concept learning by doing and hence, the education depends on the teacher. The survey showed that the employees were not satisfied with the time provided for the education, the education material, or the feedback they received during their education, to be able to improve their way of working. However, an example of what they can learn from each other is to pre-record greeting messages. TICO 8¹⁵ has recorded a greeting message, giving the employee time to breathe and relax between the phone calls. The pre-recorded greeting message also eliminates the greeting to be unclear or too fast, which happens during stressful situations.

5.1.6 Attitude in the Room

The employees’ attitude towards their work was investigated in the second survey. 45% believed that they perform their work in an ideal way, while 34% believed they do not. Furthermore, 93.2% were open minded to learn new ideal work procedures and 91.2% were willing to receive suggestions to improve their own work procedure from all colleagues, while 88.1% were willing to help all their colleagues in the room. Additionally, 86.4% were interested in knowing what their colleagues at the other functions are doing. These numbers show that the employee have a high willingness to learn from and teach each other. To understand what the employees think concerning the feedback they receive from their colleagues and supervisors, two statements were made in the third survey. They were regarding if the employees are acknowledged when they do a good job, if they receive the feedback they need and the support they need to perform their work tasks in a good way. The employees rated them approximately 3.7 and 3.2, for their co-workers and supervisors respectively, at a scale ranging from one to five. The function which was most satisfied with the support and feedback from colleagues was the technical support, which had an average of 4.2. In this area, they were also the least satisfied with their managers and rated their support and feedback as 2.8. It should be noticed that they have other managers than the other functions.

To understand whether the employees trust the information provided in the control room, a question regarding where they look for traffic information when they are about to travel with SJ was asked, in the second survey. The result is displayed in Figure 30 below, and shows that 22% of the participants use an information channel which SJ’s customers do not have access to. Out of these, eleven percent get in touch with a colleague to receive more information. This means that the employees working with providing the customers with information, do not trust the information themselves and are using internal channels to find the information wanted. Further, it also shows that the employees working for SJ are not using the information channels which the other departments at SJ want the customers to use; the app or the website.

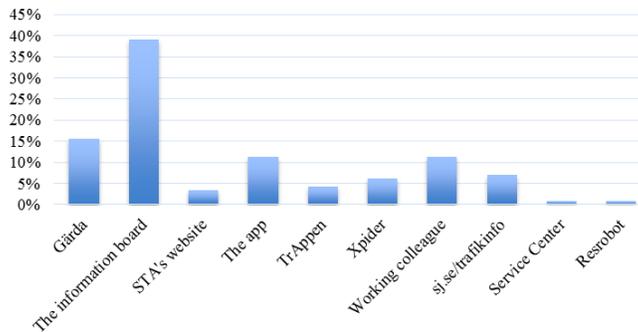


Figure 30. Where the employees look for traffic information while travelling.

The workload for the different functions in the control room is varying depending on disturbance. The Personnel Planner⁵ explained: “During a disturbance some employees are working hard while others have nothing to do and instead of helping their co-workers they are talking about private matters”. The Personal Planner believes that it needs to be changed but is not sure whether it is an organizational or a scheduling problem.

5.1.7 Key Drivers of Job Satisfaction

In the second survey performed in the room, a question regarding if the employees thought their job was challenging and resulted in personal development was asked. 81% answered yes and 14% no. Key drivers of job satisfaction were analyzed in the third survey.

In the second survey it was found that all employees are not invited to activities outside work which are called activities for SJ Traffic Control employees, and created by the employees themselves. To understand if the employees are satisfied with their social relationships in the control room, this was further investigated. The employees rated their social relationships at an average of 3.5. For the employees who have a triple competence, their values were all highly above the satisfied level. Though, there is a difference between the functions. The operating supervisors had the highest average and the function which was the least satisfied with the social relationships in the control room were the train crew co-ordinators. Moreover, for the information co-ordinators only working with information coordinating, their values were low as well. What is interesting in the results is that the technical supporters and the train crew co-ordinators are the only ones who do not agree to the statements *I am included in social activities in the control room* and *I am included in activities outside of work, which I am interested in, with my colleagues in the control room*.

5.1.7.1 Employee Survey PLS-PM

The model for job satisfaction was analyzed in SmartPLS and the results are presented below. The composite reliability values, for employee survey three, were all within the limits 0.7 and 0.95, concluding that the measure variables measure the same phenomenon. The values for composite reliability and for AVE are displayed in Table 12. The AVE values were all above the benchmark of 0.5, which means that there is convergent validity. There is indicator reliability since the outer loadings were above 0.7, except for five which were just below 0.7, as can be seen in Table 13. The data were significant since all t-values were over the benchmark 1.96, is displayed in the same table.

Table 12. Quality criteria composite reliability and average variance extracted.

Construct	Composite Reliability	AVE
Communication & Teamwork Satisfaction	0.915	0.547
Scheduling Satisfaction	0.894	0.737
Relations & Support Value	0.928	0.593
Job Satisfaction	0.917	0.786
Job Loyalty Intention	0.886	0.722

Table 13. Outer loadings and t-values.

Construct and Measurement Variable	Employee Survey 3 (n=50)	
	Outer Loading	t-value
Communication & Teamwork Satisfaction		3.432
CE1. I am satisfied with the communication between my function and the other functions in the control room	0.820	8.550
CE2. It is easy to get the other functions' attention in the control room	0.787	6.275
CE3. The other functions in the control room listen to me	0.726	8.305
CI1. I am satisfied with the communication between my colleagues within my function	0.677	5.613
CI2. It is easy to get my colleagues' attention within my function	0.649	4.762
CI3. My colleagues within my function listen to me	0.655	5.907
TWI1. I am satisfied with the collaboration within my function	0.768	6.341
TWI2. My colleagues at my function help me when I have a high workload and ask for help	0.783	6.681
TWI3. My colleagues at my function offer to help me when I have a high workload	0.770	6.945
Scheduling Satisfaction		3.260
SC1. I am satisfied with the schedule I receive the 15th each month	0.877	22.342
SC2. The schedule is individually adjusted for me and my needs	0.893	27.164
SC3. I appreciate that the schedule is varying	0.803	9.091
Relations & Support Value		2.366
M1. My manager is available when needed	0.765	8.164
M2. My manager wants to hear about my problems	0.757	7.616
M3. My manager endeavors, for me to feel as good as possible at work	0.876	12.820
M4. I have confidence in my manager	0.765	8.747
SFM1. I get recognition when I do a good job	0.810	12.353
SFM2. I receive the feedback I need to be able to perform my job in a good way	0.808	11.292
SFM3. I receive the support I need to be able to perform my job in a good way	0.820	13.257
SR1. I am satisfied with my work relations in the control room	0.608	7.525
SR2. I am included in social activities in the control room	0.687	7.927
Job Satisfaction		7.126
JS1. I am satisfied with my job	0.895	32.673
JS2. I like what I am doing at my job	0.874	19.101
JS3. It was a good decision to start working here	0.891	24.449
Job Loyalty Intention		
LI1. I am considering to recommend my work place to my friends	0.909	16.927
LI2. I will recommend my work place to my friends	0.843	10.883
LI3. I will say positive things about my job to other people	0.793	11.956

All HTMT values were below 0.9, except for one which was very briefly above 0.9, as can be seen in Table 14 below. This means that the constructs are distinct from each other.

Table 14. HTMT discriminant validity criteria.

bc bootstrap 97.5% upper confidence interval limit	Communication & Teamwork			Job Loyalty	Job	Relations & Support
	Satisfaction	Intention	Satisfaction	Satisfaction	Value	
Job Loyalty Intention	0.594					
Job Satisfaction	0.638	0.908				
Relations & Support Value	0.521	0.797	0.746			
Scheduling Satisfaction	0.471	0.803	0.828	0.814		

When looking at the R-square values in Table 15, it can be concluded that the constructs explain 47% of the job satisfaction and that the job satisfaction explains 39% of the job loyalty. Meaning that there are other factors which explain the remaining 53% of job satisfaction. Since the R-square values were above the benchmark value of 0.35, it can be concluded that the results support the hypothesis of the model. The f-square values, in Table 16, shows that the exogenous construct relations and support value has a small predictive relevance on the endogenous construct job satisfaction. It can also be seen that the communication and teamwork satisfaction as well as the scheduling satisfaction have a medium predictive relevance on job satisfaction. Furthermore, the job satisfaction has a very large effect on job loyalty.

Table 15. Quality criteria R-square.

	R Square
Job Satisfaction	0.470
Job Loyalty Intention	0.387

Table 16. Quality criteria f-square.

Exogenous Construct	Endogenous Construct	
	Job Satisfaction	Job Loyalty
Communication & Teamwork Satisfaction	0.168	
Scheduling Satisfaction	0.196	
Relations & Support Value	0.093	
Job Satisfaction		0.631

The hypothesis was that communication and teamwork satisfaction, scheduling satisfaction, as well as relations and support value lead to job satisfaction. The path coefficient from communication and teamwork satisfaction to job satisfaction was 0.306 (t-value = 3.432), from scheduling satisfaction to job satisfaction was 0.376 (t-value = 3.260), and from relations and support value to job satisfaction was 0.263 (t-value = 2.366). Meaning that the three constructs have positive relationships with job satisfaction and that the scheduling satisfaction has the strongest relationship with job satisfaction. The hypothesis also explained that job satisfaction leads to job loyalty intention. The path coefficient from job satisfaction to job loyalty was 0.622. Thus, job satisfaction and job loyalty intentions have a positive relationship.

5.1.8 Empirical Data

The time it takes to walk between different functions and the time needed to perform different activities, concerning distributing traffic information to the customers, were measured. Furthermore,

to investigate the influence of the environmental factors lighting and sound, the illuminance level and the sound pressure level were measured.

5.1.8.1 SAM

The time it takes to walk between the different functions, was measured. Data were also collected regarding how long time it takes to log in XOD, to post an occurrence at the website sj.se/trafikinfo, and to send out a text message. The results will be explained below and the collected data can be found in Appendix M.

Walking Time

The employees in the control room walk between the different functions to either deliver or receive information. Most often, the traffic co-ordinators (TCOs) walk over to the information co-ordinators to verbally transmit information which they should distribute to customers, SJ, and the STA. Another example is when the information co-ordinators walk to the TCO to ask about information they need to distribute. The TCO which has been considered in the following collected data are West, since that function is responsible for the high speed trains between Stockholm and Gothenburg. When the data were collected, XOD and Text were equally far away from the TCO, while Web was located a bit further away. The time it took to walk between the different functions is displayed in Figure 31. The time was measured from when the employee rose from the chair, walked to the other function and back, and sat down again.

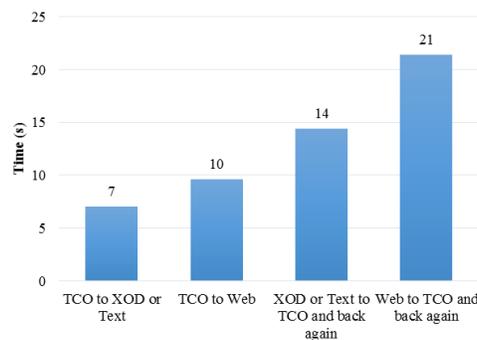


Figure 31. Walking time between the functions.

As can be seen in the figure above, the time it takes to walk between Web and the TCO was measured to be the longest. This is due to the distance but also because of a mobile file cabinet which is located in the middle of the desktops of the information co-ordinators. Hence, when the employee at Web walks to the TCO, it is disturbing for the employee at XOD, since that employee has to move so that Web can pass⁵⁰.

XOD

How long time it takes to log occurrences as well as decisions and appropriate actions in XOD were timed. Figure 32 shows the total time it takes to perform either of the loggings. The two bars to the right, occasion eleven and twelve, display the time it took to create an occurrence. The mean time it took to create either an occurrence or a decision and appropriate action was 72 seconds. It should be noticed that it was only two occasions for measuring the time it takes to create an occurrence, and ten for make a decision and appropriate action, since creating occurrences happens more seldom.

⁵⁰ Traffic and Information Co-Ordinators (Traffic Control, Division of Planning and Traffic Control, SJ AB) observed by Sara Helmrot 2016-02-23.

However, the employees in the room estimate that it takes the same amount of time to log the two alternatives.

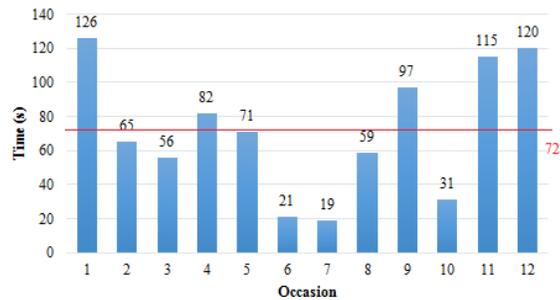


Figure 32. The total time to create an occurrence or make a decision and take an appropriate action in XOD.

Moreover, Figure 33 shows the total time it took to make a decision and appropriate action, the mean time was 63 seconds. The longest time it took to create an occurrence or to make a decision and appropriate action during the measure was 126 seconds.

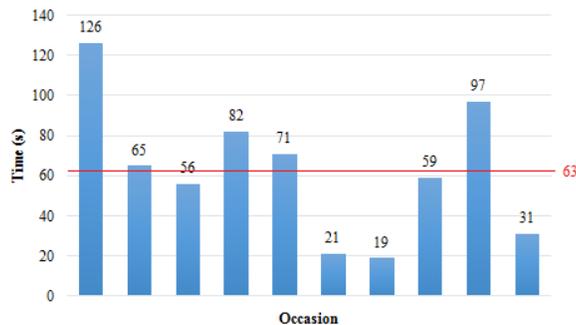


Figure 33. Total time to make a decision and make an appropriate action in XOD

Creating a decision and appropriate action can be divided into different activities which need to be performed. Depending on if the employee decides to only log in XOD, publish the information in TrAppen, or sending the information in an email, different actions are taken. Hence, some actions are not taken during all measurement occasions. In Figure 34 below, the total time has been divided in the times it takes for each of these activities. Furthermore, the percentage of the total time it took to perform each activity is demonstrated in Figure 35. When creating an occurrence the activities are somewhat difference compared to creating a decision and appropriate action, see Appendix M.

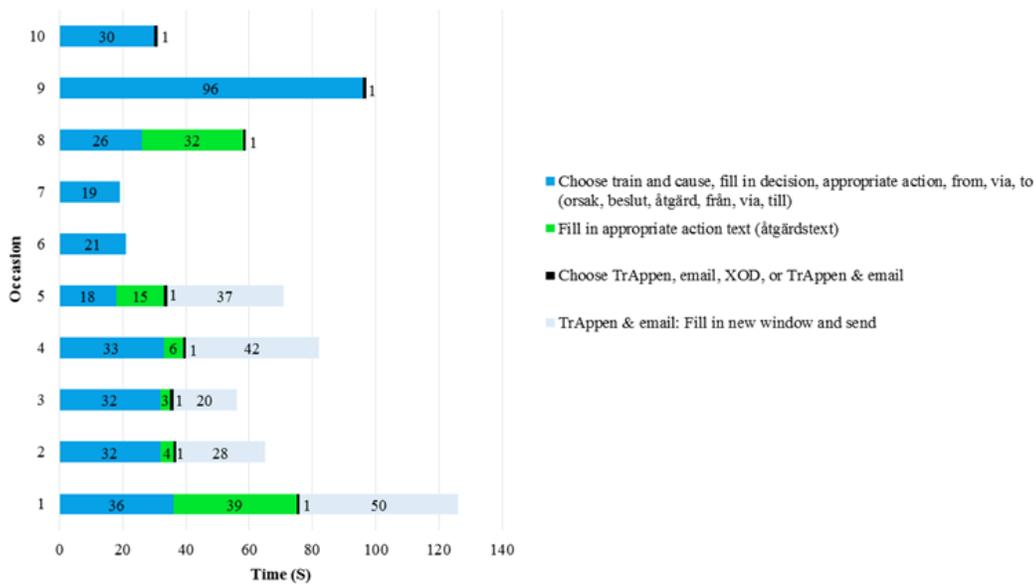


Figure 34. Time for activities in creating a decision and action in XOD.

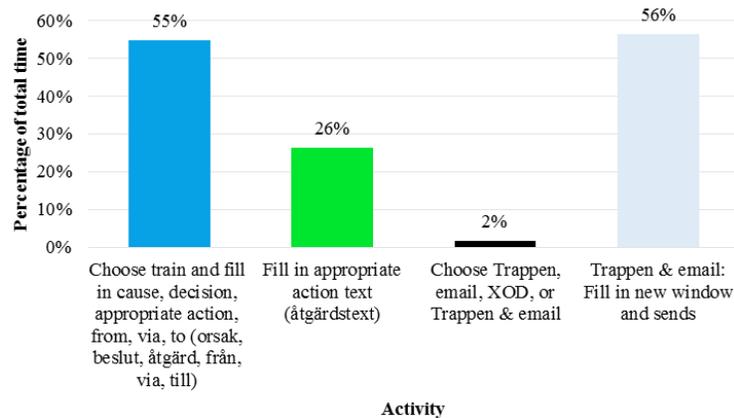


Figure 35. Percentage of total time for each activity.

Most time is spent on the first and last activity. According to TICO 6⁵¹, finding an appropriate cause to the disturbance, from the list of causes, takes the longest time in the task of logging in XOD.

Website

The work task at Web is performed by creating separate occurrences at the website, which consist of the actions; finding a suitable template, modifying the template, and specifying the train numbers. The objective of using templates is to make sure that the information always is posted in a similar way, no matter who is working at Web⁵². The total time it took to post an occurrence at the website is displayed in Figure 36. The mean time was 92 seconds, and the longest time of the measurement occasions was 197 seconds.

⁵¹ Traffic and Information Co-Ordinator 6 (Traffic Control, Division of Planning and Traffic Control, SJ AB) interviewed by Sara Helmrot 2016-02-17.

⁵² Traffic and Information Co-Ordinator 8 (Traffic Control, Division of Planning and Traffic Control, SJ AB) interviewed by Sara Helmrot 2016-02-10.

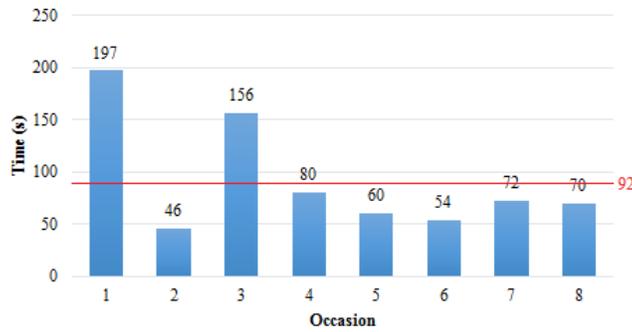


Figure 36. Total time to create a separate occurrence at the website.

The work task of creating a separate occurrence at the website can be divided into two activities; finding a template as well as modifying it and specifying the train numbers. The time it took for each activity is illustrated in Figure 37. As can be seen the most time is spent on modifying the template and specifying trains.

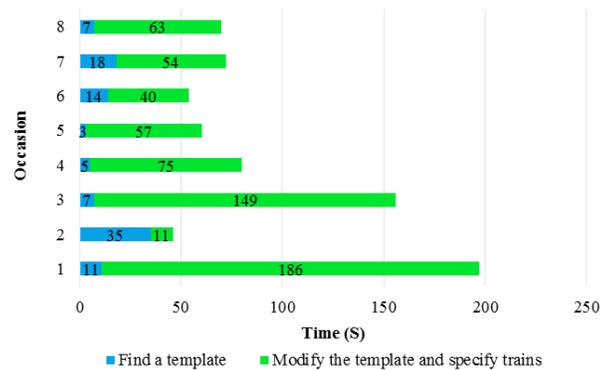


Figure 37. Time to perform the two activities included in creating a separate occurrence at the website.

The mean time it took to find a template was 13 seconds and the mean time for modifying it and specifying the train numbers was 79 seconds, which is 14% and 86% of the total time. This is shown in Figure 38.

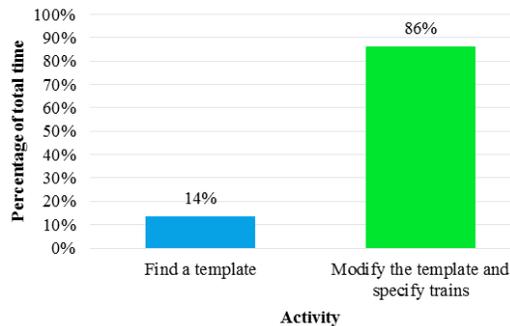


Figure 38. Percentage of total time for each activity.

Text Message

To send text messages, the first thing that has to be done is to find the affected customers. After that, an appropriate text message template needs to be found. The employee at Text can also choose to not use a template. The template needs to be rewritten and the sender of the text message, which is

always SJ AB, needs to be stated⁵³. When this is done, the text message can be sent to the affected customers. Then, the employee logs the sent text messages in XOD. The total time it took to send text messages is displayed in Figure 39. The longest time it took to send out the text messages during the measurement occasions was 321 seconds. The mean time for the employees to send out text messages was 162 seconds. It should be noticed that sometimes, it took shorter time when several text messages are sent out for the same train when the same template can be used. Therefore, some of the measured occasions do not include finding an appropriate template since it has already been done. Another thing to bear in mind is when a text message is sent to many customers it takes a long time for the software to send it. For example, regarding occasion eleven - when it took 210 seconds, the template had already been found and therefore, zero seconds were spent on finding a template, but it took 110 seconds just for the software to send the text messages.

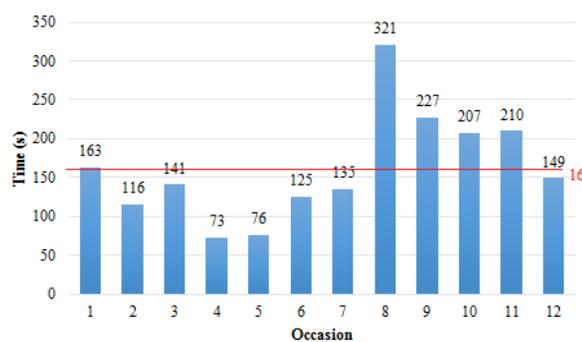


Figure 39. Total time to send out text messages.

The activities which are required when sending out a text message and the measured time for each of them are illustrated in Figure 40.

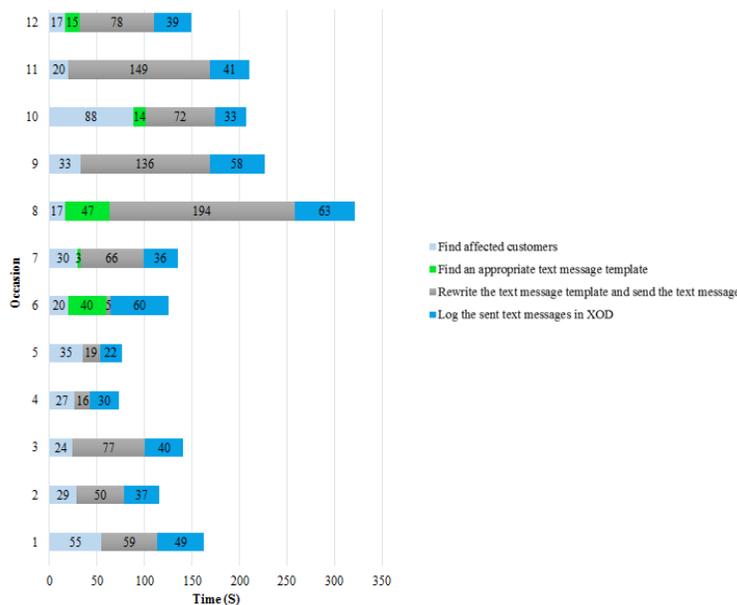


Figure 40. Time to perform each activity to send out text messages.

⁵³ Traffic and Information Co-Ordinator 12 (Traffic Control, Division of Planning and Traffic Control, SJ AB) interviewed by Sara Helmrot 2016-02-16.

The percentage of the total time spent on the different activities is shown in Figure 41. Most time was spent on rewriting the text message template and sending the text messages. During the data collection, it was noticed that the employee at Text also spends time on switching between different computers software⁵⁰. It was also noticed that it takes quite a while for the software to send out the text messages, when there are many to be delivered.

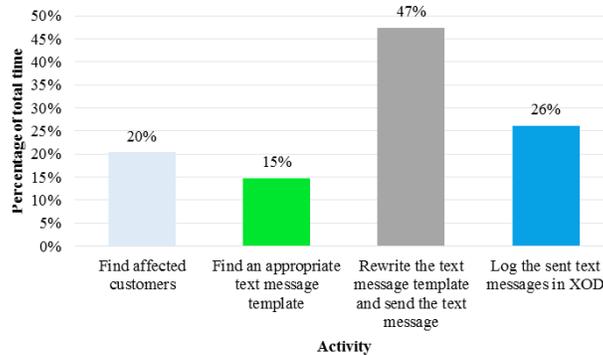


Figure 41. Percentage of total time for each activity.

5.1.8.2 Observations at Information Coordinating

During the data collection, it was noticed that sometimes, the employees at XOD, Text, and Web need to look up information while logging or posting it, which added time to their process. The information co-ordinators were often interrupted when filling in information, because other employees wanted to receive or deliver information⁵⁰. There were errors in the software, which sometimes forced the employees at XOD and Text to wait or start over with their work tasks⁵⁰. Some information co-ordinators copied and pasted with the computer mouse instead of using hotkeys, which requires more time than copying and pasting with the keyboard⁵⁰.

5.1.8.3 Environmental Factors

To find out if the illuminance level, was at an appropriate level for the employees to perform their work tasks, different places in the room were measured. To obtain a deeper understanding, interviewees about the lighting in the room were performed as well. Further, to find out if the sound level in the room was disturbing or harmful to the employees, the sound pressure level was measured during occasions with different operating levels. Since noise is subjective, employees in the room were interviewed about it.

5.1.8.4 Illuminance

In Figure 42 are the measurement points for the outer surroundings displayed as pink circles containing the numbers one to seven. The other two areas, immediate surroundings and work area, are indicated in the same figure, as pink circles with the letters A to V. The measured values were compared to what the SWEA recommends. The measured illuminance for all areas are presented in Appendix N.

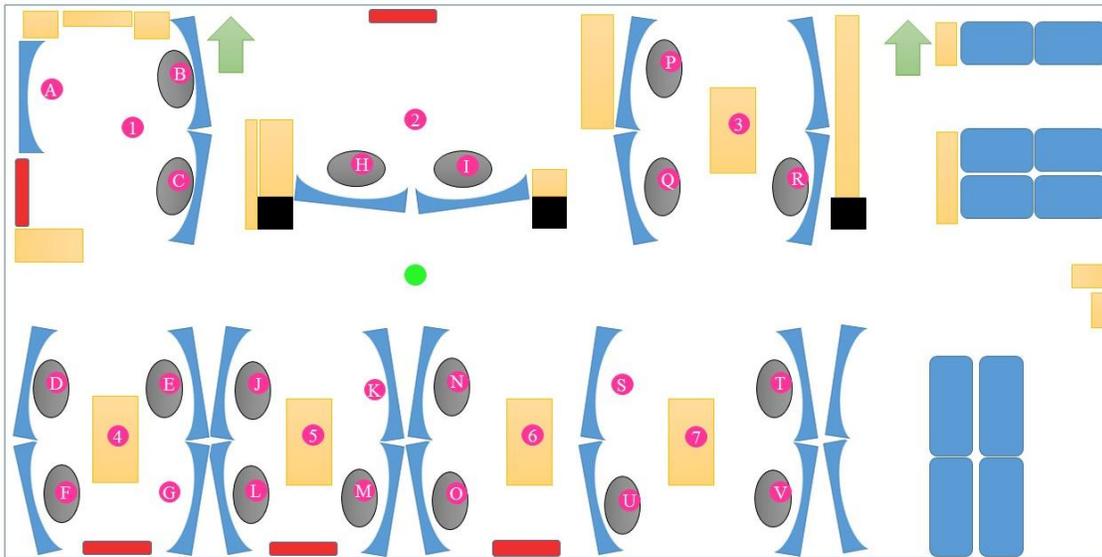


Figure 42. Lighting and sound measurement points.

Regarding the outer surroundings, with the limit of 100 lux, the illuminance for the positions two and three were lower than the limit for three out of four measurement occasions. Position number four was the only one which had an illuminance in the outer surroundings above the limit. The outer surroundings for the position seven was nearly above the limit for all measurement occasions. The result is displayed in Figure 43.

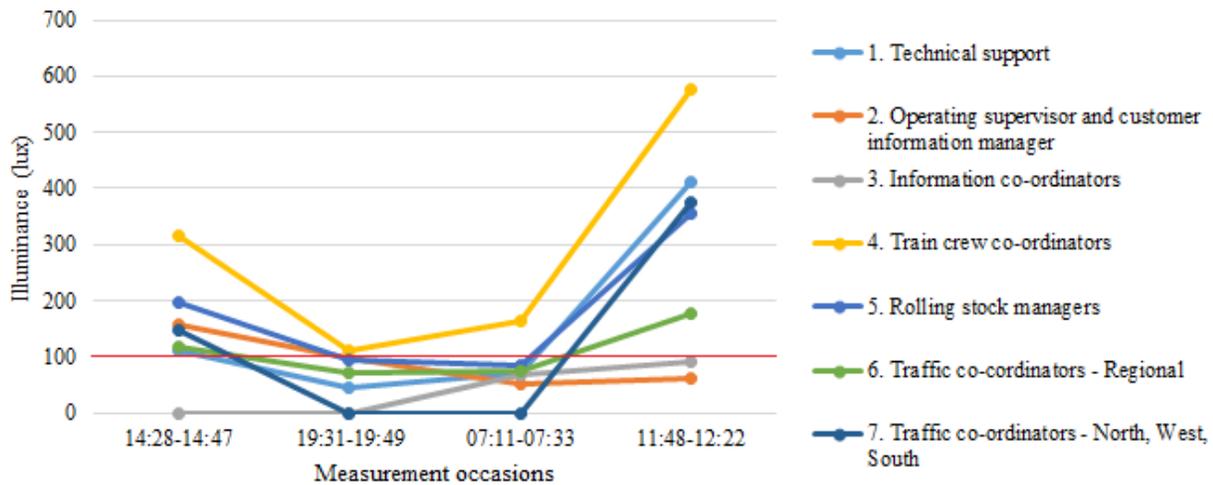


Figure 43. Illuminance in the outer surroundings.

The SWEA recommends 300 lux for the immediate surroundings and several of the functions have a lower illuminance; A, B, and C – a part from one measurement occasion, E, H, I, J, K, N, O, P, Q, R, S, and U. A has one measurement above the limit, but three were below. Hence, the train crew co-ordinators have the best illuminance in the immediate surroundings, which can be explained by the fact that they have windows in the corner. However, their desktops were not above the limit when the sun was down. An average illuminance of the immediate surroundings for each of the seven areas are illustrated in Figure 44 below.

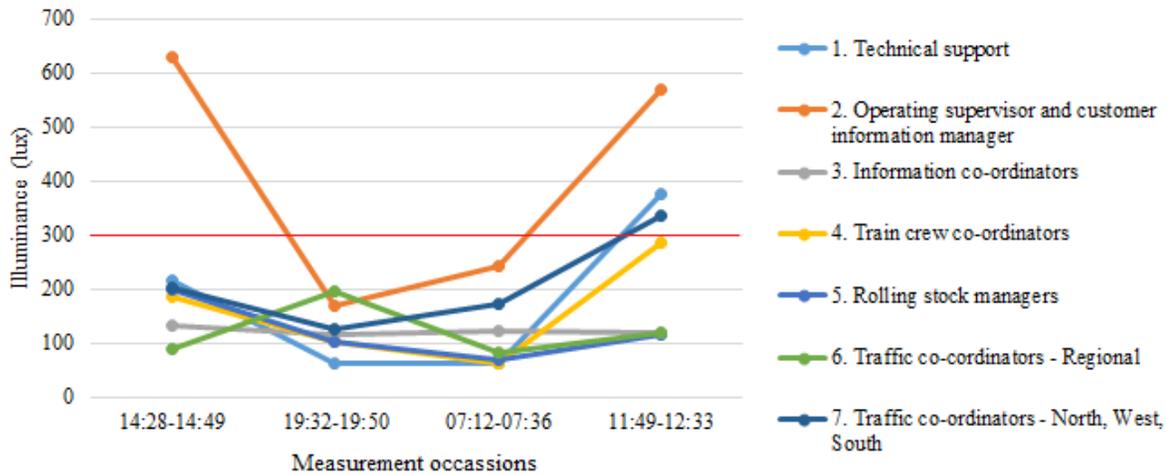


Figure 44. Average illuminance in the immediate surroundings.

The work area should have an illuminance of 500 lux and most workplaces in the control room do not reach that limit; B, C - apart from one measurement, E, H, I, J, K, L, M, N, O, P, Q, R, S, T, U, and V. B has a illuminance above the limit during a sunny day, but is otherwise below the limit. The train crew co-ordinators generally have the best illuminance in their work area, but are still not able to meet the requirements. The average illuminance for each of the seven areas, concerning the work area, are illustrated in Figure 45.

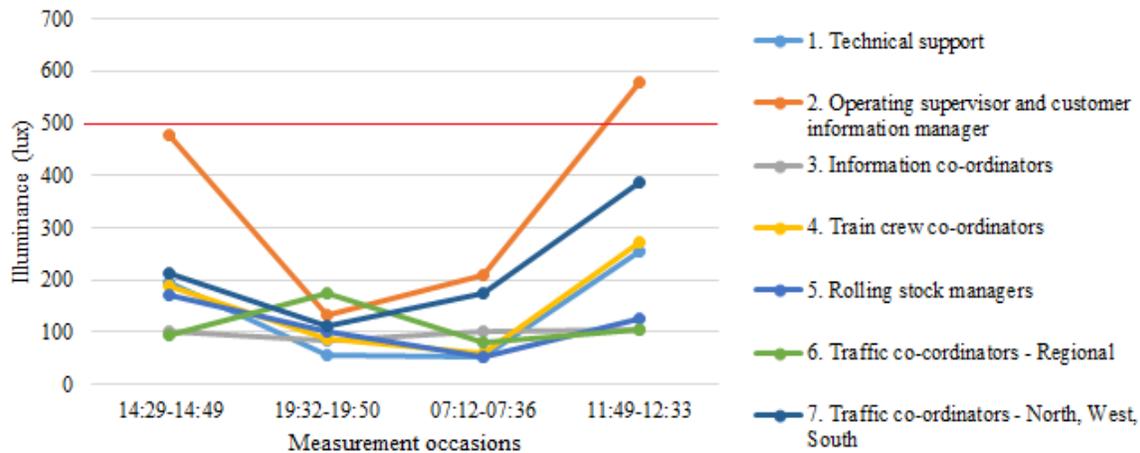


Figure 45. Average illuminance in the work areas.

It can be concluded from the results that the illuminance level for the immediate surroundings and the work area was too low. The illuminance level for the outer surroundings needs to be improved at several desktops. However, the employees in the control room have the possibility to adjust the lighting at the work stations themselves, meaning that they have chosen to not have a higher illuminance level than measured.

TICO 3⁵⁴ and 15⁵⁴ experience that the ceiling lights shine in their eyes and therefore, it is nice to be able to adjust the other two lamps. The lamps which were hanging down from the ceiling can spread

⁵⁴ Traffic and Information Co-Ordinator 3 & 15 (Traffic Control, Division of Planning and Traffic Control, SJ AB) interviewed by Sara Helmrot, 2016-04-12.

light both upwards and downwards. The employees choose themselves to turn on the light upwards, or downwards, or both. The light shining upwards has weaker light than the light shining downwards. The lamp which is hanging from the ceiling and is directed downwards shines too bright and therefore, the employees do not use it^{54,55}. Furthermore, the spot lights could be adjusted in height and sideways. Hence, the employees have control over two out of the three light sources. TICO 2⁵⁶ believes that it is important for the employees to be able to affect their own desktops, to have the influence to make it as they prefer. Additionally, all employees could choose to use the blinds if the sun was bright. TICO 15⁵⁴ believes that the problem with the lighting in the room is that it becomes too bright. According to TICO 3⁵⁴ and 15⁵⁴, the sunlight gets them blinded during the afternoon.

5.1.8.5 Sound Pressure Level

The control room has a carpeted floor and soundproofing boards in the ceiling. The chairs, stools, and couches are upholstered and coated with fabric. Apart from this, and thin blinds, there are no textiles in the room. Hence, the only soundproofing means are the roof and the broadloom. The sound level was measured at seven occasions during different times and operating levels. Since the exposure time also has an influence on the noise, the sound level was combined with the exposure time of eight hours. This resulted in a so called equivalent A-weighted sound pressure level exposure, which is the average during a specified exposure time, see Table 17 below. This A-weighted sound pressure level exposure was compared to the SWEA's limits.

Table 17. Sound pressure level

Mesurement occasion	1	2	3	4	5	6	7
Mean sound pressure level	50.3	47.5	50.5	51.1	53.8	53.9	54.2
Calculated A-level sound pressure level, during eight hours	50	47	50	51	53	53	54

The control room belongs to the third type of work environment presented by the SWEA. In the room it is of importance to be able to have conversations and to be perceptive. The maximum permitted sound pressure level for that work environment is 55dB. As can be seen from the table above, the highest A-weighted sound pressure level in the room was measured to be 54dB. It can be concluded that the noise level was below the permitted maximum level. It should be added that since the measurement point is located in the middle of the room, illustrated by a light green circle in Figure 42 above, the sound pressure level at the different work areas might be higher or lower than the measured values. The most common operating levels were measured. The noise level increases with the operating level, as can be seen from the results.

When the workload increases, the employees in the control room talk less to each other due to lack of time, which impairs the communication in the room². Additionally, they talk louder³. The noise level in the room is partly due to that if employees at the different functions at different locations in the room are involved, they start to shout information to each other because they do not bother to walk¹². At a scale ranging from one, strongly disagree, to five, strongly agree, the 50 employees participating in survey three rated the statement *I am generally satisfied with the sound level in the*

⁵⁵ Traffic and Information Co-Ordinator 5 and 8 (Traffic Control, Division of Planning and Traffic Control, SJ AB) interviewed by Sara Helmrot, 2016-04-07.

⁵⁶ Technical Support 6 and Traffic and Information Co-Ordinator 2 (Traffic Control, Division of Planning and Traffic Control, SJ AB) interviewed by Sara Helmrot, 2016-04-07.

room as 3.4. The participants rated the statement *I can focus on my work tasks without being affected by the noise level* with 3.3. Furthermore, on the statement *I can receive information without being affected by the noise level*, they answered 3.3. The results showed that the employees generally neither believe that the noise level was good nor bad. The interviews are in line with this result since they have shown that some employees are really disturbed by the noise level^{12,15,57,58} and some are not^{59,60,61}. For instance, TICO 14¹² stated: "...The noise level makes it more difficult to communicate with others." and TICO 8¹⁵ explained: "...The noise level affects my stress level. An example is when I am talking on the phone. Then, it is very important to understand what that person is saying and the phone call needs to go fast, but I barely hear what the other person is saying." Though, there is a difference between the different functions. The train crew co-ordinators and the operating supervisors were the least satisfied with the noise level. The customer information managers were the most satisfied with the noise level. The technical supporters might not mind the noise level that much since they have acquired headphones with double headphones so that they hear better when they are on the phone. However, Technical Supporter 2⁵⁸ believes that the headphones absorb the sound very well, making it difficult to hear what the colleagues, within the same function, are discussing.

5.1.9 Information Channels Towards the Customer

There are different information channels which reach the customer directly. According to the CRM Manager⁴, "SJ want to give their customer confidence-inspiring traffic information and offer the right information at the right time". The CRM Manager⁴ and the Channel Manager⁶² states that depending on if the customer is travelling frequently or not, different information channels should be used. The customers who do not travel frequently should be referred to the website while the customers who travel frequently should be referred to the app. In this chapter, the information channels towards the customers are explained.

5.1.9.1 Train Driver and Cabin Crew

The traffic information which the train drivers and cabin crew are supposed to inform the customers on board the train is explained in detail in some documents (SJ AB:4, 2016). Examples of what the train driver informs the customers about are: salutatory announcements before and after departure, announcements before arrival, announcements during the journey including planned stops, distance between the train and the platform, announcements during disturbances. Technical Supporter 7⁶³ stated: "When driving the train I need to inform the customers regarding everything, even planned stops which do not affect the journey. SJ are providing their customers with too much and unnecessary information, affecting them negatively".

⁵⁷ Traffic and Information Co-Ordinator 2 (Traffic Control, Division of Planning and Traffic Control, SJ AB) interviewed by Sara Helmrot, 2016-04-12.

⁵⁸ Technical Support 8 (Traffic Control, Division of Traffic and Service, SJ AB) interviewed by Sara Helmrot, 2016-04-12.

⁵⁹ Traffic and Information Co-Ordinator 1 (Traffic Control, Division of Planning and Traffic Control, SJ AB) interviewed by Sara Helmrot, 2016-04-12.

⁶⁰ Rolling Stock Manager 4 (Traffic Control, Division of Planning and Traffic Control, SJ AB) interviewed by Sara Helmrot, 2016-04-12.

⁶¹ Train Crew Co-Ordinator 3 (Traffic Control, Division of Planning and Traffic Control, SJ AB) interviewed by Sara Helmrot, 2016-04-12.

⁶² Channel Manager (Channel Manager Customer Service, Sales Channels, Division of Market and Sales, SJ AB) interviewed by Jennie Boérius and Sara Helmrot 2016-03-16).

⁶³ Technical Supporter 7 (Traffic Control, Division of Traffic and Service, SJ AB) interviewed by Jennie Boérius, 2016-04-21.

The cabin crew have direct contact with the customers on board the train and are supposed to make the customers feel noticed and well taken care of. The cabin crew can for example deliver traffic information personally to a customer if it is regarding a connection, or they can make announcements to all customers on the train. The cabin crew can retrieve traffic information in different ways, through; TrAppen, phone calls, and text messages. From March 1st 2016, the cabin crew will be decreased with one employee, and Rolling Stock Manager 1³¹ states: “This will increase the workload in the control room”.

According to Cabin Crew 1⁴³ the cabin crew members communicate verbally with each other during the journeys. During a disturbance, they try to inform each other about the disturbance before making an announcement through the speakers⁴³. When the cabin crew want to call SJ Traffic Control, they find the correct number in TrAppen, which is automatically updated for the geographical area they are in. It has occurred that Cabin Crew 1⁴³ called someone else in the control room, instead of waiting in line, with the purpose to be able to provide the customer with information sooner. Cabin Crew 1⁴³ stated: “I like to be honest with the customers providing them with the information I have and if I do not have any information there is no problem for me to explain that”. During a stop, the cabin crew are supposed to announce the current traffic information every 15 minutes in the announcement speakers, even if they do not have any new information.

One app that is used by the cabin crew is Mitt Tåg which lists the customers who should be on the train and with their connections. Though, all customers which are supposed to be on a train are usually not on board and if the cabin crew order cabs, they need to know which customers who are on board. When the cabin crew order cabs, they call Björks. The app Ersättningstrafik, contains the phone number to Björks and displays reserved replacement transportation services, made by either the cabin crew or SJ Traffic Control. Cabin Crew 1⁴³ stated that the cabin crew can receive information from too many information channels and it is confusing to keep track on all of them. Below in Figure 46 is the information flow for the cabin crew.

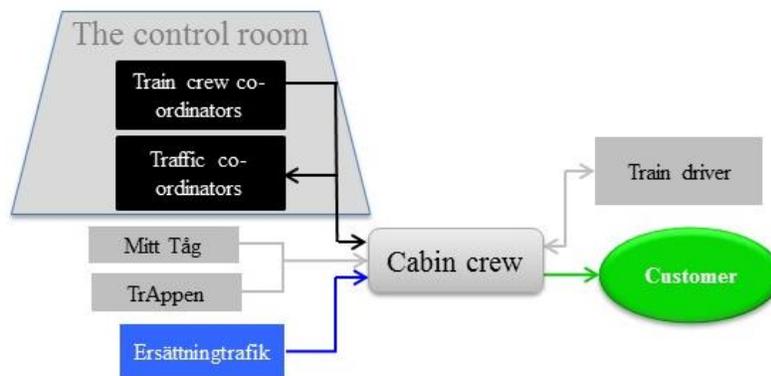


Figure 46. The information flow for the cabin crew.

5.1.9.2 The App

Customers can use SJ’s app to search for information regarding their journey and if they are members of SJ Prio they can choose to sign in. The first app was launched September 28th, 2011 (Function Manager 1:2, 2016). SJ’s old app had some problems and did not work as well as neither SJ nor the customers wanted it to⁶². March 16th, the new, improved app was launched. Between March 16th and April 8th, 2016, the new app was downloaded over 800,000 times and had around

80,000 users each day (SJ AB:5, 2016). The main improvements in the app were to make it easier for customers to buy tickets, to get a better control over their journey, and to receive better information regarding their journey⁶². However, there were four main reason why SJ decided to create a new app (SJ AB:6, 2016). The first was to create a substantial, reliable, and market-leading user experience which would result in a higher customer satisfaction and an increase in sales. The second reason was to enable customer driven development and conformity by launching new functions with high pace. The third was to support essential new hardware and upgraded OS. The fourth reason to create a new app was to quick and predictable being able to answer towards the customers', the business', and the environment's requirements and expectations. The main reason why the customers should download the app is because it is easier and faster to purchase a journey with SJ, the members of SJ Prio can easily find information about their membership and their digital SJ Prio card, and the customers will receive relevant traffic information connected to their journey (SJ AB:7, 2016).

According to the Channel Manager⁶², the main improvement regarding traffic information is the yellow bar, which previously only was displayed at the website, shown in Figure 47 below. Two types of traffic information are included here, future planned track work and specific information about the disturbance of a train. Hence, the customers can find current traffic information and updates concerning why a train is late (SJ AB:7, 2016). This information is provided by SJ Traffic Control at the same time as the website is updated. However, information concerning why a train is late and how the customers should act is not pushed to the customers, they have to search for it themselves in the app⁶². According to the Sales Business Developer⁶⁴, the only information pushed to the customers in the app is regarding cancelled trains, if they have uploaded their ticket. However, the Channel Manager⁶² added that the customers can choose to monitor a certain distance and then they get pushed information regarding if the train is delayed, if there is a new track to depart from, or a new departure time.



Figure 47. Traffic information towards the customer through the app.

⁶⁴ Sales Business Developer (Sales Business Developer, Sales, Division of Market and Sales, SJ AB) interviewed by Jennie Boérius, 2016-04-12.

New functions which can be found on the electronic ticket in the app are a countdown in minutes until the train will arrive or departure as well as which track the train will arrive at or depart from. Old functions as finding traffic information regarding a certain station or train are still in use⁶².

5.1.9.3 The Website

The website sj.se is for all customers who want to travel with SJ or have friends and relatives who do. During this project, a new version of the website was out for its beta test, and launched April 19.

Since 2001, the customers have been able to find traffic information on the website. Today they need to click on the tag called *Traffic info* or use sj.se/trafikinfo and then search for a certain station or train number. This part of the website is shown in Figure 48 below. In the yellow tag at the top of the page, current traffic changes are shown and in the column to the left, the time of the departure is stated. However, when there is a change in the departure, this time will be crossed out and the new time will be highlighted in yellow. In December 2015 sj.se/trafikinfo had a total of 419,418 unique visitors, in January 2016 - 343,576 unique visitors, in February 2016 - 275,097 unique visitors, and in March 2016 - 254,280 unique visitors (SJ AB:8, 2016; SJ AB:9, 2016). Furthermore, January 28th was the day with the most unique visitors that month, 50,079 visitors (SJ AB:8, 2016). At that day, there was a large disturbance which indicates that customers want traffic information during disturbances.

Arrival	From	Track	Train	Remarks
12:00 12:03	Vänernborg C	9	3239 Västtågen	Has arrived
12:05 12:06	Hyllie	14	1026 Öresundståg	Has arrived
12:05 12:09	Stockholm C	6	50163 SJ Regional	Has arrived
12:10 12:12	Falun C	8	7001 Tågab	Has arrived
12:15	Uddevalla C	x	3743 Västtågen	Bus replaces
12:15	Kungsbacka	16	3046 Pendeltåg	Has arrived
12:20	Alingsås	1	3543 Pendeltåg	

Figure 48. Traffic information towards the customer through the website.

Furthermore, the Division of Marketing has together with the Division of Communication and the Division of Traffic Control different views regarding where the traffic information should be displayed at the website⁴. The Division of Communication and the Division of Traffic Control want the customer to easily find information about the current traffic situation, and the easiest way is to have the information located on the first page. However, the Division of Marketing do not want the information there since it might frighten potential customers to fulfill their purchase, when there are warnings about the current traffic conditions. According to The CRM Manager⁴, this is one of the main reasons why SJ needs to begin with sending out specific and personalized traffic information to the customers.

5.1.9.4 Text Message

Today, SJ Traffic Control is sending out text messages to customers both during small and large disturbances. During 2015, approximately 350,000 text messages were sent from SJ Traffic Control each month (SJ Trafikledning Kundärenden, 2016). However, this includes text message Mälardalen due to that it is an after-sales service. A text message cost either 0.35SEK or 0.43SEK to send depending on which software that is used. After sending out the text messages, data regarding how many text messages that had been sent regarding to the total chosen ones can be found. The reason why all text messages are not sent is due to that the customers have filled in the wrong number or the number has a telephone network operator from another country. Examples of text messages, which do not concern delayed trains, are to notify affected customers when there will be no bistro on the train or when a traffic co-ordinator has booked a hotel. All text messages include the text *for more information, please go to...* combined with a link to SJ's website or a phone number to Service Center. The CRM Manager⁴ stated: "The way SJ Traffic Control works today, sending text messages to the customers; both during small and large disturbances, creates certain expectations for the customers. Especially sending information by text messages to customers during smaller disturbances creates huge expectations during large disturbances, expectations which cannot be met by SJ today because they do not have capacity to handle it". The CRM Manager⁴ believes: "To let the customers take more responsibility and initiative themselves, is a more sustainable solution. It is impossible to send out personal text messages informing all customers about their journeys. Therefore, it would be better if SJ could focus on one channel where they frequently update the traffic information and direct their customer towards that channel." The CRM Manager also stated: "There are too many information channels which the customers can use today and the customers should get the correct traffic information once, by having all information channels updated at the same time. I do not want the customers to receive traffic information through different channels with different messages, which can occur today. In a worst case scenario, the cabin crew and the customers receive different traffic information. This is not professional and make the customers confused. I want the traffic information on all channels to be relevant for the customers and cohesive. The more dispatches SJ can have from the same tool, the better."

5.1.9.5 The Information Board and Gärda at the Train Stations

SJ does not have direct control over the information board and the speaker announcements, from the voice called Gärda, at the train stations. A picture of the information board at Stockholm Central Station is illustrated in Figure 49. SJ Traffic Control need to send information to the STA, which is in charge of the two information channels, for them to update the information. The STA have an initial plan where they have decided which tracks the trains should depart from and the departure time for each train. If the STA change track, they update the information board themselves. However, if SJ Traffic Control wants to change track, they have to contact the STA to ask for permission and ask them to update the information board with the correct track, explained Function Manager 1²⁶. Additionally, SJ can ask the STA to update information regarding causes of delays as well¹.



Figure 49. The information board at Stockholm Central Station.

To update the information board, the customer information manager calls the information manager at the STA belonging to the relevant geographical area, to ask this employee to update the information board at the Central Station¹¹. The customer information manager can also send a written request through XOD to the information manager at STA. Customer Information Manager 5¹¹ explained that it is preferable to talk directly to the information manager due to that it usually takes some time until the information board is updated. The same procedure applies when SJ Traffic Control wants the STA to distribute information through Gärda¹¹.

5.1.9.6 Service Center and SJ Ticket Office

SJ Ticket Offices are located at the larger central stations, at Stockholm Central Station, Gothenburg Central Station, and Malmö Central Station. On average, approximately 1,300 customers visit SJ Ticket Office Stockholm every day (SJ AB:fb, 2015). The advantages with SJ Ticket Office are that customers can get personalized information and help in person.

Customers can also contact the Service Center, both through email and phone. Service Center normally receives nearly 2,000 phone calls a week regarding traffic information, re-bookings, and information (Channel Manager, 2016). According to the Sales Business Developer⁶⁴, there are around 100 employees working at Service Center Ånga and Tranås in total. According to a representative from Service Center⁶⁵ the main channels which Service Center use to acquire traffic information are XOD and sj.se/trafikinfo. However, there can be differences between the two. SJ Traffic Control can distribute the traffic information to external channels before the rest of SJ, or the other way around. The traffic information from the two sources is compared to make sure it is correct. If the information do not converge, the information provided in XOD is trusted. As a compliment, they can also check BASUN. When there is a more extensive disturbance, there is only information concerning the trains which are affected in the closest future⁶⁵. In those cases, the employees at Service Center inform the calling customers about the disturbance but do not give concrete information concerning the trains which have not been logged in XOD yet. In some cases, the customers have received more traffic information than the Service Center⁶⁵. This happens when the customers have received text messages but the information has not been logged in XOD⁶⁵. This creates a lack in traffic information quality for the employees at Service Center due to that they cannot provide or explain the disturbance or for the customers⁶⁵. The representative from Service Center⁶⁵ states: “This is due to the fact that different employees at SJ Traffic Control distribute the information. The maximum time it differs between the customers receiving a text message until the same traffic information has been logged in XOD is approximately five minutes. If it would take more time for both the customers and the Service Center to receive information at once, it would be worth it since that would lead to a better customer service”.

⁶⁵ Representative of Service Center (Service Center, Division of Market and Sales, SJ AB) interviewed by Sara Helmrot, 2016-04-14.

According to the Sales Business Developer⁶⁴ it is known that customers tend to call Service Center when the text message or traffic information they have received is unclear. The type of text messages the customers call and ask the Service Center about are regarding; *your departure time may change* and *your train has been cancelled this distance and will be replaced with a bus*. The text message concerning replacement busses can be difficult to interpret⁶⁵. The representative from Service Center explains: “When people hear it from a person, they can take in and assimilate the information in a different way than when they read the information.” The representative from Service Center⁶⁵ considers the unclearness if a train really is cancelled or replaced with a bus as the largest problem regarding traffic information distributed to customers. There immediately is a high load on Service Center after a disturbance has occurred, the customers call regardless if they are supposed to travel with the affected train or later during the day⁶⁵. The representative from Service Center states: “The need of human contact is of importance for the customers to feel secure when they acquire traffic information.”

Facebook and Twitter

SJ’s Facebook and Twitter accounts do not have the purpose of sending out traffic information towards their customers, but it happens that they do. The Service Center are responsible for these two accounts³. During a week with no larger disturbances, there are around 800 people visiting SJ at Facebook and Twitter (Channel Manager, 2016). During January 2016, the inflows at the Facebook and Twitter accounts were 1,952 and 1,306 respectively (SJ AB:10, 2016). It can be seen that at the day with the largest number of unique visitors at SJ’s website, during January 2016, the Facebook and Twitter accounts also had the largest inflows and represented 17% of the total inflows that month (SJ AB:8, 2016; SJ AB:10, 2016). This indicates that the customers also turn to Twitter and Facebook to find relevant traffic information. The account at Twitter has around 52,000 followers and in the introduction text it is written that *people can ask questions here, but for a quicker response one should look at the most often asked questions & answers at sj.se/faq*⁶⁶. Furthermore, the account on Facebook has around 40,000 likes and it is noticeable that SJ are frequently helping customers who need help with their already purchased tickets⁶⁶.

5.1.10 Customer Perspective

The CRM Manager⁴ stated: “Market research shows that a customer who was on a train which was late, but received appropriate information, is generally more satisfied than a customer who was on a train which was on time, but did not receive any relevant information”. Customers have different needs, but one main need is traffic information. However, different customers also get satisfied to different degrees by the traffic information given. The customers want traffic information at different time relatively to the time of departure, e.g. when they are at home or travelling to the train station, have arrived to the train station, looking for the right platform at the train station, standing at the platform, or on board the train.

5.1.10.1 Customer Behavior

The Market Department at SJ made a market research on the trains which involved 16,000 customers travelling with the high speed trains between Stockholm and Gothenburg. The travelers were asked about their impression of the traffic information which they had received during that specific journey. They were asked about the traffic information which they had received from the cabin crew, including speaker announcements and about the traffic information which they had received from

⁶⁶ Observation of the Facebook and Twitter account (SJ AB at Facebook and Twitter) observed by Jennie 2016-03-31.

their cell phone/tablet/computer. The customers answered these questions by choosing an alternative from one to seven where one is a very bad impression and seven a very good. A mean was calculated and as it can be seen in Table 18, all customer segments were less satisfied with the information provided through a cell phone/tablet/computer, indicating that they have tried to find information and are dissatisfied with the process of acquiring traffic information.

Table 18. Answers sorted by occupation (SJ AB:11, 2016).

	Self-Employed	Employee	Student	Retired	Unemployed	Military Service or GMU	Other Occupation
Cabin crew, including speaker announcements	5.5	5.6	5.6	5.8	5.5	5.6	5.6
Cell phone, tablet, or computer	5.2	5.2	5.3	5.6	5.3	5.4	5.3

In the customer survey, conducted by the authors, one question regarding which information channels the customer use when they try to find traffic information about their journey was asked, see Figure 50 below. 94% of the participants answered that they turn to the information board at the central station, 27% answered that they try to listen Gärda. Moreover, 22% and 21% use the website sj.se/trafikinfo and SJ's app, respectively. The results are interesting since SJ Traffic Control does neither have control over the information board not Gärda. It means that the customers use information channels which are not the most updated.

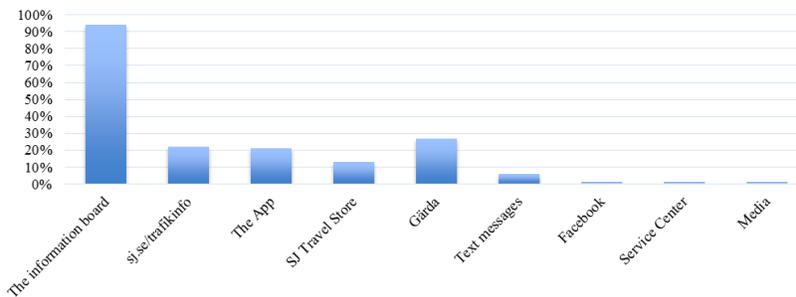


Figure 50. The information channels which the customers use to find traffic information about their journey.

5.1.10.2 Customer Survey PLS-PM

SmartPLS has been used to analyze the data from the customer survey regarding channel satisfaction and the results are presented below. The constructs had internal consistency since the composite reliability values were between the limits, 0.70 and 0.95, which can be seen in Table 19 below. There is also convergent validity, since the AVE values were high above the benchmark of 0.5. Regarding all three channels, the outer loadings for the measure variables were above the threshold of 0.7. This means that there is indicator reliability. As visualized in Table 20, the t-values for the measurement variables were all way above the limit. However, some of the t-values for the path coefficients were not above 1.96 and hence, are not significant. Regarding the app, the constructs for emotional value, TAM - perceived usefulness, and TAM - perceived ease of use were below the threshold. The construct TAM - perceived usefulness for the cabin crew was also below 1.96. Furthermore, the t-values for the constructs emotional value and TAM - perceived ease of use were lower than the limit. Thus, this data are statistically not significant and no conclusions can be made from it. Meaning that regarding these constructs, the results are inconclusive. It can be discussed whether the relatively small sample sizes are the reason for the low t-values. Regarding the cabin crew, where there were 99 participants in the survey, one path coefficient had a too low t-value. The website had 66 respondents and two path coefficients with t-values below the limit. Furthermore, 33 customers took

part in the survey about the app and three constructs had too low t-values. This is an indication that the low t-values are due to the sample sizes.

Table 19. Quality criteria composite reliability and average variance extracted

Construct	Composite Reliability	AVE
App (n=36)		
Service Performance Value	0.892	0.736
Emotional Value	0.943	0.846
TAM - Perceived Usefulness	1.000	1.000
TAM - Perceived Ease of Use	1.000	1.000
Channel Satisfaction	0.918	0.789
Channel Loyalty	0.884	0.719
Cabin Crew (n=99)		
Service Performance Value	0.883	0.718
Emotional Value	0.905	0.760
TAM - Perceived Usefulness	1.000	1.000
TAM - Perceived Ease of Use	1.000	1.000
Channel Satisfaction	0.918	0.790
Channel Loyalty	0.911	0.773
Website (n=66)		
Service Performance Value	0.906	0.763
Emotional Value	0.911	0.772
TAM - Perceived Usefulness	1.00	1.00
TAM - Perceived Ease of Use	1.00	1.00
Channel Satisfaction	0.878	0.707
Channel Loyalty	0.896	0.742

Table 20. Path coefficients, outer loadings, and t-values

Constructs	App (n=36)		Cabin Crew (n=99)		Website (n=66)	
	Path Coefficient	t-value	Path Coefficient	t-value	Path Coefficient	t-value
Service Performance Value --> Channel Satisfaction	0.500	3.608	0.267	3.295	0.437	4.162
Emotional Value --> Channel Satisfaction	0.115	0.765	0.400	4.498	0.067	0.624
TAM - Perceived Usefulness --> Channel Satisfaction	0.222	1.082	0.114	1.267	0.274	2.382
TAM - Perceived Ease of Use --> Channel Satisfaction	0.230	1.177	0.254	3.065	0.142	1.327
Channel Satisfaction --> Channel Loyalty	0.754	7.282	0.680	12.143	0.646	7.927
Measurement Variables	Outer Loading	t-value	Outer Loading	t-value	Outer Loading	t-value
Service Performance Value						
PV1: The information channels stated below deliver exactly the service and information that I want	0.924	4.514	0.894	27.402	0.878	22.334
PV2: The information channels stated below deliver quality services and quality information	0.904	20.254	0.906	46.080	0.929	70.584
PV3: The information channels stated below deliver services and information that exceed my expectations	0.732	25.541	0.731	10.765	0.809	10.231
Emotional Value						
EV1: In general, when I ask for or receive traffic information from the Cabin Crew I feel satisfied	0.929	8.927	0.907	50.112	0.880	15.141
EV2: In general, when I use the website I feel relaxed	0.896	5.228	0.867	24.865	0.876	10.521
EV3: In general, when I receive a text message about my trip or my train I feel grateful	0.935	7.981	0.841	19.453	0.881	13.654
TAM - Perceived Usefulness						
TAM - Perceived Usefulness: I believe that the following information channels can give me relevant traffic information during my trip	1.00	NA	1.00	NA	1.00	NA
TAM - Perceived Ease of Use						
TAM - Perceived Ease of Use: I believe that the following information channels are easy to use	1.00	NA	1.00	NA	1.00	NA
Channel Satisfaction						
SAT1: I am satisfied with the traffic information which I receive from the information channels below	0.856	20.074	0.886	34.809	0.853	23.691
SAT2: My choice to ask for/receive/retrieve traffic information from the information channels below was a wise one	0.912	30.718	0.884	30.259	0.838	16.747
SAT3: The information channels below do a good job of satisfying my needs to find relevant traffic information	0.896	12.730	0.895	31.037	0.831	9.647
Channel Loyalty						
LI1: To find relevant traffic information in the future, I will use the information channels below	0.906	9.544	0.924	25.256	0.859	18.638
LI2: I am thinking of to use the following information channels to find traffic information in the future	0.806	5.336	0.866	16.701	0.895	27.468
LI3: I will say positive things about the information channels below to other people	0.828	29.116	0.845	29.736	0.828	15.291

The discriminant validity was above 1.0 for the App, concerning channel satisfaction to channel loyalty and concerning service performance value to channel satisfaction. This indicates that there is no discriminant validity between those constructs. Due to the questions which were used in the

survey have been used in earlier research and proved to have discriminant validity as well as due to that there is no problem with the discriminant validity for the other channels, it can be concluded that the participants have not answered the questions properly (Carlson et al., 2015). Hence, the questions are not the reason for the HTMT values to be over 1.0, but bad answers. For all other constructs, concerning all three channels, the HTMT were under 0.9 or briefly over 0.9, which indicates that there is discriminant validity between the constructs. The HTMT values are displayed in Table 21 below.

Table 21. HTMT discriminant validity criteria

App - bc bootstrap 97.5% upper confidence interval limit	Channel Loyalty	Channel Satisfaction	Emotional Value	Service Performance Value	TAM - Perceived Ease of Use
Channel Satisfaction	1.059				
Emotional Value	0.921	0.867			
Service Performance Value	0.916	1.006	0.907		
TAM - Perceived Ease of Use	0.883	0.860	0.758	0.654	
TAM - Perceived Usefulness	0.825	0.849	0.701	0.770	0.917
Cabin Crew - bc bootstrap 97.5% upper confidence interval limit	Channel Loyalty	Channel Satisfaction	Emotional Value	Service Performance Value	TAM - Perceived Ease of Use
Channel Satisfaction	0.904				
Emotional Value	0.742	0.947			
Service Performance Value	0.698	0.918	0.901		
TAM - Perceived Ease of Use	0.740	0.822	0.683	0.669	
TAM - Perceived Usefulness	0.631	0.816	0.769	0.719	0.768
Website - bc bootstrap 97.5% upper confidence interval limit	Channel Loyalty	Channel Satisfaction	Emotional Value	Service Performance Value	TAM - Perceived Usefulness
Channel Satisfaction	0.941				
Emotional Value	0.781	0.796			
Service Performance Value	0.812	0.949	0.808		
TAM - Perceived Usefulness	0.703	0.838	0.658	0.743	
TAM - Perceived Ease of Use	0.686	0.776	0.721	0.743	0.773

From the R-square values, it can be concluded how big part of the channel satisfaction that can be explained by the constructs. It can be seen in Table 22, that for all channels, the constructs explain channel satisfaction and channel satisfaction explain channel loyalty. From the R-square values, it can be seen that the predictors for the cabin crew were better than for the website, regarding channel satisfaction. Meaning that there are other factors that have been overlooked in the model, which affect the channel satisfaction for the website. The predictors explain the channel satisfaction for the app better than for the website but not as good as for the cabin crew. All R-square values were above the cut-off value of 0.35 and hence, it can be concluded that the exogenous constructs have a positive and direct effect on channel satisfaction and that channel satisfaction has a direct effect on channel loyalty intention.

Table 22. Quality criteria R-square

	App	Cabin Crew	Website
Channel Satisfaction	0.676	0.713	0.561
Channel Loyalty	0.569	0.462	0.417

From the f-square values, see Table 23, it can be concluded how large predictive relevance the exogenous constructs have on the endogenous constructs. Regarding the app, the exogenous constructs emotional value, TAM perceived usefulness, and TAM perceived ease of use all have a small effect on the endogenous construct channel satisfaction. While service performance value has a large predictive relevance on channel satisfaction for the app. Concerning the cabin crew, TAM perceived usefulness and TAM perceived ease of use have a small effect on the channel satisfaction. Service performance value and emotional value have a medium predictive relevance on the channel satisfaction for the cabin crew. However, the emotional value has a larger effect than the service performance value. For the website, TAM perceived usefulness and TAM perceived ease of use have a small effect on channel satisfaction, while emotional value has almost none. Furthermore, service performance value has a medium effect on channel satisfaction. The f-square values also show that the job satisfaction has a very large predictive relevance on the job loyalty, for all channels.

Table 23. Quality criteria f-square

Exogenous Construct	Endogenous Construct	
	Channel Satisfaction	Channel Loyalty
App		
Service Performance Value	0.473	
Emotional Value	0.027	
TAM - Perceived Usefulness	0.065	
TAM - Perceived Ease of Use	0.076	
Channel Satisfaction		1.319
Cabin Crew		
Service Performance Value	0.146	
Emotional Value	0.297	
TAM - Perceived Usefulness	0.024	
TAM - Perceived Ease of Use	0.133	
Channel Satisfaction		0.860
Website		
Service Performance Value	0.287	
Emotional Value	0.007	
TAM - Perceived Usefulness	0.097	
TAM - Perceived Ease of Use	0.026	
Channel Satisfaction		0.717

It was assumed that service performance value, emotional value, perceived usefulness, and perceived ease of use lead to channel satisfaction. The path coefficients are displayed in Table 20. From the table, it can be concluded that there is a positive relationship between service performance value and channel satisfaction, regarding the app. Concerning the cabin crew, emotional value has a positive relationship with channel satisfaction. Service performance value and perceived ease of use also have positive relationships with channel satisfaction, even though they are not as strong. Regarding the website, there is a positive relationship between service performance value and channel satisfaction. The same applies for perceived usefulness and channel satisfaction, but the relation is not as strong. Furthermore, the hypothesis explained that channel satisfaction should lead to channel loyalty intentions. This is confirmed, for all three channels, by the positive relationship between channel satisfaction and channel loyalty intentions.

5.2 Areas of Improvement

For the traffic information flow, from SJ Traffic Control Stockholm towards SJ's customers, to be improved, some bottlenecks and critical areas have been identified. In this part they are stated.

5.2.1 Communication

The communication for the traffic information flow is seen as a major factor. In an open question in the first survey 44% of the employees answered that communication and information have the largest improvement potential in the room. This area of improvement has been divided into internal communication, regarding communication in the control room, and external communication, concerning communication with employees outside the room, mainly communication through the phone.

Regarding the internal communication four critical issues have been identified within this area; lack of understanding the other functions' work tasks and responsibilities, knowing who to inform, only taking its own function into consideration when decisions are made, and making sure that the receiver has received the information,. Survey two showed that approximately 80% of the employees in the control room have understanding for the work tasks and responsibilities for the traffic coordinators and rolling stock managers, but the percentage was lower for the other function with lowest understanding for the chief operating officer, which only 42% had an understanding of. This makes it hard for the employees to know what kind of information the different functions need, to be able to fulfill their work tasks, and how to make decisions to facilitate for the other functions. In survey two, findings regarding that the employees do not confirm that the receiver has received the information was found and it was confirmed in interviews, see part 5.1.3 *Communication in the Control Room*.

Concerning the external communication the main issue is the irrelevant incoming phone calls. Collected data shows that 38% out of the total incoming phone calls for the traffic coordinators are either unnecessary or superfluous. Resulting in that they spend approximately 72 hours on these types of calls.

5.2.2 Information Channels

SJ uses many different information channels, which is confusing for their customers due to they are not aware of which channel that is the most updated, confirmed by the CRM Manager in part 5.1.9.4 *Text Message*. The customer survey showed that 94% of the customers used the information board and 27% listed to Gärda. These are critical numbers due to that SJ is not in direct charge of these two channels. When investigating which channels the employees use while travelling, 22% use an information channel which the customers do not have access to, and 39% use the information board.

Furthermore, when analyzing the inflow for Facebook and Twitter it can be seen that during days with disturbances, it increases and one day in January responded to 17% of the total inflow that month, indicating that SJs customers want traffic information but do not know where to find it. Additionally, when customers are on board a train, there is an overproduction of information which affect the customer negatively, and Technical Supporter 7⁶³ explained: "SJ is providing the customers with too much and unnecessarily information, affecting them negatively".

5.2.3 Collected Data

Another important factor that was found is the lack of collected data which can change SJ's behavior, so that the traffic information process can be improved. Also, data regarding which information channel the customer uses does not exist, resulting in that SJ Traffic Control does not know whether the work performed is of serviceability for their customers or not. Furthermore, the unique visitors' report of sj.se/trafikinfo does not show if the customers are travelling customers, if they received the information wanted, or any information providing SJ with information which can change their behavior.

5.2.4 Education

Four interesting factors were found; a double competences have positive affect, the quality of the education depends on the one teaching, there is lack of standardized work, and there are no clear instructions, which results in that the employees are not sure of who is responsible for what, also affecting the communication. In the second survey a question regarding what effect the increase of double competences will have, 60% of the employees answered a positive effect and 19% answered both positive and negative effect. Furthermore, the interviews showed that the employees can tell a difference both in the decision making process regarding individual work and having more than one function in mind, resulting in better decisions, when having a double competence, see part 5.1.5 *Education*.

5.2.5 Fluctuation in workload and Perceptiveness

Due to that different functions need to work with a disturbance at different times, the workload varies for the different functions over time. The issue is that the functions with a low workload do not show respect for the functions that have a high one and consequently, disturb them. This is confirmed by the Personnel Planner⁵, which also sees the need for this to change. Furthermore, one characteristic needed in the control room is to have a high level of perceptiveness. However, employees who have a low workload are not always perceptive towards their co-workers who do, or perceptive towards information sharing taking place in the room.

5.2.6 Schedule

Out of the investigated constructs resulting in job satisfaction for the employees in the control room, scheduling was proved to have the largest impact, see part 5.1.5.7 *Employee Survey PLS-PM*. No fixed work times creates uncertainty and stress for the employees. The current schedule does not take the employees preferences into consideration.

5.2.7 Placing

The placing is a correlating factor to the communication. Three main issues have been found; it is too far between the functions, different functions cannot overhear each other, and some functions end up left out from the information sharing due to their placement. This was confirmed by Operating Supervisor 3⁵ stated: "The train crew co-ordinators are often end up left out form the information sharing because they do not hear what the employees at the other functions are discussing... The customer information manager and the operating supervisor cannot hear what the traffic co-ordinators at North, West, and South, discuss."

5.2.8 Social Relationships

The current fixed placing of the functions is not favorable to the social relationships between the employees working at the different functions. Survey three showed that the employees who are working at train crew coordinating were least satisfied with the social relationships in the control

room. Survey three also showed that the employees who only have competence within information coordinating have low number of satisfaction as well, while the employees who have competences within three functions are the most satisfied ones.

5.2.9 Noise

The sound level was investigated in the control room, both during green and yellow operating level. Interviews confirm that some employees are not satisfied with the sound level due to that they get disturbed in their work and can therefore not focus on their work tasks, creating a larger stress, see part 5.1.8.5 *Sound Pressure Level*. Additionally, different functions cannot hear each other.

5.2.10 Lighting

Measurements performed in the control room showed that the lighting in the room is poor, most of the time, see part 5.1.8.4. *Illuminance*. This increases the risk of bad vision for the employees.

5.2.11 Support and Feedback

Some employees do not feel that they get the support and feedback they need from their managers or colleagues. This is supported in interviews that employees did not receive useful feedback during their educations, see part 5.1.5. *Education*. Additionally, in survey two it was also stated that to receive another competence the employees wanted more feedback from the function managers. However, survey three showed that the employee ranked the support and feedback from the colleagues and managers at 3.7 and 3.2 respectively on a scale from one to five.

5.3 Future State

From the areas of improvement, implementation suggestions have been created based on the interviews and findings from the surveys. Further, the results from the customer survey and employee survey three regarding PLS-PM, showed which factors that have the most impact on channel and job satisfaction. They were included in the HoQ together with the improvement suggestions. This, to find out which implementation suggestions that will have the largest impact on the information flow.

5.3.1 Implementation Suggestions

Different implementation suggestions are stated below. It is explained what implementation that is needed as well as what it will improve. It should be noticed that all suggestions can be implemented together or separately, and are based on the interviews.

5.3.1.1 Suggestion A: Improved Education

Findings show that the employees in the room have a high willingness to learn, but that is currently not utilized. A total of 86.4% were interested in knowing what their colleagues at the other functions are doing, 93.2% were open minded to learn new ideal work procedures, 91.2% were willing to receive suggestions to improve their own work procedure from all colleagues, and 88.1% were willing to help all colleagues in the room. Findings also showed that the employees believe that the current education which they are provided with when learning a new function is poor, and better education is demanded, see part 5.1.5. *Education*. Due to that the education currently is relying on the teacher which is another employee from the room that has not been selected in a specific way, all employees receive different educations and hence, their education depends on the teacher and all employees obtain different skills.

Suggestion A:

By introducing standardized and relevant education programs, the lowest standard for the education will be improved and the opportunity to deliver feedback to the colleagues. Further, by carefully choosing the correct teachers; someone who is pedagogical, able to provide the learner with feedback, and has expertise within the function, the lowest level of skills for the employees in the room will increase. To improve the work and communication between the different functions, the employees who will be responsible for the education programs at the different functions need to have an understanding for all functions and their decision making processes in the room. Additionally, to make sure that the teachers teach in the same way, meetings between the different function teachers should take place.

When an employee is considered to be fully-trained at a function, one will do a test. The purpose of the test is to make sure that the employee clearly understands what one should do during a disturbance, one knows who to inform, and understands how one's decisions affect the other functions. The easiest way to execute this is through verbal testing where the employee receives a disturbance case. To ensure that the examiner do not give away a pass too easily, there should be guidelines for the demands on the employee who is being examined. Furthermore, to increase the collaboration and understanding between the functions, the employee who is responsible for the test should neither be the one who teaches nor is working at the same function. Moreover, the test is also an opportunity to receive and deliver feedback.

5.3.1.2 Suggestion B: Improved Information Flow

One large bottleneck in the traffic information flow is the function XOD. This is supported by TICO 8¹⁵ who states: "During disturbances, it happens that the information is queued before it is logged in XOD" and in the part 5.1.9.6 *Service Center and SJ Ticket Office* where it is explained that traffic information sometimes is sent to the customers before it is available to the Service Center in XOD. Employees at the other functions make decisions, walk to the employee who is responsible for logging in XOD, explains what to log, and walks back. This takes approximately one to two minutes depending on the amount of information which needs to be delivered. The collected data showed that the longest time it took to log in XOD was 126 seconds, see part 5.1.8.5 *Sound Pressure Level*. Sometimes, the traffic co-ordinators make a decision and forget to tell the other functions about it, meaning that the information is neither logged in XOD nor do anyone in the room know about the decision. Since no one else in the room knows about the decision made, further decisions are usually wrong as they do not take that decision into consideration, see part 5.1.3 *Communication in the Control Room*. Because of these two reasons, the employee who makes a decision should be the one responsible for logging it in XOD before moving on to the next step in the solution process. As can be seen in the Empirical Data, 5.1.8. *SAM*, it takes approximately 14 seconds for the traffic co-ordinator at West to walk to the information co-ordinator at XOD and back again. On top of that, the time it takes to explain what to log for the information co-ordinator at XOD and the time for questions needs to be taken into consideration. This sum can be compared to the mean time it takes to create an occurrence, or a decision and appropriate action, which is approximately 72 seconds. If the traffic co-ordinators would log in XOD themselves, they would save 14 seconds and the time it takes to share the information, receive questions, as well as to answer questions. Moreover, other employees at the same function, or a function nearby, who have a lower workload should help to log the information in XOD if possible.

Sending out text messages to customers is time consuming, see part 5.1.8.1 *SAM*. Additionally, the information co-ordinators at Web and Text spend time on logging information in XOD which has

been distributed to the customers. By standardizing the software and connecting them to XOD, the information co-ordinator only needs to write one message in XOD and press *Send texts and publish at website/app* or press either of them. When this is done, the information should automatically be logged in XOD for other departments, e.g. Service Center and SJ Ticket Office, to know what information that has been sent to the customers. Consequently, in the future, one employee will be needed for sending out a warning text message, updating the website, and sending out a push notification through the app, see Figure 51.

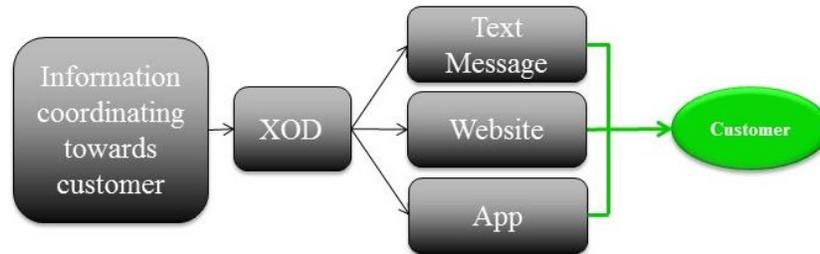


Figure 51. Information coordinating in the future.

SJ are using several channels where they distribute traffic information to their customers. During disturbances, customers want to find information, which was proven during the large disturbance at January the 28th when sj.se/trafikinfo had 50,079 unique visitors (SJ AB:9, 2016). The same day, 550 customers turned to Facebook and Twitter, which represent 17% of the incoming flow to the accounts that month (SJ AB:10, 2016). Since customers turn to Facebook and Twitter to acquire traffic information, it indicates that the customers do not know where they can find the most updated traffic information. The results from the customer survey also support this, where 94% use the information board and 27% listen to Gärda to retrieve traffic information, see part 5.1.10.1 *Customer Behavior*. Moreover, the first employee survey shows that 39% of the employees in the control room use the information board and 15% listen to Gärda, see part 5.2.2 *Information Channels*. These are information channels which SJ are not in charge of and are consequently, not the most updated ones. The two channels which SJ is in charge of are the website and the app. The customer survey showed that only 22% used the website and 21% used the app, see part 5.1.10 *Customer Behavior*. Furthermore, the first employee survey showed that 22% of the employees do not trust the information provided to the customers, since they use other information channels than the ones which are available to the customers, see part 5.1.7 *Key Drivers of Job Satisfaction*. Additionally, even though they know that their colleagues have a high workload, 11% of the employees call a colleague to retrieve traffic information. This indicates that the traffic information distributed to the customers has a lack of quality. As can be concluded from the customer survey, the quality of the information is important for the channel satisfaction regarding the cabin crew, the website, and the app, see part 5.1.10.2 *Customer Survey PLS-PM*. Since channel satisfaction leads to channel loyalty for all three channels, it can be concluded that for the customers to use the channels again, they need to be satisfied when using them, see part 5.1.10.2 *Customer Survey PLS-PM*. Therefore, SJ should only focus on a few traffic information channels towards the customers, which they can provide a quality service from, and make the customers aware of these channels. For example, in the email which is sent out to the customers a few days before departure, traffic information regarding their journey and where they can find traffic information should be clearly stated further up in the email. However, the information channels with human contact should not be removed. As the representative from Service Center⁶⁵ stated; “The need of human contact is of importance for the customers to feel secure when they acquire traffic information”. Therefore, the cabin crew, Service Center, and SJ Ticket Office are essential in the traffic information flow. This is supported by the

customer survey, where it could be concluded that the emotional value is more important than the service performance value regarding the cabin crew, see part 5.1.10.2 *Customer Survey PLS-PM*. Meaning that the impression the cabin crew make on the customers is more important than the quality of the information they provide.

An important aspect which affects the customers directly and their experience with SJ is the information provided during their journey. The CRM Manager⁴ stated: “SJ want to give their customer confidence-inspiring traffic information...” It is included in the train driver’s work tasks to announce planned stops in the speakers⁶³, see part 5.1.9.1 *Train Driver and Cabin Crew*. When the train driver informs the customers regarding all stops during the journey, even the planned ones, which do not affect the time of arrival, it makes the customers question whether they will make it on time or not. Hence, the customers are provided with unnecessary information which is not confidence inspiring. This is shown by that “Market research shows that a customer who was on a train which was late, but received appropriate information, is generally more satisfied than a customer who was on a train which was on time, but did not receive any relevant information”, as stated by The CRM Manager⁴. Therefore, traffic information provided on board the train in form of speaker announcement should only consider stops and traffic information affecting the customers’ journey.

The main issue concerning the external communication is the incoming phone calls. Even though the traffic information can be found in TrAppen, the cabin crew call SJ Traffic Control because they do not trust the information provided, as explained in part 5.4.1.2 *The Cabin Crew’s Perspective*. Therefore, the information needs to become more trustworthy, which can be realized by reducing the number of information channels used by the cabin crew. It is understandable that both the traffic and train crew co-ordinators need to talk to them, due to that the traffic co-ordinators are responsible for the traffic and the train crew co-ordinators for the regulations regarding breaks etc. However, the cabin crew currently use three apps which is confusing for them. Sending out all information through one app and thereby reducing the number of information channels to one should therefore be considered.

5.3.1.3 Suggestion C: More Even Distribution of Double Competences

Some employees in the control room have a double or triple competence. However, there is currently an unevenness in the distribution of double competences between the different functions which creates scheduling problems and results in that more than 80% of the employees have understanding for the traffic co-ordinators and the rolling stock managers’ responsibilities, but not for the other functions, see part 5.1.3 *Communication in the Control Room*.

Suggestion C:

To make more employees acquire a second competences with a more even distribution in the control room. Important to notice is that all employees in the room should have a double competence. It is important that the front edge competence remains.

5.3.1.4 Suggestion D: Collect Data

Currently, other divisions make decisions that might affect SJ Traffic Control. However, due to that SJ Traffic Control does not collect any data, there are no numbers that visualizing how they are affected. SJ Traffic Control does not collect data which can be used to change the employees, or customers’ behavior. For example, when decreasing the numbers of cabin crew with one employee, there were only hypothesis that the workload in the control room would increase, and Rolling Stock

Manager 1³¹ stated that the decision will: "...increase the workload in the control room". By collecting data it will be proven if the hypothesis are correct or not.

The unique visitors report regarding the website only tells how many people who has visit sj.se/trafikinfo, see part 5.1.9.3 *The Website*. Whether these people are customers or not, or if they found the traffic information wanted is not known. Furthermore, today SJ provides their customers with traffic information through different information channels. However, SJ does not know how many customers they reach out to, meaning that the employees at SJ Traffic Control Stockholm does not know whether they do a good job or not. For example today SJ Traffic Control have data regarding how many text messages that have been sent to the customers, but it is unknown if the customers have read the information, see part 5.1.9.4 *Text Message*. Further, to collect the necessity of the incoming phone calls is consider to be a good metric where the employees can see the workload for the different functions and if more personnel or other changes is needed.

Suggestion D:

SJ Traffic Control needs to collect data that can change their employees' and the company's behavior. When making changes which affect the traffic information to the cabin crew and train drivers, or their work habits, it is of importance to understand how the changes affect the employees in the room and the customers. For example, to see how the workload in the room changes in line with decisions, it is suggested that data concerning the necessity of the incoming phone calls is collected every time a new decision, regarding for example the cabin crew or the train drivers, has been implemented. Another way for SJ Traffic Control to measure comparable improvements in the room is to keep measuring the necessity of the incoming phone calls, and to do this once or twice a year, to evaluate whether the unnecessary and superfluous phone calls decrease.

For SJ to know which channels the customers are using as well as to see if the information provided is necessary, the importance of collecting data needs to be considered. An example can be for SJ Traffic Control to start measuring the number of sent text messages to the customers and then compare it with the number of opened text messages. Another example is to have the customers login through SJ Prio when using the app or the website, and be kept logged in until they consciously log out. By doing this interesting data can be collected. If SJ decides to send pushed information through the app regarding a specific train, and the customers are logged in and have their tickets connected to SJ Prio, a notice can be showed for the customers. When the customers have opened the message in the app they need to click *Okay* or *Confirm* to close the message and hence, SJ Traffic Control can receive a verification of how many customers who has opened the message. The same can be done for the website; when customers are visiting sj.se/trafikinfo and have signed in, the information they look for can be connected to whether if they have a journey coming up or not. In these two ways SJ Traffic Control will know how many of the affected customers they reach out to. First when SJ knows which channels the customers are using, they can see how many customers they reach with the traffic information.

5.3.1.5 Suggestion E: Reduce Text Messages

The CRM Manager⁴ explains another problem: "...sending text messages to the customers; both during small and large disturbances, creates certain expectations for the customers..." During a higher workload, the information co-ordinators do not have time to send out as many text messages as during a lower, see part 5.1.9.4 *Text Message*. Consequently, there is no lowest standard for when text messages are sent out to customers and hence, they do not know when to expect text messages.

Furthermore, sending out text messages is time consuming and costly. The employee needs to spend time on finding the affected customers, separate them, find a template which explains the disturbance, adjust the template, and paste it into the software. When a text message is sent to many customers, it takes a long time for the software to send it. Depending on which software that is used, the smallest cost for sending text messages each year is 1,470,000SEK and the highest is 1,806,000SEK, see part 5.1.9.4 *Text Message*. Additionally, there are rules regarding time limits which need to be followed when sending out the information, to avoid confusing the customers when they receive text messages. Therefore, the customers do not always get a text message concerning late departures of the trains. The customers are not aware of these rules and hence, do not know when to expect text messages. To summarize, the main reasons why SJ should stop sending text messages are that it is time consuming and expensive, but primarily because the customers cannot permanently count on receiving them and hence, they do not know what to expect.

If SJ would direct their customers to one channel, which they frequently would update, the customers would not expect SJ to provide them with traffic information through text messages, resulting in better preconditions to distribute information during large disturbances since the resources would be focused on a few channels. For SJ to be able stop sending out text messages, the customers need to learn where they can find traffic information concerning their journey, and it is up to SJ to teach them. Since the customers are used to receive text messages regarding disturbances, a familiarization phase is proposed. It would include sending out text messages explaining, to the customers, that it for the moment are disturbances in the traffic or defects with the train. It will also be stated that they should keep themselves updated by using the app or website and that these are the two most updated channels. This can be realized by only having one text message template where this message is included, see Figure 52. The template explains that there is a disturbance in the traffic which might come to affect the customers train. Therefore, SJ states that the customers should keep themselves updated at the website or through the app, to acquire the most updated information. Further, to not confuse the customers, a last statement explaining that if the information regarding the customers train is not updated, the train is not affected by the disturbance. A similar suggestion was evaluated in the first employee survey. In total, 85% of the TICOS were positive to the suggestion and the 12% who answered *Other* left positive comments or did not understand the explanation of the suggestion. Moreover, for the customers to start using the website, they need to believe that they will acquire useful information there. This conclusion can be drawn from part 5.1.10.2 *Customers Survey PLS-PM* which shows that the perceived usefulness also plays a role for channel satisfaction of the website. By referring the customers to the website, in the text message, the customers will believe that it is useful.



Figure 52. An example of what the future new text message can look like.

Text message Mälardalen is an after-sales service which is free for the customers and SJ Traffic Control spends a lot of resources on this service, see part 4.1.1.3 *Traffic and Information Coordinating*. Instead of sending out text messages, the traffic information could be sent out in the app as pushed information towards the customers. The customers would announce their interest in a certain line and receive pushed traffic information through the app.

5.3.1.6 Suggestion F: Connect New Train Numbers with Planned Train Numbers

Communication during a disturbance is considered to be the main improvement area at SJ Traffic Control. An example of this is the communication concerning new train numbers, see part 5.1.3 *Communication in the Control Room*. There is currently no connection between the planned and the new train number visualized for the employees in the software. Therefore, the traffic, information, and train crew co-ordinators frequently ask the rolling stock managers about it. Information regarding new train numbers is transferred through verbal communication and can be eliminated by connecting the new train number, which is received from the STA, with the planned train number when re-routing a train or similar. If the software is changed, the rolling stock managers would need to fill in this number, and the number would be automatically connected to the planned train number and visualized in XOD. Furthermore, if the change of train number would be visualized in XOD, there would be fewer questions and less confusion regarding change of train numbers. It would also make it easier for the financial department to connect incomes and expenses to the correct departure. Currently, it is difficult for the financial department to connect the new train number to the planned one, resulting in that SJ receives less compensation from the STA when they are the reason for a disturbance. Connecting the train numbers will facilitate this department and result in more money for SJ.

5.3.1.7 Suggestion G: Reduce Incoming Phone Calls

The employees in the control room spend a lot of time on unnecessary and superfluous incoming phone calls. Examples are when the cabin crew call to check if the information provided in TrAppen is correct or when train drivers call the rolling stock managers to ask where they should park the train. Furthermore, there is a difference in how SJ Traffic Control Stockholm and Gothenburg perform their work tasks provided to the cabin crew. It is known that the traffic co-ordinators in

Gothenburg usually help the cabin crew with the work task, see part 5.1.4.2 *The Cabin Crew's Perspective*. Consequently, the cabin crew get confused since they sometimes get help and information, while sometimes they do not. This results in unnecessary phone calls to the traffic co-ordinators, because the cabin crew should not ask them to order cabs. Based on the first survey and data from SJ, it could be concluded that the traffic co-ordinators spent a total of 71.6 hours on unnecessary and superfluous incoming phone calls during January, 2016, see part 5.1.4.1 *The Traffic Co-ordinators' Perspective*. However, this number is based on the average conversation time, which for an unnecessary or superfluous phone call probably is shorter. Hence, the total time spent on these phone calls is most likely shorter. The phone calls are time consuming and hinder the employees from finding solutions to the disturbance. Therefore, when they answer these phone calls, it adds costs of the end product. To reduce the cost related to both distributing traffic information and solving the issues created by a disturbance, these phone calls need to be diminished or eliminated.

This can be done by making the cabin crew aware of the workload the employees in the control room have. One way of doing this is to mark the phone figures in TrAppen with colors based on the employees' workload, see Figure 53. When the employee has a lower workload and can receive all types of phone calls, the employee changes the color to green. When the employee only have time to receive highly important ones, since there is a disturbance going on and the employee needs to be focused on finding a solution, the color should be red. By indicating the phone figure with different colors the train driver and cabin crew know that they, at the moment, should not call about smaller issues and can reconsider if the phone call is relevant or if it can wait. Furthermore, this color should automatically be changed to green after a certain time so that the employee in the room does not need to remember to change it.

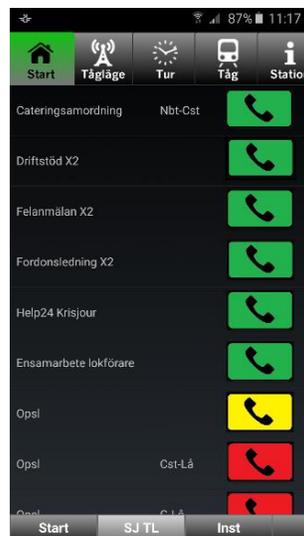


Figure 53. What TrAppen could look like with Poka-Yoke.

It is of importance that the offices retain the same lowest level of work tasks they perform to help the cabin crew and train drivers. This can be done by introducing new guidelines which applies for both the office in Stockholm and the office in Gothenburg. Another way of reducing the superfluous incoming phone calls to the traffic co-ordinators from the cabin crew is to ensure the quality of the information which is logged in XOD. TICO 8 states: “The better the quality of the information in XOD, the fewer phone calls the traffic co-ordinators receive from the cabin crew. Consequently, the

time the traffic co-ordinators get to solve the problem increases and the phone calls they receive are more relevant. Also, the sooner we distribute the information, the lower the load becomes at our phone lines.”

5.3.1.8 Suggestion H: Creation of Team and Repositioning

The largest flaw in communication between the functions in the room is based on the incorrect decisions which are due to that one function needed to be included in the decision making process is not, or because one function has not received information concerning that a decision has been made and consequently, makes other decisions which are not in line with the previous one, see part 5.1.3 *Communication in the Control Room*. This results in different traffic information messages towards their customers, where the main outcome is confused customers whose trust in SJ is damaged. Furthermore, the current way of working in the room, where the positioning is after functions, are equal to a silo organization.

During the first survey a suggestion of changing the positions in the control room came. In the second one, repositioning suggestions were described, and the participants could choose positive, do not understand the difference compared to today, negative, or other. One suggestion included a new structure, to create teams based on different geographical areas, consisting of one train crew co-ordinator, one rolling stock manager, and one traffic co-ordinator. A total of 39% out of the employees were positive towards this suggestion, 44% negative, and 10% other. However, most of the employees who chose other had a positive comment. The feedback was increased quality of the information flow, a faster and better decision making process, better collaboration in the control room, more personnel in the control room would be needed, and that the general competence of the employees in the room would decrease. It was also mentioned that the workload for both the train crew co-ordinators and the rolling stock managers would increase, since the trains and the personnel working at the trains are not in line with each other. According to Operating Supervisor 3⁵, the suggestion falls short on the train crew co-ordinators, since they are currently working with either train drivers or cabin crew. To work and being responsible for both is too much for one employee. Operating Supervisor 3⁵ and the Personnel Planner⁵ added that they do not believe in employees belonging to and working in the same team all the time. Because the employees might feel that one team is better than another, creating negative feelings in the team. Hence, they do not believe in static groups due to internal conflicts and that some groups will not work very well.

Train Crew Co-Ordinator 4⁴⁸ explained: “The positions need to be changed for the control room to become a more effective workplace. How we are positioned today is not effective, and during some hours of the day there is nothing to do. Instead of sitting in functions, we should sit in teams with a mix of skills from the different functions”. The train crew co-ordinator also stated: “To make this concept water proof, the employees in the team should have competences in all the included functions”. Furthermore, Train Crew Co-Ordinator 4 believes that by creating teams, the efficiency in the room would increase due to that the employees are sitting closer together and can make faster decisions. The quality of the information and decisions would increase, which would lead to a better functioning SJ Traffic Control. Train Crew Co-Ordinator 4 has talked to some colleagues who do not believe in this suggestion, since they are critical towards the OnCall personnel and wonder about which person that would take care of that. But Train Crew Co-Ordinator 4 does not see any problems

with it. Rolling Stock Manager 3⁶⁷ does not believe in the team positioning and stated: “We had this positioning some years ago and it worked well since the organization was not complex, which it is today. Currently, SJ’s organization is complex with too many systems which need to integrate with each other. There used to be only one train model; locomotive and coach. While today, there are more models, resulting in that the cabin crew and train drivers need certain qualifications for the different models. The consequences is that the puzzles for the train crew co-ordinators and the rolling stock managers are larger and hence, the communication within these two functions is very important, and it would fall apart if the team was created”. However, when the rolling stock manager talked about the team idea, nothing regarding the competences was mentioned.

The main reason why the team idea would not work today is due to how the crew planning is performed. Currently, the cabin crew do not follow the train driver, which makes the work for the train crew co-ordinators more complicated compared to if the cabin crew would follow the train driver. Because of this, the team idea would create confusion between which team who gets the personnel needed. According to the Chief of Crew Planning⁶⁸ the main reason why the cabin crew do not follow the train drivers is economical. As many departures as possible should be occupied with the least amount of personnel. If the cabin crew cannot follow the train driver that would be more expensive. There are approximately 10,300 trains that are supposed to depart each month, around 1,000 members in the cabin crew, and 600 train drivers. Furthermore, the personnel have different qualifications and hence, it would be an increased cost if the cabin crew members followed a train driver each day⁶⁸. Additionally, the train drivers start their work shift before the cabin crew and therefore, their breaks do not synchronize. The train driver will need a break earlier on the journey than the cabin crew.

Suggestion H:

To break up the silos, teams consisting of one traffic co-ordinator, one rolling stock manager, and one train crew co-ordinator should be created, resulting in that the main functions needed to make traffic decisions are included. The teams should be working within the different geographical areas; Regional, North, South, and West. Furthermore, TIB should also be considered as a team. The same employees should not be working in the same team, but rotating, so they work with new employees from day to day or week to week. Lastly, repositioning needs to be considered since it will facilitate the communication between all teams and functions.

5.3.1.9 Additional Suggestions

During a disturbance, employees in the control room use high voices to share or retrieve information. In addition, when they are talking about insignificant subjects, which are not relevant for solving the disturbance, it increases the noise level. The measured noise level were below the limits, see part 5.1.85 *Sound Pressure Level*. As can be seen in that part, the employees in the room do, according to survey three, generally neither believe that the noise level is good nor bad. However, there is a significant difference when analyzing the different functions. Furthermore, interviews showed that some are really disturbed by the noise level. For instance, TICO 14¹² stated: “...The noise level makes it more difficult to communicate with others.” and TICO 8¹⁵ explained: “...The noise level affects my stress level. An example is when I am talking on the phone. Then, it is very important to

⁶⁷ Rolling Stock Manager 3 (Traffic Control, Division of Planning and Traffic Control, SJ AB) interviewed by Jennie Boérius 2016-04-11.

⁶⁸ Chief of Crew Planning (Chief of Personnel Crew Planning, Division of Traffic and Service, SJ AB) interviewed by Jennie Boérius 2016-04-26.

understand what that person is saying and the phone call needs to go fast, but I barely hear what the other person is saying.” Since the progress in the control room depends on the communication between the employees, it is crucial that the noise does not deteriorate their communication. If it does, the process will go slower and the quality of the information decreases. To decrease the noise level, absorbing material on the walls and under the desktops should be installed. Furthermore, using headphones when talking at the phone, which is the most sensitive task towards high noise levels, will make the employees less sensitive to noise in the room. The technical supporters currently have headphones which shut out external sound and this could be used at all functions.

The employees appreciate the lighting settings that they can adjust themselves, but their current use of the light sources results in insufficient lighting, see part 5.1.8.4 *Illuminance*. The illuminance in the work area is the most insufficient and the illuminance in the immediate surroundings is not nearly above the limit either. The lighting in the outer surroundings was better, but still not sufficient for all functions. The reason why the work area and immediate surrounding have too low illuminance was because the employees do not use the lamp above the desktop which is shining downwards. To improve the insufficient lighting at the employee’s work area, the strip lights above the desktops, shining downwards, should be changed to ones which do not shine as bright. Moreover, according to the employees, the reflection is too large when the sun shines, see part 5.1.8.4 *Illuminance*. There are blinds in the control room which reduce the glare from the sun, but they let too much light through. To fix this, blinds which let through less light should be installed.

When sending text messages to customers, the sender has to be specified and it is always SJ AB, which is unnecessary and adds to the time it takes to send out text messages, see *Text Message* in part 5.1.8.1 *SAM*. The action could be removed if the sender, e.g. SJ AB would be pre-defined, which can be realized through reprogramming.

Lack of communication between functions and misunderstandings during disturbances result in employees in the control room not knowing what has been done or needs to be done, to moderate the disturbance and to faster find a solution. Today, the board is mainly used during orange and red operating levels. By always using the disturbance board creates a clearer understanding of what has been done and what has not. Introducing standards explaining which work tasks the different functions are responsible for, will also reduce the uncertainty.

5.3.2 House of Quality

To understand which of the different suggestions which will have the largest impact on the improvement areas, a HoQ was created, see Figure 54. The house is based on the constructs from the customer survey and survey three as well as the implementation suggestions. Each implementation suggestion is divided in three due to that the app/website, cabin crew, and the control room are taking into consideration; column one, two, and three under each improvement suggestion. In Appendix O, the explanations of the abbreviations only used in the HoQ can be found. The roof corresponds to the relationships between the different improvement suggestions. As showed in the HoQ there are only positive correlations between some of the suggestions. For example, by introducing Suggestion A and Suggestion B, their impact on each other will be positive creating a stronger impact. However, it is important to notice that this only refers to the suggestions implemented.

When normalizing the external constructs, from the customer survey, the normalization is performed in a different way due to that the construct values for both the app and web needed to be added together. However, the normalization for the cabin crew was performed in the same way as in the employee survey. Below, in Table 25 are the numbers from the software and their normalized value.

Table 25: Numbers from software and the normalized values.

Measurement Variables	Channel value			Normalized values		
	App	Web	Cabin Crew	App	Web	Cabin Crew
PV1	0.142	0.108	0.084	0.157	0.147	0.081
PV2	0.191	0.148	0.102	0.211	0.201	0.098
PV3	0.127	0.13	0.063	0.140	0.176	0.061
EV1	0.036	0.026	0.165	0.040	0.035	0.159
EV2	0.028	0.017	0.119	0.031	0.023	0.114
EV3	0.04	0.023	0.125	0.044	0.031	0.120
TAM1	0.165	0.185	0.123	0.182	0.251	0.118
TAM2	0.177	0.1	0.26	0.195	0.136	0.250
SUM	0.906	0.737	1.041	1	1	1

In Table 4 below, the normalized values are added for each construct, exactly like for the employee survey, which will represent the degree of importance in the HoQ. Due to that the app and website currently are updated by the same software, they will have the same relationship to the suggestions. Therefore, their constructs were added, assuming to have the same impact, and the following formula was used for the PV value:

$$PV_{app/web} = (PV_{app} * 0,5) + (PV_{web} * 0,5)$$

The same formula was used for the different measurement variables. In this way, both the app and website will affect the suggestions equally. Due to that all values are not statistically significant for the external channels, some values will be zero in the house, making the total degree of importance for the different external channels not equal to 100%, but 64% for the app/website and 88% for the cabin crew. These values are dark grey in Table 26. One value, TAM1 for the App/web is light grey due to that the data regarding TAM1 was statistically significant for the web but not for the app.

Table 26: The sum of the normalized numbers for each construct.

	App	Web	App/ Web	Cabin Crew
PV	0.508	0.524	0.516	0.239
EV	0.115	0.090	0.102	0.393
TAM1	0.182	0.251	0.217	0.118
TAM2	0.195	0.136	0.166	0.250
SUM	1	1	1	1

When the normalization was performed, the relationship values between the constructs and the suggestions were calculated. How the different constructs are effected by the different suggestions is explained in the next paragraphs. The relationship values between the constructs and the suggestions are displayed in Table 27.

Table 27. The relationship matrix between the constructs and the suggestions.

	A			B			C			D			E			F			G			H		
PV	△	△		●	●					○			●						○	○		●	●	
EV	○	○		○	○		△	△		△	△		○						○	○		○	○	
TAM1	△	△		○	●								○											
TAM2	△			●	△								△											
CTS				●				○					○				○					●		
SCS								○																
RSV				○			△						○							△				●

Next, the impact the different constructs have on the suggestions was calculated. This was done by using the degree of importance and multiplying it with the relationship values, receiving the values in Table 28 below. Due to that the impact of the external channels, the app/website and cabin crew, should not be larger than the impact of the internal parts, the control room, a normalization had to be made. The normalization was needed for the external and internal parts to equally effect on the improvement on the information flow. The weighted average values for the external and internal parts are visualized in Table 29, and the result is shown in the first row in Table 30. For example, to find the total improvement value for the app/web for suggestion A the following calculation was made:

$$A_{App/web} = 0.641 * 0.25 = 0.16$$

Table 28. Impact of the different constructs on the suggestions.

	A		B		C		D		E		F		G		H	
PV	0.516	0.239	4.642	2.153	0	0	1.547	0	4.642	24%	0	0	1.547	0.718	4.642	2.153
EV	0	1.179	0	1.179	0	0.393	0	0.393	0	39%	0	0	0	1.179	0	1.179
TAM1	0.126	0	0.377	0	0	0	0	0	0.377	0%	0	0	0	0	0	0
TAM2	0	0	0	0.25	0	0	0	0	0	25%	0	0	0	0	0	0
CTS		3.472		1.157		3.472		1.157		1.157		3.472		3.472		3.472
SCS		0		0		0.933		0		0		0		0		0
RSV		0.91		0.303		0.91		0.91		0		0		0.303		2.73
SUM	0.641	1.418	4.382	5.018	3.581	1.461	0	0.393	5.315	1.547	0.393	2.067	5.018	0.882	1.157	0

Table 29. Weighted average values for the external and internal parts.

Weighted average values	
App/web	25%
Cabin crew	25%
Control room	50%

Table 30. Improvements for the different suggestions

A		B		C		D		E		F		G		H									
0.16	0.35	2.19	1.25	0.90	0.73	0.00	0.10	2.66	0.39	0.10	1.03	1.25	0.22	0.58	0.00	0.00	1.74	0.39	0.47	1.89	1.16	0.83	3.10
0.01	0.02	0.10	0.06	0.04	0.03	0.00	0.00	0.12	0.02	0.00	0.05	0.06	0.01	0.03	0.00	0.00	0.08	0.02	0.02	0.09	0.05	0.04	0.14

The second row in Table 30 above, shows the total improvement that the different suggestions each have on the app/web, cabin crew, and in the control room, referring to the percentage. It was found by taking one number in the first row and dividing it by the sum of all numbers in the same row. For example:

$$A_{App/web} = \frac{0.16}{21} = 0.01 = 1\%$$

The total improvement percentages are shown in Table 31 below. The external values correspond to both the app/website and cabin crew, while the internal values are represented only by the control room. Both the external and internal values are added to the last row to visualize which of the improvement suggestions that will have the largest impact in total. The graphs of these three combinations are visualized in Figure 55-57 below.

Table 31. Improvements for the different suggestions.

	A	B	C	D	E	F	G	H
App/website	1%	6%	0%	2%	6%	0%	2%	5%
Cabin crew	2%	4%	0%	0%	1%	0%	2%	4%
Control room	10%	3%	12%	5%	3%	8%	9%	14%
External	2%	10%	0%	2%	7%	0%	4%	9%
Internal	10%	3%	12%	5%	3%	8%	9%	14%
All	13%	13%	13%	7%	10%	8%	13%	24%

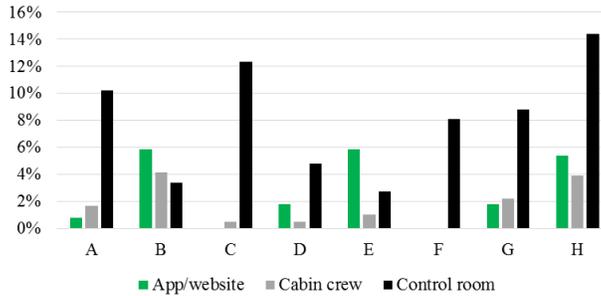


Figure 55. The distribution of how the different suggestions will improve the app/website, cabin crew, and control room.

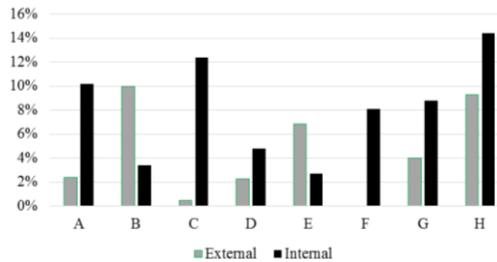


Figure 56. The distribution of how the different suggestions will improve external and internal parts.

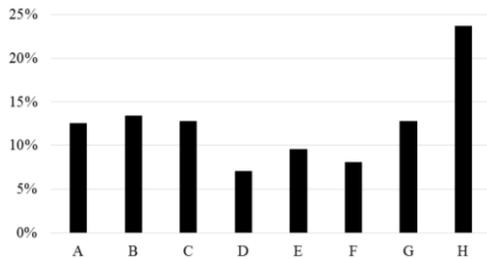


Figure 57. The distribution of the impact of the different suggestions in total.

5.3.2.1 Suggestion A: Improved Education

The performance value will increase for both the customers and the cabin crew when introducing standardized education due to clearer and monotonous information messages. If the traffic information to the customers and the cabin crew is standardized, the perceived usefulness and perceived ease of use will be increased.

Better education will increase the communication and teamwork satisfaction due to that the employees will have a better understanding of what the other functions are doing. Additionally, by organizing function meetings between all functions, the level of understanding will be increased and the employees will know what information the different functions need to make better decisions. When the employees have a better understanding of what the other functions are doing, the social

relationship between the employees will increase. It will also be easier for the employees to give feedback and support each other due to that the work procedures will be standardized.

5.3.2.2 Suggestion B: Improved Information Flow

The performance value, emotional value, perceived usefulness, and perceived ease of use will increase both for the customers and the cabin crew when improving the information flow. By having only one information co-ordinator which uploads standardized information from the same software, to the different channels, the traffic information will be monotonic. Therefore, it will also be easier for the customers to understand and the same information will be uploaded in all channels at the same time, increasing the performance value. The emotional value will increase due to that the customer will recognize the information and be able to identify it when it is sent through the same software. Also, if the customers receive a text message, which has been automatically logged in XOD when sent, Service Center and the cabin crew will have the correct traffic information at the same time as the customers. Therefore, they will be able to answer the customers' questions. This results in that the customers receive a feeling of getting the information asked for. By reducing the number of different channels for the cabin crew to use, the performance value will increase because it will be easier for them to know where to find the information, increasing the perceived usefulness value as well.

The improvements for the information flow will also have a positive impact on the communication and teamwork satisfaction. By making the employee who made the decision to log it in XOD, it will be shown for all functions in the room sooner, and everyone can find the information. By knowing that there is a lot to do during a disturbance, employees will most likely ask to help their colleagues to facilitate their work by example log in XOD, increasing the relations and support.

5.3.2.3 Suggestion C: More Even Distribution between the Double Competences

Introducing a more even distribution between the different functions regarding double and triple competences the emotional value for the app/website and cabin crew will increase, due to that more skills result in a better and faster decisions making processes. This results in that the information reach the customer faster, creating a feeling for the customer and cabin crew that they have control over the situation.

Within the room, a more even distribution of double competences between the different functions will have a large positive impact. More skills in the room will result in an increase of understanding for the different functions and thereby better communication and teamwork. If an employee has the competence of two functions decisions without asking about certain facts can be made, e.g. where they can re-route the train etc. Therefore there is no need to ask other employees, facilitating the work and resulting in a faster decision making process. Due to that employees with a double competence can work at more than one function, the scheduling will be easier. Having a double competence means working at different functions during different work shifts, thereby also working with different colleagues, which will increase the social relationships in the room. Further, by having a double competence includes more variation in work tasks and more opportunities for the employees to help each other.

5.3.2.4 Suggestion D: Collect Data

By collecting data and using the data as a base for the decision on how to improve the traffic information, both the performance and emotional values will increase for the app/website. By collecting data regarding which information channels the customers' use and then focus on them,

the performance value in the channels will increase. The emotional value will also increase due to that the customer will know where to find the information and will thereby be feel calm sooner. The emotional value for the cabin crew will increase due to that they will also receive information sooner if they, for example, stop with unnecessary calls to the control room.

5.3.2.5 Suggestion E: Reduce Text Messages

By getting control over and reducing the number of text messages towards the customers the performance value, emotional value, and perceived ease of use will increase for the customers. In the process towards stop sending text messages, the customers will learn how to keep themselves updated concerning their journey and where, as well as, in which channels they can find the most updated information. The emotional value will increase due to that the customers will know in which channels the traffic information can be found and they will only find one traffic information message in those channels. This will increase the perceived usefulness because customers will believe that the channels suggested will be very useful.

In the control room this will have a positive impact on the communication and teamwork satisfaction due to that a huge problem is when information based on wrong decision has been sent to the customers in the form of a text message and new information needs to be sent. When reducing text messages or sending a text messages that there is a disturbance and the train might be affected, it is not considered a big deal if the customers receiving the text messages are not the correct ones. Therefore, the chance of sending out wrong information decreases.

5.3.2.6 Suggestion F: Connect New Train Numbers with Planned Train Numbers

By reprogramming the software so the planned train numbers will be connected to the new train numbers and displayed in XOD, when for example re-routing a train, the communication and teamwork satisfaction will be improved. This is due to that there is no need to communicate about train numbers and the employees can easily find the information themselves in XOD.

5.3.2.7 Suggestion G: Reduce Incoming Phone Calls

The performance and emotional value for both the app/website and cabin crew will increased when dealing with the incoming phone calls. The performance value will increase because the employees in the control room will not be disturbed and can therefore focus on trying to find a solution to the disturbance. Consequently, finding the best possible solution faster. A faster decision making process will also result in the customers and cabin crew receiving the information sooner. Hence, they will know what is going on and feel that they have the situation under control. Further, the cabin crew will retain the updated traffic information sooner if they do not call and disturb the employees in the room.

Withal, if the employees in the control room spend less time on the phone it will increase the communication and teamwork value. If the employees receive less unnecessary phone calls, they can focus their energy and social skills at the necessary phone calls which creates a better SJ Traffic Control, increasing the relations.

5.3.2.8 Suggestion H: Creation of Teams and Repositioning

By creating teams, both the app/website's and cabin crew's performance and emotional values will be improved. The quality of the information will increase and therefore, also the performance values. The emotional value for the customers and cabin crew will be improved due to that the creation of teams results in a faster decision making process, which in turn results in that they receive the

information earlier. Consequently, they will know what is going on and feel that they have the situation under control.

Within the control room, the creation of teams will have a large positive impact. Because the teams consist of the functions needed and affected when making decisions, the communication and teamwork satisfaction will be increased and facilitated. Repositioning and moving the technical supporter to the center of the room will facilitate the technical supporter to inform all teams. This will also increase the communication value. The social relationship will increase when working in a team due to they need to work together and come up with a solution as a team. Furthermore, by putting the technical support in the center of the room will increase their social relations. The support and feedback satisfaction from the colleagues will be increased when the employees are working in teams, due to that they have a common goal.

5.3.3 Information Flow

After adding all the improvement suggestions together an information flow was mapped out, see Figure 58. The information and decisions are based on the same scenario as in 5.1.1 *The Information Flow*.

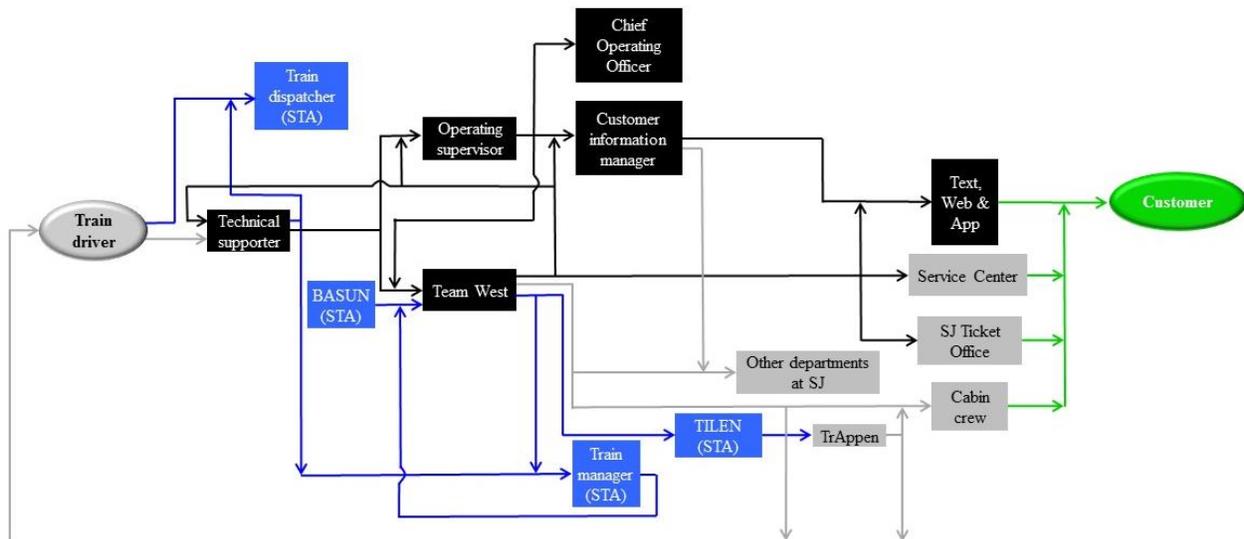


Figure 58: Future information flow.

To make sure the creation of teams does not fall short on lack of competences or lack of employees, calculations based on the number of employees needed as well as the number of employees with double and front edge competence was calculated, see Table 27 below. Excluding TIB, there will be four teams working at the different geographical areas as suggestion H proposes. The teams include one rolling stock manager, one train crew co-ordinator, and one traffic co-ordinator, during both the morning and afternoon shift. However, there is no need for a change during the night shift. In the teams, the employees will be responsible for all decisions made and for logging all decisions in XOD themselves, by working as a team. By doing this, the decisions will be faster logged in XOD during large disturbances, due to that there will be no bottleneck with queued information. It will also go faster during smaller disturbances since there is no need of walking to the employee at XOD to inform what to log. Moreover, to not lose competence, there will in total be four employees during both the morning and afternoon shift which have a front edge competence, one within rolling stock

managing, one within train crew coordinating, one within traffic coordinating, and the last one is optional. However, since train crew coordinating is the function with the most regulations and laws, it might be appropriate to consider two employees who have a front edge competence within this function. The other eight employees in the teams are going to have double competences. It is important to make sure that there are equally many employees of the three double competence combinations available. By making the employees acquire double competences, they can easier help each other during a disturbance, which will lead to a more even workload during their shift. Additionally, by making sure that more employees acquire double competences and are positioned in teams, the decision making will not only be done with the function in mind, but in general for the whole team.

In the current state, there are three employees working as information co-ordinators. Since the suggestion above includes the teams to deal with XOD themselves, this function will no longer be needed. Furthermore, sending text messages is not a sustainable solution and how SJ currently is working with text messages is similar to curling the customers, and it results in a high cost. Instead, SJ should teach the customers where they should look for information and in the future, the text messages will no longer be needed. One employee should be responsible for updating the website and sending text messages, and in the future also send pushed information through the app. The number of employees needed during a shift, where the operating supervisor, the customer information manager, and the technical supporters are not changed, is 38 employees during a normal Tuesday, for all three shifts, compared to the current 39 employees. However, a suggestion is to add one extra employee to technical support, which will unburden them and information regarding train defects will be faster distributed to the teams, see Table 32.

Table 32. Numbers of employees and FTEs needed for the new suggestion.

Team /Function	Regional	West	South	North	Other	Day	Not affected	
Morning shift	Operating supervising					1	Double competence	
	Customer information managing					1	Front edge competence	
	Technical support					1	1	
	Rolling stock managing	1	1	1	1			
	Train crew coordinating	1	1	1	1			
	Traffic coordinating	1	1	1	1			
	Information coordinating					1		
Afternoon shift	Operating supervising					1		
	Customer information managing					1		
	Technical support					1		
	Rolling stock managing	1	1	1	1			
	Train crew coordinating	1	1	1	1			
	Traffic coordinating	1	1	1	1			
	Information coordinating					1		
Night shift	Operating supervising					1		
	Customer information managing					1		
	Technical support					1		
	Rolling stock managing					1		
	Train crew coordinating					1		
	Traffic coordinating					1		
	Information coordinating					1		
Total	6	6	6	6	8	6		
24h total	38							

Function	FTEs	Least number of FTEs with front edge competence
Operating supervising	8	-
Customer information managing	4	-
Technical support	-	-
Rolling stock managing	9	5
Train crew coordinating	12	8
Traffic and information coordinating	29	5
Total	62	

Currently, there are some furniture in the control room which are more in the way than used. Some functions have mobile file cabinets between the desktops making it difficult for the employees who sit near the wall to get out. A question regarding the mobile file cabinet was posed in during the second survey, and Figure 59 shows the employees' general opinions regarding them. Train Crew

Co-Ordinators 1⁶⁹ and 2⁶⁹ believe that the furniture is used and not in the way, and they use it for putting coffee cups and papers at. Rolling Stock Manager 1⁶⁹ and TICO 14⁶⁹ stated that they never use this furniture, it is just in the way. But some of their colleagues use it as a free surface. Therefore, the mobile file cabinets were removed for the future suggestion, but all other storage furniture were left. Technical support is placed in the middle of the room to facilitate their work of informing the teams when a disturbance regarding a defect on the trains occurs. An example of how the replacing can be done is visualized in the correct measurement scale in Figure 60 and 61.

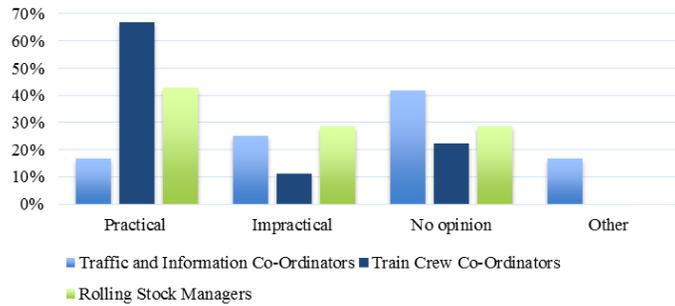


Figure 59. Employees' opinion regarding the mobile file cabinets.

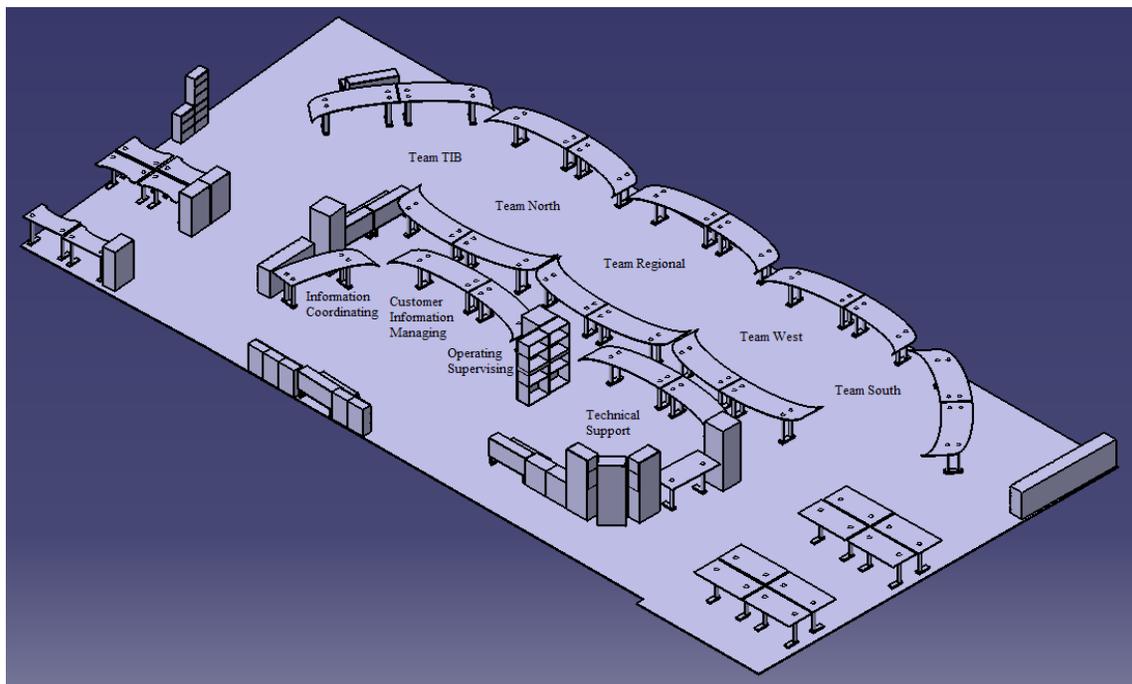


Figure 60. An example of how the replacement can be performed.

⁶⁹ Group Interview (Traffic Control, Division of Planning and Traffic Control, SJ AB) interviewed by Jennie Boérius 2016-03-05.

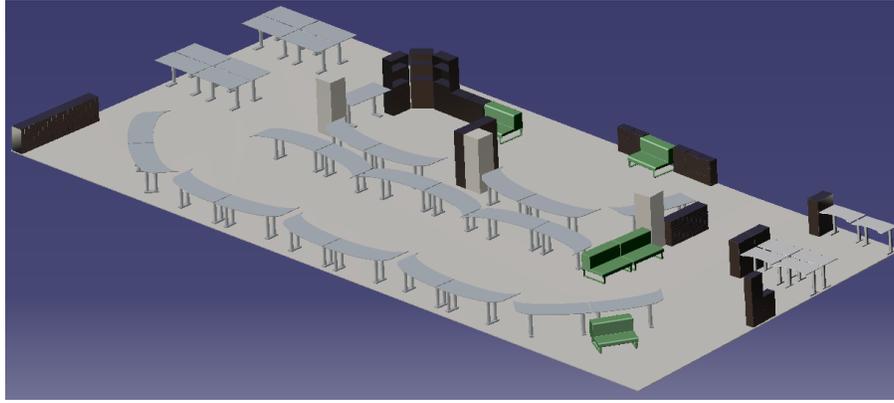


Figure 61. Same example as above, just a different view.

5.3.4 Core Values

The implementation of the suggestions will have a positive effect on the core values, stated in Table 33. The decisions made in the control room will be more reliable, sharing traffic information in the control room will get easier, the employees will become more caring, and it will be more joyful working there. The traffic information distributed to the customers will be more reliable, it will be easier for the customers to find traffic information, the customers will feel that SJ is caring and helpful, and the customers will have a more joyful journey.

Table 33. Core values for the future state.

Internal	
Reliable	<p>By having only one information channel which the cabin crew use, they will trust the information provided in that channel.</p> <p>More competences in the room will widen the employees' view, resulting in more reliable decisions.</p> <p>By creating teams, the functions needed will sit together and be part of the decision making process, decreasing the risk of miscommunication and re-decision making.</p>
Simple	<p>Reducing the number of apps for the cabin crew, to one, will make it easier for them to perform their work.</p> <p>More employees that have double competences will improve the communication in the room, due to that the employees know what type of information their colleagues want.</p> <p>The creation of teams will decrease the need of moving around in the room.</p>
Caring	<p>By increasing the number of employees with double competences, making the distribution more even between the functions, and improving the education, the understanding of the different functions will increase and thereby also the respect for colleagues at other functions.</p> <p>By creating teams, the members will work towards the same goal and help each other.</p>
Joyful	<p>If the employees receive more feedback from their colleagues and managers they will become more encouraged to work.</p> <p>A pre-recorded greeting message makes sure that SJ Traffic Control always sounds friendly when answering the phone.</p> <p>By creating teams, the employees will work together and unburden each other.</p> <p>The new placing will decrease the feeling of being left out, both regarding information and social relations.</p>
External	
Reliable	<p>By having the same information provided in all information channels the customers will receive the same traffic information wherever they try to find it.</p> <p>By directing the customers towards the most updated channels, they know where to find the most updated traffic information and that they can trust the information provided.</p>
Simple	<p>Decreasing the number of channels towards the customers will result in fewer channel and hence, it will be easier for the customers to know where to find traffic information.</p> <p>Informing the customers about which information channels that are the most updated ones, will make it easier for them to find traffic information regarding their journey.</p>
Caring	<p>If SJ removes the information regarding planned stop during the journeys, the customers will not be disturbed with information about something which does not affect their journey.</p> <p>Faster information distribution to the customers make them feel calm regarding their journey.</p>
Joyful	<p>The customers feel appreciated when receiving information. SJ Traffic Control should take advantage of this opportunity by sending pushed information through the app, which is also beneficial for SJ economics.</p> <p>By only providing the customers with relevant information, they are not disturbed and can consequently enjoy their journey, instead of listening to irrelevant information.</p>

6. Discussion

In this chapter, the findings from the research are combined with the theory, explaining that the improvement suggestions are scientifically supported. Together, they create the base for how the areas of improvement can be revamped. An implementation plan is also specified.

6.1 Improvement Suggestion

In this part the different improvement suggestions, for SJ Traffic Control Stockholm to improve their traffic information flow towards their customers, connected to the theory.

6.1.1 Suggestion A: Improved Education

By implementing suggestion A, the communication, education, and the support and feedback will be improved. Survey three showed that the employees at SJ Traffic Control Stockholm are not satisfied with their education and a change is needed. Currently the employees in the control room are performing their work in different ways and therefore, the best practices should be identified and applied for all employees, introducing Standardized Work (Zandin, 2001). Some employees could for instance save some time by using hotkeys instead of the mouse. Hence, this would be the best practices. When the best practices have been determined, they should be documented, which later can be used in an educational purpose (Berlin & Adams, 2015). It is of importance that it is the employees in the room who together comes up with the best practices, and they should be encourage to identified the different areas, included in the implementation process (Berlin & Adams, 2015). After that, it should be confirmed that all employees work according to the best practices. 93.2% of the employees participating in the second survey were open minded to learn new work procedures to facilitate their work, which indicates that teaching them new work ways will not be a problem. With the current situation at SJ, the process potential is not maximized and therefore Standardized Work should be introduced, supported by Zandin (2001). By introducing standards will make it easier to give and receive feedback, both for colleagues and managers, during education and later (Zandin, 2001). The third survey showed, the employees were almost satisfied with the feedback and support they received from their colleagues but not from their managers. The satisfaction concerns both the quantity and quality of the support and feedback. The technical supporters were generally the most satisfied with the support and feedback they receive from their colleagues, but also the function which was the least satisfied with the support and feedback from their managers. However, it should be noticed that this function have more than one manager due to that they belong to another division. The train crew co-ordinators were least satisfied with the support and feedback they receive from their colleagues and however they were also the function who was the most satisfied with the support and feedback from their managers.

Due to that 88.1% of the employees in the control room were willing to help their colleagues it is considered fairly easy to find teachers which have the correct skills. Furthermore, by letting the chosen teachers, for the different functions, meet and discuss what kind of information they need to make certain decisions, the awareness and understanding in the room will increase, resulting in better communication. Additionally, during these meetings, suggestions for how to facilitate each other's work can be included and they can learn from each other. The meetings are also supported by Zandin (2001), where the employees in the control room will have the opportunity to give their reflections of the standards. Last, the implemented standardized work practices will result in an

increased efficiency and productivity of the work tasks, which will lead to reduced operational costs (Zandin, 2001). An increased productivity will result in that the employees at SJ Traffic Control are able to send out traffic information to their customer faster, without impairing the quality. An improved productivity will lead to more satisfied customers and a better trademark.

6.1.2 Suggestion B: Improved Information Flow

Since the employees will log the information right away, the bottleneck regarding queued information will disappear, meaning that the information will never reach the customers before it reaches XOD. This will facilitate the Service Center, the cabin crew, and SJ Ticket Offices. Furthermore, employees unburdening each other to log in XOD even out the varying workload in the room. By connecting the softwares to XOD, so that information only has to be written and logged once, the waste in form of double and triple handling will be eliminated (Suzuki, 1987).

SJ started to publish traffic information at their website in 2001. Fifteen years later, an average of 323,093 customers are visiting it each month (SJ AB:9, 2016; SJ AB:9, 2016). However, if the visitors were travelling customers who seek traffic information or just happened to click their way into it is unclear. Since SJ has around 100,000 customers travelling with them each day, the average of customers who visit sj.se/trafikinfo each month is considered to be small. It can be discussed whether this depends on that SJ has not convinced the Early Adopters to start using the website, mainly because it is not easy to find traffic information or to use the website, which is supported by Sahin (2006).

Rogers's diffusion model can be applied to understand where in the diffusion process SJ's app is. Since the new app was released in March 2016, it has during the first three weeks been downloaded more than 800,000 times, and has around 80,000 users each day. However, regarding the daily users, it is not clear if it is travelling customers or customers who are looking for information for future journeys, defined as a vanity metric (Croll & Yoskovitz, 2013). As stated in SJ AB:6 (2016), the new app is easier to use and provides the customers with more and better traffic information, compare to the old one. This is an indication of that the app successfully has been implemented among the Early Adopters (Sahin, 2006). Furthermore, it can also be discussed how SJ crossed the Chasm during the release of the new app and successfully moved into the group Early Majority. The step *target the point of attack* was definitely taken, since the customers who are travelling more frequently can find better and more detailed information which facilitates the process of travelling with SJ. To *assemble the invasion force* is partly done but will further be developed when updating the app. SJ *defined the battle* by creating new innovative functions, which did not exist before. Furthermore, when *launching the invasion*, they mainly turned to the customers who travel most frequently, by marketing the new app at the central stations, and by sending emails to their SJ Prio members.

One argument why SJ neither should focus on new technology innovations towards their customers nor different information channels than they are currently using is the diffusion of innovation theory. If SJ wants to adopt new channels for sending traffic information, to prove that they are a modern company, the only customers they will reach are the innovators. Further, more resources at SJ Traffic Control will be needed to keep track on all channels, making sure that they are updated and at the same time, making sure that the different channels provide the customer with the same traffic

information. An important aspect is that it takes time for the customers to adapt to new technology. Therefore, it is better to focus on the channels which they have today, making them sustainable and develop them so that all customers can and will use them. Furthermore, the information channels with human contact should not be removed since customers will not be satisfied with only finding written information. This is supported by Brown et al. (2001) who explain that empathy, which is one dimension of service quality, cannot be realized through the electronic channels.

One dimension of service quality is assurance (Brown et al., 2001). An example of when assurance is not realized is when the train driver through speaker announcements informs the customers about planned stops which do not affect the punctuality. Reliability is another dimension of service quality, which means that the company is able to deliver the promised services on time (Brown et al., 2001). Even though the train is on time and hence, the component reliability is accomplished, the dimension assurance is not fulfilled due to the waste of information from the speaker announcements. This affects the customers' perception of the service in a negative way.

One risk of only having one app that the cabin crew use is if that channel would not work a particular day.

6.1.3 Suggestion C: More Even Distribution of Double Competences

Training and work rotation are factors which can be used to increase the employees' skills (Suzuki, 1987). By introducing a more even distribution and more employees which have competences within two functions, the understanding of the other functions' work tasks and responsibilities would increase, facilitate the communication in the room. Currently, there is a need for a higher understanding of the other functions work tasks and responsibilities in the room, see part 5.1.3 *Communication in the Control Room*. The employees with double or triple competences stated that they have obtained a wider perspective since they acquired another competence, see part 5.1.5 *Education*. When they make decisions, they base them on more than one function's point of view, which results in wiser decisions, less re-decision making, and economically beneficial decisions for SJ. Furthermore, they make faster decisions since they do not have to receive all information from other functions, because they have the knowledge needed. Moreover, the communication is faster and more direct since they know what type of information the other functions need. The interviewed multi competencers also explained that acquiring a double competence also leads to personal development, new skills, and variation in work tasks, see part 5.1.5 *Education*.

Train Crew Co-Ordinator 4⁴⁸ stated: "When I am working with someone who has more than one competence, I can tell that they have a different way of solving problems and they make their decisions based on more than one function's point of view". Indicating that the decision making process would be faster and better since other functions are taken into consideration. There would also be an increased respect for functions which have a higher workload, an increase in social relationships since the employees will move around more and work together with different employees, and more variation in work tasks. Which is supported by the findings in survey three regarding social relationships, which showed that the employees which has skills within three functions are the ones most satisfied regarding social relationships in the control room, while the employees who only works with information coordinating were not satisfied, see part 5.1.7 *Key*

Drivers of Job Satisfaction. More employees obtaining more skills would, apart from increasing the flexibility in the room, also result in a deeper understanding of the other functions, contributing to an improved communication. Though, through a wider knowledge, some of the front edge competence could be lost. This is solved by letting a few employees at each function acquiring a front edge competence and have the responsibility of that function. Due to that the suggestion includes employees with front edge competence it is concluded that the suggestions will be supported by more than 79% of the employees working in the control room, see part 5.1.5 *Education*. However, 52% of the employees want an increase in their salary to acquire another competence. Though, since the salaries are individual and based on the employee's performance, the employees with several competences have a substantial chance of acquiring a higher salary.

Furthermore, Suggestion C would also solve the scheduling problems by making the distribution of double competence between the functions more even. The major issue with the scheduling is that the load in the control room varies substantially, the load fluctuates for the different functions, which is identified as the waste Mura, see part 3.2.1.2 *Waste*. Depending on the disturbance, the different functions have different solution processes. For instance, if there is a defect with a train, the technical supporters and rolling stock managers have a higher workload in the beginning and the train crew co-ordinators have a higher workload towards the end. Consequently, the employees need to be concentrated at different times. The Personal Planner⁵ stated: "During a disturbance some employees are working hard while others have nothing to do and instead of helping their co-workers they are talking about private matters", resulting in that they are disturbing the employees which are working. The fluctuations cause another waste, waiting time (Suzuki, 1987). When employees have nothing to do, they wait. If more employees would have double competences, they would be more flexible during fluctuating workloads and hence, SJ Traffic Control would be less sensitive during large disturbances and facilitate for the employees to help each other during disturbances. However, by helping each other out more, both within and between the functions, the waiting time will be reduced, and the social relations between the different functions will increase as well as that the fluctuation in workload would decrease, which is possible if more employees have more skills.

6.1.4 Suggestion D: Collect Data

Currently, no data collection is done which can change the employees or customers behavior regarding traffic information. If SJ starts to collect data concerning the workload in the room, it will be easier for the company to understand how SJ Traffic Control is affected when decisions regarding the organization are made. The employees' hypotheses could change to facts, and if it is like Rolling Stock Manager 1³¹ stated: "This will increase the workload in the control room", it is important to reconsider the decisions. Consequently, SJ Traffic Control can understand and argue for how different decisions affect the workload in the room. They can also come up with improvement suggestions for the implemented decisions.

Since disturbances are not foreseeable, SJ Traffic Control should keep using lagging metrics. Though, they should measure more useful ones. Currently, they measure the total amount of incoming phone calls to the control room and the time it takes before they are answered. Croll and Yoskovitz (2013) mean that if the collected data are not critical to the company's business, it can mislead the company in believing that the business is going better than it does. The reason for measuring these parameters can be questioned. If the objective is to reduce the answering time, the quality of the phone calls will most likely be reduced. The data can show the load on the employees coming from incoming phone calls, but it can only be speculated in other conclusions. Why the

employees lose calls or have long answering times are of interest to be able to change the behavior, but not investigated. However, the authors came up with a new way of using this data, see part 5.1.4 *Incoming Phone Calls*, where they calculated the time per employee spent on the phone for the different functions. This data indicates whether the workload regarding to the numbers of employees per function is equal, showing it was not. To measure comparable improvements, the suggestion was to keep collect data regarding the necessity of the incoming phone calls. This data should be collected once or twice a year to understand if the different changes with the information towards the cabin crew affect their calling behavior of calling.

A quality metric should be a ratio or a rate and should be able to change the company's behavior (Croll & Yoskovitz, 2013). One important metric which SJ does not currently measure is which information channels their customers actually use. Today, SJ are using many information channels but have no idea which ones the customers use. If they would know which channels the customers are using, it would help them to prioritize which channels that should be used for providing traffic information and decisions regarding technical improvements can easier be established. SJ can make decisions regarding if the different channels are necessary, how the perceived ease of use and perceived usefulness can be improved, resulting in more customers using the channels, see part 5.3.2.4 *Suggestion D: Collect Data*. This will also result in that SJ can make decisions regarding how the customers' behavior should be changed, in order to reach out to more customers through the chosen channels. If SJ want their customers who are travelling more frequently to use the app and the ones which are not travelling frequently to use the website, they can see if they accomplish to change the customers' behaviors by collecting data.

An example of a vanity metric is the number of unique visitors at sj.se/trafikinfo which is measured and presented in SJ's unique visitor report, see part 5.1.9.3 *The Website* (Croll & Yoskovitz, 2013). In that report, the data are compared to the previous month and to the same month a year earlier. However, the data do not reveal if a customer was at the website by mistake, when one for instance was trying to buy a ticket. Furthermore, the metric does not explain anything about the quality of the information retrieved. Though, the metric indicates that customers are looking for traffic information during disturbances, but not if it was relevant or if the customers found what they were looking for.

6.1.5 Suggestion E: Reduce Text Messages

According to Parasuraman et al. (1988), one issue which can lead to lack of service quality is that the company creates too high expectations which cannot be met. This is currently done by SJ Traffic Control when sending out text messages to customers, providing them with information concerning deviations from their planned journey. Sending out text messages with detailed information about how the customers' planned journeys will be affected, creates expectations that SJ Traffic Control cannot meet during a larger disturbance. These text messages create a customer behavior which does not include the feeling of own responsibility of looking for and acquiring traffic information. In addition to this, it creates high expectations on SJ.

By implementing suggestion E, the customers receive information about the occurrence of disturbances, they will get used to taking own responsibility in finding more traffic information about their journey, and they will know where to find the most updated traffic information. It will become easier for the employee sending out the text message since there is only one text message template. Furthermore, information which has been sent as a text message cannot be taken back. A

sent text message with wrong traffic information cannot be regretted. When SJ Traffic Control sends another text message with new information, because the information in the first do not apply, it results in confused customers who have two text messages with different information. If the website or the app would be used, the information can be changed and it would therefore be less confusing for the customers who would not have different messages, just the most updated information.

6.1.6 Suggestion F: Connect New Train Numbers with Planned Train Numbers

To acquire information about new train numbers, the different functions need to walk to the rolling stock managers. Suzuki (1987) would call this unnecessary transportation which is a type of waste that should be avoided. If it would be mandatory to fill in the new number, it would facilitate the rolling stock managers, who frequently need to answer questions concerning the train numbers, and the functions which need the new train numbers. If this would be visualized in XOD, it would facilitate the train crew, traffic, and information co-ordinators' work, since less verbal communication, which easily results in misunderstandings, would be needed.

6.1.7 Suggestion G: Reduce Incoming Phone Calls

Incoming phone calls to the control room from the personnel on board the train which are unnecessary or superfluous are defined as the waste Muda, since they neither provide any value to the process of solving the disturbance nor add value to the customers (Suzuki, 1987). Poka-Yoke, in form of a light indicator - see Figure 53, can be used as a proactive measure to stop the cabin crew to perform unnecessary phone calls during disturbances, see part 3.2.1.1 *Poka-Yoke*. The purpose with the light indicator is for the cabin crew to get an understanding of what the current situation is like for the employees in the control room. However, to eliminate the risk of cabin crew calling another function in the control room, due to that the other function indicates a lower workload and the one they need to call indicates a higher one, it is important to introduce Standardized Work for both SJ Traffic Control Stockholm and SJ Traffic Control Gothenburg to follow (Zandin, 2001). When the cabin crew are calling another function it is a central factor to tell them to call the correct function. It is of importance to not make any exception, otherwise this suggestion loses its purpose. If both offices are following the new standards, the efficiency and productivity of the incoming phone calls can be increased (Berlin & Adam, 2015). If the number of unnecessary and superfluous incoming phone calls are reduced, all functions will have more time to focus on solving the problems which are caused by a disturbance and hence, find make decisions and find solutions faster.

6.1.8 Suggestion H: Creation of Teams and Repositioning

By letting the employees be positioned in teams consisting of the main functions involved in the traffic decision making process, no re-decisions will be needed and the risk of sending out information too fast will be reduced. Suggestion H is supported by Poka-Yoke since the re-decision making will be prevented (Grout, 2007; Plonka, 1997). Further, the quality of the information, both towards customers and in the room, will greatly increase and the fluctuating workload for the different functions will be more even. Moreover, the decision making process will be improve due to that the members of team are working towards the same goal also increasing their willingness to help the team members. The social relationships in the room will also be improved as a result of that the employees will be rotating between the functions, working with different employees different days or weeks.

Currently, some of the work areas for the different functions are located quite far away from each other and the walking distance is unnecessary long (Suzuki, 1987). When working in a team, and with the new placing visualized in Figure 60 and 61, the need to walk to another function to receive or deliver information will decrease, as well as the need to screaming information to each other will decreasing resulting in a reduction in noise level. Findings regarding bad social relationships in the room appeared in survey two. Therefore, it was further investigated in survey three which showed that the technical supporters and the train crew co-ordinators were not satisfied regarding if they were included in social activities in the control room and outside work, see part 5.1.7 *Key Drivers of Job Satisfaction*. The reason behind this can be discussed and one aspects is important to notice: both functions are currently placed in the room's corners. The new positioning will not exclude functions, or in this case –teams, as the position currently is and hence, adding value to the social relationships.

Currently, there are mobile file cabinets which are not essential to add value to the end product and therefore, they are waste (Suzuki, 1987). Unnecessary movements is another type of waste, e.g. in the control room, the employees have to walk around the mobile file cabinets in their work area to be able to walk to another function, to either acquire or deliver information (Suzuki, 1987). Because of the mobile file cabinets, the distance becomes longer but mainly it becomes more complicated to past them and the employees disturb their colleagues, see part 5.3.3 *Information Flow*. Hence, in the new positioning, no other storage than needed is included, meaning that the mobile file cabinets are excluded.

One important issue regarding the team idea is to further look into how the crew planning and the rolling stock planning can be improved to support the suggestion. How the planning currently is performed is not beneficial for the team idea. It has been investigated and found that it is not possible for the cabin crew to follow the train drivers due to economical reasoning, see part 5.3.1.8 *Suggestion H: Creation of Team and Repositioning*. But it has not been investigated whether it is possible to perform the crew planning after the geographical areas. However, if the crew planning would change, and thereby make it possible to introduce the team idea, it might result in a question regarding saving money or increasing the quality of traffic information towards the customers and other departments at SJ. Therefore, this is suggested for future studies.

6.1.9 Additional Suggestions

More absorbent materials should be used to reduce the reflected noise in the room which is supported by Berlin and Adams (2015). A downside of using the headphones is that the employees do not hear what their co-workers are saying when they are on the phone. However, they do not need to hear others when they are talking on the phone. By reducing the noise level in the room and the negative effects of the noise level, the employees will not be as disturbed when communicating and sharing traffic information with each other as well as with other departments at SJ.

According to Berlin and Adams (2015), there should be both general and specific lighting, which is the case in the control room. Good lighting in a workplace can lead to an increased productivity, while insufficient lighting can impair the employees' vision (Berlin & Adams, 2015). When there is insufficient lighting, people tend to bend forward to see better, creating bad ergonomics, which in the long run can be harmful (Berlin & Adams, 2015). Therefore, it is of importance to have sufficient lighting in the control room. The area which is furthest away from the illuminance limit is the work

area and it can be fixed by just changing the strip light in one type of lamp. The reflection should be further investigated since no measurements have been done and because the employees mention them as a problem. However, as a first attempt to reduce the glare from the sun, other blinds could be installed. By implementing these solutions, the risk of employees getting physical effects due to bad work environment regarding light will decrease. It might also lead to improved productivity and hence, an improved traffic information flow.

The action to always state SJ AB as the sender of the text messages is unnecessary and consequently waste, which is supported by (Suzuki, 1987). By reprogramming, this waste can be removed by pre-defining the sender, SJ AB, resulting in a decrease of the time it takes to send text messages to customers.

The Lean tool Poka-Yoke can be used to prevent errors from happening and using the disturbance board more frequently is one way (Grout, 2007). If the disturbance board is used at all operating levels, it will prevent unclearness regarding what tasks that has been done.

6.2 Implementation Plan

As visualized in the HoQ, the different suggestions have different impact. The suggestions also need different resources and have therefore been divided into two different categories in the implementation plan; obvious and challenging. The suggestion in the category obvious means that they have a high impact or are fairly easy to implement. In the category challenging, the suggestions have a high importance but need further investigation.

6.2.1 Obvious

Suggestion A, education improvements, has a total impact of 13% among all the improvement suggestions and it does not require additional resources. It is therefore considered an obvious suggestion to implement due to that it would increase the standard in the room, the employees' awareness, and the employees' skills. However, two small challenges in this suggestion might be to find the employees who have the correct skills to be able to teach and to find time for the meetings between the different functions, to make sure the education is standardized.

Suggestion C, a more even distribution between the double competences, has a total impact of 13% and does not require more resources. The reason why it is considered obvious is because it is fairly easy to implement, due to that it is only the employees willingness that is needed, which has been proven to exist.

Suggestion D, the collection of data, only has a total impact of 7% among all the improvement suggestions but is considered an obvious suggestion anyhow. By starting collecting data regarding how many customers SJ reaches when sending out traffic information, they will know which channels to focus at. Without this information SJ Traffic Control does not know whether the job they are performing, regarding informing their customers about disturbances and traffic information, is of serviceability. It is of high importance that SJ becomes aware of which channels the customers use. For this to be realized it has to be decided how the data should be collected. Additionally, to collect data regarding the necessity of the incoming phone calls do not need to require any resources besides extra time from the employees. One easy, but a little old fashioned, way to collect this data

is to let the employees themselves draw a line on a paper depending on the necessity of the phone call. However, the result of the necessity is considered predominant compared to the time the employees need to spend on this.

Suggestion F, to connect supplementary train numbers with the planned train numbers and make it visible in XOD, has a total impact of 8% among all the improvement suggestions but is considered an obvious suggestion due to that it would increase the communication and teamwork satisfaction as well as it would lower the noise level in the room. Furthermore, it would facilitate the financial department to be able to receive compensation from the disturbances caused by the STA, resulting in more resources to SJ.

6.2.2 Challenging

Suggestion B, improved information flow, has a total impact of 13% among the improvement suggestions. However, the individual loggings in XOD after making a decision is considered to be obvious to be able to remove the bottleneck with queued information. By removing this bottleneck a better flow and higher quality of the information will be obtained. The reason why suggestion B is considered challenging is due to that SJ needs to reduce the number of information channels, both to their customers and the cabin crew. Re-programming is needed for this to be realized, both regarding XOD and decreasing the number of apps. Today, the customers do not know which information channels that are the most updated one. By reducing the information channels this problem, along with the problem to have monolithic messages in all channels, will be diminished.

Suggestion E, to reduce the text messages towards customers, has a total impact of 10% among the improvement suggestions. The reason why this is considered challenging is due to that the majority of the employees at SJ believe that removing text messages would result in a lack of an expected service for the customers. However, if SJ instead would use the text messages as an opportunity to inform their customers where they can find the information themselves, SJ will be able to stop sending out text messages in the future. However, this suggestion is in line with one part of suggestion D; to collect data regarding which channels the customers use. For example, if SJ sends a text message to all customers who will travel with a certain train, partly explaining that more information can be found in the app or at the website, SJ can with the collected data see how many customers they reach. However, for SJ to be able to see that it is the customers who received the text message that are checking the information at the app or website, it is important that the customers are members of and logged onto SJ Prio. Therefore, by adding the two suggestions, the collected data of the number of reached SJ Prio members can be ensured.

Suggestion G, to reduce the incoming phone calls, has a total impact of 13% among the improvement suggestions and needs some reprogramming to be able to be implemented. However, the reprogramming is not considered the challenge. The challenge with the improvement suggestion for the cabin crew to not make unnecessary or superfluous calls, but to trust the information provided in TrAppen, and not try to acquire information before the solutions have been provided in the control room. Additionally, by implementing the color code on the different phones in TrAppen, the challenge will be for the cabin crew to respect the different colors. This can be prevented by communicating that the purpose of the colors is for the employees in the control room to make faster decisions, which in the end will lead to a faster traffic information distribution to the cabin crew. The suggestion takes advantage of the opportunity that the cabin crew always click at the picture of the phone when they call, which means that they will reconsider before making an unnecessary call.

Suggestion H, the creation of teams and repositioning, has by far the largest impact among the improvement suggestions, with 24%. However, for the suggestion to be realized there is a need for SJ to investigate the crew planning and make changes to facilitate the work for the train crew coordinating. This will result in a question regarding quality versus expenses, but can be solved by further collaborations between the two departments. Another challenge with the suggestion is the replacing, resulting in new aspects for the employees to keep in mind. However, the creation of teams and replacing would increase the quality of the information, the speed of the decision making processes, and the cohesiveness - creating a better SJ Traffic Control. Therefore, the opportunity can be put in action, using TIB as a pilot test for this suggestion. However, TIB includes a new area, new train models, and new personnel. Three important factors to keep in mind when analyzing the result of the team suggestion for TIB as a pilot test.

7. Conclusions

1. *What does the traffic information flow, from SJ Traffic Control Stockholm to SJ's customers, look like?*

The traffic information flow at SJ Traffic Control has been mapped out and all involved parties have been identified. There are several information channels the customers can use to acquire traffic information, where some are not controlled by SJ. The customers do not know which the most updated channels are. The quality of the traffic information distributed directly and indirectly to the customers depends on the operating level at SJ Traffic Control. At the train, the customers receive unnecessary traffic information about planned stops.

2. *What areas of improvement can be identified and connected to the traffic information flow?*

The thesis has shown that the largest improvement area at SJ Traffic Control is communication, mainly in the control room but also between the control room and the personnel onboard the trains. There is a lack of standardized work and education at SJ Traffic Control. Furthermore, the employees are neither satisfied with the social relations, nor the support and feedback. Another improvement area is perceptiveness towards colleagues who have a high workload. Regarding the work environment, the noise level disturbs the employees, the lighting is insufficient, and the placing complicates the traffic information sharing. If the right type of data are collected at SJ Traffic Control, improvements of the traffic information flow can be made.

3. *What are the key drivers of channel satisfaction regarding traffic information?*

The results have shown that schedule satisfaction is the most important key driver of job satisfaction in the control room. After that comes communication and teamwork satisfaction as well as relations and support value. It can be concluded that the constructs explain 47% of the job satisfaction. Hence, the other 53% of the job satisfaction are explained by other factors than the constructs. Service performance value is the most important key driver of channel satisfaction regarding the app and the website. Perceived usefulness also have an impact on the website's channel satisfaction. Three key drivers of channel satisfaction concerning the cabin crew were identified; emotional value, service performance value, and perceived ease of use, where emotional value has the largest impact on channel satisfaction. It was determined that the constructs explain the channel satisfaction for all three channels, but more for the cabin crew than the app and the website. The constructs explain 71%, 68%, and 56%, respectively, of the channel satisfaction for the three channels. Thus, there are other factors which have been overlooked in the model that affect the channel satisfaction, and especially regarding the website.

4. *How should the improvement areas be prioritized?*

The prioritization of the improvement suggestions is based on the impact the suggestions have on channel and job satisfaction, by using HoQ, as well as on the resources required to implement the suggestions. The obvious improvement suggestions should be implemented first and they are suggestion A: improved education, C: more even distribution between the double competences, D: collect data, and suggestion F: Connect New Train Numbers with Planned Train Numbers.

7.1 Widen the Scope

The thesis have made a methodological contribution by demonstrating that the methods PLS-PM and HoQ can be used together when trying to understand customer and job satisfaction. The thesis has also shown that production theories can be used in the context of information flows.

7.2 Future Studies

Recommended to future studies is, among other things, to look into how the crew planning at SJ can be modified to fit together with Suggestion H. Furthermore, the effects of a red operating level regarding the workload in the control room should be investigated. It is also recommended to obtain a better understanding of the customer's point of view. In that area, the differences between customer segments can be further looked into. Additionally, a more detailed investigation should be performed regarding what makes the customers satisfied with the different information channels. Further, the noise level in the control room should be evaluated during orange and red operating levels since the sound level increases with the operating level. Additionally, the reflection has not been measured, and considering the employees' comments about that being an issue, it should be further investigated in future studies. Some of the issues in the control room are presumed to be due to the organizational culture; attitude towards helping co-workers with a high workload and attitude towards disturbing colleagues. Therefore, it is recommended that the organizational culture at SJ Traffic Control is evaluated in future studies.

7.3 Limitations

It should be kept in mind that the survey was conducted during one day, at two different trains, and that there were 100 participants. The sample sizes concerning the measurements of the sound level and the illuminance in the control room are limited. The sound level has not been measured during orange or red operating levels. When using the results from the SAM measurements, it should be kept in mind that the sample sizes are small. Furthermore, the information flow has only been mapped out for one scenario.

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- 44: Multi Competencer 1 (Traffic and Information Co-Ordinator and Rolling Stock Manager, Traffic Control, Division of Planning and Traffic Control, SJ AB) interviewed by Jennie Boérius 2016-04-07.
- 45: Multi Competencer 2 (Traffic and Information Co-Ordinator and Customer Information

Manager and Operating Supervisor, Traffic Control, Division of Planning and Traffic Control, SJ AB) interviewed by Jennie Boérius 2016-04-11.

46: Multi Competencer 3 (Traffic and Information Co-Ordinator and Rolling Stock Manager and Operating Supervisor, Traffic Control, Division of Planning and Traffic Control, SJ AB) interviewed by Jennie Boérius 2016-04-11.

47: Multi Competencer 4 (Traffic and Information Co-Ordinator and Rolling Stock Manager, Traffic Control, Division of Planning and Traffic Control, SJ AB) interviewed by Jennie Boérius 2016-04-11.

48: Train Crew Co-Ordinator 4 (Traffic Control, Division of Planning and Traffic Control, SJ AB) interviewed by Jennie Boérius 2016-04-07.

49: Multi Competencer 5 (Traffic and Information Co-Ordinator and Train Crew Co-Ordinator, Traffic Control, Division of Planning and Traffic Control, SJ AB) interviewed by Jennie Boérius 2016-04-11.

50: Traffic and Information Co-Ordinators (Traffic Control, Division of Planning and Traffic Control, SJ AB) observed by Sara Helmrot 2016-02-23.

51: Traffic and Information Co-Ordinator 6 (Traffic Control, Division of Planning and Traffic Control, SJ AB) interviewed by Sara Helmrot 2016-02-17.

52: Traffic and Information Co-Ordinator 8 (Traffic Control, Division of Planning and Traffic Control, SJ AB) interviewed by Sara Helmrot 2016-02-10.

53: Traffic and Information Co-Ordinator 12 (Traffic Control, Division of Planning and Traffic Control, SJ AB) interviewed by Sara Helmrot 2016-02-16.

54: Traffic and Information Co-Ordinator 3 & 15 (Traffic Control, Division of Planning and Traffic Control, SJ AB) interviewed by Sara Helmrot, 2016-04-12.

55: Traffic and Information Co-Ordinator 5 and 8 (Traffic Control, Division of Planning and Traffic Control, SJ AB) interviewed by Sara Helmrot, 2016-04-07.

56: Technical Support 6 and Traffic and Information Co-Ordinator 2 (Traffic Control, Division of Planning and Traffic Control, SJ AB) interviewed by Sara Helmrot, 2016-04-07.

57: Traffic and Information Co-Ordinator 2 (Traffic Control, Division of Planning and Traffic Control, SJ AB) interviewed by Sara Helmrot, 2016-04-12.

58: Technical Support 8 (Traffic Control, Division of Traffic and Service, SJ AB) interviewed by Sara Helmrot, 2016-04-12.

59: Traffic and Information Co-Ordinator 1 (Traffic Control, Division of Planning and Traffic Control, SJ AB) interviewed by Sara Helmrot, 2016-04-12.

60: Rolling Stock Manager 4 (Traffic Control, Division of Planning and Traffic Control, SJ AB) interviewed by Sara Helmrot, 2016-04-12.

61: Train Crew Co-Ordinator 3 (Traffic Control, Division of Planning and Traffic Control, SJ AB) interviewed by Sara Helmrot, 2016-04-12.

62: Channel Manager (Channel Manager Customer Service, Sales Channels, Division of Market and Sales, SJ AB) interviewed by Jennie Boérius and Sara Helmrot 2016-03-16).

63: Technical Supporter 7 (Traffic Control, Division of Traffic and Service, SJ AB) interviewed by Jennie Boérius, 2016-04-21.

64: Sales Business Developer (Sales Business Developer, Sales, Division of Market and Sales, SJ AB) interviewed by Jennie Boérius, 2016-04-12.

65: Representative of Service Center (Service Center, Division of Market and Sales, SJ AB) interviewed by Sara Helmrot, 2016-04-14.

66: Observation of the Facebook and Twitter account (SJ AB at Facebook and Twitter) observed by Jennie 2016-03-31.

67: Rolling Stock Manager 3 (Traffic Control, Division of Planning and Traffic Control, SJ AB) interviewed by Jennie Boérius 2016-04-11.

68: Chief of Crew Planning (Chief of Personnel Crew Planning, Division of Traffic and Service, SJ AB) interviewed by Jennie Boérius 2016-04-26.

69: Group Interview (Traffic Control, Division of Planning and Traffic Control, SJ AB) interviewed by Jennie Boérius 2016-03-05.

Appendix A

Stakeholder Analysis

To understand to what degree the stakeholders have an impact on the research, a Stakeholder Analysis was performed. The stakeholders were divided according to the influence they were perceived to have on the project and the interest they were perceived to have in the result of the project, see the figure below. The identified stakeholders were two groups; Chalmers and SJ. The supervisor of the thesis, the examiner of the thesis, and the head of the master's programs were stakeholders belonging to Chalmers. The ones belonging to SJ were the supervisor at SJ, employees in the control room, managers at SJ Traffic Control, and other departments at SJ.

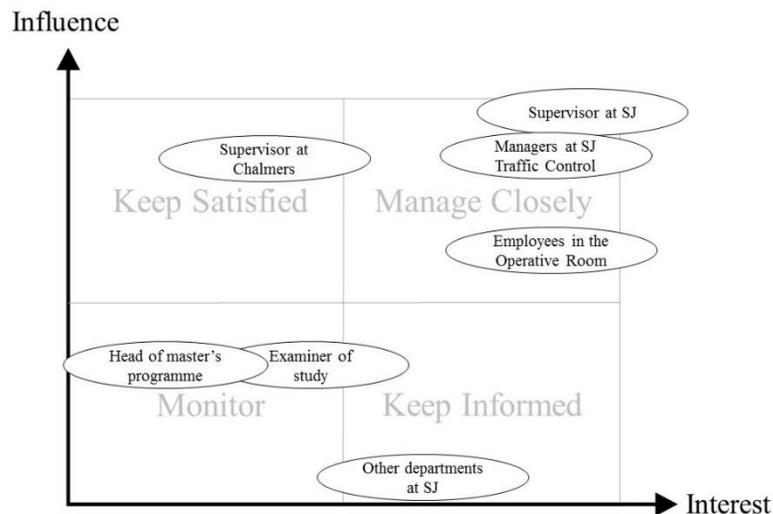


Figure. Stakeholder Analysis

Starting with the stakeholders at Chalmers, the head of each of the authors' master's program needed to give an approval that the thesis was accordance with the master's program. They had the authority to hinder the project to take place. If someone makes a review of the master thesis in the future, it is important that the thesis is in line with the orientation of the master's programs. The examiner of the study was the one who decided if the master thesis was approved or not. The research methodology and scientific quality of the thesis were important factors for him. The supervisor supported the authors throughout the project and it was therefore assumed that she was interested in the development of the study. She wanted to meet the authors regularly to be updated and provided them with feedback to make sure they were moving towards the goal. Furthermore, the supervisor wanted the study to contribute to the research at Chalmers.

The supervisor at SJ wanted to receive concrete and relevant improvement suggestions. She wanted regular updates about the progress of the project and wanted to be able to provide feedback to make sure that the results were useful to SJ Traffic Control. The supervisor was the one who gave approvals of performing interviews etc. at SJ and connected the authors with the needed employees for the project to reach its goal. Employees in the control room took part in the study by being interviewed and observed. The results of the study will have an impact on them and it was therefore of high importance that they felt included in the process. Consequently, they were assumed to have a large interest in the results of the study. Since they were the experts in the room and of their work

tasks, their ideas and suggestions for making their work tasks easier or more effective were taken into consideration. Managers at SJ Traffic Control were interviewed and if SJ decides to follow the improvement suggestions from the study, they will implement them. Other departments at SJ were involved in the project since they needed to contribute with important information. Whether they will be affected by the outcomes of the project depends on the scope of the improvement suggestions and how much of the improvement suggestions that SJ decides to consider.

Appendix B

Dictionary [English - Swedish]

Cabin crew = Ombordare
Chief operating officer = Operativ Chef
Chief operating officer of depot = Operativ Depåchef
Competitors = Övriga tågoperatörer
Control room = Operativa rummet
Create an occurrence = Skapa händelse
Crew planning = Personalplanerare
Customer information manager = Informationsledare
Depot = Depå
Disturbance board = Störningstavlan
Driving plan = Körplan
Information co-ordinator = Trafiksamordnare men endast för information
Locomotive and coach = lok och vagn
Operating supervisor = Skiftesledare
Operating level = Drifnivå
Operational Maintenance Planning = Operativ underhållsplanerare
Other Divisions at SJ = Övriga avdelningar/divisioner på SJ
Make a decision and appropriate action = Skapa beslut och åtgärd
Media Relations = Pressjour
Readiness group = Beredskapsgrupp
Replacement Transportation Services = Ersättningstrafik
Regional operating manager = Regional Operativ Ledare
Re-route a train = Vända ett tåg
Rolling Stock Manager = Fordonsledare
Service Center = Service Center
Short-Time Crew Planning = Korttidsplanerare
SJ Traffic Control = SJ Trafikledning
SJ Ticket Offices = SJs Resebutiker
SJ OnCall Security = Trafiksäkerhetsjouren
Swedish Transport Administration = Trafikverket
Tactical Planning = Taktisk planering
Technical support = Driftstödare
Traffic and information co-ordinator = Trafiksamordnare
Traffic Control Gothenburg = Trafikledning Göteborg
Traffic co-ordinator = Trafiksamordnare endast för trafik
Track work = Banarbete
Train crew co-ordinator = Operativ Personalplanerare (opsl)
Train dispatcher = Tågklarare
Train driver = Förare
Train manager = Tågledare [for STA]

Definitions

BASUN: The in-tray with emails from the STA.

Gärda: Is the voice at the Central Station.

Function meeting: A function meeting is when the employees at a certain function have a meeting and discuss about different aspects regarding their work.

Illuminance: A measure of how well a surface is lit and is measured in lux.

Muda: waste in form of any activity in the process which does not add value to the product.

Mura: waste in form of variation in the process that is caused by imbalance.

Muri: waste in form of an activity that puts unreasonable stress on employees or equipment.

Re-route a train: Does not physically mean that they are turning a train. The correct definition is that the train is changing direction and therefore need a new intern train number.

RPS: The software which mainly the rolling stock managers and train crew co-ordinators use.

Text Message Mälardalen: An aftersales service provided for the customers who are commuters. They receive text messages when there is a disturbance in the traffic.

Train: Includes all different parts in the rolling stock models. It can for example be the driver's cabin of a rail car, a locomotive, or a coach.

Train dispatcher: is responsible for a certain line within a geographical area, working for the STA

Train manager: is responsible for all lines within a geographical area, working for the STA

TrAppen: The app which the cabin crew and train drivers are using while they are working.

QFD: Quality Function Deployment

XOD: A software used for documenting disturbances, information, and decisions which are made in the room. Is a part of XPIDER.

XPIDER: The main software which the employees in the control are working in

Appendix C

Interviews

[1] Interview with Function Manager 1

Date: 2015-12-18

Present: Jennie Boérius, Sara Helmrot, and Function Manager 1 (Function Manager and Chief Operating Officer, Traffic Control, Division of Planning and Traffic Control, SJ AB)

Recorded: Yes

Time of Interview: 1.5h

Area: SJ Traffic Control

SJ Traffic Control

SJ Traffic Control works with day zero, which means today. Consequently they work with planning today's traffic where today is right now and 24 hours forward. Only urgent matters should be handled at SJ Traffic Control.

The control room

There are six different types of roles in the control room and their job is to handle disturbances. Function Manager 1 explains that since the disturbance already has happened when they start working with it in the control room, they are already behind. Therefore, the employees who are working in there need to be able to work under pressure and make fast decisions. The employees in the control room need to have very much communication with each other. The six roles working in the control room are described below.

Operating Supervisor

Responsible in the control room. Has contact with the Swedish Transport Administration.

Customer Information Manager

This role is not manned around the clock. This employee is in charge of making sure that the right information reaches both the internal and external information channels. Information to other employees in the company. The Customer Information Manager assists the Operating Supervisor. This role also updates the system for travel time guarantee, which enables the customers to search themselves. Consequently, it goes faster at the Customer Service. The Customer Information Manager works from a national perspective.

Traffic Co-Ordinator

This is the broadest role. There are no experts at a route, area or information, because all Traffic Co-Ordinators rotate. They talk to everyone in the control room.

During a disturbance, the Traffic Co-Ordinators decide what to do with the travellers. The responsibilities are divided in geographical areas. They book busses, cabs, and hotels. Furthermore, they talk a lot to other companies with complementing traffic. However, sometimes, they also need to use competitors as MTR.

The Traffic Co-Ordinators log all events with the trains. They send out information through an internal communication system that everyone at SJ can see, which is called Spider. The Traffic Co-Ordinators also have the responsibility to send out text messages. There are text message templates and they are titled for everyone to find them. Often, an existing template is not enough for a situation and it needs to be rewritten.

The Traffic Co-Ordinators talk to the Swedish Transport Administration. The Swedish Transport Administration has the authority over the trains' timetable, which means that during a disturbance, the timetable for SJ's trains is not valid. Telegrams sent from the Swedish Transport Administration are called BASUN. SJ Traffic Control can also see Telegrams regarding routes where SJ do not drive trains.

SJ Traffic Control have, through a signal system, access to real time information about the occupancy of the different stations. However, not all stations are covered by the system. This is the Swedish Transport Administration's system, which means that in this regard SJ Traffic Control has access to the same information as them.

Rolling Stock Manager

This employee also works with the trains. The Rolling Stock Manager has the competence to work with all types of trains. Tries to match trains, personnel, and the personnel's train competences. This person can look in a system to see what trains are available.

Technical Support

This employee is a train driver and an expert at the trains. The Technical Support functions as a helpdesk when there is a problem with a train. The employee helps both train drivers and cabin crew.

Train Crew Co-Ordinator

Move personnel between different routes. For instance, if someone is ill or if a train should depart sooner than first planned. Has reserves and calls with employees. Has money and information to do this.

Chief Operating Officer

There is also a Chief Operating Officer whose job is to unburden the control room. The Chief Operating Officer has access to call functions and has contact with the Emergency Manager, which means that this employee, if it is needed, has the possibility to redirect resources. Function Manager 1 is a Chief Operating Officer.

[2] Interview Traffic and Information Co-Ordinators Group 1

Date: 2016-01-21

Present: Jennie Boénius, Sara Helmrot, and ten Traffic and Information Co-Ordinators (TICOs), 8-17.

Recorded: Yes

Time of Interview: 49min

Area: Traffic and Information Co-Ordinators

- *What is the main objective of your functions at SJ Traffic Control? What are your work tasks at SJ Traffic Control?*
- *When changing shifts, what happens? Is the information transfer verbal or in written form?*
- *From what positions do you retrieve information from and send information to, both internally and externally? Please draw the information flow.*
- *Is the information exchange between the functions in the control room verbal or in written form?*
- *What information channels are used to distribute traffic information to the customers?*
- *Does the information flow vary depending on the workload in the control room?*
- *What do you think about the suggestion of providing the customers with traffic information in two steps; first explaining that there is a disturbance and that they are affected and then giving them more detailed information?*
- *What does currently not work well at SJ Traffic Control?*
- *Do you have any improvement suggestions?*

Work Tasks & Roles

There are mainly two types of co-ordinator task; dealing with traffic or information. Some employees are only working with the distribution of information but the main part of the employees are rotating between the areas. Most days, the staff working as Traffic and Information Co-ordinators, TICOs, rotate between the different roles.

The different roles within the field of traffic control are divided according to geographical areas. Hence, the employee who is responsible for a certain area has the responsibility to deal with the disturbances which are affecting all train routes within that area. TICO 11 explains that the employee working with Traffic Co-Ordination are responsible for taking the passengers from point A to point B. During a disturbance this can include booking busses, hotels, taxis, and very seldom, flights. Additionally, the Traffic Co-ordinators are responsible for the contact with the Cabin Crew. The different Traffic Co-Ordinator roles are; Regional, West, South, and North. At Regional, there are always two employees working, at the other three Roles there is only one employee per role. However, West are working with the routes between Stockholm and Gothenburg as well as Stockholm and Oslo. At North they are focusing at the night trains and the trains that are going in the area of Dalarna. The roles of the employees working with information distribution are; Text Message, XOD, and Web Site. Text Message includes sending out Text Message to customers, at XOD they log all decisions and results in the internal system XOD, and at Web Site they publish at SJ's web site. TICO 10 explains that the different roles consists of several responsibilities. However, the employees perform their tasks differently to fulfil their responsibilities.

During a day of smaller disturbances, the employees whom works with tasks concerning traffic and information are only focusing on their own tasks. However, when there are larger disturbances and some roles have more workload, the colleagues are helping each other and as a consequence, they are working outside the borders of their original work tasks. Since the staff are rotating between all the mentioned roles above, they know what to do when they help their colleagues. An example is when XOD has a high workload and the information is not distributed fast enough, then a Traffic Co-Ordinator, which has a smaller workload, may send out the information in XOD herself. According to the TICO 12, 14, and 15, this is a way of removing a bottleneck in the information flow system.

Initially, the Traffic and Information Co-Ordinators were divided and the staff either worked within one field or the other. Though, the staff did not like that structure/framework and everyone of TICO 8 to 17 prefer the way it is today. The group believes that it is advantageous to have a wider perspective and a better insight in other work tasks than one, which today's structure creates/provides.

Booking hotels and flight

There is a difference in how the TICOs book hotels. One way is to book through "Hotelzoon" but this approach is used by very few. This is because all the names of the passengers which should live there are required and that information may not be available at that time. Furthermore, sending a written request takes more time than calling. Another issue with Hotelzoon is the frequently recurring complications during payment, which sometimes is due to a demand that the bill should be paid with a credit card. Instead, the TICOs look at Artic and reserve hotel rooms with hotels that SJ have agreements with, or search for suitable hotels at Google. It is also common to use Hotelzoon as a tool to find hotels which are located in the particular area as well as to find the names and contact information of those hotels. However, some TICOs only use Hotelzoon to locate hotels and then Google for the rest. In most cases, they call the hotel directly and send a requisition to them.

Flights are only booked at very rare occasions as for instance funerals and they are booked through "Ticket". Though, the Customer Information Manager books plane tickets.

Disturbances

A disturbance is often discovered by the Operating Supervisor, the Customer Information Manager, or by a Traffic Co-Ordinator through a message from the Swedish Transport Administration which arrives as an e-mail in the inbox called BASUN. Train drivers and cabin crew can also notify the Traffic Co-Ordinators that there are unauthorized persons or animals in the track.

When a disturbance occurs, the disturbance plans from the Swedish Transport Administration should be used for the concerned geographical area or the concerned route. The plan includes decisions about which trains that should run and which trains that should be cancelled. However, the TICOs always make exceptions from that plan.

At large disturbances, the employees in the operative room should take a timeout to update each other and have a briefing.

Communication within the operational room

TICO 8 says that the higher the workload is, the worse the communication within the operational room gets. TICO 9 explains that due to lack of time during a large disturbance, the personnel talk less with each other. Though, they need to communicate to be able to take decisions, adds TICO 8. Usually, the communication between employees in the operational room consists of yelling. Because the phones constantly are calling during substantial disturbances, the personnel are not always available to listen to the one yelling. Another usual form of communication is to approach is to go to the persons working space and talk to him or her. The TICOs say that if the person they want to talk to is busy talking on the phone, they usually write down the message on a note so that the person

can read it when she or she has time. In the group, oral communication is preferred over written communication. The TICOs argue that speaking with each other takes shorter time than writing down the information. Moreover, since they need to make fast decisions, oral communication is preferable. Additionally, there are often supplementary questions and they can be answered immediately when speaking directly to a person.

There is a live chat that can be used. However, a new message is notified through a blinking light in the lower corner of the screen. The TICOs explain that when people are stressed, they do not see that sign until there is less to do.

The TICOs have contact with everyone in the operational room. Moreover, the traffic co-ordinators have most contact with the Train Crew Co-Ordinator. TICO 11 adds that the information from the Train Crew Co-Ordinator often comes a bit late because that person has spent time on trying to solve the problem.

Cabin Crew

The traffic co-ordinators are receiving phone calls from cabin crew and train drivers. In most cases, according to TICO 12, they want information from the traffic co-ordinators. The traffic co-ordinators always have to answer when someone is calling from a train because they do not know what their reason to call is. Furthermore, the phone call can be about something important or something unnecessary, meaning that SJ Traffic Control does not possess that information or that the information is available to the cabin crew or the train driver in their app, called TrAppen. According to the TICOs, the cabin crew often want information which the traffic co-ordinators do not have. During large disturbances, the traffic co-ordinators receive a lot of phone calls which forces them to spend most of their time answering the phone. According to the TICOs, they spend too much time at the phone which prevents them from trying to find a solution to the problem. Consequently, they are spending time on extinguishing fires instead of solving the problems.

The TICOs do not believe that one person being responsible for answering the phone would help, since that person would not be aware of the developments in each geographical area. Furthermore, TICO 12 explains that if a phone line with a high load is turned off, the cabin crew start calling to other phone lines instead. Moreover, if the cabin crew are not satisfied with the information provided by the traffic co-ordinators in the phone call, they will call back again. TICO 11 explains that you need to make a decision, which may not be in accordance with the cabin crew, but you need to make a decision.

TICO 11 explains that the cabin crew have 300 to 400 passengers who want information. Moreover, the cabin crew does not know when the information co-ordinators will update the information and therefore, they call the traffic co-ordinators. The pressure on the cabin crew, of getting information, increases with customers using social media, because that may lead to customers knowing more than the cabin crew. The TICOs agree with the suggestion of distributing the information to the cabin crew in two steps, to prevent a majority of them from start calling when they have found out that there is a stop in the traffic flow.

The information co-ordinator with the role called XOD should insert information in XOD and send it to the cabin crew through Trappen. The TICOs state that this is the most effective way to distribute

information to them. The traffic co-ordinators at the interview believe that it would be preferable if they call the cabin crew when they want something, and not the other way around. If the traffic co-ordinators want information from the cabin crew or the train drivers, they call them. The type of information they typically would ask for is where the train is located or if the train has run over something.

The TICOs explain that many in the cabin crew do not take care of the connections by themselves. Today, the traffic co-ordinators assist the cabin crew with the rebooking of the connections. However, this is part of the cabin crew's responsibility and they should primarily search for information in Trappen themselves. The traffic co-ordinators should only be involved if a decision regarding the traffic needs to be made, if for instance a train should wait or not. Though, this may be a transition from the old standards where the traffic co-ordinators were responsible for rebooking the connections, and not the cabin crew. TICO 12 mentions that this has reduced since the change was enforced. It could also be due to lack of information to the cabin crew, regarding the new standards. Moreover, the TICOs say that the cabin crew have access to the same information as them to being able to find appropriate connections, since they use the app 'Reserobot'. The app is available for the public and shows available connections at a station.

Other departments at SJ

The live chat is used for distributing information to external sources, for instance to SJ's ticket stores, the Contact Centre, and the Swedish Transport Administration.

Information Distribution to Customers

There are templates that should be used for sending out text messages to customers. All of them contains a message which says that "for more information, please go to..." combined with a link to the company's web site. The TICOs explain that the templates are useful, but that you always have to reformulate them a bit, and that they are a lot better than the old ones. The TICOs like the suggestion that the information should be dispatched in two steps. First, send out information and saying that there is a disturbance and then provide more information when a decision has been made. The Customer Information Manager urges for a fast information distribution. However, the TICOs explain that the information sometimes is sent out too fast. For instance, first they state that a train is cancelled, and then that it is not cancelled.

Identified Problems

The TICOs identified some of the problems they consider as the biggest ones; the communication between the different functions in the operational room, uncertainty of whether a decision has been made or not, uncertainty if the information has been logged or not, and lastly, during large disturbances, the sound level in the operational room is high which is disturbing the personnel working there.

[3] Interview Traffic and Information Co-ordinators Group 2

Date: 2016-01-21

Present: Jennie Boérius, Sara Helmrot, as well as seven Traffic and Information Co-Ordinators (TICOs), 1-7.

Recorded: Yes

Time of Interview: 36min

Area: Traffic and Information Co-Ordinators

- *What is the main objective of your functions at SJ Traffic Control? What are your work tasks at SJ Traffic Control?*
- *When changing shifts, what happens? Is the information transfer verbal or in written form?*
- *From what positions do you retrieve information from and send information to, both internally and externally? Please draw the information flow.*
- *Is the information exchange between the functions in the control room verbal or in written form?*
- *What information channels are used to distribute traffic information to the customers?*
- *Does the information flow vary depending on the workload in the control room?*
- *What do you think about the suggestion of providing the customers with traffic information in two steps; first explaining that there is a disturbance and that they are affected and then giving them more detailed information?*
- *What does currently not work well at SJ Traffic Control?*
- *Do you have any improvement suggestions*

Work Tasks & Roles

The responsibilities of Traffic Co-Ordinators include to keep track of delays, replace trains with busses, cancel trains, inform Cabin Crews about delays and other issues with the trains, as well as try to solve the problems which arise. The different roles within Traffic Co-Ordinators and their responsibilities are:

Regional: the area between Gävle and Göteborg, two employees.

South: the Southern Main Line, the area between Stockholm and Malmö.

West: the Western Main Line and Värmland, the area between Stockholm and Gothenburg, including the trains going to Oslo and Karlstad.

The different roles within Information Co-Ordinators as well as their responsibilities are mentioned below. There is one person at each role:

XOD: Logs information about events affecting the traffic and the trains. All decisions regarding the trains' direction are logged in XOD. The information is used internally, at SJ, and externally, at the Swedish Transport Administration through email in Basun. By using XOD, Cabin Crew and Train Drivers get informed through written information.

Text Messages: Informs the customers about cancelled trains, that there is no food available at the train, and comparable information. The only separation of different customers is through Text Message Mälardalen, where commuters have signed up and are paying to get information in form of text messages. There is for instance no connection between the information distribution to customers and the customer program SJ Prio (TICO 3).

Website: (sj.se/trafikinfo/) The Swedish Transport Administration posts delays, while the employee who is responsible for the website adds causes and information about the delays and cancellations. This employee also adds trains to the website, which the customers can follow.

Additionally, the trains customers can rebook themselves from due to a disturbance are added at the website by the employee. In the text messages where the customers are informed that they can rebook themselves, a link to the website where they can do that is included.

Disturbances

The Traffic and Information Co-Ordinators explain that they can help each other out if one has a disturbance and another one has nothing going. Furthermore, TICO 1 clarifies that since there are two employees working as Regional, one of them can often help someone else. TICO 6 continues and says that when the Traffic Co-Ordinators are not busy and they need to log a small amount of information in XOD, they do it themselves instead of asking the Information Co-Ordinator at XOD to do it. She explains that it is a way of distributing the information by using fewer steps.

During large disturbances, there is more to do which means that they need to write more, explains TICO 5. TICO 3 adds that during a large disturbance everyone within the control room screams more. The Traffic and Information Co-Ordinators say that apart from this, the information flow looks the same during a large disturbance as during a small one. However, TICO 4 adds that the Customer Information Manager uses more communication channels when a large disturbance happens, to reach the press etc.

When there is a large disturbance, the Traffic Co-Ordinators need to decide what information that is important to communicate to the customers and what information that is not. When there is less to do, the Information Co-Ordinators have time to inform the customers of less crucial matters.

During a large disturbance, the so called disturbance boards show the tasks that need to be done and the tasks which are finished. TICO 5 says that the board is a useful tool and that you do not have to ask a colleague what has been done, since you can look at the board instead.

Communication within the operative room

There is a lot of oral communication within the control room. The Traffic Co-Ordinators orally asks the Information Co-Ordinators to turn the information into written information. TICO 2 explains that if the employee you need to talk to is on the phone, you will write a note to him/her. Then, that employee can look at the note when she/she has time. However, the most of the TICOs prefer oral communication. They explain that a few people prefer notes. They use the means of communication which they themselves prefer, and not the one who will receive the information. TICO 4 explains that she/she take notes when she/she receives information. Additionally, TICO 4 says that the information sharing between the people in the operative room works well when they talk directly to each other.

TICO 2 explains that if you cannot leave the computer or you do not have time to go to the colleague you need to talk to, you can ask that colleague a question on the chat and she/she can answer when she/she is available. TICO 3 states that the chat is also useful when you want to send a booking reference or a link. TICO 6 adds that you also scream to the receiver that you have sent him/her a message in the chat, since that person will not notice the message otherwise. Additionally, the chat is very useful for communication with SJ's Ticket Stores and for instance to ask them to "open more registers when these people arrive", says TICO 4.

When there is a change of shifts, the information is shared both orally and written down. TICO 2 describes that events that will happen during the day are written down. Generally, the information is exchanged orally if it is small disturbances, while the information is shared both orally and written

if there are larger disturbances. Hence, when there is more information to share, you write it down, says TICO 3.

The information from all the different systems is collected in the Navet. Thus, the Navet is connected to all the systems.

Information Distribution to Cabin Crew

The Cabin Crew call the Traffic Co-Ordinators because they want help with the customers' connections. TICO 3 states: "That the main part of the phone calls from the cabin crew are about information which is available in TrAppen". The TICOs continuous to explain that it is an old habit and that it is easier for the Cabin Crew to call and ask for the information than to search for it themselves. Furthermore, when the Traffic Co-Ordinators do not have time to help them, they say that they at the moment do not have enough time to help them. TICO 4 adds that they try to help as much as they can, but sometimes they simply have too much to do and are therefore not able to help them.

To make sure that the Cabin Crew receive the information before the customers, the information should first be logged at XOD and TrAppen, explains TICO 1. However, sometimes the customers receive the information before the Cabin Crew, which is not very good, continuous TICO 1.

Information Distribution to Customers

TICO 1 states that Text Messages are very useful when they want a customer to take an earlier train, to for example be able to catch the last connection. TICO 1 continues to say that they would never have been able to reach those customers through the website. Moreover, TICO 7 says that if you have time to plan, Text Messages are a very good way of reaching the customers. TICO 2 believes that it would be better with a website which continuously is updated, than to send Text Messages to the customers.

Contact Centre is responsible for writing at Facebook and Twitter.

Speed of Information Distribution

The TICOs prefer to send out all information at once, compared to distributing it in two steps. However, it is not very often they have all the required information to do so. TICO 2 states that they sometimes have to say that "I do not know anything more, the train is delayed, listen to announcements at the train station and keep an eye on the board".

A problem is that they are too fast at sending out information, says TICO 3. TICO 1 says that it sometimes feel like it is more important to send out information than to send out relevant information. TICO 5 adds that it is due to that the customers want it that way. The TICOs feel pressure from the company to distribute information. After a while, the circumstances change and then a new Text Message has to be sent out. TICO 2 says that by sending out incorrect information, the trust of their customers is damaged. Though, it is difficult to know when the information will stop changing, adds TICO 6. For instance, a train can be changed from being cancelled to not cancel when the correct Cabin Crew has been found. TICO 2 suggested that instead of trying to distribute the information faster, maybe they should strive for waiting longer before providing the customers with information, to be able to send out more information which is correct. TICO 4 says that you act upon the information you have got and that information may change in 30 seconds, but you do

neither know if or when it is going to change. Therefore, at some point, the Information Co-Ordinator has to make a decision, says TICO 4.

Identified Problems

TICO 6 explains that they are using several information channels. Furthermore, they are using several systems for sending out information in the different information channels. TICO 6 says that there is one system for sending out text messages to Text Message Mälardalen, another for sending other text messages to regular customers, and a third one for sending out information in XOD, etc. TICO 3 believes that they should be able to use just one. TICO 7 adds that XOD is supposed to be the only system they should use to distribute information, but that the problem is that the money which were used to develop the system have been freezed. This have resulted in a semi-finished XOD.

TRICO 1 states that the biggest problem is that they need to work in that many systems, and that it takes time to switch between them. TICO 2 adds that with one single system the information flow to the customers and Cabin Crew would become a lot more effective.

TICO 5 says that possible causes of disturbances are displayed in scrollbars and that you are supposed to choose one of the causes. TICO 5 continues and explains that you cannot write in the system but have to choose something in these scrollbars, which takes unnecessary time and usually does not fit.

[4] Interview with CRM Manager

Date: 2016-02-05

Present: Jennie Boérius, Sara Helmort, CRM Manager (Responsible CRM Campaign Logic and Result, Customer Insight and CRM, Division of Market and Sales, SJ AB).

Recorded: Yes

Time of Interview: 32min

Area: Traffic Information and SJ Prio

- *What is your position and what are you in charge of?*

The CRM Manager is in charge of two areas:

- Credit accounts of SJ Prio; which includes making prognostication and sending information to the financial department.
- The logic of campaign; which includes controlling that the communication to the customer is done in a correct way so that a clear message comes through. They are studying the customers' behavior and searching for changed behaviors. An example could be if a customer stops travelling with SJ or if a customer changes from travelling in first class to second. This part can also include a need from SJ to increase the number of customers at a certain line. If this is the case, they choose a target group which is suitable.

- *What do you know about your customers?*

SJ have a lot of knowledge about their SJ Prio customers; they know where they live, where they travel, etc. SJ has communicated with their Prio members since 2007. Recently, SJ started to

communicate with their customers which are not members of SJ Prio, but which recently travelled, and they will also start to communicate with companies; small and medium sized. Additionally, they will examine the traffic information. They want to do this because as the CRM Manger states “SJ want to give their customer confidence-inspiring traffic information and offer the right information at the right time”.

Today, SJ has a customer interaction plan which includes how they should communicate with their customers. It includes different key performance indexes. For instance, that SJ should increase their members in SJ Prio with X members that should be active for at least a time period of X months. The different key performance indexes are then connected with the customer interaction plan and the main goal is that this communication should flow without disturbances between all channels. Thus, for a customer, it should not matter if she uses the App, website, or another information channel, she should get the same information wherever she looks. Furthermore, this information should be essential and specific for her. If she wants to book a trip at the website, she should not get traffic information about the current situation. Rather, the customer should be met with a specific message depending on who she is, how often she travels, which information channels she uses, how many times she has seen the message, etc.

There are different prioritizations within the different messages. A vision is that the most important one is put at the top and knocks out everything below. An example would be if the customer has purchased a journey and visits the website sj.se she should not be met by an offer saying “95 SEK on your next trip”, but rather see information about her specific trip and the traffic situation right now. At the same time, another customer has not purchased her trip yet and will therefore get the offer of 95 SEK, mentioned above, and not information based on the traffic situation. The main purpose is that the information channels should show a specific and relevant message depending on who the customer is. The information should be personalized. This type of communication is most applicable for customers who are members of SJ Prio and logged in. However, the idea is to also make it available to the other customers as much as possible.

- *How and what do you want to change when you say “changing the customer's behavior”?*

On way to look at a customer is through the customer life cycle. SJ wants to affect the customer in every step of the customer life cycle to influence them to be more loyal. Two phases in the customer life cycle are the Welcoming Phase and the Active Phase. The Welcoming Phase is the first phase which a customer enters when she signs up for SJ Prio. This phase includes signing up, receiving certain information regarding that the member is new, and some offers making the new member wanting to travel with SJ - to be able to create a certain travel behavior. SJ wants their new member to start travelling a lot as soon as possible. In the Active Phase, SJ can tell that the member frequently is travelling with them and hence, they want to both reward the customer for travelling with them but also maybe change the customer's behavior. An example to change a customer's behavior is to try to make them travel in first class instead of in second. Thus, depending on the customer life cycle, SJ has different events oriented and connected to the communication towards a certain customer. However, this is based on what the customer has or has not done, etc.

- *Have SJ tried to navigate the customers towards a specific information channel?*

No. The only thing which is similar is that if a customer purchased her trip when she was online at SJ Prio she will get X points which she can use in the bistro, or in the long run to purchase a new ticket. However, there is no extra information provided to the SJ Prio members. But one part of the customer confidence-inspiring project is about traffic information. Though, one problem is that SJ

are not able to distribute all information in every channel and therefore, they try to reach the customers where they can find the relevant information. (When this interview was performed, it was not yet decided what specific channel that should be connected to the different customer segments). It is important to keep in mind that traffic information is very complex. The customer can be at home, at the train station, on the train, just got off the train, etc. Moreover, today the information can be connected to some of the customers like commuters, business travellers, or someone who travels twice a year. But then important questions will arise: what kind of information do the different customers need to be satisfied? There is a huge difference between a commuter and the customer who travels twice a year. A customer wants to know what is going on. But when does she want to know it, how often, and in what way? All customers are different and want different information, which is important to keep in mind to be able to satisfy as many as possible. What quality does the information need to contain for the customer to be satisfied? If 80% of SJ's customers are satisfied with the provided information, so is SJ. SJ believe that it is close to impossible to make all 100% satisfied, due to that different customers use different information channels. Unfortunately, no market research has been performed by SJ where they ask their customers about this. The CRM Manager believes: "To let the customers take more responsibility and initiative themselves, is a more sustainable solution. It is impossible to send out personal text messages informing all customers about their journeys. Therefore, it would be better if SJ could focus on one channel where they frequently update the traffic information and direct their customer towards that channel."

- *Are members of SJ Prio provided with extra traffic information?*

Members of SJ Prio do not get specific traffic information. SJ can analyze the members' different behaviors. If a customer has a frequent behavior like she always travels at the line Stockholm - Gothenburg, they can give this certain customer a heads up that there will be a track work that day or something similar. SJ have a vision that they want to be able to give their members at the highest level something more than the other customers, to show them that they are appreciated. Furthermore, there is a demand of being able to differentiate the information depending on what level you are in the loyalty program.

- *What are your opinions of the information channels that SJ uses today?*

The CRM Manager also stated: "There are too many information channels which the customers can use today and the customers should get the correct traffic information once, by having all information channels updated at the same time. I do not want the customers to receive traffic information through different channels with different messages, which can occur today. In a worst case scenario, the cabin crew and the customers receive different traffic information. This is not professional and make the customers confused. I want the traffic information on all channels to be relevant for the customers and cohesive. The more dispatches SJ can have from the same tool, the better."

- *What is your vision of the future for SJ Prio?*

Today, SJ Prio uses Adobe Campaign where they perform all dispatches to their SJ Prio members. The CRM Manager adds that the more dispatches they can have from the same tool, the better. This would give the customer the same "picture" of SJ, no matter which information channel she uses. If this would be the case, there would for example be different sets of regulations to make sure that they do not communicate too much and that they keep track on which channels the customer uses and prefers. The advantage of this would be that SJ get some sort of 360 degree view of their

customers. Furthermore, if this vision would come true, the information SJ sends to the customers would be relevant which is preferable, for both SJ and the customers. This 360 degree view is important to be successful within communication, since they can send the correct information and messages to specific customers. The CRM Manager continues, she believes that it takes too much time to send text messages to their customers today. Therefore, they are currently working with a new tool for campaign, which hopefully will be easier and faster to use when sending out information to the customers.

“The way SJ Traffic Control works today, sending text messages to the customers; both during small and large disturbances, creates certain expectations for the customers. Especially sending information by text messages to customers during smaller disturbances creates huge expectations during large disturbances, expectations which cannot be met by SJ today because they do not have capacity to handle it”. The CRM Manager believes that letting the customers take more responsibility and initiative themselves would be better and a long-term solution.

A large part of the customer confidence-inspiring project within traffic information is to control the customers’ behavior. It is impossible to send out personal text messages informing all customers about their train and trip. Therefore, it would be better if they focus on one channel where they frequently update the information.

- *Is it a good idea to keep using text messages where SJ tells the customer to keep themselves updated at a certain information channel like the App or the website?*

This is a good idea, but does someone download the App if she is not a frequent traveller? Can SJ demand it? However, the Division of Marketing has together with the Division of Communication and the Division of Traffic Control ended up in a trap regarding this. The Division of Communication and the Division of Traffic Control want the customer to easily find information about the current traffic situation, and the easiest way is of course to have the information located on the front page. However, the Division of Marketing do not want the information there since it might frighten potential customers to fulfill their purchase, when there are warnings about the current traffic condition. This is one of the main reasons why SJ needs to begin with specific and personalized information towards the customer. The message will be relevant if a SJ Prio member can be kept online at the website. The vision is that the traffic information is only shown to the customer who needs it. Furthermore, depending on if the customer is travelling frequently or not, different information channels should be used. For example, the customers who do not travel frequently, they should be referred to the website while the customers who do travel frequently should be referred to the App. Furthermore, which information channels who are of importance here are not yet decided during this interview. Only that the App is meant to be used by the customers who travel frequently. New traffic laws within these areas are being implemented and are consequently pushing SJ to change their current system. However, how differentiated the information for the different customer segments it is going to be is still unclear.

- *Is there anything you would like to add which you believe is important to keep in mind?*

“Market research shows that a customer who was on a train which was late, but received appropriate information, is generally more satisfied than a customer who was on a train which was on time, but did not receive any relevant information”.

Today, SJ Prio has around 1 million customers, and around 800 000 of these are active in one way or another. The definition of being active is that they have traveled with SJ, as a SJ Prio Customer, at least once during the last year.

The advertising inside the train is outsourced to a company called Get On Board.

[5] Interview Scheduling in the Control Room

Date: 2016-04-13

Present: Jennie Boérius, Sara Helmrot, Personnel Planner (Personnel Planner, Traffic Control, Division of Planning and Traffic Control, SJ AB), and Operating Supervisor 3 (Traffic Control, Division of Planning and Traffic Control, SJ AB)

Recorded: No

Time of Interview: 1h 55min

Area: Scheduling in the Control Room

- *How many employees are needed at each function in the Control Room? How many do you schedule to work at each function in the Control Room?*

A challenge with the scheduling in the Control Room is that the load varies substantially. There is a minimum occupancy which is required during a very small load but the occupancy is scheduled higher than that, which means that they can cope with disturbances. However, the Control Room has not the required occupancy which is necessary to deal with the largest disturbances. Apart from the normal occupancy, there is a reserve of people who are scheduled. The objective of the reserve is especially to cover for holidays, sick leaves, and work meetings. The Train Crew Co-Ordinators have a larger scheduled reserve of employees than the other functions since they have a high load during a long time. Furthermore, problems that they have to deal with can remain a long time after a disturbance, approximately up to 24 hours.

There are three shifts in the Control Room; morning, afternoon, and night. The “normal” occupancy from Monday to Friday and Sunday night is the following:

- Operating Supervisor: morning 1, afternoon 1, and night 1. This function ALWAYS needs to be occupied, with no exceptions.
- Customer Information Manager: morning 1, afternoon 1.
- Information Co-Ordinator (XOD, Web, Text): morning 3, afternoon 3, the night between Sunday and Monday 1, since Monday is the busiest travelling day during the week.
- Traffic Co-Ordinator (North, West, South, 2 Regional): morning 5, afternoon 5, night 1 except from the night between Sunday and Monday when 2 people are required.
- Rolling Stock Managers: morning 1 (X2 and X40), afternoon 1 (X2 and X40), day 1 (Locomotive and Wagon)
- Train Crew Coordinators: morning 3, afternoon 3, night 1.

SJ Traffic Control have few employees which are paid by hour. The schedulers say that a business cannot be built on on those type of employees since one cannot count on them being available when needed. The Personnel Planner says that SJ Traffic Control have a relatively high sick leave in form of getting a burnout due to the varying load. Operating Supervisor 3 adds that it is also because the employees in the Control Room never can solve all problems. The Personnel Planner adds that the

sick leaves still are at an acceptable level. The Personnel Planner explains that the occupancy at SJ Traffic Control is at the right level, meaning that the number of employees in occupancy is correct.

- *What do you think about multi competences?*

Multi competences are valuable during a disturbance and they are also handy for the schedulers. Though, Operating Supervisor 3 is worried that introducing multi competences will hide the fact that more people are needed during a shift. A downside of the employees which have multi competences today is that it sometimes complicates scheduling. She mentions an example of this; when there is an employee which works as a Train Crew Co-Ordinator and has a multi competence as a Rolling Stock Manager but there is no Rolling Stock Manager who can work as a Train Crew Co-Ordinator.

Apart from having a group of employees as a reserve, there is group of five employees which have multi competences, which is very useful for the schedulers.

Operating Supervisor 3 says that everyone in the Control Room do not want to have a double or competence. The Personnel Planner explains that just because an employee has a double or triple competences, she does not get a higher wage. Both interviewees believe that employees should get an increased salary when they have multi competences. However, the Personnel Planner explains that the employees in the Control Room get individual wages which means that those who are forward and hardworking get higher wages. Furthermore, the employees with multi competences therefore have a higher chance of getting a higher wage. But there is no such thing as becoming multi competent and automatically getting a higher wage. In their opinion, the risk of quitting is smaller if the one who receive a double competence gets an increase in the salary.

The Personnel Planner believes that SJ can force everyone in the Control Room to acquire double competence. She thinks that the Train Crew Co-Ordinators would show most resistance towards becoming employees with multi competences.

- *We have thought about an improvement suggestion where one from each function; Traffic Co-Ordinators, Information Co-Ordinators, Rolling Stock Managers, and Train Crew Co-Ordinators, are placed in teams that are responsible for a geographical area, as the Traffic Co-Ordinators are today. What are your thoughts about that?*

According to Operating Supervisor 3, the suggestion falls short on the Train Crew Co-Ordinators since they today are either working with Train Drivers or Cabin Crew. To work with both is too much for one employee. Though, she believes that the group together could solve all the Train Crew Co-Ordinator's problems. She emphasizes that one person cannot do it by herself.

Operating Supervisor 3 and the Personnel Planner add that they do not believe in employees belonging to and working in the same team all the time. Because that people, for instance, might feel that group A is a lot better than group B and that they themselves belong to group B, which leads to negative feelings about their own group. Hence, they do not believe in statical groups due to internal conflicts and that some groups will not work very well.

During a disturbance, you do not have the time to document everything, even though you should, says Operating Supervisor 3 based on her own and others' experience in the Control Room.

- *From one of the surveys performed in the Control Room, there was a comment about that the Train Crew Co-Ordinators cannot sit together with the other functions, since they cannot be disturbed when they are talking on the phone. The comment came from an employee who is not a Train Crew Co-Ordinator. What is your view in this matter?*

Operating Supervisor 3 says that the problem is not that they cannot be disturbed when they are talking on the phone. She says that they have sensitive phone calls but that it could be solved in another way when those phone calls happen. The sensitive phone calls can be when Cabin Crew or a Train Driver have been involved in a collision, says Operating Supervisor 3.

- *One of the authors tell them about the authors' observations that some employees are working very hard during a disturbance while others have nothing to do and are, instead of helping their co-workers, chatting with each other about private matters.*

The Personnel Planner states: "During a disturbance some employees are working hard while others have nothing to do and instead of helping their co-workers they are talking about private matters". The Personnel Planner agrees and also believes that it needs to be changed. Though, she wonders if it is an organisational or a scheduling problem. The Personnel Planner and Operating Supervisor 3 believes that being perceptive to others in the Control Room is the most important attribute to have as an employee.

- *The information distribution from SJ Traffic Control Gothenburg to the Cabin Crew is today experienced as better than from SJ Traffic Control Stockholm. What do you believe is the reason for that?*

Operating Supervisor 3 explains that the information from the Gothenburg office is better than from Stockholm since they have more departures in Stockholm, 60% more than Gothenburg. She also believes that it is due to that the employees in Gothenburg make more exceptions from the rules, regarding for instance replacement traffic services, than the ones in Stockholm do. Though, they are not sure what the main reason is. The Personnel Planner says that employees at SJ Traffic Control visit the Gothenburg office to see if there is anything they can learn. She believes that they should do more of those visits to learn more. She also adds that the employees at SJ Traffic Control never visits the Stockholm office.

- *The Personnel Planner and Operating Supervisor 3 explain how the scheduling for the Control Room works.*

Today, the scheduling is based on different shifts. The schedule for a function consists of X number of weeks, where there are different schedules for each week. Furthermore, all employees at a function rotate between those schedules and consequently, all employees will have a different schedule each week.

Operating Supervisor 3 states that a scheduling approach which is based on the employees' wishes would be optimal for the Control Room. The Personnel Planner agrees. The Personnel Planner and Operating Supervisor 3 explain that they as schedulers would present the different schedules and then the employees would themselves choose the times slots they want. Though, there should be some set rules which says that everyone for example need to work every second weekend, a Friday, need some time to rest between time slots, etc. The different time slots will be worth different points depending on how desirable or popular they are. When the employees choose time slots, they need to come up in a certain amount of points. The Personnel Planner and Operating Supervisor 3 believe that the employees in the Control Room would prefer this type of scheduling.

However, to enforce this scheduling approach, a new IT system is required. The Personnel Planner explains that a new project has been started where a new IT system for scheduling is developed and that system does not include functions for this type of scheduling. The Personnel Planner explains that the main drawback with switching to this scheduling approach is that there has to be a system supporting the scheduling. Another drawback with the approach would be that employees who are unstructured might have a hard time to decide which time slots they would prefer, says The Personnel Planner. Operating Supervisor 3 has worked three shift for many many years and she says that it might be difficult to decide what you want since you are not used to it. The Personnel Planner explains that they have tested a variant of this approach at the Customer Group and it worked quite well for them. The IT system which was used is called CCC. When the Personnel Planner did not have access to the IT system anymore, due to that she was placed in another part of the organization, in SJ Traffic Control, the Customer Group's scheduling was realized in the IT system RPS, which is used at SJ Traffic Control. Since RPS does not facilitate this scheduling approach, it could not be used for the Customer Group when the Personnel Planner started working at SJ Traffic Control. The Personnel Planner says that the approach of scheduling based on the employees' preferences requires more time in the initial planning, but that the end result is a lot better.

- *The authors tell the interviewees about that they do not believe that the placement in the room is not ideal. The authors also told them about the improvement suggestion of having teams consisting of different functions, which are responsible for geographical areas, instead of how it is today where the room is divided in functions.*

The employees in the Control Room take up a lot of space since everyone have four computer screens each, says the Personnel Planner. Operating Supervisor 3 says that they operatively have tried to put a train Crew Co-Ordinator, a Rolling Stock Manager, and a Traffic Co-Ordinator together in a different room and that it worked well.

Operating Supervisor 3 said: "The train crew co-ordinators are often end up left out form the information sharing because they do not hear what the employees at the other functions are discussing, both due to the sound level in the room but mainly because of the distance. The customer information manager and the operating supervisor cannot hear what the traffic co-ordinators at North, West, and South, discuss."

The Personnel Planner explains that the Train Crew Co-Ordinator which is responsible for the Train Drivers and the Rolling Stock Managers need to sit close to each other.

- *One of the authors tell the interviewees about the idea of testing the team-suggestion at a new geographical area which SJ Traffic Control will be responsible for.*

The Personnel Planner says that a drawback on doing the pilot study on a new geographical area is that it will face a lot of children diseases. Hence, even though the pilot study in itself works well, it is easy to blame the team-suggestion even if the problems come from handling the new geographical area.

- *Discussin regarding the employees in the Control Room.*

The Personnel Planner says that a mixture of different people in the Control Room is a strength. She says that people matter, that how it works in the room cannot only be explained by the organization. Operating Supervisor 3 adds that many of the employees in the Control Room have been working as Cabin Crew before they started working here.

The Personnel Planner recommends role play to use as a mean of changing employees' behaviour. She also adds that everyone should be recorded during a period of time, when they are talking at the phone, to then be compared to each other.

[6] Interview with Operating Supervisor 2

Date: 2016-02-23

Present: Jennie Boérius, Operating Supervisor 2

Recorded: No

Time of Interview: 7min

Area: Operating levels

- *Can you explain more about the different operating levels?*

The conditions in the control room can be explained by four different states; green, yellow, orange, and red. Which state the control room is in is decided by the Operating Supervisor or the Chief Operating Officer. To go from the state green to yellow is decided by the Operating Supervisor. When that is done, the Customer Information Manager sends text messages to other departments at SJ, including the Chief Operating Officer. It is then up to the Chief Operating Officer to decide if they should move from the state yellow to orange, or even to red.

The decision to go from the green state to the yellow, depends on the number of trains and customers affected by the incidence. Around ten trains need to be included due to the same incident.

[7] Interview with Function Manager 1

Date: 2016-02-22

Present: Jennie Boérius, Sara Helmrot, and Function Manager 1 (Function Manager and Chief Operating Officer, Traffic Control, Division of Planning and Traffic Control, SJ AB).

Recorded: No

Time of Interview: 23min

Area: Placing of functions, operating level, staffing

Furnishing solution in the control room

Since there are more departures and consequently faster changes in Regional than the other areas, they are located close to the Rolling Stock Managers. There are two employees working at Regional at the same time, because there are departures every 30 minutes from the area covered by Regional. The Train Crew Co-Ordinators are located close to each other since they work a lot together. The Technical Support and the Rolling Stock Managers are working quite close together.

Level of disturbance

There are two factors to consider when changing the level of disturbance, the severeness at the train lines and the workload in the control room:

- Orange: When there is a danger, even if just one train line is affected, the level of disturbance should be changed to orange. Other departments in the company are also involved when the disturbance is changed from yellow to orange.
- Red: A disturbance is rated as red when several lines are affected. Storms can typically lead to a red level.
- The workload in the control room is also determining the level of disturbance.

Staffing

The number of employees during each shift is based on the estimated number of trains which can be handled by a person during a disturbance. The idea is that the employees during a shift should be able to cope with a level red disturbance, though that is not true today.

[8] Interview with Operating Supervisor

Date: 2016-02-12

Present: Jennie Boérius, Operating Supervisor 1

Recorded: No

Time of Interview: 13min

Area: Responsibilities of functions

A short interview based on the main responsibilities for some of the functions in the control room.

The Operating Supervisor is responsible for making sure that everyone within the room know what is going on. Of course, different Operating Supervisors perform their tasks differently. However, Operating Supervisor 1 explained that when a disturbance is discovered she starts by informing Rolling Stock Managers or Traffic and Information Co-Ordinators, depending on the cause of the disturbance. For example, if it would be a defect on a vehicle, the Traffic Support would be the first ones to know, and they would tell the Operating Supervisor as soon as possible. The Operating Supervisor then takes a turn within the control room and informs everyone, since it very likely that that specific train will be delayed. When she receives new information from any function in the room, she takes another turn to make sure that everyone are updated.

[9] Interview with Operating Supervisor 3

Date: 2016-04-07

Present: Jennie Boérius, Operating Supervisor 3

Recorded: No

Interview time: 8 minutes

Area: Main work tasks

The Operating Supervisor is distributing the work tasks during a disturbance and is in charge of everything that is going on and all decisions made. She is the one responsible for the overall traffic decisions.

During the morning and afternoon shift, the Operating Supervisor have one briefing meeting with all employees in the Operating Room. They are at 07:15 and 14:30. The reason why there is not a briefing meeting for the night shift is because they are only four employees working then so they have communication anyway. During a briefing meeting the Operating Supervisor inform the group about current trackworks and speed limits reductions from STA which will affect a trains' punctuality or similar. She also inform about study visit so the employees knows that there will be other people in the room. Then, each function will explain what information they received from the employee working at the previous shift, information including the current situation, personal, and the trains.

There is also another meeting which is a Rolling Stock meeting. These meetings are at 10:00 and 20:00 and the employees participating is the Chief Operating Officer of Depot for both Hagalund and Gothenburg, and the two Operating Supervisor from Traffic Control Stockholm and Gothenburg. They discuss how the trains (rolling stocks) are distributed for the coming hours.

The Operating Supervisor explains that she communicate most with the Regional Operating Manager and the Train Manager at STA. When she wants the larger picture she contacts the Regional Operating Manager and when she wants more detail she is talking with the Train Manager. This communication is always through phone for the interviewed Operating Supervisor, but she knows that some other Operating Supervisors also uses the chat.

The Operating Supervisor is the one responsible for the communication with the Chief Operating Officer. 99 out of 100 times it is the Operating Supervisor who contacts the Chief Operating Office, this can be through text messages or phone. The Operating Supervisor should always contact the Chief Operating Office if there is an accident or personal accident. During a yellow operating level the Operating Supervisor or the Customer Information Manager can send text messages with information to the Chief Operating Officer and if the Chief Operating Officer wants more information she will call the Operating Supervisor.

[10] Interview Customer Information Managers

Date: 2016-01-20

Present: Jennie Boérius, Sara Helmrot, Customer Information Manager 1, 2, 4 and 4.

Recorded: Yes

Time of Interview: 50min

Area: Responsibilities of the customer information manager

- *What is the objective of the customer information manager? What work tasks are included in the customer information manager?*
- *How many shifts are there for the customer information manager? When does the shift change take place? What happens during a shift change? Do you provide information to the following employee? Is the information exchange verbal or in written form?*
- *From what positions do you retrieve information from and send information to, both internally and externally? Please draw the information flow.*

- *Is the information exchange between the functions in the control room verbal or in written form?*
- *What information channels are used to distribute traffic information to the customers?*
- *Does the information flow vary depending on the workload in the control room?*

A Customer Information Manager is responsible for the information transferred into and out from SJ Traffic Control. It is one person who has the role each shift and the role is included in two out of the three teams: there is no Customer Information Manager during the night shift. During a change of shift the transfer of information is verbal with the most important information also being written down in XOD. The shift teams does not consists of the same employees every day, the employees are rotating and changes both positions and the people they work with. A Customer Information Manager gathers information from everyone in the control room and sends information to other departments at SJ - via the Intranet, the Swedish Transport Administration - to Tilen, who is the one responsible for the black information boards and the voice at the stations, all employees in the control room, and other competitors. Furthermore, the Customer Information Manager is also responsible for taking care of the customers. This includes making sure that the customers gets from point A to point B. Also, when it is a larger disturbance it also includes making sure that the customers get something to eat or a hotel to stay at during the night if that is necessarily.

It is only the Customer Information Manager and the Operating Supervisor whom have the authority to update the Intranet during a disturbance at SJ Traffic Control. However, it is part of the Customer Information Manager's main responsibility together with the contact and update to Press Duty. The main difference between the Customer Information Manager and the Operating Supervisor is that the Operating Supervisor is working towards the functions and has the responsibility for all the traffic while the Customer Information Manager is responsible for how they inform and that the information is correct. The Operating Supervisor is also responsible for all the employees working inside the control room.

Depending on how critical a disturbance is there are different states to be called out for the employees to know how serious the situation is. There are four possible states in the following order; Green State, Yellow State, Orange State, and Red State. Where Green State represent no or almost none disturbance. During a disturbance the Customer Information Manager together with the Operative Supervisor can only make the decision to move from Green into Yellow State. It is up to the Chief Operating Officer to make the decision to move into Orange or Red State. SJ Traffic Control can handle the Yellow State pretty good, but when it goes up to Orange or Red State it gets more stressful and it becomes harder to make decisions of what to do. If they decide that it is an Orange or Red State of the disturbance more people from the whole organization needs to be involved. Therefore, they do not update the state every time they should due to that they have experience of that more employees involved results in a larger mess.

The most time consuming task for a Customer Information Manager during a disturbance is to answer and be on the phone. It is quite often that there are Train Drivers and Cabin Crews whom call the Customer Information Managers to receive information about something else than the current disturbance or something that is not important for the moment. Furthermore, Customer Information Manager 2 states: "The better the quality of the information is in XOD, the fewer phone calls we receive from for example Service Center and other departments."

The employee working closest to the Customer Information Manager inside the control room are the Traffic and Information Co-Ordinators. However, the Customer Information Manager is continually in touch with Call Center, Press Duty and the Swedish Transport Administration through the phone. Information within the room is usually transferred verbally while some employees send a Post-It with the information written down. However, whether this is good or not is a decision that depends on the employee herself. During a disturbance it is important that the information gets to the right person as fast as possible, it is very stressful, and the employees in the control room need to come up with a solution as soon as possible. It has happened that information has been missed due to that employees send an email or write on the chat without giving a heads up to the employee receiving the information. Therefore most employees believe that it is better to handover the information verbally and writing it down by themselves, and not by the chat or email. Furthermore, there are two advantages why sending information verbally is better than writing it down. Firstly, if the information needs to reach more than one person the person giving the information can just tell all the employees at once. Secondly, the one giving the information get a confirmation that the one receiving has received the information and understood it. However, the Customer Information Managers agree about that in a stressful situation some of the verbally expressed information is forgotten, but they still think verbally information flows inside the control room are better than written ones. When it is very stressful, it happens that the employee receiving information tells the employee giving the information that they have a lot to do for the moment and asks them to send it on the chat instead. However, while using the chat or email it is then important that the one giving the information verbally tells the one receiving information that they sent something on the chat or email, otherwise it is easy that the information will be missed.

[11] Interview Customer Information Manager

Date: 2016-04-07

Present: Sara Helmrot, Customer Information Manager 5.

Recorded: No

Time of Interview: 15min

Area: The role of the customer information manager

- *Who is responsible for the TV in the room? What is it used for? When is it used?*

The Customer Information Manager and the Operating Supervisor. The TV in the room is used during disturbances categorized as orange or red. It is used for displaying what has been done so that employees in the control room do not have to walk around and ask. Though, the Customer Information Manager believes that it also should be used when the level is green and yellow. She does not know why it is not used all the time. All information from the Swedish Transport Administration and from the control room is inserted in the TV. Apart from the Customer Information Manager, the Traffic Co-Ordinators, the Information Co-Ordinators and the Operating Supervisor have access, through Navet, to add information to the TV. If the Rolling Stock Managers or the Train Crew Co-Ordinators want to make information available to everyone, they tell the Operating Supervisor who add it to the TV.

- *How do SJ Traffic Control get the information board at the Central station to be updated?*

The Customer Information Manager calls the Information Manager belonging to the relevant geographical area, east, west, north, or south, at the Swedish Transport Administration to ask them

to update the information board at the Central station. The Customer Information Manager ask them to update the board concerning track changes, time to departure, and more detailed comments which can be added for each train. The Customer Information Manager can also send the Information Manager at the Swedish Transport Administration a written request through XOD. Though, the interviewed Customer Information Manager prefers to talk directly to the Information Manager. It usually takes a few seconds after the phone call until the information board has been updated.

- *How do SJ Traffic Control get information to be distributed by announcements at the Central station?*

The Customer Information Manager has to call the Information Manager at the Swedish Transport Administration to ask if they can distribute information with announcements at the station

- *Who do you mostly talk to at the phone?*

The Customer Information Manager mostly talk to the Swedish Transport Administration and the SJ Traffic Control in Gothenburg at the phone. The Customer Information Manager and the Swedish Transport Administration update each other about what is happening and what has happened. When the Customer Information Manager talks to SJ Traffic Control Gothenburg they update each other about the current situation and about daily operations.

- *Why do you have contact with the Service Center?*

The Customer Information Manager is in contact with the Service Center regarding rebookings and delays. The Customer Information Manager make service recoveries which the Service Center use when customers want to rebook their tickets or get refunds.

SJ Travel Store call the Customer Information Manager regarding shorter trains, rebooking, special escort, etc.

The main task of the Customer Information Manager is to distribute information to everyone.

[12] Interview Traffic and Information Co-Ordinator 14

Date: 2016-04-14

Present: Sara Helmrot, Traffic and Information Co-Ordinator 14

Recorded: No

Time of Interview: 11min

Area: Noise Level in the control room & Load on Traffic and Information Co-Ordinators during disturbances

- *Do you experience the noise level as disturbing?*

Not when the load is low. But when there are more disturbances, the noise level is disturbing.

- *Does the noise level affect your ability to communicate with each other?*

“Yes, I do not hear because everyone shout down each other. The noise level makes it more difficult to communicate with others.”

- *Does the noise level affect your stress level or your physical well-being?*

Yes. I get more tired. At a longer lasting disturbance, it is tiring to hear at a higher noise level. It affects the way you physically feel.

- *When employees in the control room do not have anything to do, they talk to each other. Are you disturbed by that?*

No.

- *Out of the three Information Co-ordinators, Web, XOD, and Text, who has the highest and the lowest load during a disturbance?*

XOD has the highest load, while Text and Web have less to do. Text has the least to do since Web makes more updates.

- *How does it work during a large disturbance?*

They work with the disturbance board during a large disturbance. At the disturbance board, it is stated what has been done and what needs to be done. The Customer Information Manager makes the list and the employees can see it on the TVs in the room and at their computers.

If Text for instance, does not have the time to send out all text messages, Web helps. Normally, Text has the time to send all text messages during a large disturbance and Web has time to post everything at the website.

- *During a disturbance, would the Traffic Co-ordinators have time to log in XOD?*

During a smaller disturbance, the Traffic Co-ordinators have time themselves to log in XOD. However, not during a larger one.

[13] Interview Traffic and Information Co-ordinators 1, 12

Date: 2016-02-17

Present: Jennie Boénius, two TICO (1, 12)

Recorded: No

Time of Interview: 8min

Area: Geographical Areas

- *At the different areas of the Traffic Co-ordinators, who is responsible for which areas?*

North: Narvik, Sundsvall, Östersund. Stockholm - Mora, Falun. Göteborg (Laxå) -Luleå. Nattåg: Stockholm - Malmö.

Regional: Linköping -Gävle. Stockholm - Eskilstuna. Stockholm - Västerås, Hallsberg, Arboga. Sala - Linköping. Also include SJ Regional towards Gothenburg.

South: Southern Main Line

West: Stockholm - Oslo. Stockholm - Göteborg (Laxå).

[14] Interview with Traffic and Information Co-ordinator 7

Date: 2016-02-12
Present: Sara Helmrot, TICO 7
Recorded: No
Time of Interview: 16min
Area: Replacement Traffical Services

How are buses and cabs reserved?

When the traffic co-ordinators want to book buses or cabs, they fill in a form with the number of passengers, the route, and time. Hence, they do not have to call them to book a bus or cab, apart from when the system is down. This form is sent to Björks with whom they have an agreement. Björks has contractors in the whole of Sweden so they are always contacted when a bus or cab need to be booked. However, if a cab needs to be booked, it is the cabin crew's responsibility to do so. Though, the traffic co-ordinators sometimes help the cabin crew when they call. If a bus needs to be booked, then it is the traffic co-ordinator's responsibility to book it. The cabin crew can through TrAppen see when a bus or cab has been booked through Björks. When a bus or cab has been booked through Björks, it automatically ends up in TrAppen.

[15] Interview Traffic and Information Co-Ordinator 8

Date: 2016-04-14
Present: Sara Helmrot, Traffic and Information Co-Ordinator 8
Recorded: No
Time of Interview: 22min
Area: Noise Level in the control room & Load on Traffic and Information Co-Ordinators during disturbances

- *Do you experience the noise level as disturbing?*

At disturbances since the mood get worked up. Then you don't notice that you increase the sound of your voice. Additionally, some employees just talk more loudly.

- *Does the noise level affect your ability to communicate with each other?*

Yes. TICO 8 gets disturbed by the noise level which affects him when she is communicating with others. All the noise pierces through and then I can forget what I am about to say. It only gets worse that the noise can come from different directions.

- *Does the noise level affect your stress level or your physical well-being?*

“Yes. The noise level affects my stress level. An example is when I am talking on the phone. Then, it is very important to understand what that person is saying and the phone call needs to go fast, but I barely hear what the other person is saying.” In that situation, TICO 8 gets stressed. She says that open offices lead to this kind of disturbances. TICO 8 explains that she often wants to tell people to shut up so that she can do her work, but adds that she does not since she does not want to ruin the atmosphere in the Control Room.

- *When employees in the control room do not have anything to do, they talk to each other. Are you disturbed by that?*

Yes, absolutely. Often, the employees who talk about private matters with each other tend to raise their voice when they do and they laugh quite loudly. Sometimes, you really need to focus at a work task and you cannot do that when others are being that loud and disturbing you.

- *Out of the three Information Co-Ordinators, Web, XOD, and Text, who has the highest and the lowest load during a disturbance?*

XOD has the highest load, while Text and Web have less to do. Web has the lowest load since it goes very fast to update the website. Text is a bit more time consuming.

- *How does it work during a large disturbance?*

During a large disturbance, the three employees at the Information Co-Ordinator functions are shifting between their roles all the time. The responsibilities for the three functions are not static during a large disturbance.

- *During a disturbance, would the Traffic Co-Ordinators have time to log in XOD?*

Absolutely. Instead of giving instructions to a coworker at Information Co-Ordination, the Traffic Co-Ordinator can do it herself since it only takes approximately one minute to do it. However, it depends on what level of disturbance it is. The Traffic Co-Ordinators do not have time to log in XOD during a large disturbance. Though, there are gaps during a large disturbance when you as a Traffic Co-Ordinator has time to log at XOD.

- *Are all text messages sent during a large disturbance?*

All text messages are sent during a large disturbance since there are templates. It goes fast since we have standards we can follow and use.

- *Is everything updated at the website during a large disturbance?*

Everything is updated at the website during a large disturbance, since there are templates which makes the work task fast. TICO 8 explains that they consider the website and XOD as their most important information channels. The website externally and XOD internally. TICO 8 says: "The better the quality of the information in XOD, the fewer phone calls the traffic co-ordinators receive from the cabin crew. Consequently, the time the traffic co-ordinators get to solve the problem increases and the phone calls they receive are more relevant. Also, the sooner we distribute the information, the lower the load becomes at our phone lines."

- *What do you believe are improvement possibilities in the Control Room?*

Employees in the Control Room get information from different sources. They cannot hear all sources which means that they have to walk around in the Control Room to acquire more information. TICO 8 believe that it is an advantage that they cannot hear what everyone in the Control Room say because if they would, it would be even more disturbing noise. She likes that they have to move around in the room, it feels nice to not sit down all the time.

- *If you could decide one thing that should be improved in the Control Room, what would that be?*

That the TVs in the room should be used more frequently as disturbance boards during disturbances. They are not used very frequently today. TICO 8 states: "During disturbances, it happens that the information is queued before it is logged in XOD".

- *TICO 8 explains about a solution she believes more would gain from:*

TICO 8 has recorded a greeting message at her phone, which means that when she answers the phone the greeting message is read out loud to the other person. Consequently, she gets time to breath, collect herself, and relax between tasks before she actually answers the phone. She adds that the pre-recorded greeting message also avoids her from greeting the caller a bit unclear or too fast, which she does when she is stressed.

[16] Interview Traffic and Information Co-Ordinator 9

Date: 2016-04-12

Present: Sara Helmrot, TICO 9

Recorded: No

Time of Interview: 11min

Area: Load on Traffic and Information Co-Ordinators during disturbances

- *Out of the three Information Co-Ordinators, Web, XOD, and Text, who has the highest and the lowest load during a disturbance?*

During a disturbance, XOD has the highest load. Which of the functions Web and Text that have the most to do depends on the type of day. If there are a lot of smaller disturbances which make the trains more than 10 minutes late, and the text messages can be sent out 15 minutes before departure, Text spends a lot of time on sending out text messages to the prenumeration service Mälardalen. If there are larger disturbances, Web has more to do. According to TICO 9, Web has always least to do.

Generally, Web helps both the Traffic and Information Co-Ordinators. During larger disturbances, both Text and Web can help XOD to log. Or one of them helps to log and the other books busses so that everyone knows everything about the busses and also because Björks only calls one person, which would not have been the case if several people would have booked busses.

- *During a disturbance, would the Traffic Co-Ordinators have time to log in XOD?*

During a larger disturbance you do not want to log in XOD. At larger disturbances, the Traffic Co-Ordinators really need the Information Co-Ordinators.

[17] Interview Information Co-Ordinator 1

Date: 2016-02-12

Present: Jennie Boénius, Information Co-Ordinator 1

Recorded: No

Time of Interview: 4min

Area: information flow during disturbance - Text Message

- *We have the scenario that a Train Driver has some problem with her train. The train is for the moment standing. What is your action?*

Text Message will receive the information from either the Customer Information Manager or the Traffic Co-Ordinator, but mostly from the Traffic Co-Ordinator (verbally). Text messages will be

sent to the customer only if the disturbance will affect the train a delay of 30 minutes or more (written to the customer).

[18] Interview with Information Co-Ordinator 2

Date: 2016-02-11

Present: Sara Helmrot, TICO 2.

Recorded: No

Time of Interview: 5min

Area: Text

- *Why do you need to send different text messages to boarding and disembarking customers?*

Before sending text messages to customers, the affected customers have to be found. You need to send different text messages to boarding and disembarking customers since you need to search for them separately. The text messages have to be formulated to suite the affected customers. Another reason is that the text messages are clearer if they are sent separately to boarding and disembarking travelers.

[19] Interview with Information Co-Ordinator 5 & Customer Information Manager 2

Date: 2016-02-10

Present: Sara Helmrot and TICO 5, Customer Information Manager 2

Recorded: No

Time of Interview: 16min

Area: XOD

This interview concerns the work tasks of XOD and the customer information manager.

TrAppen

The Swedish Transport Administration publishes the departure times of the trains. SJ Traffic Control publishes everything that is under “Traffic!” in TrAppen.

Telegram

When a telegram is sent in XOD, it is sent to the Swedish Transport Administration, to SJ’s Ticket Stores, and to all train operators which are affected by the logged disturbance or logged action against a disturbance.

Hotels

If a Traffic Co-Ordinator books a hotel, she only tells the employee at Text, The employee at XOD does not log anything.

What influence does the customer information manager have on the information which is sent?

The customer information manager checks if the information XOD, Text, and Web logs, sends, and posts is correct.

[20] Interview Traffic Co-Ordinator 16

Date: 2016-04-14

Present: Jennie Boérius, Traffic and Information Co-Ordinator 16

Recorded: No

Time of Interview: 16min

Area: Multi competence and flaws

- *Why don't you have a multi competence? Is it something you want?*

She has only worked as a TICO for two years and around seven months and she doesn't really feel like she has all the knowledge which she needs to understand everything here yet. She is indeed interested because she believes it is fun to learn new things and achieve better knowledge. She further explained that she has been asked but said no due to that she wants to have all skills within the function TICO first.

- *Do you see any advantages or disadvantages with having multi competences?*

The advantages is that the ones who has a double or triple competence are better, have more knowledge, and keeps more aspects in mind which the ones who do not have a double competence does not think of. She added that the ones who has a double or triple competence are more stable than the others.

The disadvantages is that they might have less knowledge for the specific functions. They do not achieve the front edge competence which the ones who only work at one function can achieve. She added that there are more rules to keep track on which can be confusing.

- *Flaws: Why do you have flaws?*

She believes that the flaws are based on the prognoses which are wrong. For example, the STA have a problem and they tell them that it will take around four hours to solve. Then that is what they can base their solutions and decisions on. But then they get a new prognoses which say that it will be done in ten minutes, and everything becomes chaotic.

- *If you could change one thing in the Control Room what would it be?*

TICO 16 likes most things today. However, the air is horrible. It is too hot. And also the IT systems could be improved.

[21] Interview Technical Support

Date: 2016-05-04

Present: Jennie Boérius, Technical Supporter 8, 9, 10

Recorded: No

Time of Interview: 5min

Area: Incoming phone calls

- *What does TrAppen look like for you when you are a train driver?*

The technical supporters explained that while they are working as a train driver, it is confusing to know where to call where they need to do an error report regarding something that considers the safety, for example broken doors. In TrAppen there are only numbers to technical support, rolling stock managing, and error report where the error report is connected to comfortability and not safety. Due to that it is the technical support which is in charge of the error report regarding safety questions and rolling stock managing who is in charge of the error report regarding comfortability this is confusing and can easily be solved by adding an extra number called error report - safety and changing the name of the current error report to error report - comfortability.

[22] Interview Technical Support

Date: 2016-04-01

Present: Jennie Boérius, Technical Supporter 4

Recorded: No

Time of Interview: 23 minutes

Area: Work tasks of the technical supporters

- *Who is your main communication with?*

Technical Supporter 4 explained that they have mainly communication with the Rolling Stock Managers about the trains and mainly communication with the Train Crew Co-Ordinators about train drivers and cabin crew. However, she should always keep the Operating Supervisor updated about the current situation.

- *Which work tasks are included in your work?*

Work tasks that are included in the Technical Supporting work is to give permission to train drivers to drive a train without some software fully working. These decisions are made fully by the Technical Support without any other functions involved. They are also the ones making decisions about if a train can drive or if it should be cancelled due to safety reasons. Furthermore, decisions about conditions of the carriage, like limitations of speed, are they also responsible for. In other words, all technical decisions are they responsible for, and only them. An example can be a train which regular phone is not working, then they can only drive for a maximum of 6 hours, then it needs to be transported to the workstation, the same with the fire alarm, it can only be out of work for four days, then the train needs to be transported to the workstation as well. It is up to the Technical Supporters to keep track of these and to tell them when to stop. When they make a decision like this, it is important that the other employees in the control room listens to them, and Technical Supporter 4 says they do.

Other responsibilities which they have are orders of urgent maintenance of the trains, announcement and notifications about daily passage (how the coach are acting; vibrations etc, not coach tilting), report safety defects to SJ Safety Duty (like smoke development and derailment).

- *What software are you working in?*

They are right now in the learning process of a new system. They are moving from *ford* and are learning *EAM-SAP*. Technical Support 4 believe the new software is more complicated than the earlier one, but if the new software can collect some interesting data she can see some good reason

to switch. Even if the old software was working more than fine. Moreover, the subcontractors to SJ are using a different software, so all information is not being translated into their new software (or the old) and this is annoying and creates extra work.

- *Who do you receive phone calls from?*

They receive phone calls from both train drivers and cabin crew, but most calls are from train drivers.

[23] Interview Rolling Stock Manager 1

Date: 2016-04-01

Present: Jennie Boérius, Rolling Stock Manager 1

Recorded: No

Time of Interview: 9 minutes

Area: Work tasks of the rolling stock managers

- *What are your main tasks?*

The main area for the Rolling Stock Managers is everything related to the trains. They are trying to make trains, Cabin Crew, and Train Driver fit together. If they cannot find available Cabin Crew or Train Drivers they talk to the Train Crew Co-Ordinators. Furthermore, the Rolling Stock Managers are responsible for the “kilometers”. This means that they have to keep track on how many kilometer each train has passed. After certain kilometer the train has to be sent to the work station for observation and test. It is very important that the trains do not run longer than the certain kilometer due to safety reasons. For the trains which they are handling (X2, X40, locomotive and coach), they are also responsible for the error reports regarding comfortability. This includes everything inside the trains; cleaning, air conditioning, etc. Moreover, they are also responsible for that the trains are in a runoff; so that the trains are in the right place at the right time when needed as well as that they are going to the correct destination.

[24] Interview with Rolling Stock Manager 2

Date: 2016-04-06

Present: Sara Helmrot, Rolling Stock Manager 2

Recorded: No

Time of Interview: 32 minutes

Area: More about the rolling stock managers' role

- *What software do Rolling Stock Managers use to find trains and staff?*

We use RPS to find trains and staff. Sometimes she also uses Xpider to find staff.

- *What do you most often work with?*

Changing trains and changing the direction of trains hence, turning the trains. We need to change a train when it is broke. When the Traffic Co-Ordinators want to change the direction of a train, the Rolling Stock Managers need to put that in the software. They do that to make sure that the train does not exceed its safety interval, or allowed km-distance. It is the most important responsibility of the Rolling Stock Manager to make sure that the trains do not exceed their safety interval. The

Traffic Co-Ordinators decide when trains which are out on the track should change direction. They are also supposed to decide when the trains which are waiting at the station should change direction, but the Rolling Stock Managers also get that information from the Train Crew Co-Ordinators.

- *When do you talk to the Cabin Crew?*

When the Cabin Crew give an error report regarding comfortability.

- *When do you talk to the Train Driver?*

Sometimes when Train Drivers are going to park their train, they call the Rolling Stock Managers to ask where they should park it. There is a plan for where all the trains should be parked. However, the Train Driver has not checked that plan when she calls. The Rolling Stock Manager call the Train Driver when she has ordered a new train number, to tell her that number.

- *What do you talk to the Information Co-Ordinators about?*

She talks to the employee at XOD, which is one of the Information Co-Ordinators, to tell her about a changed type of train and fewer wagons.

- *Who do you talk to the most?*

The Rolling Stock Managers mostly talk to the Depot in Hagalund. They need to cooperate because the Depot have responsibility over the trains in the depot and the Rolling Stock Managers over the trains out on the track. When the Rolling Stock Managers have train shortage, they ask the Depot in Hagalund about how many trains they have and which they can use.

The Rolling Stock Managers also talk a lot to the Train Crew Co-Ordinators. The Rolling Stock Manager only have responsibility over the trains and the Train Crew Co-Ordinators have the responsibility to make sure that there is staff with the correct competence available. When the Rolling Stock Managers find a new train, they only briefly check if the Cabin Crew and the Train Driver have the required competences to work at that train. Because they always need to check with the Train Crew Co-Ordinators, which also check if the competences are updated.

- *What is the most challenging with working as a Rolling Stock Manager?*

The most challenging with working as a Rolling Stock Manager is to have enough time to do everything you are supposed to do during a disturbance.

- *Do you have to ask the Swedish Transport Administration of permission to re-route a train?*

Yes.

- *Who asks the Swedish Transport Administration of permission to re-route a train?*

Most often the Rolling Stock Managers ask the Swedish Transport Administration of permission to re-route a train. They ask them by calling or sending them an email. When the Swedish Transport Administration have given the train permission to turn, the Rolling Stock Managers send in an application, through Xpider, of getting a new train number. Because when the train number is changed, the train gets a new driving plan. The driving plan is the planned route which the train should take. Without the driving plan, the train is not allowed to drive. Since the Swedish Transport Administration needs to check if there is room at the track for the train to turn and drive, it can take a while before the Rolling Stock Managers receive the new train number. When they have the new train number, they call to the Train Driver so that they can drive again. The Rolling Stock Manager

adds that often when they re-route a train, they just switch number between two trains and cancel the fare-stage of the route where the two trains do not travel. SJ are allowed to switch the numbers between two trains without the Swedish Transport Administration's permission.

[25] Interview with Train Crew Co-Ordinator 3

Date: 2016-04-06

Present: Sara Helmrot, Train Crew Co-Ordinator 3

Recorded: No

Time of Interview: 36min

Area: More about the train crew co-ordinators' role

- *Are the different Train Crew Co-Ordinators responsible for different trains or geographical areas?*

No. One is responsible for the Train Drivers, one for the Cabin Crew, and one for both.

- *Is it always the Train Crew Co-Ordinators which check if personnel have qualifications to work at the trains?*

The initiative comes from the Rolling Stock Managers, they ask if it is possible. Hence, the Rolling Stock Managers are responsible for checking with the Train-Crew Co-Ordinators.

- *What work tasks do the Train Crew Co-Ordinators have?*

When a train is changed to another train model, the Train Crew Co-Ordinators check if the staff whom are supposed to work at the train have the required qualifications.

When there is a shortage in staff on the train, the Train Crew Co-Ordinators check reserves from the short time planning if they are available with the required qualifications. If they do not find anyone there, they can call staff which are employed by the hour. When they look for staff which are employed by the hour, they look in the software Netwic where they have signed up when they can work. The Train Crew Co-Ordinators can also send out text messages to staff working at the trains where they ask if they want to work overtime. Shortage in staff can depend on change of train model, turning of a train, illness, etc. If a train is late, a person in the staff at the train might not make it to the next train which she is supposed to be working at, since she needs her brake.

When a train has been in a collision, for instance if it has run over something or someone, the Train Crew Co-Ordinators talk to the staff to see if they want support in form of counselling. Either the staff call themselves or the Train Crew Co-Ordinators call the staff at the train.

- *How does it work to find qualifications when someone does not have the required qualifications, does it always work out in the end?*

The Train Crew Co-Ordinators find staff with the required qualifications, when the staff who is supposed to work do not have them, in nine out of ten cases. When the Train Crew Co-Ordinators cannot find anyone available with the required qualifications, the Rolling Stock Managers have to find another train.

- *Who do you talk the most to? What do you talk about?*

The Rolling Stock Managers, the Traffic Co-Ordinators, Cabin Crew, and Train Drivers. The Train Crew Co-Ordinators talk to the Rolling Stock Managers about changes of train models and turning of trains. If trains will be late because of staff on the trains, the Train Crew Co-Ordinators tell the Traffic Co-Ordinators. While if trains are rerouted, the Traffic Co-Ordinators tell the Train Crew Co-Ordinators about that so that they can check if that is in accordance with the staff's contracts, regarding brakes etc. Furthermore, the Train Crew Co-Ordinators call the Cabin Crew to inform them when turning of trains happens and when the trains will not go the entire way they are supposed to, but stop before. They also inform the Cabin Crew about route changes which lead to changes in shifts. The Train Crew Co-Ordinators most often also call the Train Drivers to inform about train turnings. They also call the Train Drivers if their route will change. For instance, there might be a vacancy the day after which affects her route and the Train Crew Co-Ordinators can ask the Train Driver if she can drive a part of the route without one of the members of the Cabin Crew. The Train Drivers call the Train Crew Co-Ordinators when they realize that something in the route is not right. They also call if their rest before the day after is going to be too short. Additionally, the Train Crew Co-Ordinators inform the Information Co-Ordinators when, for instance, no one will be working in the Bistro and they therefore, only will be able to serve coffee.

- *What do Train Crew Co-Ordinators spend most time on?*

To keep the trains manned.

- *Do you document all decisions which are being made? To what purpose?*

When something has been determined, the Train Crew Co-Ordinators log it in the software RPS which is sent to Xpider. That information can be seen in TrAppen. The Cabin Crew's and the Train Drivers' salaries are based on that logged information.

[26] Interview with Function Manager 1

Date: 2016-04-21

Present: Jennie Boérius, Sara Helmrot, and Function Manager 1 (Function Manager and Chief Operating Officer, Traffic Control, Division of Planning and Traffic Control, SJ AB).

Recorded: No

Time of Interview: 40min

Area: Responsibilities at SJ Traffic Control

- *Are Technical Support a part of SJ Traffic Control? What is included in their two managers' different responsibilities?*

Technical Support are, regarding the organization at SJ, part of the Service Division of Traffic and Service. Because the employees working there are also working as Train Drivers and the Train Drivers are part of the Division of Traffic. Therefore, Technical Support have two managers, one at the Division of Traffic and one at SJ Traffic Control. The manager at the Service Division of Traffic and Service are responsible for scheduling, sick leaves, their wellbeing at the work etc. The manager at SJ Traffic Control makes sure that the employees at Technical Support have access to the IT systems they need and other resources they need to be able to perform their work tasks.

- *When does the STA update the information board at the Central Station themselves and when does SJ Traffic Control ask them to update the board?*

The STA have an initial plan where they have decided which tracks the trains should depart from and the departure time for each train. If the STA change track, they update the information board themselves. However, if SJ Traffic Control want to change track, they have to contact the STA to ask for permission and to ask them for updating the information board with the correct track. SJ Traffic Control might want to change track because a disability elevator only works at one side of the train and the platform, at the track they are supposed to arrive at, is located on the side where the elevator does not work. Then, they want to change track to enable customers with wheelchairs to both disembark and get on the train.

- *Which responsibilities belong to the Chief Operating Officer? What are the responsibilities of the Tactical and the Strategic Readiness Groups? Do any of them make decisions which affect the Control Room?*

The main objective of the Chief Operating Officer is to work towards the rest of SJ, function as a support, and a person which the Operating Supervisor can discuss with when making large decisions. Meaning decisions which have a larger impact than usual. This employee makes larger decisions concerning both traffic and information, but not on a detailed level. The employees in the Control Room make all normal decisions. It is the Chief Operating Officer's responsibility to get other departments at SJ started, for instance, make sure the SJ Travel Stores have longer opening hours. At level red disturbances, the Strategic Readiness Group are activated. Their focus is to strategically maintain SJ's trademark. They can, for example, decide that customers should get a refund right away, that the ticket prices should be decreased, or that customers should be allowed to travel for free. The Tactical Readiness Group are activated during both orange and red disturbances. They work with a closer time perspective than the Strategical group. The Tactical group's objective includes practical work concerning the disturbance. They can decide that more employees are needed at the platforms, extra food is needed, more concise decisions to the Service Center is needed, there should be an informative answering message, who of the employees that do what, etc.

[27] Interview with Punctuality Manager

Date: 2016-03-04

Present: Jennie Boérius, Punctuality Manager (Punctuality Manager and Chief Operating Officer, Traffic Control, Division of Planning and Traffic Control, SJ AB)

Recorded: Yes

Time of Interview: 36min

Area: Operating Level

- *Can you explain what a Chief Operating Officer is doing?*

A Chief Operating Officer is a readiness function. So the employees who are Chief Operating Officers also have another function at Traffic Control. Each fifth or sixth week they have have a readiness week as a Chief Operating Officer. The one who is Chief Operating Officer for the week, is that for the whole company; both in Stockholm and Gothenburg. It is a rotating function and the employee who is Chief Operating Officer is activated when the operating level is yellow or orange, but usually they keep an eye on the operating level all the time. They are also keeping an eye on things which might happen in the future, like bad incoming weather or similar which can affect the traffic, just to be prepare. So they are not only "working" during the critical operating levels.

Traffic Control works in the operational mode and when larger disturbances occurs the Chief Operating Officer is the one who is in charge of the communication out to the company. If something occurs, they convene for a tactical meeting with representatives from different departments. This is done to get the whole company involved in the decisions made and to make the whole company work in the disturbance. By letting the Chief Operating Officer handle this communication, Traffic Control can take care of their own work tasks without getting disturbed.

- *Which are the different operating levels?*

There are four different operating levels; green, yellow, orange, and red. There is always an operating level in the control room. Green, and usually yellow, is normal mode or non-disturbances. However, there are always diversifications but the level can still be green due to that they are in controlled. The operating level in the control room commutate a lot between green and yellow. When they have a short stop somewhere they move into yellow operating level. Furthermore, it is not the Chief Operating Supervisor who decide to move into yellow mode, it is the Operating Supervisor.

- *When do you as a Chief Operating Officer come into the picture? What is needed to move from one operating level to another?*

To move from yellow operating level into orange is a decision which the Chief Operating Officer decides together with the Operating Supervisor. If the Chief Operating Supervisor estimates the effects of the disturbance to be large, then they move into the orange operating level. This is also a signal out to the other departments that right now the company has problems and they need to active some departments. The other departments which needs to be activated are; depot, traffic and service, sales (including revenue management), and communication. Revenue management is contacted if they need to stop the bookings or similar. Other departments of SJ is activated during both orange and red operating levels.

To make decisions of the operating level they created a matrix which was depending on how many trains that were affected, the risk of media getting involved, how many customers involved, etc. This matrix is not in use today, but they keep it in mind to make the decision to move into orange or red operating level. There are different parameters which are put into a matrix to be able to make decisions about moving into a certain operating level. No one uses this matrix today, they usually make decisions depending on experience.

To make a decision to move into orange operating level, around ten trains needs to be affected. To move into red operating level, the disturbance need to have very serious impact at SJ's production. Red operating level occurs around two to three times a year.

- *Which other parts are involved in a disturbance with orange respectively red level?*

In general, there is no big difference between the employees involved during an orange or red operating level. It might be, but that depends on that there are different readiness groups. The different groups are tactical readiness group and strategic readiness group. The tactical readiness group includes the Chief Operating Officer, which is the chairman of the group and convene the group, and different department duties which are involved in this group. The strategic readiness group is involved when the disturbance has an extremely impact on the company's production. This group consists of employees at a director level and make very general decisions like heavy economical ones for a longer period of time. However, this group is very seldom activated.

- *During a disturbance, who do you have most communication with?*

During a disturbance with an orange operating level the Chief Operating Officer has most communication with the Operating Supervisor in the control room. However, she talks with the Customer Information Manager and other functions as well. But the main contact is with the Operating Supervisor. Depending on if the Chief Operating Officer is in the office the communication is verbally, otherwise it can be through text message or through the phone. Fredric states that it is always best with the verbally communication. The departments and employees the Chief Operating Officer talks with outside the control room depends on the kind of disturbance. It could be STA and their operative management department, but it could also be any of SJ's own duties like sale duty, etc. During the larger disturbances they are in charge with the communication with Björks, which is SJ supplier of replacement services. They take over this communication for the planning to get the best quality and the best supply towards the customers.

Furthermore, just because the operating level is orange it does not mean that it is disturbances in the traffic, it can also be because a critical software are down or similar and therefore they can only drive their trains for some certain more hours. Furthermore, the reasons behind the operating level do not need to be traffic related. Even if the operating level would be orange or red, it does not mean that the customers are affected.

She explains that during disturbances she do not believe that stress is one reason to lack of communication but when the disturbances grow, there might be lack of communication between the office in Stockholm and the one in Gothenburg due to that they cannot reach each other through the phones. Furthermore, she believes that bad communication between the employees in the control room do not appear that often. In general the communication works good, but it can be improved, especially between the two offices.

[28] Interview with Chief Dispatcher

Date: 2016-04-07

Present: Jennie Boénius, Chief Dispatcher (Chief Dispatcher and Chief Operating Officer)

Recorded: No

Time of Interview: 10min

Area: Communication

The Chief Operating Officer is the one who needs to put the two tactical groups in action during a disturbance. The two groups are Tactical and Strategical Readiness Groups. In the tactical readiness group, it is the Chief Operating Officer who is in charge and the functions included are; Revenue Management, Chief of the Press (Press Duty), Chief Operating Officer of Depot, Chief of SJ Travel Store, Service Center, Division of Traffic and Service, and the Chief of Traffic Control. However, for larger disturbances, the Readiness Manager puts together a Strategic Readiness Group consisting of the Division of Communication, Division of Sales, Division of Rolling Stock, Division of Traffic and Service, and the Chief Operating Officer.

Furthermore, she explains that Press Duty do not work during the day but when the employees who work with the press has left for the day, their duty start. She also explains that the function at STA which she has the most communication with within the Operative Management Department is the National Operating Manager.

[29] Interview Rolling Stock Manager 1 and 3

Date: 2016-04-14

Present: Jennie Boérius, Rolling Stock Manager 1 and 3

Recorded: No

Time of Interview: 33 minutes

Area: Tåg i Berslagen (TIB)

- *Which train lines and models are included in TIB?*

The traffic included in TIB are from Gävle in north to Mjölby in south, most by Falun-Borlänge-Västerås and by Avesta-Krylbo-Hallsberg. A few trips will also frequent Stockholm and Arlanda.

- *How will this affect SJ Traffic Control?*

The hardest work will be for the Traffic Co-Ordinatos due to that they do not know these areas too well, there are three totally new lines for them. However, the workload in the Control Room will increase for most functions.

- *Are there any differences between their trains and yours? How will that affect you?*

There are 28 train which SJ will be “responsible” of. Out of these 23 are of the model X51 and five of the model X14, this means that they are of the type Regina, but there are some differences. Furthermore, it is important to know that these trains are old, and they cannot be connected to the trains they have today.

[30] Interview Technical Support

Date: 2016-04-06

Present: Jennie Boérius, Technical Supporter 5

Recorded: No

Time of Interview: 6 minutes

Area: Information flow

- *What does the process for a train driver look like when there is a defect on the train?*

During a defect with one of SJ’s train the Train Driver should always call the Train Dispatcher at STA the first thing she does. It does not matter if she do know what is going on with the train or not. She should call them to tell them that. The Train Dispatcher is the one who is responsible for a certain line, while the Train Manager is responsible for the whole area. However, it happens that the Train Driver calls to Technical Support first, and then Technical Support call the train Dispatcher. But the Technical Supporter have some communication with either the Train Dispatcher or Train Manager during disturbances.

[31] Interview Rolling Stock Manager 1

Date: 2016-02-12
Present: Jennie Boérius, Rolling Stock Manager 1
Recorded: No
Time of Interview: 17min
Area: information flow during a disturbance

- *We have the scenario that a Train Driver has some problem with her train. The train is for the moment standing still. What is your action?*

When the Rolling Stock Manager receive the information from Technical Support they look in their software to find out where the train is located. They the report the information back to Technical Support. However, the Rolling Stock Manager's role in this process depends on the train model. If it concerns one of the models X12, X50, or X3000 they would contact the Rolling Stock Managers at the Gothenburg office to make them aware of the problem, otherwise if it concerns any of the models X40, X2000, or locomotive and coach, they would start to investigate in backup trains. It is also the Rolling Stock Manager responsibility to stay in contact with the Train Manager at the Swedish Transport Administration by phone calls and telegrams. It is from the Train Manager they receive new train numbers and if they switch train they need to make sure the Train Manager receives this information. The Rolling Stock Manager does also talk on the phone with the Train Driver to decide if the train will be completing the journey or if a switch of trains in necessarily for the driver. The Rolling Stock Manager is in charge of making sure that the Customer Information Manager and the Traffic and Information Co-Ordinators know what is going on. The communication within the room is almost always verbally. The Rolling Stock Manager has sometimes direct verbal contact with the employee working with the website to inform her about important changes to keep the software updated directly.

It is the Rolling Stock Manager who contact the Train Crew Co-Ordiantors, and this communication is mainly by telegram but during large and stressful disturbances it changes to verbal. This information is mainly about what personal is needed where. , depending on what train the Train Crew has some certain qualifications.

- Is there anything you want to add?

“Yes. But it is regarding something different. On March 1st SJ will decrease the numbers of employees working in the cabin crew with one employee. I do not see how SJ can make a decision like this. This will increase the workload in the control room”.

[32] Interview Technical Support

Date: 2016-02-12
Present: Jennie Boérius, Technical Support 3
Recorded: No
Time of Interview: 12min
Area: Information flow during a disturbance

- *We have the scenario that a Train Driver has some problem with her train. The train is for the moment standing still. What is your action?*

After Technical Support 3 received the call from the Train Driver she talks with the Rolling Stock Managers to find out where the train is located, she also asks if there are any backup trains available nearby. When the Technical Support 3 has talked to the Rolling Stock Manager, she talks to the Train Crew Co-Ordinators to prepare them that there is a technical problem with one of their train and that they might need to switch.

Technical Support should also inform the Operating Supervisor that there is a problem.

If the train is located somewhere in the Stockholm area Technical Support 3 calls Rolling Stock Hagalund to get more information about the problem and an approximate time for when the problem is solved or when it can depart. An approval from Rolling Stock Hagalund is required before the train can depart.

Depending on what kind of train model that has the technical problem the Technical Support 3 might need to contact the Rolling Stock Managers in Gothenburg. If it would be one of the models X12, X50, or X3000 she would contact the Gothenburg office. If it would concern X40, X2000, or locomotive and coach she would talk to the Rolling Stock Managers in the control room Stockholm.

[33] Interview Operating Supervisor

Date: 2016-02-12

Present: Jennie Boérius, Operating Supervisor 2

Recorded: No

Time of Interview: 8min

Area: information flow during a disturbance

- *We have the scenario that a Train Driver has some problem with her train. The train is for the moment standing still. What is your action?*

Technical Support informs the Operating Supervisor about the disturbance verbally. This is supposed to be the first step, however everyone working at Technical Support do not begin with this. When the Operating Supervisor have received the information she goes around in the control room to inform everyone that there is a disturbance so everyone can prepare for it. It is good that everyone are prepared because the disturbance might become larger than expected, and it is especially important that the Traffic- and Information Co-Ordinators receive the information. Right when the Operating Supervisor receive new information she will do the same thing again.

[34] Interview Train Crew Co-Ordinator 1

Date: 2016-04-06

Present: Jennie Boérius, Train Crew Co-Ordinator 1

Recorded: No

Time of Interview: 10min

Area: Information flow during a disturbance

- *We have the scenario that a Train Driver has some problem with her train. The train is for the moment standing still. What is your action?*

Normally the Train Crew Co-Ordinator receive some information from the Technical Support or the Operating Supervisor to be prepared to start their work. However, it is the Rolling Stock Manager who contacts the Train Crew Co-Ordiantors, and this communication is mainly by telegram but during large and stressful disturbances it changes to verbal. This information is mainly about what Cabin Crew and Train Driver is needed and where. The Train Crew Co-Ordinator then tries to find the correct employees with the correct qualification for the certain train model. When they found the information needed they send text messages to the Cabin Crew. The Train Crew Co-Ordinators are also in charge of the Train Driver and have contact with her by telephone, mainly about what is going on and what qualification the driver has; is she able to drive another kind of train model or not. The Train Crew Co-Ordinators also receive verbal information from the Traffic Co-Ordinators, information like if a train change direction. Also the Operating Supervisor inform the Train Crew Co-Ordinators about the current situation.

[35] Interview Traffic Co-Ordinator 16

Date: 2016-02-12

Present: Jennie Boérius, Traffic and Information Co-Ordinator 16

Recorded: No

Time of Interview: 14min

Area: Information flow during a disturbance - North

- *We have the scenario that a Train Driver has some problem with her train. The train is for the moment standing still. What is your action?*

Sometimes Technical Support inform the Traffic Co-Ordinators verbally directly (it depends on who is working at Technical Support). Otherwise it is the Operating Supervisor who informs them about the disturbance. The Traffic Co-Ordinators give and receive information from the Customer Information Manager to keep each other updated, this information flow is mostly verbally. Traffic Co-Ordinators can also receive information from the Cabin Crew, e.g. if the train is standing still, this communication is by telephone. However, this information does normally not help the Traffic Co-Ordinator to solve the disturbance. It is also up to the Traffic Co-Ordinators to keep XOD, Website, and Text Message updated through verbal communication, it can happen that they send a telegram to XOD and Website but then they are careful with by telling them this verbally as well. Traffic Co-Ordinators receive many phone calls from Service Center and SJ's Ticket Stores whom wants information about what is going on and if the information in XOD is correct or the most updated one so they can give this information direct to the customers.

[36] Interview Customer Information Manager

Date: 2016-02-12

Present: Jennie Boérius, Customer Information Manager 2

Recorded: No

Time of Interview: 4min

Area: information flow during disturbance.

- *We have the scenario that a Train Driver has some problem with her train. The train is for the moment standing still. What is your action?*

The Customer Information Manager has continuous communication with the Operating Supervisor to exchange information and keep each other updated about the disturbance. The Customer Information Manager then transfer this information to the Information Co-Ordinators; Text Message, Website, and XOD. The communication is verbal.

[37] Interview Information Co-Ordinator 12

Date: 2016-02-12

Present: Jennie Boérius, Traffic and Information Co-Ordinator 12

Recorded: No

Time of Interview: 5min

Area: Information flow during a disturbance - XOD

- *We have the scenario that a Train Driver has some problem with her train. The train is for the moment standing still. What is your action?*

XOD will receive the information from either the Customer Information Manager or the Traffic Co-Ordinator (verbally, a few times telegrams from the Traffic Co-Ordinator). XOD then update the software XOD which make information available as written information for everyone who has access to Xpider (another software). Also TrAppen is updated by this. So when updating XOD the employee can choose to send it to TrAppen as well. The Train Driver and the Cabin Crew have access to both XOD and TrAppen.

[38] Interview Information Co-Ordinator 4

Date: 2016-02-12

Present: Jennie Boérius, Traffic and Information Co-Ordinator 4

Recorded: No

Time of Interview: 4min

Area: Information flow during a disturbance - Web

- *We have the scenario that a Train Driver has some problem with her train. The train is for the moment standing still. What is your action?*

Website will receive the information from either the Customer Information Manager or the Traffic Co-Ordinator (verbally, a few times telegrams from the Traffic Co-Ordinator). Website update the website for the customer so they can find information about the traffic at sj.se/trafikinformation

[39] Interview Traffic Co-Ordinator 19

Date: 2016-04-13

Present: Jennie Boérius, Traffic and Information Co-Ordinator 19

Recorded: No

Time of Interview: 15min

Area: Multi competence and flaws

- *You don't have a multi competence, why is that? Are you interested in a multi competence?*

She finds this function amusing enough and she has not yet fallen for another function. She has worked here for 10 years and she still has not obtained the feeling of completeness for the function she sits at today. She is neither interested in getting a multi competence today.

- *Do you see any advantages or disadvantages with having a multi competence?*

The advantages of obtaining a multi competence is mainly to get a better understanding of the work one is doing in the control room. For example if she would have the knowledge for the function of Rolling Stock Management she could make better decision regarding the trains and see the bigger picture during the disturbances. However, one disadvantage is that the ones which have multi competences are exploited by SJ in the way that they do not get extra paid.

- *Can you tell a difference between the ones which have multi competence and the ones which has not?*

Yes, the ones which have multi competences have a much wider perspective and they make better decisions for the functions which they have the competences for.

- *Wrong decision making. Why are the decisions sometimes wrong?*

The reason why the decision sometimes are wrong is due to that the Traffic Co-Ordinators forget to tell the Information Co-Ordinator to log information and tell the rest of the employees in the room. This is due to that when there is a disturbance, it is very stressful in the room and it is easy to forget to tell the rest.

The only way to solve this is to put the Information Co-Ordinators closer to the Traffic Co-Ordinators, in for instance groups. Then the Information Co-Ordinators can hear everything the Traffic Co-Ordinators decides to do. However, there is not enough employees for this.

[40] Interview Traffic Co-Ordinator 20

Date: 2016-04-14

Present: Jennie Boérius, Traffic and Information Co-Ordinator 20

Recorded: No

Time of Interview: 13min

Area: Multi competence and flaws

- *Why don't you have a multi competence? It is something you want?*

She has worked as a TICO for 14 years. She believes that she fits best with the TICO's. She has been working as a personal planner, but in a different area, before so she has tried that. And she does not believe she has the technical interest to be a Rolling Stock Manager. So therefore she does not

want any other competence. But one should never say never! Furthermore, she has been asked to obtain a multi competence.

- *Do you see any advantages or disadvantages with having a multi competence?*

The advantages are that the persons can see the whole chain of what the decisions result in, an increase in understanding and for the company

The disadvantage is that people are different; someone might not remember their work tasks correctly. Furthermore, she does not tell a difference of a co-worker who as a double or triple competence compared to the ones who does not when working together with each other.

- *Flaws: Why do you have flaws?*

“The flaw with the communication in the control room is between the functions, due to that employees believe they know what a function does, but they really do not”

- *The Organizational Culture, how do you believe it has changed during the years?*

Today people are more open minded, they want to help and everyone can ask if they wonder. She further said that people in the Control Room are more clear of what they want to say today compared to earlier.

[41] Interview with IT Co-Ordinator

Date: 2016-04-14

Present: Jennie Boérius, IT Co-Ordinator

Recorded: No

Time of Interview: 15min

Area: Incoming phone calls and connection of train numbers during a detour

Incoming Phone Calls

- *Earlier you told us that you have performed a study in the Control Room regarding incoming phone calls. What was the purpose of this and how many times have you performed it?*

The purpose of the study was for Traffic Control to understand if the information provided in the different channels are understandable for the Cabin Crew, to see what quality the information had (is it enough), do the ones who call know where the information wanted can be found, is the call really meant to be to SJ Traffic Control.

She stated that they have performed the study two to three times depending on what functions. However, she believes it is time to perform a new one soon.

- *Were any changes made based on the results?*

Yes. Better system supports were made. For example for the quality of the information to be correct the system support was made, both for the employees in the Control Room to perform their work tasks more easy and for the Cabin Crew to understand it better.

- *Who updates “Mitt Tåg”?*

No one in the Control Room is responsible for updating Mitt Tåg. The updates occurs automatically.

Connection of train numbers during a detour

- *In Xpider there are two boxes which the Rolling Stock Manager can fill in regarding the train numbers during a detour. (It is located at “Operativa: Ansökan om tågläge/anordna tåg”). Why is this not mandatory for the employees to fill in the box “Ann. tågnr”?*

She does not know, but she wants it to be mandatory. She continued and said that if this would be mandatory it would be easier for the people in the Control Room to work. His vision is that the relationship between the main train number and the new one is easily visualized in XOD for all employees in the Control Room.

[42] Interview Train Crew Co-Ordinator

Date: 2016-04-06

Present: Jennie Boérius, Train Crew Co-Ordinator 2

Recorded: No

Time of Interview: 12min

Area: Information flow

- *From who do you receive or give information?*

The Train Crew Co-Ordinators do not receive information directly from the Technical Support, but they can overhear when something happened and start to prepare themselves.

It happens that the Traffic Co-Ordinators decides to re-route a train and then they call the Cabin Crew to inform them about this. But then it is the Cabin Crew who informs the Train Driver who then call to the Train Crew Co-Ordinators who have not received this information. The Traffic Co-Ordinators should inform the Train Co-Ordinators and Rolling Stock Managers before calling the Cabin Crew, so everyone knows what is going on.

Further she explains that they send out text message to Cabin Crew when they need extra personnel. First they start by searching for a certain area, then the text messages can be sent to two different groups; “extra time” or “other”. The Cabin Crew which are included in the group extra time are the ones who signed up for the extra times offers while when sending a text message to the group others all Cabin Crew in the chosen area is included.

[43] Interview with a member of the Cabin Crew

Date: 2016-04-04

Present: Jennie Boérius, Sara Helmrot, Cabin Crew 1 (Departure Signaler and qualification to work at the train models X2, X40, X55, locomotive and coach, and X51. Currently working during weekends and mainly at the X2’s between Stockholm and Gothenburg, has worked as Cabin Crew for ten years and as a Departure Signaler for eight years.)

Recorded: Yes

Time of Interview: 58min

Area: Cabin Crew and traffic information from SJ Traffic Control

- *Do the Cabin Crew have communication with the Train Driver?*

She has communication with the Train Driver. Before they leave the depot she tells the Train Driver about the number of passengers which will be travelling with them, if there are any passengers in wheelchairs, and what safety education the members in the Cabin Crew have. The safety educations are of interest for the Train Driver since the functions have different knowledge and authority regarding taking certain actions during, for instance, an evacuation of the train. It is only the Departure Signaler who has the authority to evacuate a train. There are two types of safety functions at a train; Departure Signaler and Service Manager. The steps for becoming a Departure Signaler are, among other things, to take part in the Railways Board's education, practice on the trains, writing a theoretical test, and conducting a practical test. However, there are physical requirements which need to be fulfilled to be able to take part in the education of this safety function. For example, one can neither have color blindness, diabetes, nor any physical constraints.

If there are longer stops, she walks to the Train Driver instead of calling her, due to that she does not want to block the phone line if the Train Driver is waiting for a call or already is talking at the phone. The Train Driver is often talking to the Swedish Transport Administration's Train Dispatcher. Additionally, if something has happened to the Train Driver, for instance that she has gotten ill, it is better to walk to her instead of calling. The Cabin Crew are not supposed to call the Train Drivers when they are in the critical areas; before and after stations, since the Train Driver has a lot to keep in mind there and is usually talking to the Swedish Transport Administration's Train Dispatcher.

- *When you as a member of the Cabin Crew want to call SJ Traffic Control, how do you find the correct phone number?*

She uses TrAppen to call to SJ Traffic Control. Depending on which train she is on, the number will be automatically updated for that certain trip in TrAppen. For example, if she works at X2 Gothenburg-Stockholm, the number to the Traffic Co-Ordinator would be to the one at West. However, if she would work at X2 Malmö-Stockholm, the number to the Traffic Co-Ordinator would be to the one at South. Furthermore, if the phone line is occupied, she ends up in a phone line. She has only called someone else in the control room instead a few times, when it has been very acute.

However, she explains that TrAppen often freezes and when it does, she cannot get information concerning the specific train she is working on, which means that she cannot find the correct numbers to SJ Traffic Control. Additionally, she cannot find the traffic information for that specific train either. Furthermore, she believes that sometimes when the app freezes might be due to that her phone has not received the updates. She explains that if the phone is turned off, it does not get new updates and her phone is only switched on when she is working. This results in that she does not get all of the updates. She adds that they have launched a new software which should work better.

- *Do you reserve cabs to your customers?*

She reserves cabs herself by directly calling to Björks. In another app, called, Ersättningstrafik, reserved replacement transportation services are displayed as well as the phone number to Björks. Though, she does not use that app frequently.

- *How do you know that a bus has been booked if you do not use the app Ersättningstrafik?*

Since she does not use that app to see if any replacement transportation service has been reserved, she calls SJ Traffic Control and then they tell her that they have ordered a bus, if they have. A couple of weeks ago, SJ Traffic Control Gothenburg sent her a regular text message which said that they had booked busses, which she liked.

- *How did you receive information about that you were supposed to reserve a cab?*

She makes her own decisions regarding reserving cabs or not. The customers often know if the situation is critical and then they tell her that they might miss their last bus, boat, or train connection.

- *How is the communication between the members in the Cabin Crew?*

The Cabin Crew members communicate orally with each other. During a disturbance, she tries to inform the Cabin Crew about the disturbance before calling it out in the speakers.

- *Do you have time for all customers during a disturbance?*

During a disturbance, she wants to go through the whole train to get an overview of all the customers' trips. When she goes through the train, the customers want to know how their trips will be affected. However, that is usually not a big problem. The app Mitt Tåg lists the customers which should be on the train together with their connections. Though, she always double checks when they have boarded the train because she does not fully trust the app and not all travelers which are on the list will get on board the train. Furthermore, if a disturbance would occur and she needs to order cabs, she needs to know which customers who are at the train.

- *What other information channels do the Cabin Crew use?*

TrAppen, Mitt Tåg, the speakers, the phone, and text messages. The Cabin Crew receive a lot of text messages about things which are not relevant at the time. For instance, they receive text messages from the Train Crew Co-Ordinators and Short-Time Planners regarding that they do not have enough employees and are looking for someone who can pitch in. Those text messages concern a very short time frame, within the next 24 hours, from the Train Crew Co-Ordinators, to a longer of a few days, from the Short-Time Planners. Additionally, the Cabin Crew receive information through text messages about ticket machines being broke at a station and similar scenarios. Since they receive many non-relevant text messages, it is easy to miss the important ones.

- *Describe a situation when you use TrAppen.*

She does not use TrAppen very often since it freezes a lot. She uses TrAppen when she needs to find phone numbers to other trains. She calls other trains to tell them that a customer has forgotten something on a platform or if the train she is going to work at that day is facing problems.

- *Do you get a notification when new information is published in TrAppen?*

The Cabin Crew does not get a notification when new information is published in TrAppen. For instance, the disturbance messages in TrAppen are not pushed.

- *When do you call to SJ Traffic Control?*

Cabin Crew explained: "When I am not sure if a customer will catch its connection, I call the traffic co-ordinator to ask if the other train can be held. Also, instead of using the app for reserved replacement transportation services to find out if SJ Traffic Control have booked a bus, I call them and ask"

- *How do you feel that SJ Traffic Control treats you when you call them?*

She feels that she has been treated well by SJ Traffic Control. She explains that the one thing she does not like is the part when they tell her that they need to look it up and then return to her, but then they call back after a long time. She believes that it is unprofessional towards the customers to give them information in the last minute, just before they disembark the train. "I like to be honest with the customers providing them with the information I have and if I do not have any information there is no problem for me to explain that". She then stated that she believes that it is better to be honest and tell them that they currently do not know, but will return when they have the required information.

- *Do the customer ever receive traffic information before the Cabin Crew?*

In the past, the customers often received traffic information before the Cabin Crew through media. Though, today it works a lot better. The problem is more the opposite nowadays, for example that customers get stressed about things which do not affect their train.

- *Do you ever fake when you are scanning a customer's ticket?*

She often fake-scans customers' tickets. Because the scanner cannot check Iphones. Moreover, the customers really want to show their ticket. If she has missed checking a customer's ticket, they often remind her.

- *Do you always tell the customers if you believe that the train will stand still for a while?*

She always tells the customers what she knows, because she believes that you should be honest. Even if she does not know what is going on, she has no problem to tell the customers that. During a stop, the Cabin Crew are supposed to announce the current traffic information every 15 minutes in the speakers. Even if they do not have any information, they are supposed to announce that.

- *Do you think it would be helpful if SJ Traffic Control would tell you that they do not have any information when they do not?*

She agrees that it would have been nice if SJ Traffic Control stated that they do not have any information in the current state, but will return as soon as they have correct and relevant information to share.

- *Imagine that the train is standing still. What do you do?*

The Train Driver knows a lot so she talks to the Train Driver before she talks to SJ Traffic Control. She also checks disturbance messages in TrAppen and her text messages. She usually does not call SJ Traffic Control to acquire information about the disturbance. She can call the Rolling Stock Manager to find out what train model they should drive on their way home.

[44] Interview Multi Competencer 1

Date: 2016-04-07

Present: Jennie Boérius, Multi Competencer 1 (Traffic and Information Co-Ordinator and Rolling Stock Manager)

Recorded: No

Time of Interview: 19min

Area: Competences

- *For how long time have you worked at each function? And why did you want a multi competence?*

Multi Competencer 1 has worked as a Traffic and Information Co-Ordinator for five years and a Rolling Stock Manager for two years. She got the question if she was interested in having knowledge about two function, which she was. The reason why she found it interesting was due to personal development and variation in work.

- *What do you think of multi competences?*

“After I received my second competence I became more independent. When I am working with traffic coordinating there is no need for me to ask the rolling stock managers where the re-routing of the train can take place, because I have that knowledge. This saves both time and increases the quality of my work”. She explains that she only sees positive things with being a Multi Competencer. Since she became multi competently she has realized that she is a better decision maker as a TICO and has realized that she is solving problem faster by making the correct decisions sooner.

- *Should everyone have it?*

Even though she only sees positive aspects to have multi competences she does not believe in making it a must for everyone, but a decision which the employee make herself.

[45] Interview Multi Competencer 2

Date: 2016-04-11

Present: Jennie Boérius, Multi Competencer 2 (Traffic and Information Co-Ordinator, Customer Information Leader, and Operating Supervisor)

Recorded: No

Time of Interview: 15min

Area: Competences

- *For how long time have you worked at each function?*

Multi Competencer 2 has worked in the Operating Room for 6 years. She started out as a Traffic and Information Co-Ordinator and four 2.5 years she has been a Customer Information Manager, and for four months she has been a Operating Supervisor. Today she is mostly working as a Operating Supervisor, but around 3-4 working shift a month she is a Customer Information Manager, and only one work shift a month she is a Traffic and Information Co-Ordinator.

- *Do you think it is hard to remember the different tasks at the different functions?*

“I work as a TICO once a month, and do not find it hard to remember the work tasks”. She adds that the difference between these three function is not major, but if she would be a Train Crew Co-Ordinator she believe it would be a little bit larger differences between the work tasks.

- *How did you proceed to become a Multi Competencer? Did you receive what you needed during your training?*

She got the question to become a Customer Information Manager and asked/searched to become an Operating Supervisor as well. Furthermore, it took around one year for her to learn the work tasks of a Customer Information Manager and before she felt secure in that role. She is not 100% comfortable in her role as an Operating Supervisor right now, because she has not worked as it for

too long. She continues and says that she does not believe that she get that support or feedback which she needs from her colleagues or managers. She wish to have more feedback continuously, and not only once a year during the employee appraisal. She adds that it would be good to receive feedback from both colleagues and managers so she know what everyone thinks of her work.

- *Why did you become a multi competencer? What do you believe is necessarily to become a multi competencer?*

She decided to be a multi competencer because she likes the variety in work and to be able to go to work and do different tasks. However, to become a multi competencer she believes that the person in question needs to be ambitious, but it also needs to be some spots available for that function, and the Manager over the function needs to have a good impression of the person in question.

- *What have you learned since you became a Multi Competencer?*

She believes that she has learned a lot since she got the multi competences, more perspective which leads to better decision making during disturbances. She adds that she believes that more employees in the Operating Room should have it because makes people have a wider perspective for the problem during a disturbance.

[46] Interview Multi Competencer 3

Date: 2016-04-11

Present: Jennie Boérius, Multi Competencer 3 (Traffic and Information Co-Ordinator, Rolling Stock Manager, and Operating Supervisor)

Recorded: No

Time of Interview: 14min

Area: Competences

- *For how long time have you worked at each function? How did you proceed to become a Multi Competencer?*

She has worked as a Traffic and Co-Ordinator for 8 years, Rolling Stock Manager for 6 years, and Operating Supervisor for approximately 2 years. She wanted to extend her knowledge within the Operating Room and asked to become a Rolling Stock Manager, then she applied to become an Operating Supervisor.

- *How was the training?*

During the training to become a Rolling Stock Manager she just “went” beside, to learn the work tasks (this is how they do in the Operating Room). However, she believes that she got the feedback she needs, both from colleagues and managers, but is not sure.

- *Why did you want multi competence?*

The reason why she wanted to become multi competencer was for her interest in develop new skills and get a wider perspective. “When I work as an operating supervisor I know what information the rolling stock managers and the TICO’s need, which leads to faster and a more clear communication in the room”.

- *Should more people have multi competences? What do you believe is needed to become a Multi Competencer?*

She believes that more people should have multi competences because she only sees positive things with it, no negative aspects at all. Employees will have a deeper understanding in what the other functions does, which contributes to a better communication. To become a multi competencer she believes that the interest is important, to want to learn more, and to develop new skills.

- *Is there any down draws with multi competences?*

If she is not often at one of the function she does not have the same level of detail as before, especially because the change the software/systems all the time.

[47] Interview Multi Competencer 4

Date: 2016-04-11

Present: Jennie Boérius, Multi Competencer 4 (Traffic and Information Co-Ordinator and Rolling Stock Manager)

Recorded: No

Time of Interview: 13min

Area: Competences

- *For how long time have you worked at the different function? How often are you at each function today? How did you proceed to obtain multi competences?*

She has multi competence within Traffic and Information Co-Ordinator and as a Rolling Stock Manager. She is currently working around 50/50 at each function with a little bit more as a Rolling Stock Manager. She has worked as a Traffic and Information Co-Ordinator for 7 years and a Rolling Stock Manager for 4. She was asked to become a Rolling Stock Manager, but she likes to do more than one thing to not become bored.

- *How long time did it take for you to learn a new function? What do you think of the training?*

It took approximately one year for her to learn a function and feel comfortable with it. She further explained that it takes a year due to that different disturbances occur differently and affect her work differently as well as she then can learn from her mistakes. "During my training as a rolling stock manager, I did not receive useful feedback regarding the tasks I performed and the training was poor. Today the feedback is better, but it can be improved".

- *Is there any downsides with becoming a Multi Competencer?*

One negative thing with being a Multi Competencer is that she misses the meetings for the both functions due to that she is usually at the other function. She explains that she gets an email, but it is not the same.

Once she did not work as a Traffic and Information Co-Ordinator for a month, and when she came back it that function she felt like a beginner. The software are updated, and she needs to get her head into it again.

- *What do you believe is necessarily to become a Multi Competencer?*

To become a Multi Competencer she believes that the need of it is important, but also the interest for the employee as well as the willingness to learn. However, since she got the second competence she has versatility, does not get bored, knows more which make her a better decision maker. She adds, the more one understand in the control room (not just knowing what they do, but really understands it), the better one will be at her job.

Furthermore, she states that more employees in the control room should have it.

[48] Interview Train Crew Co-Ordinator 4

Date: 2016-04-07

Present: Jennie Boérius, Train Crew Co-Ordinator 4

Recorded: No

Time of Interview: 32min

Area: Positions and Multi Competencies in the control room

- *You had some suggestions which you think we should investigate, can you explain them?*

Train Crew Co-Ordinator 4 explained: “The positions need to be changed for the control room to become a more effective workplace. How we are positioned today is not effective, and during some hours of the day there is nothing to do. Instead of sitting in functions, we should sit in teams with a mix of skills from the different functions”. Train Crew Co-Ordinator 4 explains the team should be divided by the different areas/lines. So the teams should be Southern Main Line, Western Main Line including Oslo, Everything North of Stockholm, and Tåg i Bergslagen. Each team should include one Train Crew Co-Ordinator which deals with both Train Drivers and Cabin Crew, one Rolling Stock Manager, and one Traffic and Information Co-Ordinator. The train crew co-ordinator also stated: “To make this concept water proof, the employees in the team should have competences in all the included functions”. Furthermore, Train Crew Co-Ordinator 4 believes that by creating these teams, the efficiency in the room would increase and SJ Traffic Control would not need to have so many employees. Another advantage with this is that the information is shared directly between the function which need it and no one is missed. This will create higher quality and faster distribution of the information flow which in the long run will lead to a better Traffic Control. Today, unnecessarily misunderstandings are appearing all the time. For example do the different functions believe that the other functions are doing things so they do not need to do it. These misunderstandings would not occur if the team existed. However, she knows that some employees are critical against this suggestion because the idea with teams was how they were positioned in the room for many years ago (around 15 she believes), but she believes that the people who are critical against this suggestion do not really have any arguments why. For example has she talked to one employee who is a Train Crew Co-Ordinator as well who does not like the team-idea due to the she believes that it will create more work and misunderstanding between the train drivers and the Train Crew Co-Ordinators. For example, if a train driver is driving a train at the Southern Main Lane up to Stockholm and then she is going to drive a train on the Western Main Lane later. If she is late with the first train, there might be misunderstanding of who she should talk to. However, Train Crew Co-Ordinator do not see the problem with this due to that she means that if the first train is running late, that team should give this information to the other team so they are aware of it and might need to start to look for another train driver. Another critical thing she has heard the Train Crew Co-Ordinators being critical about is the personnel duties, who will take care of that? But she believes

that each team can talk to them if they need them. However, during team positions in the room the main communication between the team will be between the same functions, so for example, the Train Crew Co-Ordinator at the Southern Main Line should inform the Train Crew Co-Ordinator at the Western Main Line.

Furthermore, she explains that if an employee is multi or triple competent, they have access to all the software/system needed, so if someone has a triple competence of Train Crew Co-Ordinator, Rolling Stock, and Traffic Co-Ordinator, they could help and understand each other much better. “When I am working with someone who has more than one competence, I can tell that they have a different way of solving problems and they make their decisions based on more than one function’s point of view”. She adds that they think bigger and in a total different way compared to ones who only has one competence, which make them find better solutions for most functions. (It should be added that this Train Crew Co-Ordinator does not have any other competences that for this function).

[49] Interview Multi Competencer 5

Date: 2016-04-11

Present: Jennie Boérius, Multi Competencer 5 (Traffic and Information Co-Ordinator and Train Crew Co-Ordinator)

Recorded: No

Time of Interview: 17min

Area: Competences

- *For how long time have you worked at each function?*

Multi Competencer 5 has worked as a TICO for three years and as a Train Crew Co-Ordinator for two.

- *Why did you want to become a multi competencer?*

From the beginning she was part of the Cabin Crew. Then she started out as a TICO, and to get more presents in the room, she asked to become a Train Crew Co-Ordinator as well. For the moment, she is trying to change her competence in TICO to a Rolling Stock Manager, because she believes that the most important function within the Operating Room is the Rolling Stock Managers and the Train Crew Co-Ordinators due to their responsibilities. Her main drive is to obtain a deeper understanding.

Furthermore, she added that the employees do not understand the function until they have the competence for that certain function. For Multi Competencer 5 this is one of the reasons why she wants to learn more. To get that satisfaction. To help, and in some cases even save, the company.

- *How long time did it take to learn each function?*

It took her approximately one year to learn and feel comfortable at a function.

- *Do you believe more employees should have multi competences?*

Both yes and no.

Yes: It makes it all easier and everyone will have a better understanding. But it will not work to force employees into it, at least not today.

No: All people are not made for having a multi competences. Some people cannot make decisions or are not stress-hardy, and for them to have a multi competence would do no good.

[50] Observations of Information Co-Ordinators

Date: 2016-02-23

Present: Sara Helmrot, TICOs

Recorded: No

Area: Work tasks of information co-ordinators

The observations were made while timing and while waiting to be able to time the work tasks of the information co-ordinators.

- Web always have to walk around or squeeze by the piece of furniture in the middle when she wants to go somewhere. When she does this, she disturbs the employee at XOD.
 - Some employees at Text, XOD, and Web copies and pastes with the computer mouse instead of with the keyboard, which takes longer time than doing it with the keyboard.
 - The employees at Web, Text, and XOD are often interrupted when they are filling in information. They are interrupted because other employees in the control room want to ask or tell them something.
 - It takes time to switch between the different softwares at Text.
-

[51] Interview with Information Co-Ordinator 6

Date: 2016-02-17

Present: Sara Helmrot, TICO 6

Recorded: No

Time of Interview: 4min

Area: XOD

- *What is the most time consuming work tasks of working at XOD?*

When logging in XOD, the appropriate cause to the disturbance needs to be specified. When specifying the cause, the employee needs to choose a cause from a scroll list with predefined causes. TICO 6 believes that finding an appropriate cause to the disturbance, from the list of causes, takes the longest time in the task of logging in XOD.

[52] Interview with Information Co-Ordinator 8

Date: 2016-02-10

Present: Sara Helmrot and TICO 8

Recorded: No

Time of Interview: 8min

Area: Web

This interview concerns the work tasks of Web.

There are web templates to make sure that the information has been posted in a similar way, no matter who works at Web.

Web always reads through the posted information at the website after have posted it, to make sure it is correct.

[53] Interview with Information Co-Ordinators, XOD & Text

Date: 2016-02-16

Present: Sara Helmrot, TICO 16, and TICO 12

Recorded: No

Time of Interview: 9min

Area: XOD and Text

This interview concerns the work tasks of Text and XOD.

There are errors in the software which affect the employees at XOD and Text, since they have to wait or start over with filling in the information again.

Before sending a text message to customers, the employee at Text always needs to state who the sender of the text message is. It is always the same sender of the text messages and that is SJ AB.

[54] Interview Traffic and Information Co-Ordinator 3 & 15

Date: 2016-04-12

Present: Sara Helmrot, Traffic and Information Co-Ordinator 3 & 15

Recorded: No

Time of Interview: 13min

Area: Lighting in the control room

- *What do you think about the hanging light which is directed downwards?*

TICO 3 believes that the hanging light which is directed downwards shines too bright. She believes that it shines in your eyes when that light is on and that it is therefore better with the hanging light which is shining upwards. Therefore, she does not use it. TICO 15 experiences that the ceiling lights shine in his eyes and that it is nice that she can adjust the other two lamps herself. During night, TICO 15 prefers a darker work environment.

TICO 15 adds that she believes that the lighting problem in the room is that it often becomes too bright. Both TICO 3 and 15 say that they almost get blinded by the light in the afternoon. However, it is different in the winter and during the nights.

[55] Interview Traffic and Information Co-Ordinator 5 & 8

Date: 2016-04-07

Present: Sara Helmrot, Information Co-Ordinator 5 & 8

Recorded: No

Time of Interview: 4min

Area: Lighting in the control room

- *Do you use the lamp hanging down from the ceiling, which is pointing downwards?*

The lamp hanging downwards over the desktop shines both upwards and downwards. The lamp shining downwards over the desktop is very bright and the desktops are white, so the light is reflected. Therefore, the light is too bright for the eyes and hence, the employees do not use those lights.

[56] Interview Technical Support 6 & Traffic and Information Co-Ordinator 2

Date: 2016-04-07

Present: Sara Helmrot, Technical Support 6, Traffic and Information Co-Ordinator 2

Recorded: No

Time of Interview: 7min

Area: Lighting in the control room

- *After the author had told her that she was measuring light, Technical Support 6 stated this:*

Reflection can also be a problem and should be measured because they disturb. Technical Support 6 said that she added reflection protection to her glasses, which is working very well in the summer. The reflection protection helps. Traffic and Information Co-Ordinator 2 stated that you should also measure the light in the room during the night, because then there is no light from outside. It is important to be able to affect your own workstation, to have the influence to make it as you want and prefer.

[57] Interview Traffic and Information Co-Ordinator 2

Date: 2016-04-12

Present: Sara Helmrot, TICO 2

Recorded: No

Time of Interview: 11min

Area: Noise Level in the Operative Room

- *Do you experience the noise level as disturbing?*

Yes, during disturbances. Though, it does not have to be a large disturbance. If people at different functions at different locations in the room are involved, they start to shout to each other because they do not bother to walk.

- *Does the noise level affect your ability to communicate with each other?*

When you are not involved in the disturbance yourself and you are planning or talking at the phone, it disturbs you. You may, for instance, not hear what is said at the phone. TICO 2 adds that she clearly can hear what is said by the employees which are located behind her (in the same group of desktops). Furthermore, she says that she hears more what they say than what employees in front of her says. She believes that the noise bounces.

- *Does the noise level affect your stress level or your physical well-being?*

I feel more disturbed and feel stressed by that.

- *When employees in the Operative Room do not have anything to do, they talk to each other. Are you disturbed by that?*

No. I believe that it is nice that people are talking and are happy.

[58] Interview Technical Supporter 8

Date: 2016-04-12

Present: Sara Helmrot, Technical Supporter 8

Recorded: No

Time of Interview: 8min

Area: Noise level in the control room

- *What do you think about the noise level in the control room?*

It gets quite noisy when a lot is happening and many people are talking. The Technical Supporters have acquired headphones with double headphones so that they hear better when they are on the phone. They really like the headphones. However, it is difficult to hear if someone sitting next to you tries to talk to you. It is only the Technical Supporters who have these headphones since they acquired them on their own. The Technical Supporters need the headphones since the Train Drivers, which they are talking to, are sitting in noisy environments.

[59] Interview Traffic and Information Co-Ordinator 1

Date: 2016-04-12

Present: Sara Helmrot, TICO 1

Recorded: No

Time of Interview: 4min

Area: Noise level in the control room

- *Do you experience the noise level as disturbing?*

Yes, when there is a large disturbance.

- *Does the noise level affect your ability to communicate with each other?*

No. You just have to raise your voice.

- *Does the noise level affect your stress level or your physical well-being?*

No.

- *When employees in the control room do not have anything to do, they talk to each other. Are you disturbed by that?*

No. I think it is good that people talk.

[60] Interview Rolling Stock Manager 4

Date: 2016-04-12

Present: Sara Helmrot, Rolling Stock Manager 4

Recorded: No

Time of Interview: 3min

Area: Noise level in the control room

- *Do you experience the noise level as disturbing?*

No. I have gotten used to it.

- *Does the noise level affect your ability to communicate with each other?*

No.

- *Does the noise level affect your stress level or your physical well-being?*

No.

- *When employees in the control room do not have anything to do, they talk to each other. Are you disturbed by that?*

No. It is a fresh breath of air.

[61] Interview Train Crew Co-Ordinator 3

Date: 2016-04-12

Present: Sara Helmrot, Train Crew Co-Ordinator 3

Recorded: No

Time of Interview: 5min

Area: Noise level in the control room

- *Do you experience the noise level as disturbing?*

When I am talking at the phone, but it happens extremely seldom.

- *Does the noise level affect your ability to communicate with each other?*

No.

- *Does the noise level affect your stress level or your physical well-being?*

No.

- *When employees in the control room do not have anything to do, they talk to each other. Are you disturbed by that?*

No.

[62] Interview Channel Manager

Date: 2016-03-16

Present: Jennie Boérius, Sara Helmrot, Channel Manager (Channel Manager Customer Service, Sales Channels, Division of Market and Sales, SJ AB)

Recorded: Yes

Time of Interview: 34min

Area: Traffic information in the new app.

- *What new functions do the new app have compared to the old one?*

SJ's old app has had a lot of problems and did not work as well as the customers have wanted it to. On March 16 the new, improved app was launched. The main improvements in the app were to make it easier for customers to buy tickets, to get better control over their journey, and to receive better information regarding their trips. In the old version, the customers could search for a train station or a certain train number and then the app displayed available traffic information regarding that specific station or train. This function also exists in the new version. An addition, which previously only was displayed at the website, is the yellow bar. Two types of traffic information are included here, future planned track work and specific information about the disturbance of a train. Hence, information about that a train is standing still is stated here.

- *What made you choose to make these improvements? Did you ask customers or did the ideas come from SJ?*

The improvements were chosen based on information from both customers and from own ideas.

- *Do the customers receive pushed traffic information through the App?*

The customers can also choose to monitor a certain distance and if that distance is affected by a disturbance, the customer receives pushed traffic information. If the customers have activated a bought ticket in the App, or bought the trip directly in the App, or bought the ticket at the website while being logged in, they get pushed traffic information regarding that trip, via their ticket in the App.

- *What traffic information is updated by the STA and what comes from SJ Traffic Control?*

The time table comes from the STA as well as information regarding track changes and changes in the departure time. While SJ Traffic Control provides information about updates concerning how customers should act when a train is late. Information concerning why a train is late and how the customers should act is not pushed to the customers, they have to actively require it in the App. If a customer monitors a distance, she gets pushed information regarding if the train is delayed, there is a new track to depart from, and a new departure time. Furthermore, if a train is cancelled, that information is pushed to the customers, when they monitor a distance.

- *What information channel should the customers use?*

The Channel Manager explains that the information in the App should be personalized and to realize that, they need the customers to be logged in. Therefore, there are more functionalities when a customer is logged in. Customers who travel frequently should use the App and customers who travel less frequently should use the website. The same type of traffic information can be found at both information channels.

[63] Interview Technical Supporter 7

Date: 2016-04-21

Present: Jennie Boérius, Technical Supporter 7

Recorded: No

Time of Interview: 59min

Area: Traffic information

- *What do you think of the information provided to the customers on board the train?*

Traffic information is important. However, SJ has no control over it. Customers want traffic information but when do they want it and how much? The problem today is that we are sending out information to the customers all the time during the trip. “When driving the train I need to inform the customers regarding everything, even planned stops which do not affect the journey. SJ are providing their customers with too much and unnecessary information, affecting them negatively” If I as a Train Driver needs to stop for a signal, which is planned, I need to tell the customer this. This is not good for the branding of SJ. We are feeding the customers with negative information about their trip, even if it is included in the journey time.. For example, if you taking a cab to your friend’s house you are not demanding the cab driver to explain for you why she stopped for red, due to that this is part of the trip. However, if there is a lot of traffic and you have to stop in line for a while you might ask him to turn the radio on so you can hear the news and get the information that way, but you want this information because you did not plan for it.

Instead of informing about everything, Technical Supporter 7 believes that we should only inform about deflection in the customer's trip.

[64] Interview with a Sales Business Developer

Date: 2016-04-12

Present: Jennie Boérius, the Sales Business Developer (Sales Business Developer, Sales, Division of Market and Sales)

Recorded: No

Time of Interview: 20min

Area: Service Center and traffic information

- *How many employees are working at the two Service Centers? And how do they receive information which they can give to the customers?*

There are around 100 employees working at Service Center Ånga and Tranås together. The main tools they use to answer questions about Traffic Information from the customers are XOD.

Furthermore, during large disturbances it has occurred that the customers have received information before the details are logged into XOD. This created a lack in quality for the employees at Service Center due to that they cannot provide or explain the disturbance or for the customers.

- *How does text messages affect Service Center?*

However, it is known that customers tend to call Service Center when the text message or information they have received is unclear.

- *Is any information pushed to the customers in the new app?*

Yes, but only information regarding cancelled trains. Which is done automatically and only if the customers have uploaded their tickets in the app or bought it through the app.

[65] Interview Service Center

Date: 2016-04-14

Present: Sara Helmrot, Representative of Service Center (Service Center, Division of Market and Sales)

Recorded: No

Time of Interview: 1h 10min

Area: Service Center and Traffic Information

- *What have you worked with before your current position?*

I was working as a member of the Cabin Crew.

- *Can you tell me about the project you are involved with today?*

I am currently working at the Service Center in Östersund and I am also part of a cooperation project. Each month, representatives from the STA, SJ Travel Stores in Stockholm, and the Service Center meet in a forum where we discuss flaws in the communication to the customer. We cooperate to function as a whole.

- *What IT systems do you use to find traffic information?*

XOD and sj.se/trafikinformation. There can be differences between the two. SJ Traffic Control can distribute the traffic information to the public before the rest of SJ, and the other way around. The representative from Service Center compares the traffic information from the two sources to make sure it is correct. If the information do not converge, she trusts the information provided in XOD. As a compliment, she checks the disturbance messages from the STA which can be found in BASUN.

- *Do you always have information when the customer calls?*

In most cases, the representative from Service Center has the information she needs when customers call. When there is a more extensive disturbance, there is information about the trains that are affected in the closest future. However, there is no information about the trains further away in time, because SJ Traffic Control has not had the time to log the information in XOD, says the representative from Service Center. The representative from Service Center explains that in those cases, she can still make assumptions based on the problem which has occurred, and that is often sufficient.

- *What do the customers want to know when they call you?*

When the customers call the Service Center, they want to know how they can continue their trip with transfers. They wonder when they can travel from their transfer point towards their final destination.

- *Are there any customer segments which call more often than others?*

There is a mixture of customers who call the Service Center. Many customers need help to rebook themselves and to see if there are any available seats. Therefore, the Service Center need to know how extensive a disturbance is and when it will be possible to drive trains again.

- *Do the customers ever have more information than you do at the Service Center?*

Yes, in some cases, the customers have received more traffic information than they have at the Service Center. “This is due to the fact that different employees at SJ Traffic Control distribute the information. The maximum time it differs between the customers receiving a text message until the same traffic information has been logged in XOD is approximately five minutes. If it would take more time for both the customers and the Service Center to receive information at once, it would be worth it since that would lead to a better customer service”. This happens when the customers have received text messages but the information has not been published in XOD. The representative from Service Center says that this is due to the fact that different people at SJ Traffic Control distribute the information. The maximum time it differs between the customers receiving a text message until the same traffic information has been logged in XOD is approximately five minutes. Furthermore, when the customer receives the information in a text message prior to Service Center, they interpret the text message the customer has received. In some cases, the customers believe that there is a disaster when the media are fast at publishing. Then, the Service Center need to inform them that it will not affect their trip etc. The representative from Service Center believes that the Service Center has useful traffic information to provide the customers with.

- *Would you prefer if it would take a bit longer time before the Service Center would receive traffic information, but that the Service Center then always would get the information before the customers?*

Yes, because the Service Center should receive the traffic information first. If that means that it would take a bit longer time for both the customers and the Service Center to receive information, it would be worth it. Because that would lead to a better customer service.

- *You mentioned that you need to explain text messages to the customers. What type of text messages do you need to explain?*

The type of text messages the customers call and ask the Service Center to explain are ones which say; *your departure time may change* and *your train has been cancelled this distance and has been replaced with bus*. The text message concerning replacement busses can be difficult to interpret. The older customers get worried when they receive text messages and do not properly read and interpret them, but call instead. In those cases, the Service Center explains to them what it says in the text message. The representative from Service Center explains: “When people hear it from a person, they can take in and assimilate the information in a different way than when they read the information”. She says that the customers are afraid of misinterpreting the information in the text message and therefore, they call so that they can trust it. Furthermore, if they call and ask, they do not have to be responsible for interpreting the information themselves. They do not have the courage to make a decision with the fear of making the wrong one. Hence, if they ask the Service Center it is not their fault if something goes wrong. Consequently, “The need of human contact is of importance for the

customers to feel secure when they acquire traffic information”, states the representative from Service Center.

At SJ Traffic Control Gothenburg, one employee is responsible for all three functions that the Information Co-Ordinators are in Stockholm; Web, XOD, and Text. The representative from Service Center believes that the solution in Gothenburg is better because then, one person keeps track and has control over everything. Consequently, no traffic information is sent to the customers before it is logged in XOD.

- *Why do you think that it is better with one person sending out information, as they do in Gothenburg?*

The representative from Service Center believes that it is better with one person distributing all the information, than several, because then one person has control over the event and the Service Center receives the information before the customers do. Furthermore, when several persons are sending out information, it can take a long time between when the customers receive text messages and when the Service Center receives information in XOD. Additionally, when several persons are sending out traffic information, they may interpret it differently.

- *Are there any more reasons for the customers to call the Service Center than the ones you have already mentioned?*

Sometimes, the booking for the trains have been blocked because of track work which has not yet been determined if it is going to happen or not. Then, the customers call and ask why the trips, which often are in the far future, do not exist. At these instances, the customers do not have access to the information the Service Center possesses. This is frequently occurring and the representative from Service Center has presented the issue in the forum she is a part of.

- *Do you have any solution to that problem?*

The Service Center’s solution to the problem is that they receive a date when the track work should have been planned so that they can tell the customers when the trains are available to book.

- *How long time after a disturbance has occurred do the customers usually call?*

There is immediately a high load on the Service Center after a disturbance has occurred. The customers call regardless if they are supposed to travel with the affected train or later during the day.

- *Where in their journey do the customers usually call? It can be from home as well.*

The customers often call the Service Center when they are at the first train and want their ticket to be re-booked to a transfer train.

- *Do the customers ever call from the train about something else than to get their ticket re-booked? I am thinking about if the Cabin Crew have not received enough information.*

According to the representative from Service Center, the Cabin Crew have enough information to be able to inform the customers. Even though, the customers are often very fast to call the Service Center. They can call about booking a cab since the customer will arrive later than planned and because a transfer train cannot be offered to the customer. However, when the customers call about this, the Service Center refer them to letting the Cabin Crew reserve cabs. Otherwise, there is a risk that double bookings are done. IT also happens that the customers are standing at the train station and call the Service Center to ask where and when the replacement transportation busses will departure from.

- *What do think will happen in the future? How will the Service Center and traffic information develop?*

The representative from Service Center has a hunch that the Service Center will grow since the number of phone calls is not declining during large disturbances. The customers are learning to book tickets at the website, but they want to talk to a person about traffic information. The representative from Service Center hopes for a continuing good cooperation regarding traffic information and improvement possibilities outside the different departments' limits.

- *What do you consider as the current largest problem regarding traffic information which is distributed to the customer?*

The unclerness about if a train really is cancelled or replaced with a bus. If that information would be distributed directly and if it would be more customer friendly, the Service Center would be receiving a lot fewer phone calls. The representative from Service Center adds that she had already brought up the problem in the forum.

[66] Observations of SJ's Facebook and Twitter accounts

Date: 2016-03-31

Present: Jennie Boérius

Area: Traffic information at Facebook and Twitter

The author observed the Facebook and Twitter accounts and looked for traces of customers looking for traffic information.

[67] Interview with Rolling Stock Manager 3

Date: 2016-04-11

Present: Jennie Boérius, Rolling Stock Manager 3

Recorded: No

Time of Interview: 36min

Area: Positions in the control room

- *For how many years have you worked here?*

The interviewed employee has worked as a Rolling Stock Managers for more than 10 years and as a TICO for 10 years as well.

- *What do you think of the positions today?*

She does not believe it would work out to sit in any other functions than they do today. Today their operation is too complex with too many software which need to integrate with each other. One can therefore not divide them into parts. How the functions are placed today is the correct and only way.

- *What other positions for the different functions have SJ Traffic Control tried?*

They have tried to sit depending on different areas. But that would not work today. “We had this positioning some years ago and it worked well since the organization was not complex, which it is today. Currently, SJ’s organization is complex with too many systems which need to integrate with each other. There used to be only one train model; locomotive and coach. While today, there are more models, resulting in that the cabin crew and train drivers need certain qualifications for the different models. The consequences is that the puzzles for the train crew co-ordinators and the rolling stock managers are larger and hence, the communication within these two functions is very important, and it would fall apart if the team was created”.

It would not be efficient to change the positions in the room to different areas. It might work for Tåg i Berslagen, but for the organization they have now it would be chaotic. Today they have around 42 high speed trains (X2000), where only 32-34 are able to drive, while they only have around 20 going X55. Today they have a larger organization than before and therefore Rolling Stock Manager 3 does not see how it is possible to make it work any other way. One should not mix different concepts. It is important to understand the organization.

- *What is your suggestion?*

Rolling Stock Manager 3 has heard about something which the Toyota did, which also Scania is doing. They are making the flow of their production better. This is something which SJ needs to apply, but in a different way due to that SJ does not have a flow of production. She suggested to analyze different communication channels. Development of the quality of the communication is the most important now. It is about the handling of information as well as the deficiency in capacity.

She believed that the function consisting of Information Co-Ordinators can be analyzed and improved while increasing the level of quality towards the customers.

[68] Interview with Chief of Crew Planning

Date: 2016-04-26

Present: Jennie Boérius and Chief of Crew Planning (Chief of Crew Planning, Division of Traffic and Service, SJ AB)

Recorded: No

Time of Interview: 55min

Area: Crew planning

- *How is the planning of personnel working on board the trains working today?*

Each month there are 10 300 trains which are supposed to departure. Out of these, the short time planners have as a goal to leave a maximum number of vacancies to the train crew co-ordinators in the control room each month, 40 cabin crew members and 20 train drivers. The average of handed over vacancies for the cabin crew during 2013 and 2014 were below 40 but during 2015 above 40. However, regarding the train drivers, it was on average below 20 vacancies handed over each month during 2013, but above 20 during both 2014 and 2015.

- *Why do the cabin crew not “follow” the train driver?*

The reason behind this is mainly economical. To occupy as many departures as possible with the least amount of personnel, the cabin crew cannot follow the train driver, since that would be too

expensive. There are approximately 10 300 trains that are supposed to departure each month, around 1000 members in the cabin crew, and 600 train drivers. However, the personnel have different qualifications and because of that, it would be a higher cost for SJ if the cabin crew members followed a train driver each day.

Additionally, the train drivers start their work shift before the cabin crew, so they cannot follow each other because they need a break after a certain amount of hours and these breaks do not synchronize for the two. The train driver will need a break earlier on the journey than the cabin crew. For example, a train driver which will drive from Malmö to Stockholm needs to change for a break in Linköping due to that she started her work shift at the depot outside of Malmö. However, the cabin crew do not start their work shift until around 30 minutes to an hour before the train departures and can therefore follow the train all the way to Stockholm without a break.

- *What are the important parameters to consider when planning personnel?*

There are three parameters to consider during personnel planning; cost liability, punctuality and quality, as well as satisfied personnel. Today, SJ are in a project where they are going to save money and therefore, the cost liability is a very important aspect. However The Chief of Crew Planning added that his hypothesis is that the personnel changing trains do not have a large impact on the punctuality. One can say that out of the 100% lost trains, around 20% are defects or reasons which SJ is in charge of. The Chief of Crew Planning explained that out of these 20%, there is not a large fraction which is due to the personnel on board the trains. However, she believes that it would be useful if SJ did look it up and collected some data based on this. She continued and added that both the punctuality and the regularity are two important parameters to take into consideration. Included in the regularity are cancelled trains. However, today they are counting the cancelled trains manually but wish that they had a software doing it automatically.

[53] Interview with Employees in the control room

Date: 2016-03-05

Present: Jennie Boénius, Technical Supporter 3, Customer Information Manager 1, Train Crew Co-Ordinator 1, Train Crew Co-Ordinator 2, Rolling Stock Manager 1, Traffic Co-Ordinator 14, Traffic Co-Ordinator 2, and Information Co-Ordinator 1

Recorded: No

Time of Interview: 14min

Area: Furniture in the control room

- *What do you think about the furniture in the control room?*

Traffic Co-Ordinator 14 stated that there are some furniture in the control room which are more in the way than being used. Between almost all seats there are furniture with purpose of a storage and table. For the Traffic and Co-Ordinators and the Information Co-Ordinators these two furniture are more in the way than of use. It is hard for the employees who sits among the wall to get out. However, the Train Crew Co-Ordinators 1 and 2 believe that their furniture is well used and not in the way. They use it for putting stuff like coffee cups and paper on it.

The Rolling Stock Manager 1 agrees with the Traffic Co-Ordinator 14 and adds that she never uses this furniture, it is just in the way. But she also adds that some of her co-workers uses it for some

easy things. Technical Support 3 says that all their furniture are used for important documents and papers.

The furniture around the Customer Information Manages which has storage as a purpose only consists of personal belongings and only for certain people says Customer Information Manager 2.

Appendix D

Mail

E-mail conversation with the Channel Manager (Channel Manager Customer Service, Sales Channels, Division of Market and Sales, SJ AB)

E-mail from Sara Helmrot to Manager Customer Channels, the e-mail was forwarded to her (2016-03-21)

Hej XX,

Vi är två exjobbare på Trafikledningen som undrar hur många kunder som använder de olika informationskanalerna. Vi skulle vilja ha data för januari månad 2016. De informationskanaler vi undrar om är:

- Hemsidan: Vi har fått "Unique Visitors Report" för januari 2016 men undrar om ni har mer specifik information om hur många som har klickat sig vidare till sj.se/trafikinfo.
- Appen: Antal nedladdningar för den nya appen (detta gäller såklart inte för januari 2016).
- Facebook: Antal personer som kontaktar er per dag.
- Twitter: Antal personer som kontaktar er per dag.
- Call Centre (Service Centre): Hur många som ringer in angående trafikinformation per dag.

Tack på förhand! Har du några frågor, tveka inte att kontakta oss.

Med vänliga hälsningar,

Sara & Jennie

E-mail from Channel Manager to Sara Helmrot (2016-03-22)

Hej Sara!

En vanlig vecka (utan trafikstörningar) har vi cirka 800 personer som kontaktar oss via Facebook och Twitter. Malin Simonsson i Ånge kan vara mer precis med siffrorna och kommer att återkomma till dig i slutet av veckan.

När det gäller telefon så är det i normalfallet strax under 2000 samtal i veckan avseende trafikinfo, ombokning och information.

/XX

Mail conversation one with Function Manager 1 (Function Manager and Chief Operating Officer, Traffic Control, Division of Planning and Traffic Control, SJ AB)

Mail from Function Manager to Jennie Boénius (2016-04-08):

Hej,

FTE Trafiksamordnare: 29

FTE Operativ Personalledare: 12

FTE Fordonsledare: 9

FTE Skiftesledare: 8

FTE Informationsledare: 4

Hälsningar X

From Jennie Boérius to Function Manager (2016-04-08):

Hej X,

Här om dagen pratade vi om att ses nästa vecka och du trodde att du skulle hinna på torsdag innan klockan 10. Vi kan från 07.30 så om du vill ses tidigare än 09.00 går det också bra. Vi tänker oss ett effektivt möte så 30 mintuer bör räcka.

Det vi tänkte prata om och fråga dig är:

- Uppdatering kring hur vi ligger till
- Kundundersökningen vi genomförde och syftet med den
- Vilka förslag som har testats eller inte gällande olika grupperingar/positioner i rummet
- Appen "Mitt Tåg", vem som uppdaterar den

En fråga som du gärna får svara på innan är om du vem som har varit Operativ Chef sen 1997? Vi skulle gärna vilja intervjua honom/henne då han/hon har intresanta svar och reflektioner i den andra undersökningen. Så vet du vem det är får du gärna skicka ett namn.

Om du har FTE uppgifterna vi tidigare frågat om tills torsdag, eller gärna innan, så vore det toppen! Hoppas du får en fin fredag och en trevlig helg!

Många hälsningar,

Jennie & Sara

Mail conversation two with Function Manager 1(Function Manager and Chief Operating Officer, Traffic Control, Division of Planning and Traffic Control, SJ AB)

Mail from Function Manager 1 to Jennie Boérius (2016-05-03) :

Se svar fr X!

Återkommer med besöksantalet för april.

Hälsn X

Vidarebefordrat brev:

From Channel Manager to Function Manager 1 (2016-05-03):

Appen har jag fått svar på: 28 sep 2011 men ingen som vet när vi började publicera trafikinfo tyvärr.
Hälsningar // X

Vidarebefordrat brev:

Mail from Function Manager 1 to Channel Manager (2016-05-03) :

Hej hej

Har du några svar till ex-jobbarna på nedanstående frågor? Eller vet du vem som skulle kunna svara?

Hälsningar X

From Jennie Boérius to Function Manager 1 (2016-05-02):

Hej X,

Hoppas du haft en bra Valborg!

Vi undrar när ni lanserade första versionen av appen (den gråa appen - Min Resa) och när ni började publicera trafikinformation på hemsidan.

Mvh,

Jennie & Sara

Mail conversation with Office Manager Traffic Control Stockholm (Office Manager Traffic Control Stockholm, Traffic Control, Division of Planning and Traffic Control, SJ AB)

Mail from Office Manager Traffic Control Stockholm to Jennie Boérius (2016-04-14) :

Hej,

Dubbel/trippel ger inte direkt ett pålägg på lönen. Då vi har individuell lönesättning kan det ev ge en ökad löneökning om medarbetare visar fram fötterna och gör ett bra arbete. Går man däremot över och vikarierar i en funktions som ligger högre får medarbetaren ett tillägg under perioden.

Med vänlig hälsning

X

From Jennie Boérius to Office Manager Traffic Control Stockholm (2016-04-11):

Hej X,

Vi har några frågor till dig gällande löner för dem olika funktionerna samt löneökning då man skaffar sig en dubbel- eller trippelkompetens. Vi vet att det är ett känsligt ämne, men för att våra förslag inte ska brista i de ekonomiska frågorna så behöver vi på något sätt lösa detta. Givetvis är det inte något som behöver publiceras i rapporten utan mer så att vi inte lägger ner tid på något som inte är ekonomiskt hållbart för SJ. Det är helt och hållet upp till dig hur mycket information kring detta du vill ge ut, men ju mer exakta siffror vi får desto bättre kan vi räkna med våra resultat i slutändan.

Många hälsningar,

Jennie & Sara

Mail conversation with SJ Traffic Control - Customer Service Department

Mail from SJ Trafikledning kundärenden to Jennie Boérius (2016-04-25) :

Hej,

I snitt skickade vi ca 350 000 sms/månad under 2015.

Hälsningar

From Jennie Boérius to SJ Traffic Control (2016-04-11):

Hej,

Vi undrar om ni vet hur många sms som skickades ut från SJ Trafikledning per månad 2015?

Med vänlig hälsning,
Jennie & Sara

Mail from Trademark Manager (Trademark Manager, Headquarter Compound of Communication, SJ AB)

Mail from Trademark Manager to Sara Helmrot (2016-03-10) :

Hej!

För info: Efter ett race från översättningsfirmor och internt, så har vi nu landat i ord och fraser enligt nedan.

Mvh Johan

Pålitligt= Reliable

Enkelt= Simple

Mänskligt= Caring

Härligt= Joyful

Ett SJ att lita på och längta till =

SJ - to rely on and look forward to

Affärsidén:

Business mission

SJ shall offer the market's most customer-oriented and sustainable travel, both independently and in cooperation with others.

This means that we are to be the leaders when it comes to fulfilling the customer's needs – while ensuring that social, environmental and economic responsibility permeates our entire organisation.

Appendix E

Survey One for employees within the control room, original version

Avsnitt 1: I det Operativa Rummet

Hej alla i det Operativa Rummet!

Vi skulle vilja att ni svarar på följande frågor individuellt för att hjälpa oss få en djupare förståelse av era arbetsuppgifter.

Tack på förhand!

Varma hälsningar,
Jennie & Sara

Kön

- Kvinna
- Man

Ålder

Hur många år har du varit anställd av SJ?

Arbetar du heltid?

Om övrigt, fyll gärna i arbetstid i procent.

- Ja
- Övrigt _____

Vilken är din roll i det Operativa rummet idag?

- Driftstödjare [Öppna avsnitt 2]
- Fordonsledare [Öppna avsnitt 3]
- Informationsledare [Öppna avsnitt 4]
- Operativa Personalplanerare [Öppna avsnitt 5]
- Skiftesledare [Öppna avsnitt 6]
- Trafiksamordnare - information och trafik [Öppna avsnitt 7]
- Trafiksamordnare - endast information [Öppna avsnitt 8]
- Övrigt _____ [Öppna avsnitt 10]

Avsnitt 2: Driftstödjare

Vid frågor gällande kommunikation menar vi kommunikation som är arbetsrelaterad, exempelvis vid störning då information erhålls och/eller ges.

Hur länge har du arbetat som Driftstödjare?

Har du haft någon annan roll i det Operativa Rummet än som Driftstödare?

Om övrigt, fyll gärna i vilken/vilka andra roller du haft.

- Nej
- Övrigt_____

Har du haft en anställning av SJ utanför det operativa rummet tidigare?

Om övrigt, fyll gärna i vilken/vilka andra anställningar du haft.

- Nej
- Övrigt _____

Vänligen rangordna vilka du kommunicerar mest med i det Operativa Rummet. Där 1 motsvarar den du kommunicerar mest med och 6 minst.

	1	2	3	4	5	6
Fordonsledare	<input type="radio"/>					
Informationsledare	<input type="radio"/>					
Operativ Personalplanerare	<input type="radio"/>					
Skiftesledare	<input type="radio"/>					
Trafiksamordnare - Information	<input type="radio"/>					
Trafiksamordnare - Trafik	<input type="radio"/>					

Vilka kommunicerar du med som inte befinner sig i det Operativa Rummet? Vänligen specificera.

- Kommunicerar inte med någon utanför det Operativa Rummet
- Övrigt_____

Vilka tre "personer" kommunicerar du mest med totalt? Vänligen rangordna och placera den du kommunicerar mest med överst.

(Personer som befinner sig i och utanför det Operativa Rummet)

Scenario. En tågförare ringer till dig för att meddela att han/hon har problem med sitt fordon och kan inte lämna Hagalund på grund av att signaler ej fungerar. Vänligen förklara utförligt hur du går vidare härifrån. Försök gör fallet så verkligt som möjligt och ju fler detaljer desto bättre.

(Exempelvis vem du kommunicerar med, hur du rör dig i det Operativa Rummet, etc)

Har det hänt att du trott att du kunnat lösa fordonsproblemet, och därför ej meddelat övriga personer i det Operativa Rummet, som sedan visat sig vara ett större problem och därför resulterat i en försening?

Vid övrigt, vänligen kommentera.

- Ja
- Nej
- Övrigt_____

Hur ofta uppstår en sån situation?

Vid övrigt, vänligen skriv andel i procent.

- 0,1% av alla situationer
- 1% av alla situationer
- 5% av alla situationer
- 10% av alla situationer
- 30% av alla situationer
- 50% av alla situationer
- 70% av alla situationer
- Övrigt_____

[Öppna avsnitt 11]

Avsnitt 3: Fordonsledare

Vid frågor gällande kommunikation menar vi kommunikation som är arbetsrelaterad, exempelvis vid störning då information erhålls och/eller ges.

Hur länge har du arbetat som Fordonsledare?

Har du haft någon annan roll i det Operativa Rummet än som Fordonsledare?

Om övrigt, fyll gärna i vilken/vilka andra roller du haft.

- Nej
- Övrigt_____

Har du haft en anställning av SJ utanför det operativa rummet tidigare?

Om övrigt, fyll gärna i vilken/vilka andra anställningar du haft.

- Nej
- Övrigt _____

Har du behörighet för att arbeta med alla fordonstyper (X2000, X40, lok&vagn)?

Om övrigt, fyll gärna i vilken/vilka fordonstyper du har/inte har behörighet för.

- Ja
- Övrigt_____

Vänligen rangordna vilka du kommunicerar mest med i det Operativa Rummet. Där 1 motsvarar den du kommunicerar mest med och 6 minst.

	1	2	3	4	5	6
Driftstödjare	<input type="radio"/>					
Informationsledare	<input type="radio"/>					
Operativ Personalplanerare	<input type="radio"/>					
Skiftesledare	<input type="radio"/>					
Trafksamordnare - information	<input type="radio"/>					
Trafksamordnare - trafik	<input type="radio"/>					

Vilka kommunicerar du med som inte befinner sig i det Operativa Rummet? Vänligen specificera.

- Kommunicerar inte med någon utanför det Operativa Rummet
- Övrigt _____

Vilka tre "personer" kommunicerar du mest med totalt? Vänligen rangordna och placera den du kommunicerar mest med överst.

(Personer som befinner sig i och utanför det Operativa Rummet)

[Öppna avsnitt 11]

Avsnitt 4: Informationsledare

Vid frågor gällande kommunikation menar vi kommunikation som är arbetsrelaterad, exempelvis vid störning då information erhålls och/eller ges.

Hur länge har du arbetat som Informationsledare?

Har du haft någon annan roll i det Operativa Rummet än som Informationsledare?

Om övrigt, fyll gärna i vilken/vilka andra roller du haft.

- Nej
- Övrigt _____

Har du haft en anställning av SJ utanför det operativa rummet tidigare?

Om övrigt, fyll gärna i vilken/vilka andra anställningar du haft.

- Nej
- Övrigt _____

Inkommande samtal. Vi klassar inkommande samtal i tre grupper: aktuella, inaktuella och onödiga. Om ett samtal anses vara aktuellt innebär det att samtalet är nödvändigt, exempelvis för att hitta en lösning till störningen eller liknande. Om samtalet är inaktuellt finns inte den information som efterfrågas, exempelvis en ombordare som undrar vad som händer med tåget men ingen lösning/plan finns. Med onödighet samtal menas att informationen som efterfrågas finns i XOD/TrAppen eller gäller mer än 24h fram i tiden. Vänligen uppskatta den andel (i procent) som du anser de totala inkommande samtalen motsvarar.

Svarexempel: Aktuella: XX%, Inaktuella: XX%, Onödiga: XX% (OBS, se till att summan blir 100%).

Scenario. Du upptäcker att Trafikverket har skickat ett telegram angående en störning strax utanför Katrineholm som kommer att påverka sträckan Stockholm-Göteborg (snabbtåg). Prognosen är att inga tåg kommer att kunna passera under de närmsta 2 timmarna. Vänligen förklara utförligt hur du går vidare härifrån. Försök gör fallet så verkligt som möjligt, ju fler detaljer som beskrivs desto bättre.

Vem kommunicerar du med, vad säger du, hur förflyttar du dig i rummet, etc.

[Öppna avsnitt 11]

Avsnitt 5: Operativa Personalplanerare

Vid frågor gällande kommunikation menar vi kommunikation som är arbetsrelaterad, exempelvis vid störning då information erhålls och/eller ges.

Hur länge har du arbetat som Operativ Personalplanerare?

Har du haft någon annan roll i det Operativa Rummet än som Operativ Personalplanerare?

Om övrigt, fyll gärna i vilken/vilka andra roller du haft.

- Nej
- Övrigt _____

Har du haft en anställning av SJ utanför det operativa rummet tidigare?

Om övrigt, fyll gärna i vilken/vilka andra anställningar du haft.

- Nej
- Övrigt _____

Vänligen rangordna vilka du kommunicerar mest med i det Operativa Rummet. Där 1 motsvarar den du kommunicerar mest med och 6 minst.

	1	2	3	4	5	6
Driftstödjare	<input type="radio"/>					
Fordonsledare	<input type="radio"/>					
Informationsledare	<input type="radio"/>					
Skiftesledare	<input type="radio"/>					
Trafiksamordnare - information	<input type="radio"/>					
Trafiksamordnare - trafik	<input type="radio"/>					

Vilka kommunicerar du med som inte befinner sig i det Operativa Rummet? Vänligen specificera.

- Kommunicerar inte med någon utanför det Operativa Rummet
- Övrigt _____

Vilka tre "personer" kommunicerar du mest med totalt? Vänligen rangordna och placera den du kommunicerar mest med överst.

(Personer som befinner sig i och utanför det Operativa Rummet)

[Öppna avsnitt 11]

Avsnitt 6: Skiftesledare

Vid frågor gällande kommunikation menar vi kommunikation som är arbetsrelaterad, exempelvis vid störning då information erhålls och/eller ges.

Hur länge har du arbetat som Skiftesledare?

Har du haft någon annan roll i det Operativa Rummet än som Skiftesledare?

Om övrigt, fyll gärna i vilken/vilka andra roller du haft.

- Nej
- Övrigt _____

Har du haft en anställning av SJ utanför det operativa rummet tidigare?

Om övrigt, fyll gärna i vilken/vilka andra anställningar du haft.

- Nej
- Övrigt _____

Vänligen rangordna vilka du kommunicerar mest med i det Operativa Rummet. Där 1 motsvarar den du kommunicerar mest med och 6 minst.

	1	2	3	4	5	6
Driftstödjare	<input type="radio"/>					
Fordonsledare	<input type="radio"/>					
Informationsledare	<input type="radio"/>					
Operativ Personalplanerare	<input type="radio"/>					
Trafksamordnare - information	<input type="radio"/>					
Trafksamordnare - trafik	<input type="radio"/>					

[Öppna avsnitt 11]

Avsnitt 7: Trafksamordnare - Trafik

Vid frågor gällande kommunikation menar vi kommunikation som är arbetsrelaterad, exempelvis vid störning då information erhålls och/eller ges.

Hur länge har du arbetat som Trafksamordnare? Inom både trafik och information.

Har du haft någon annan roll i det Operativa Rummet än som Trafksamordnare?

Om övrigt, fyll gärna i vilken/vilka andra roller du haft.

- Nej
- Övrigt _____

Har du haft en anställning av SJ utanför det operativa rummet tidigare?

Om övrigt, fyll gärna i vilken/vilka andra anställningar du haft.

- Nej
- Övrigt _____

Inkommande samtal. Vi klassar inkommande samtal i tre grupper: aktuella, inaktuella och onödiga. Om ett samtal anses vara aktuellt innebär det att samtalet är nödvändigt, exempelvis för att hitta en lösning till störningen eller liknande. Om samtalet är inaktuellt finns inte den information som efterfrågas, exempelvis en ombordare som undrar vad som händer med tåget men ingen lösning/plan finns. Med onödighet samtal menas att informationen som efterfrågas finns i XOD/TrAppen eller

gäller mer än 24h fram i tiden. Vänligen uppskatta den andel (i procent) som du anser de totala inkommande samtalen motsvarar.

Svarexempel: Aktuella: XX%, Inaktuella: XX%, Onödiga: XX% (OBS, se till att summan blir 100%).

Hur går du till väga för att hitta och boka ett hotell vid en större störning?

[Öppna avsnitt 9]

Avsnitt 7: Trafiksamordnare - Information

Vid frågor gällande kommunikation menar vi kommunikation som är arbetsrelaterad, exempelvis vid störning då information erhålls och/eller ges.

Hur länge har du arbetat som Trafiksamordnare?

(Endast inom information)

Har du haft någon annan roll i det Operativa Rummet än denna?

Om övrigt, fyll gärna i vilken/vilka andra roller du haft.

- Nej
- Övrigt _____

Har du haft en anställning av SJ utanför det operativa rummet tidigare?

Om övrigt, fyll gärna i vilken/vilka andra anställningar du haft.

- Nej
- Övrigt _____

[Öppna avsnitt 9]

Avsnitt 9: Trafiksamordnare - SMS

Vid frågor gällande kommunikation menar vi kommunikation som är arbetsrelaterad, exempelvis vid störning då information erhålls och/eller ges.

Scenario. Du har fått information om att en storm är på väg och detta kommer att beröra snabbtåget Stockholm-Göteborg och tåg kan komma att behöva ställas in. Vad är din åsikt om att skicka ut ett SMS till de berörda resenärerna om att deras tåg troligtvis kommer att påverkas och därför ska dem hålla sig uppdaterade via en nämnd informationskanal. På så vis antas kunden själv hålla sig uppdaterad om det rådande trafikläget.

[Öppna avsnitt 11]

Avsnitt 10: Annat

Vid frågor gällande kommunikation menar vi kommunikation som är arbetsrelaterad, exempelvis vid störning då information erhålls och/eller ges.

Vad ingår i dina arbetsuppgifter?

Hur länge har du arbetat som detta?

Har du haft någon annan roll i det Operativa Rummet?

Om övrigt, fyll gärna i vilken/vilka andra roller du haft.

- Nej
- Övrigt _____

Har du haft en anställning av SJ utanför det operativa rummet tidigare?

Om övrigt, fyll gärna i vilken/vilka andra anställningar du haft.

- Nej
- Övrigt _____

Vänligen rangordna vilka du kommunicerar mest med i det Operativa Rummet. Där 1 motsvarar den du kommunicerar mest med och 6 minst.

	1	2	3	4	5	6	7
Driftstödjare	<input type="radio"/>						
Fordonsledare	<input type="radio"/>						
Informationsledare	<input type="radio"/>						
Operativ Personalplanerare	<input type="radio"/>						
Skiftesledare	<input type="radio"/>						
Trafksamordnare - information	<input type="radio"/>						
Trafksamordnare - trafik	<input type="radio"/>						

[Öppna avsnitt 11]

Avsnitt 11: Sista delen

Du ska resa med SJ och befinner dig på Stockholms Central. Vilken informationskanal vänder du dig till för att ta reda på information om din resa?

Vid övrigt, skriv gärna den informationskanal på raden.

- SJ på facebook
- Appen - Min Resa
- SJ på Twitter
- SJ på instagram
- Ringer kundservice
- Lyssnar aktivt på utrop från Gärda (rösten på Centralstationen)

- Kollar på tavlan
- Hör av mig till min kollega som jag vet arbetar och har all information som jag behöver veta
- Övrigt _____

Vart finns den största förbättringspotentialen i det Operativa Rummet?

Är det något som vi har missat att fråga som du tycker att vi ska ta med oss?

Tack så mycket för att du tog dig tid att svar på dessa frågor!

Survey One for employees within the control room, translated version

Part 1: In the Control room

Hello everyone in the Control room!

We would like you to answer the following questions individually to help us get a deeper understanding of your job assignments.

Thanks in advance!

Warm greetings,
Jennie & Sara

Gender

- Female
- Male

Age

- Below 25 years
- 25 - 35 years
- 36 - 45 years
- 46 - 55 years
- 56 - 65 years
- Above 65 years

How many years have you been employed by SJ?

Do you work full time?

If other, please complete with the working percentage.

- Yes

- Other _____

What is your function in the Control room today?

Please choose the one which is most accurate. If other, write which function you have.

- Technical Support [Part 2 will open]
- Rolling Stock Manager [Part 3 will open]
- Customer Information Manager [Part 4 will open]
- Train Crew Co-Ordinator [Part 5 will open]
- Operating Supervisor [Part 6 will open]
- Traffic and Information Co-Ordinator [Part 7 will open]
- Information Co-Ordinator [Part 8 will open]
- Other _____ [Part 10 will open]

Part 2: Technical Support

With questions regarding communication we refer to communication which is related to work, for example during a disturbance when information is received and/or delivered.

For how long time have you worked as a Technical Supporter?

Have you had any other functions in the Control room than as a Technical Supporter?

If other, please write which other functions you have had.

- No
- Other _____

Have you had an employment by SJ outside the Control room before?

If other, please fill in which other employments you have had.

- No
- Other _____

Please order which you communicate the most within the Control room, where 1 corresponds to the one you communicate most with and 6 the least.

	1	2	3	4	5	6
Technical Supporter	<input type="radio"/>					
Customer Information Manager	<input type="radio"/>					
Train Crew Co-Ordinator	<input type="radio"/>					
Operating Supervisor	<input type="radio"/>					
Information Co-Ordinator	<input type="radio"/>					
Traffic Co-Ordinator	<input type="radio"/>					

Whom do you communicate with who is not inside the Control room?

- Do not communicate with anyone outside the Control room
- Other _____

Which three “persons” do you communicate the most with? Please order and place the one you communicate the most with first.

(Persons which are both inside and outside the Control room)

Scenario. A Train Driver calls you to tell you that she has a problem with her train and cannot leave Hagalund due to that some signals do not work correctly. Please explain in detail how you would move on from here. Try to do the case as real as possible and the more details you add, the better.

(For example, who do you communicate with, how do you move in the Control room, etc)

Has it happened that you have thought that you could solve a problem with a train, and therefore not informed the other functions in the Control room, which has later turned out to be a larger problem and resulted in a delay?

If other, please comment.

- Yes
- No
- Other _____

How often does a situation like this occur?

If other, please write proportion in percentage.

- 0.1% of all situations
- 1% of all situations
- 5% of all situations
- 10% of all situations
- 30% of all situations
- 50% of all situations
- 70% of all situations
- Other _____

[Open part 11]

Part 3: Rolling Stock Manager

With questions regarding communication we refer to communication which is related to work, for example during a disturbance when information is received and/or delivered.

For how long time have you worked as a Rolling Stock Manager?

Have you had any other functions in the Control room than as a Rolling Stock Manager?

If other, please write which other functions you have had.

- No
- Other _____

Have you had an employment by SJ outside the Control room before?

If other, please fill in which other employments you have had.

- No
- Other _____

Do you have the qualifications to with all train models? (X2000, X40, and locomotive and coach)

If other, please fill in which train models you do/do not have qualifications for.

Please order which you communicate the most within the Control room, where 1 corresponds to the one you communicate most with and 6 the least.

	1	2	3	4	5	6
Rolling Stock Manager	<input type="radio"/>					
Customer Information Manager	<input type="radio"/>					
Train Crew Co-Ordinator	<input type="radio"/>					
Operating Supervisor	<input type="radio"/>					
Information Co-Ordinator	<input type="radio"/>					
Traffic Co-Ordinator	<input type="radio"/>					

Whom do you communicate with who is not inside the Control room?

- Do not communicate with anyone outside the Control room
- Other _____

Which three “persons” do you communicate the most with? Please order and place the one you communicate the most with first.

(Persons which are both inside and outside the Control room)

[Open part 11]

Part 4: Customer Information Manager

With questions regarding communication we refer to communication which is related to work, for example during a disturbance when information is received and/or delivered.

For how long time have you worked as a Customer Information Manager?

Have you had any other functions in the Control room than as a Customer Information Manager?

If other, please write which other functions you have had.

- No
- Other _____

Have you had an employment by SJ outside the Control room before?

If other, please fill in which other employments you have had.

- No
- Other_____

Incoming phone calls. We divide incoming phone calls in three groups; essential, unnecessary, and superfluous. If a call is considered to be essential it means that the call is necessarily, for example to find a solution to the disturbance or similar. If a call is considered to be unnecessary the information wanted is not yet available, for example if a Cabin Crew calls and wonder what will happen with the train but no solution/plan exists yet. A call is considered to be superfluous if the information wanted is already logged in XOD/TrAppen or is questions regarding more than 24 hours ahead. Please estimate the proportion (in percentage) that you believe that the total amount of incoming calls correspond to.

For example: Essential: XX%, Unnecessary: XX%, Superfluous: XX% (N.B. make sure the sum will be 100%).

Scenario. You discover a telegram from the Swedish Transport Administration regarding a disturbance right outside Katrineholm, which will affect the rout Stockholm- Göteborg (speed train). The forecast says that no trains will be able to pass through during the 2 upcoming hours. Please explain in detail how you would move on from here. Try to do the case as real as possible and the more details you add, the better.

Who do you communicate with, what do you say, how do you move in the Control room, etc.

[Open part 11]

Part 5: Train Crew Co-Ordinator

With questions regarding communication we refer to communication which is related to work, for example during a disturbance when information is received and/or delivered.

For how long time have you worked as a Train Crew Co-Ordinator?

Have you had any other functions in the Control room than as a Train Crew Co-Ordinator?

If other, please write which other functions you have had.

- No
- Other_____

Have you had an employment by SJ outside the Control room before?

If other, please fill in which other employments you have had.

- No
- Other_____

Please order which you communicate the most within the Control room, where 1 corresponds to the one you communicate most with and 6 the least.

	1	2	3	4	5	6
Technical Supporter	<input type="radio"/>					
Rolling Stock Manager	<input type="radio"/>					
Customer Information Manager	<input type="radio"/>					
Operating Supervisor	<input type="radio"/>					
Information Co-Ordinator	<input type="radio"/>					
Traffic Co-Ordinator	<input type="radio"/>					

Whom do you communicate with who is not inside the Control room?

- Do not communicate with anyone outside the Control room
- Other _____

Which three “persons” do you communicate the most with? Please order and place the one you communicate the most with first.

(Persons which are both inside and outside the Control room)

[Open part 11]

Part 6: Operating Supervisor

With questions regarding communication we refer to communication which is related to work, for example during a disturbance when information is received and/or delivered.

For how long time have you worked as an Operating Supervisor?

Have you had any other functions in the Control room than as an Operating Supervisor?

If other, please write which other functions you have had.

- No
- Other _____

Have you had an employment by SJ outside the Control room before?

If other, please fill in which other employments you have had.

- No
- Other _____

Please order which you communicate the most within the Control room, where 1 corresponds to the one you communicate most with and 6 the least.

	1	2	3	4	5	6
Technical Supporter	<input type="radio"/>					
Rolling Stock Manager	<input type="radio"/>					
Customer Information Manager	<input type="radio"/>					
Train Crew Co-Ordinator	<input type="radio"/>					
Information Co-Ordinator	<input type="radio"/>					
Traffic Co-Ordinator	<input type="radio"/>					

[Open part 11]

Part 7: Traffic and Information Co-Ordinator

With questions regarding communication we refer to communication which is related to work, for example during a disturbance when information is received and/or delivered.

For how long time have you worked as a Traffic and Information Co-Ordinator? Both within traffic and information.

Have you had any other functions in the Control room than as a Traffic and Information Co-Ordinator?

If other, please write which other functions you have had.

- No
- Other_____

Have you had an employment by SJ outside the Control room before?

If other, please fill in which other employments you have had.

- No
- Other_____

Incoming phone calls. We divide incoming phone calls in three groups; essential, unnecessary, and superfluous. If a call is considered to be essential it means that the call is necessarily, for example to find a solution to the disturbance or similar. If a call is considered to be unnecessary the information wanted is not yet available, for example if a Cabin Crew calls and wonder what will happen with the train but no solution/plan exists yet. A call is considered to be superfluous if the information wanted is already logged in XOD/TrAppen or is questions regarding more than 24 hours ahead. Please estimate the proportion (in percentage) that you believe that the total amount of incoming calls correspond to.

For example: Essential: XX%, Unnecessary: XX%, Superfluous: XX% (N.B. make sure the sum will be 100%).

How do you proceed to find and book a hotel during a larger disturbance?

[Open part 9]

Part 8: Information Co-Ordinator

With questions regarding communication we refer to communication which is related to work, for example during a disturbance when information is received and/or delivered.

For how long time have you worked as an Information Co-Ordinator?

Have you had any other functions in the Control room than this one?

If other, please write which other functions you have had.

- No
- Other _____

Have you had an employment by SJ outside the Control room before?

If other, please fill in which other employments you have had.

- No
- Other _____

[Open part 9]

Part 9: Traffic and Information Co-Ordinators - Text Message

With questions regarding communication we refer to communication which is related to work, for example during a disturbance when information is received and/or delivered.

Scenario. You have received information that a storm is on the way in over Sweden and will affect the speed train Stockholm-Göteborg and train will most likely be cancelled. What is your opinion to send out text message to the concerned customers saying that their train might be affected and they should therefore keep themselves updated by a mentioned information channel. In this way it is assumed that the customer will keep herself updated about the current traffic situation.

[Open part 11]

Part 10: Other

With questions regarding communication we refer to communication which is related to work, for example during a disturbance when information is received and/or delivered.

What is included in your work tasks?

For how long time have you worked with this?

Have you had any other functions in the Control room?

If other, please write which other functions you have had.

- No
- Other_____

Have you had an employment by SJ outside the Control room before?

If other, please fill in which other employments you have had.

- No
- Other_____

Please order which you communicate the most within the Control room, where 1 corresponds to the one you communicate most with and 6 the least.

	1	2	3	4	5	6	7
Technical Supporter	<input type="radio"/>						
Rolling Stock Manager	<input type="radio"/>						
Customer Information Manager	<input type="radio"/>						
Train Crew Co-Ordinator	<input type="radio"/>						
Operating Supervisor	<input type="radio"/>						
Information Co-Ordinator	<input type="radio"/>						
Traffic Co-Ordinator	<input type="radio"/>						

[Open part 11]

Part 11: Last part

You are about to travel with SJ and are currently at the train station here in Stockholm. Which information channel do you turn to receive information about your trip?

If other, please write that information channel at the empty space.

- SJ at Facebook
- The App - "Min Resa"
- SJ at Twitter
- SJ at Instagram
- I call Service Center
- Listen actively for the exclamation from *Gärda* (the voice at the central station)
- Looking at the information board
- Get in touch with a colleague which I know works and have all information that I need
- Other_____

Where is the largest improvement within the Control room?

Is there something that we have missed which you believe we should bring along?

Thank you so much for taking your time and answering these questions!

Appendix F

Survey Two for employees within the control room, original version

Avsnitt 1 - Undersökning 2

Hej och stort tack för väldigt bra svar och tips i tidigare undersökning. Vi har några följdfrågor och skulle uppskatta om ni kunde ta er tid att svara på dessa när ni har möjlighet. Det här är den sista undersökningen vi kommer att genomföra med er och är ytterst tacksamma för att ni deltar och hjälper oss med vårt examensarbete här på SJ Trafikledning.

Tack på förhand!

Jag arbetar med/som:

- Driftstöd [Öppna avsnitt 3]
- Fordonsledare [Öppna avsnitt 3]
- Informationsledare [Öppna avsnitt 3]
- Operativ Personalplanerare (opsl) [Öppna avsnitt 3]
- Operativ chef [Öppna avsnitt 3]
- Skiftesledare [Öppna avsnitt 3]
- Trafiksamordnare [Öppna avsnitt 2]
- Trafiksamordnare - endast information [Öppna avsnitt 2]
- Övrigt_____ [Öppna avsnitt 3]

Jag har arbetat i det Operativa Rummet sedan:

Mitt arbete är utmanande och bidrar till personlig utveckling:

- Ja
- Nej
- Övrigt_____

Känner du att du utför ditt arbete på ett optimalt sätt?

- Ja
- Nej
- Vet inte
- Övrigt_____

Är du öppen för att lära dig optimala arbetsmetoder?

- Ja
- Nej
- Vet inte
- Övrigt_____

Är du öppen för att ta emot tips från arbetskollaboratorer för att utveckla ditt arbetssätt?

- Ja, från alla i det Operativa Rummet
- Ja, men endast från de som arbetar på samma funktion som jag gör
- Nej
- Övrigt_____

Är du villig att hjälpa dina arbetskolligor att arbeta på ett optimalt sätt?

- Ja, alla i det Operativa Rummet
- Ja, men endast från de som arbetar på samma funktion som jag gör
- Nej
- Övrigt _____

Vänligen kryssa i de funktioner vars arbetsuppgifter och ansvar du förstår och har förståelse för:

- Driftstöd
- Fordonsledare
- Informationsledare
- Operativ Personalplanerare (opsl)
- Operativ chef
- Skiftesledare
- Trafiksamordnare
- Trafiksamordnare - endast information
- Har endast förståelse för de arbetsuppgifter som utförs på den funktionen där jag arbetar
- Övrigt _____

Är du intresserad av att veta vad dina kollegor på de andra funktionerna gör?

- Ja, alla i det Operativa Rummet
- Nej
- Jag vet inte
- Ja, fast endast (vänligen fyll i under övrigt):
- Övrigt _____

Vad tror du om att införa fler multikompetenser i det Operativa Rummet skulle kunna leda till?

För att utbilda dig inom de andra funktionerna, vad skulle du kräva i gengäld?

Avsnitt 2: SMS

"Du har fått information om att en storm är på väg och detta kommer att beröra snabbtåget Stockholm-Göteborg och tåg kan komma att behöva ställas in. Vad är din åsikt om att skicka ut ett SMS till de berörda resenärerna om att deras tåg troligtvis kommer att påverkas och därför ska dem hålla sig uppdaterade via en nämnd informationskanal. Alltså ger ni dem ingen detaljerad information, utan berättar bara att deras tåg kommer att påverkas. På så vis antas kunden själv hålla sig uppdaterad om det rådande trafikläget."

25 stycken Trafiksamordnare deltog och åsikterna vi fick från er var följande:

Positiv: 70%

Gör kunden mer förvirrad så att kundservice kommer att överbelastas: 10%

Negativ. Ska avvakta med att höra av oss tills vi har tagit ett beslut: 16,7%

Svar kan ej tolkas: 3,3%

Vilka förbättringar i det Operativa Rummet tror du krävs för att det ska vara möjligt att genomföra denna förändring?

Alltså kommer arbetsuppgifterna för funktionen SMS att ändras.

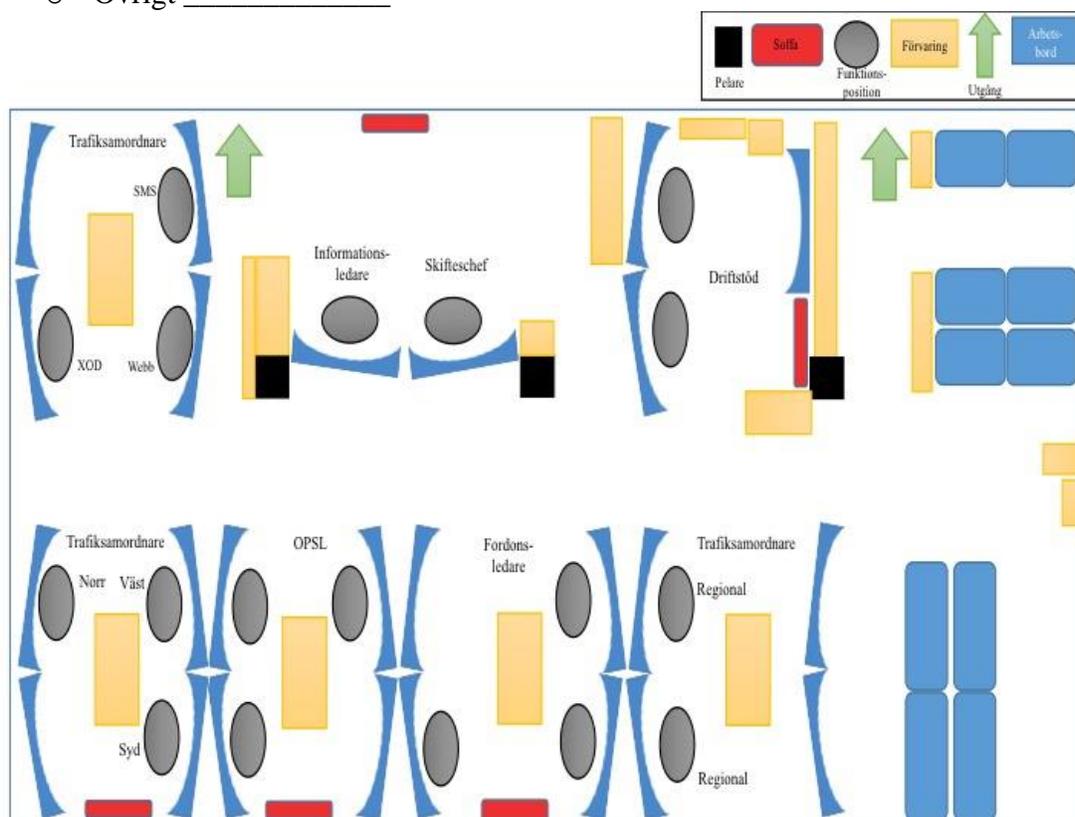
[Öppna avsnitt 3]

Avsnitt 3: Placering i det Operativa Rummet

Under förra undersökningen kom det upp förslag kring förbättring av placering av de olika funktionerna i det Operativa Rummet. Tre förslag har nu analyserats och beskrivs nedan.

Förslag 1: Rotation. Ni sitter kvar i samma funktionsgrupper som ni gör idag, men ändrar placering, se bild nedan (vi antar att du måste zooma in för att se den ordentligt). Lagg gärna någon minut på att analysera bilden. Vad tycker du om detta förslag?

- Positivt, motivera gärna nedan under övrigt
- Förstår inte skillnaden jämfört med hur vi har det idag
- Negativt, motivera gärna nedan under övrigt
- Övrigt _____



Förslag 2: Vi "skapar" team baserade på olika sträckor eller områden. Varje team består av en Trafiksamordnare, en Fordonsledare och en Operativ Personalplanerare.

- Positivt, motivera gärna nedan under övrigt
- Förstår inte skillnaden jämfört med hur vi har det idag
- Negativt, motivera gärna nedan under övrigt

- Övrigt _____

Förslag 3: Ni sitter kvar i samma funktioner och på samma placeringar som idag, skillnaden är att vi "skapar" ett team som endast fokuserar på Stockholm-Göteborg (snabbsträckan med hög konkurrens). Teamet består av en Trafiksamordnare, en Fordonsledare och en Operativ Personalplanerare. Vad tycker du om detta förslag?

- Positivt, motivera gärna nedan under övrigt
- Förstår inte skillnaden jämfört med hur vi har det idag
- Negativt, motivera gärna nedan under övrigt
- Övrigt _____

Vilket av de tre förslagen föredrar du?

- Förslag 1: Rotation.
- Förslag 2: "Skapandet" av team baserade på olika sträckor eller områden.
- Förslag 3: Endast ett team för sträckan Sthlm-Gbg
- Inget av ovanstående
- Övrigt _____

Vid de olika funktionerna finns det lådhurtsar (bord), vad tycker du om dessa?

- De är praktiska och jag använder det frekvent
- Opraktiska och ofta i vägen
- Ingen åsikt
- Min funktionsplats har ingen lådhurts
- Övrigt _____

Vid de olika funktionerna finns det även soffor, vad tycker du om dessa?

- De är praktiska och jag använder det frekvent
- Opraktiska och ofta i vägen
- Ingen åsikt
- Min funktionsplats har ingen soffa
- Övrigt _____

Vid de olika funktionerna finns det även pallar, vad tycker du om dessa?

- De är praktiska och jag använder det frekvent
- Opraktiska och ofta i vägen
- Ingen åsikt
- Min funktionsplats har inga pallar
- Övrigt _____

Är det något kring placeringen eller sakerna i det Operativa Rummet som du anser att vi missat att fråga om och vill tillägga?

[Öppna avsnitt 4]

Avsnitt 4: Kommunikationen i det Operativa Rummet

Från den förra undersökningen framgick det att finns brister i kommunikationen här i det Operativa Rummet. För att en förbättring ska kunna genomföras behöver vi ärliga åsikter på följande frågor:

Vad anser du är problemet med kommunikationen idag?

Vad tror du krävs för att kommunikationen ska bli bättre?

Hur tycker du att detta ska uppnås?

Är det något kring kommunikationen som du tror att vi missat som du tycker är viktigt?

TACK!

Stort tack för att du tog dig tid att besvara dessa frågor!

Survey Two for employees within the control room, translated version

Part One - Survey 2

Hello and a huge thank you for very good response and ideas in the previous survey. We have some attendant questions and would appreciate if you could take your time and answer these when you have time. This is the last survey we will perform with you and we are exceedingly thankful that you participate and help us with our master thesis here at SJ Traffic Control.

Thanks in advance!

I work with/as:

- Technical Support [Open part 3]
- Rolling Stock Manager [Open part 3]
- Customer Information Manager [Open part 3]
- Cabin Crew Co-Ordinator [Open part 3]
- Chief Operating Officer [Open part 3]
- Operating Supervisor [Open part 3]
- Traffic Co-Ordinator [Open part 2]
- Information Co-Ordinator [Open part 2]
- Other_____ [Open part 3]

I have worked in the Control room since:

My work is provocative and contributes to personal development:

- Yes
- No
- Other_____

Do you feel like you perform your work in an optimal way?

- Yes
- No
- Do not know
- Other _____

Are you open minded to learn optimal work methods?

- Yes
- No
- Do not know
- Other _____

Are you open minded to accept proposal from work colleagues to develop your work skills and methods?

- Yes, from everyone in the Control room
- Yes, but only from the colleagues who works at the same function as I do
- No
- Other _____

Are you willing to help your work colleagues to work in an optimal way?

- Yes, everyone in the Control room
- Yes, but only the colleagues who works at the same function as I do
- No
- Other _____

Please put a cross for the functions whose work tasks and responsibility you understand and have comprehension for:

- Technical Support
- Rolling Stock Manager
- Customer Information Manager
- Cabin Crew Co-Ordinator
- Chief Operating Officer
- Operating Supervisor
- Traffic Co-Ordinator
- Information Co-Ordinator
- I do only understand the work tasks which is performed at the function where I work
- Other _____

Are you interested in knowing what your colleagues at the other functions do?

- Yes, everyone in the Control room
- No
- I do not know
- Yes, but only (please fill in other)
- Other _____

What do you think introducing more multi competences in the Control room would result in?

What would you claim in return to educate yourself within the other functions?

Part 2: Text Message

“You have received information that a storm is on the way in over Sweden and will affect the speed train Stockholm-Gothenburg and train will most likely be cancelled. What is your opinion to send out text message to the concerned customers saying that their train might be affected and they should therefore keep themselves updated by a mentioned information channel. In this way it is assumed that the customer will keep herself updated about the current traffic situation.”

25 Traffic and Information Co-Ordinator participated and the opinions we received was the following:

Positive: 70%

Will make the customer more confused so Call Center will become overburden: 10%

Negative. Should not say anything to the customer until we have made a decision: 16.7%

The response cannot be expounded: 3.3%

Which improvements within the Control room do you believe is necessary to make this change possible?

The work tasks for the function Text Message will be changed.

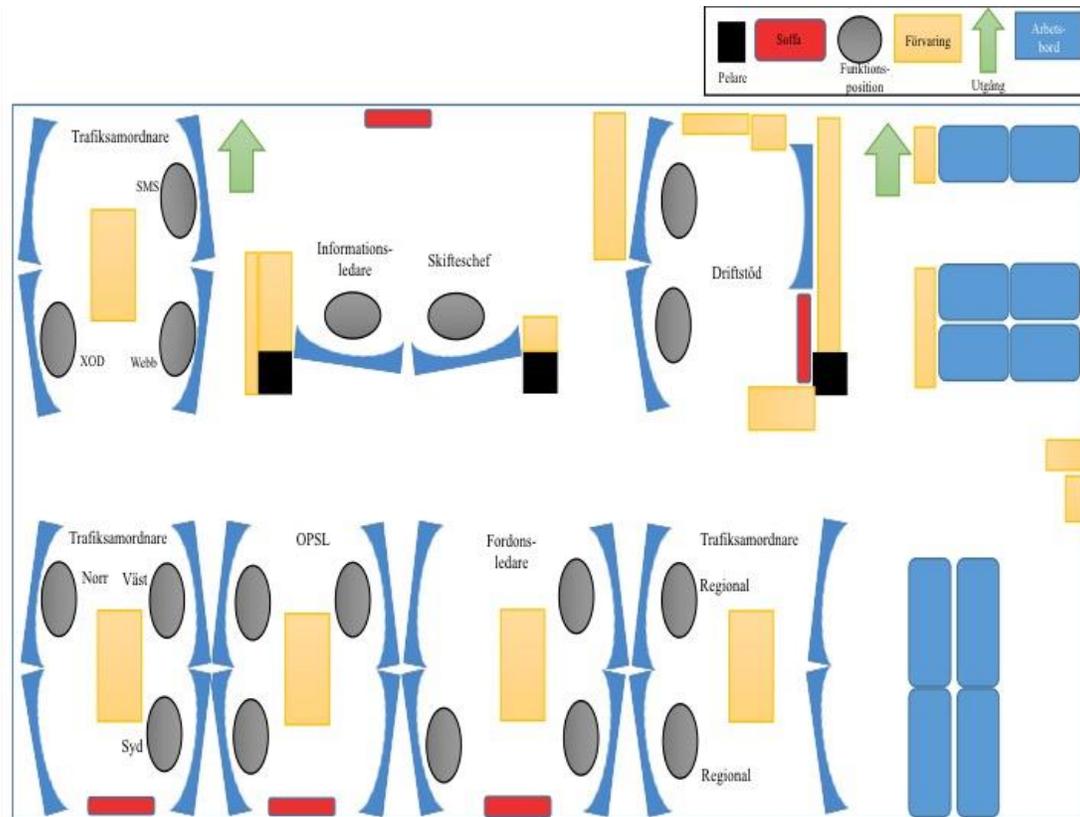
[Open part 3]

Part 3: Emplacement in the Control room

During the last survey proposals around improvements of the emplacement of the different functions in the Control room came up. Three proposals have been analyzed and are explained below.

Proposal 1: Rotation. You will still be placed in the same function groups as you do today, but the location of where the function group is will be changed, see picture below (we believe that you need to zoom in to see it properly). Please spend some minutes to analyze the picture. What is your opinion about this proposal?

- Positive, please motivate at the line other
- I do not understand the difference between this proposal and how we have it today
- Negative, please motivate at the line other
- Other_____



Proposal 2: We “create” teams based on the different lines or areas. Each team consists of one Traffic Co-Ordinator, one Rolling Stock Manager, and one Train Crew Co-Ordinator.

- Positive, please motivate at the line other
- I do not understand the difference between this proposal and how we have it today
- Negative, please motivate at the line other
- Other _____

Proposal 3: You stay in the same functions and in the same place as today, the difference will be that we “create” one team which will only focus at the line Stockholm-Gothenburg (speed line with high competition). The team will consists of one Traffic Co-Ordinator, one Rolling Stock Manager, and one Train Crew Co-Ordinator. What is your opinion of this proposal?

- Positive, please motivate at the line other
- I do not understand the difference between this proposal and how we have it today
- Negative, please motivate at the line other
- Other _____

Which of the three proposals do you prefer?

- Proposal 1: Rotation.
- Proposal 2: The “creation” of teams based on the different lines or areas
- Proposal 3: Only one team for the line Stockholm-Gothenburg
- None of the above
- Other _____

At the different functions there are mobile file cabinet (tables), what do you think of these?

- They are practical and I use them frequently
- They are impractical and often in the way
- No opinion
- My function area do not have a mobile file cabinet
- Other_____

At the different functions there are also couches, what do you think of these?

- They are practical and I use them frequently
- They are impractical and often in the way
- No opinion
- My function area do not have a couch
- Other_____

At the different functions there are stools, what do you think of these?

- They are practical and I use them frequently
- They are impractical and often in the way
- No opinion
- My function area do not have any stools
- Other_____

Is there anything around the emplacement or the things in the Control room which you believe we have missed to ask about and would like to add?

[Open part 4]

Part 4: The communication in the Control room

From the last survey it appears that there are some deficiency in the communication here in the Control room. To make an improvement possible we would like some honest opinions of the following questions:

What do you believe is the problem with the communication today?

What do you believe is necessarily to make the communication better?

How do you believe this will be reached?

Is there anything around the communication which you believed we missed and think is important?

Thanks!

A huge thanks to you for taking your time to answer these questions!

Appendix G

Survey Three for employees within the control room, original version

Avsnitt 1

1. Funktion

Vid dubbel- eller trippelkompetens, vänligen välj alla aktuella alternativ.

- Operativ chef
- Skiftesledare
- Informationsledare
- Driftstöd
- Fordonsledare
- Operativ personalplanerare
- Trafiksamordnare
- Trafiksamordnare – endast information
- Övrigt

2. Jag har arbetat i det operativa rummet sedan:

3. Jag vet alltid vem jag ska ge information till:

Instämmer inte alls	Instämmer inte	Neutral	Instämmer	Instämmer helt
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Avsnitt 2:

CI1. Jag är nöjd med kommunikationen med mina kollegor inom min funktion:

Instämmer inte alls	Instämmer inte	Neutral	Instämmer	Instämmer helt
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

CI2. Det är lätt att få mina kollegors uppmärksamhet inom min funktion:

Instämmer inte alls	Instämmer inte	Neutral	Instämmer	Instämmer helt
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

CI3. Kollegorna inom min funktion lyssnar på mig:

Instämmer inte alls	Instämmer inte	Neutral	Instämmer	Instämmer helt
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

CE1. Jag är nöjd med kommunikationen mellan min funktion och andra funktioner i det operativa rummet:

Instämmer inte alls	Instämmer inte	Neutral	Instämmer	Instämmer helt
<input type="radio"/>				

CE2. Det är lätt att få andra funktioners uppmärksamhet i det operativa rummet:

Instämmer inte alls	Instämmer inte	Neutral	Instämmer	Instämmer helt
<input type="radio"/>				

CE3. Andra funktioner i det operativa rummet lyssnar på mig:

Instämmer inte alls	Instämmer inte	Neutral	Instämmer	Instämmer helt
<input type="radio"/>				

N1. Generellt är jag nöjd med ljudnivån i rummet:

Instämmer inte alls	Instämmer inte	Neutral	Instämmer	Instämmer helt
<input type="radio"/>				

N2. Jag kan fokusera på mina arbetsuppgifter utan att bli påverkad av ljudnivån:

Instämmer inte alls	Instämmer inte	Neutral	Instämmer	Instämmer helt
<input type="radio"/>				

N3. Jag kan ta emot information utan att ljudnivån påverkar mig:

Instämmer inte alls	Instämmer inte	Neutral	Instämmer	Instämmer helt
<input type="radio"/>				

E1. Jag fick den tid för utbildningen jag behövde för att kunna genomföra mina arbetsuppgifter på korrekt sätt:

Gäller utbildningar genomförda från 2011 och framåt. Vänligen svara inte om detta inte gäller dig.

Instämmer inte alls	Instämmer inte	Neutral	Instämmer	Instämmer helt
<input type="radio"/>				

E2. Jag fick rätt utbildningsmaterial för att kunna genomföra mina arbetsuppgifter på korrekt sätt:

Gäller utbildningar genomförda från 2011 och framåt. Vänligen svara inte om detta inte gäller dig.

Instämmer inte alls	Instämmer inte	Neutral	Instämmer	Instämmer helt
<input type="radio"/>				

E3. Jag fick feedback under min utbildning för att kunna genomföra mina arbetsuppgifter bättre:

Gäller utbildningar genomförda från 2011 och framåt. Vänligen svara inte om detta inte gäller dig.

Instämmer inte alls	Instämmer inte	Neutral	Instämmer	Instämmer helt
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

SC1. Jag är nöjd med schemat jag får den 15e varje månad:

Instämmer inte alls	Instämmer inte	Neutral	Instämmer	Instämmer helt
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

SC2. Schemat är individuellt anpassat för mig och mina behov:

Instämmer inte alls	Instämmer inte	Neutral	Instämmer	Instämmer helt
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

SC3. Jag uppskattar att schemat varierar:

Instämmer inte alls	Instämmer inte	Neutral	Instämmer	Instämmer helt
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

SR1. Jag är nöjd med mina jobbrelationer i det operativa rummet:

Instämmer inte alls	Instämmer inte	Neutral	Instämmer	Instämmer helt
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

SR2. Jag är inkluderad i sociala aktiviteter i det operativa rummet:

Instämmer inte alls	Instämmer inte	Neutral	Instämmer	Instämmer helt
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

SR3. Jag är inkluderad i aktiviteter utanför jobbet, som jag är intresserad av, med mina arbetskollaboratorer i det operativa rummet:

Instämmer inte alls	Instämmer inte	Neutral	Instämmer	Instämmer helt
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

SF1. Jag får erkännande när jag gör ett bra jobb:

	Instämmer inte alls	Instämmer inte	Neutral	Instämmer	Instämmer helt	Vet ej
Av mina kollegor	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Av mina chefer	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

SF2. Jag får den feedback jag behöver för att genomföra mitt jobb på ett bra sätt:

	Instämmer inte alls	Instämmer inte	Neutral	Instämmer	Instämmer helt	Vet ej
Av mina kollegor	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Av mina chefer	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

SF3. Jag får det stöd jag behöver för att genomföra mitt jobb på ett bra sätt:

	Instämmer inte alls	Instämmer inte	Neutral	Instämmer	Instämmer helt	Vet ej
Av mina kollegor	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Av mina chefer	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

TW11. Jag är nöjd med samarbetet inom min funktion:

Instämmer inte alls	Instämmer inte	Neutral	Instämmer	Instämmer helt
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

TW12. Mina kollegor inom min funktion hjälper mig när jag har hög arbetsbelastning och frågar om hjälp:

Instämmer inte alls	Instämmer inte	Neutral	Instämmer	Instämmer helt
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

TW13: Mina kollegor inom min funktion erbjuder sig att hjälpa mig när jag har hög arbetsbelastning:

Instämmer inte alls	Instämmer inte	Neutral	Instämmer	Instämmer helt
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

TWE1: Jag är nöjd med samarbetet mellan min funktion och de andra funktionerna i det operativa rummet:

Instämmer inte alls	Instämmer inte	Neutral	Instämmer	Instämmer helt
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

TWE2: De andra funktionerna i det operativa rummet tar beslut med min funktion i åtanke:

Instämmer inte alls	Instämmer inte	Neutral	Instämmer	Instämmer helt
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

TWE3: De andra funktionerna i det operativa rummet har förståelse för min funktions arbetsuppgifter och beslutsfattande:

Instämmer inte alls	Instämmer inte	Neutral	Instämmer	Instämmer helt
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

M1. Min chef är tillgänglig vid behov:

Instämmer inte alls	Instämmer inte	Neutral	Instämmer	Instämmer helt
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

M2. Min chef vill höra om mina problem:

Instämmer inte alls	Instämmer inte	Neutral	Instämmer	Instämmer helt
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

M3. Min chef anstränger sig för att jag ska må så bra som möjligt på jobbet:

Instämmer inte alls	Instämmer inte	Neutral	Instämmer	Instämmer helt
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

M4. Jag har förtroende för min chef:

Instämmer inte alls	Instämmer inte	Neutral	Instämmer	Instämmer helt
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

PL1: Jag är nöjd med hur funktionerna är placerade i det operativa rummet:

Instämmer inte alls	Instämmer inte	Neutral	Instämmer	Instämmer helt
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

PL2: Placeringen av de olika funktionerna gynnar mitt arbete:

Instämmer inte alls	Instämmer inte	Neutral	Instämmer	Instämmer helt
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

PL3: Placeringen av min funktion underlättar för mig att få den information jag behöver:

Instämmer inte alls	Instämmer inte	Neutral	Instämmer	Instämmer helt
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

W1: Jag frågar alltid mina kollegor, på min funktion, om de behöver hjälp när de har mycket att göra men inte jag:

Instämmer inte alls	Instämmer inte	Neutral	Instämmer	Instämmer helt
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

W2: Jag hjälper alltid mina kollegor, på min funktion, om de frågar om hjälp när de har mycket att göra men inte jag:

Instämmer inte alls	Instämmer inte	Neutral	Instämmer	Instämmer helt
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

W3: Jag vill underlätta för så många som möjligt i det operativa rummet:

Instämmer inte alls	Instämmer inte	Neutral	Instämmer	Instämmer helt
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

JS1. Jag är nöjd med mitt jobb:

Instämmer inte alls	Instämmer inte	Neutral	Instämmer	Instämmer helt
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

JS2. Jag gillar det jag gör på mitt jobb:

Instämmer inte alls	Instämmer inte	Neutral	Instämmer	Instämmer helt
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

JS3. Det var ett klokt beslut att börja jobba här:

Instämmer inte alls	Instämmer inte	Neutral	Instämmer	Instämmer helt
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

LI1. Jag funderar på att rekommendera min arbetsplats till mina vänner:

Instämmer inte alls	Instämmer inte	Neutral	Instämmer	Instämmer helt
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

LI2. Jag kommer att rekommendera min arbetsplats till mina vänner:

Instämmer inte alls	Instämmer inte	Neutral	Instämmer	Instämmer helt
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

LI3. Jag kommer att säga positiva saker om mitt jobb till andra personer:

Instämmer inte alls	Instämmer inte	Neutral	Instämmer	Instämmer helt
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Finns det något du vill tillägga?

Survey Three for employees within the control room, translated version

Part 1:

1. Function

If double or triple competence, please choose all current alternatives:

- Chief operating officer
- Operating supervisor
- Customer information manager
- Technical supporter
- Rolling stock manager
- Train crew co-ordinator
- Traffic co-ordinator
- Information co-ordinator
- Other

2. I have worked in the control room since:

3. I always know who to deliver information to:

Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
<input type="radio"/>				

Part 2:

CI1. I am satisfied with the communication between my colleagues within my function:

Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
<input type="radio"/>				

CI2. It is easy to get my colleagues' attention within my function:

Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
<input type="radio"/>				

CI3. My colleagues within my function listen to me:

Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
<input type="radio"/>				

CE1. I am satisfied with the communication between my function and the other functions in the control room

Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
<input type="radio"/>				

CE2. It is easy to get the other functions' attention in the control room:

Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
<input type="radio"/>				

CE3. The other functions in the control room listen to me:

Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
<input type="radio"/>				

N1. In general, I am satisfied with the noise level in the room:

Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
<input type="radio"/>				

N2. I am able to focus on my work tasks without being disturbed by the noise level:

Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
<input type="radio"/>				

N3. I can receive information without being affected by the noise level:

Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
<input type="radio"/>				

E1. I got the time needed for the education I needed, to be able to perform my work tasks in a correct way:

Concern educations performed from 2011 and forward. Please do not answer if this does not concern you.

Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
<input type="radio"/>				

E2. I got the correct education tools to be able to perform my work tasks in a correct way:

Concern educations performed from 2011 and forward. Please do not answer if this does not concern you.

Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
<input type="radio"/>				

E3. I received feedback during my education to be able to perform my work task better:

Concern educations performed from 2011 and forward. Please do not answer if this does not concern you.

Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
<input type="radio"/>				

SC1. I am satisfied with the schedule I receive the 15th each month:

Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
<input type="radio"/>				

SC2. The schedule is individually adjusted for me and my needs:

Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
<input type="radio"/>				

SC3. I appreciate that the schedule is varying:

Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
<input type="radio"/>				

SR1. I am satisfied with my work relations in the control room:

Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
<input type="radio"/>				

SR2. I am included in social activities in the control room:

Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
<input type="radio"/>				

SR3. I am included in activities outside of work, which I am interested in, with my colleagues in the control room:

Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
<input type="radio"/>				

SF1. I get recognition when I do a good job:

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
By my colleagues	<input type="radio"/>				
By my managers	<input type="radio"/>				

SF2. I receive the feedback I need to be able to perform my job in a good way:

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
By my colleagues	<input type="radio"/>				
By my managers	<input type="radio"/>				

SF3. I receive the support I need to be able to perform my job in a good way:

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
By my colleagues	<input type="radio"/>				
By my managers	<input type="radio"/>				

TW11. I am satisfied with the collaboration within my function:

Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
<input type="radio"/>				

TW12. My colleagues at my function help me when I have a high workload and ask for help:

Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
<input type="radio"/>				

TW13: My colleagues at my function offer to help me when I have a high workload:

Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
<input type="radio"/>				

TWE1: I am satisfied with the collaboration between my function and the other functions in the control room:

Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
<input type="radio"/>				

TWE2: The other functions in the control room always make decisions with my function in mind:

Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
<input type="radio"/>				

TWE3: The other functions in the control room have understanding for my function's work tasks and decision making process.

Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
<input type="radio"/>				

M1. My manager is available when needed:

Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
<input type="radio"/>				

M2. My manager wants to hear about my problems:

Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
<input type="radio"/>				

M3. My manager endeavors, for me to feel as good as possible at work:

Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
<input type="radio"/>				

M4. I have confidence in my manager:

Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
<input type="radio"/>				

PL1: I am satisfied with the how the fucntions are placed in the control room:

Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
<input type="radio"/>				

PL2: The placing is beneficial for my work:

Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
<input type="radio"/>				

PL3: The placing facilitate for my function to receive the information I need:

Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
<input type="radio"/>				

W1: I always ask my colleacues, in my fucntion, if they need help when they have a high work load but I don't :

Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
<input type="radio"/>				

W2: I always help my colleagues, at my function, if they ask me to help them when they have a high work load but I don't:

Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
<input type="radio"/>				

W3: I want to facilitate for as many as possible in the control room:

Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
<input type="radio"/>				

JS1. I am satisfied with my job:

Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
<input type="radio"/>				

JS2. I like what I am doing at my job:

Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
<input type="radio"/>				

JS3. It was a good decision to start working here:

Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
<input type="radio"/>				

LI1. I am considering to recommend my work place to my friends:

Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
<input type="radio"/>				

LI2. I will recommend my work place to my friends:

Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
<input type="radio"/>				

LI3. I will say positive things about my job to other people:

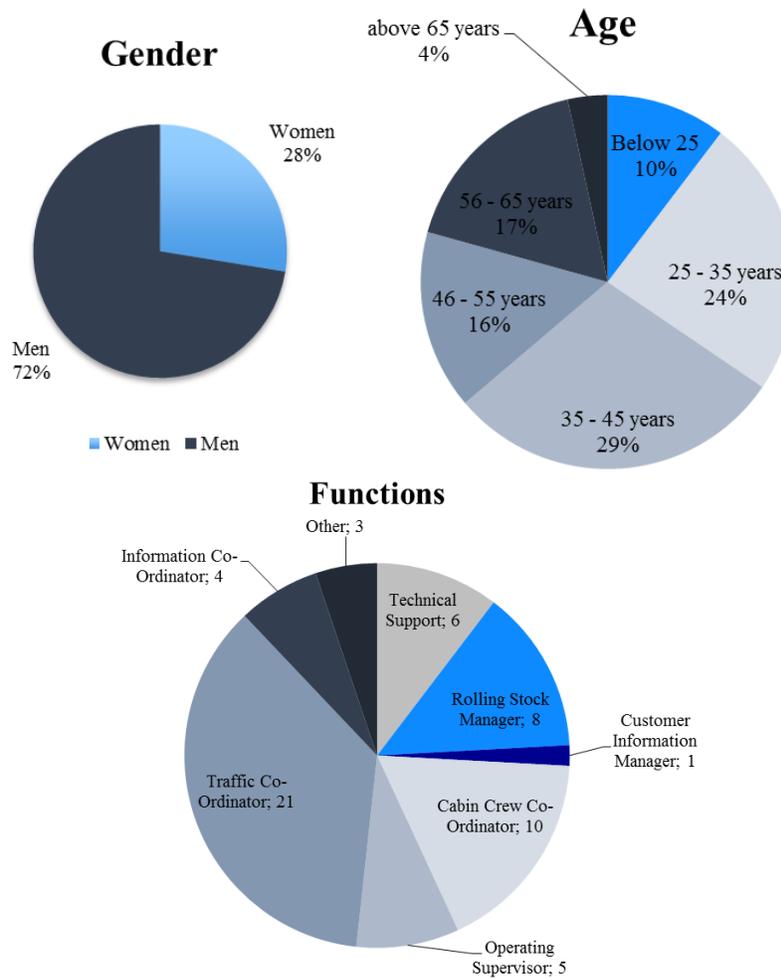
Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
<input type="radio"/>				

Is there anything you would like to add?

Appendix H

Summary of Survey One performed in the control room.

In total, 58 employees participated in the survey. Out of these, 16 were women and 42 were men. 77.6 % were full time employees while the remaining were everything from employed by the hour, temporary or part time employed, etc.



Technical Support

The six employees at Technical Support who participated in the survey had worked as Technical Supporter as follow; 6 years, 9 years, 2 years, borrowed in periods during 8 years, 10 years, and around 25 years.

Everyone are Train Drivers, one is also working at Technical Support Copenhagen, and two are also instructors for new Train Drivers.

When it comes to the communication within the Control room, all Technical Supporters think they talk most to the Operating Supervisor. However, they were supposed to grade which they talked to, and the following order of communication was created after taking an average of their answers, where the first one is the one they talk the most to and the last one the least: Operating Supervisor, Rolling Stock Managers, Train Crew Co-Ordinators, Traffic Co-Ordinators, Information Co-Ordinators, and Customer Information Manager.

When it comes to the communication outside the Control room, the talk with all of the following: the Rolling Stock Departments and the Cleaning Crews in Hagalund, Gothenburg, and Malmö; Train Drivers; Cabin Crew; the Operating Supervisor in Gothenburg; the Technical Support in Gothenburg; the Train Manager (STA) for Stockholm, Gävle and Gothenburg; the duty of traffic safety; Stab traffic safety; and also some teams like locomotive and coach, railcar, X2.

The three functions which they have most communication with, both inside and outside the control room are the following:

- Rolling Stock Manager / Operating Supervisor / Traffic Co-Coordinator
- Train Drivers / Operating Supervisor / Rolling Stock Manager
- Operating Supervisor / Rolling Stock Manager / Train Crew Co-Ordinator
- Operating Supervisor / Rolling Stock Manager / Rolling Stock Department Hagalund
- Operating Supervisor / Rolling Stock Manager / Rolling Stock Department Hagalund and Operating Supervisor Gothenburg

The answers of the scenario was the following:

- Direct communication with the Traffic Co-Ordinators due to a potential delay, also communication with the Rolling Stock Manager about the opportunity to “turn” a train, also communication with the Operating Supervisor to watch over the situation.
- Start to communicate with the Operating Supervisor and/or the Rolling Stock Managers. Talk with Hagalund. Talk with Train Crew Co-Ordinators. If a train should pass against a stop signal the Train Driver handle this communication with the STA by herself. If there is something wrong with the train it is up to Hagalund to fix/plan the change. However, I use to keep the Rolling Stock Managers updated so they can make up a plan at the same time.
- Communicate with the Operating Supervisor first, then I talk to the Rolling Stock Manager in the Control room and then eventually the Rolling Stock Department Manager at Hagalund. It is also good if the Train Crew Co-Ordinator know what is going on.
- I start to find out what has happened. Give the Train Drive some different suggestion on how she can solve the problem. If it does not help I call the Rolling Stock Manager and ask her to get a trouble shooter from the workshop. I also ask the Rolling Stock Manager at Hagalund if there are any possibilities to switch train so the workshop get more time to fix the defect. Then I tell the Operating Supervisor that the train eventually will be late.
- If there is something wrong with the signals at Hagalund this is not really my work task. I ask the Operating Supervisor if she know what is going on. I believe we will try to reason about how long time this will take before the train can leave.

Four of the six Technical Supporters agree that they have not told the Operating Supervisor that there is something that is wrong with a train due to the fact that they believed that they could solve the problem themselves. Two of them answered that 1 % of all situations is like this, another one

answered rarely and that it is hard for them to keep track on when the train is supposed to leave when they are all caught up with the problem and find a solution for it.

Rolling Stock Manager

The eight employees at Rolling Stock who participated in the survey had worked as Rolling Stock Managers for; 7 years, 17 years, 5 months, 5 years, 3 years, 7 years, and “many years to and from”.

When it comes to the communication within the Control room, all Rolling Stock Managers think they talk most to the Train Crew Co-ordinators. However, they graded which they talked to, and the following order of communication was created after taking an average of their answers, where the first one is the one they talk the most to and the last one the least: Train Crew Co-ordinators, Technical Support, Operating Supervisor, Traffic Co-ordinators, Information Co-ordinators, and Customer Information Manager.

Outside the Control room they communicate with the Rolling Stock Department at Hagalund, Traffic Control Food and Beverage, STA, tactical planning, competitors, Hagalund, all functions at Traffic Control Gothenburg, Train Drivers, Cabin Crew, Train Drivers at Green Cargo, etc.

The three functions which they have most communication with, both inside and outside the control room are the following:

- Rolling Stock Departments / Train Crew Co-ordinators / Operating Supervisor
- Traffic Co-ordinators / Train Crew Co-ordinators / Rolling Stock Department Hagalund
- Train Crew Co-ordinators / Rolling Stock Department Managers / Operating Supervisor

Customer Information Manager

There was only one Customer Information Manager participating in the survey. She had worked at this function for 2 years and before that she was a Traffic and Information Co-ordinator.

When it comes to the phone calls she said that 70% is essential, 10% unnecessary, and 20% are superfluous.

Answer for the scenario. She start with updating “Trafik och Driftinfor” at the Intranet. Then she sends a text message to all managers at all other departments at SJ about the level of disturbance. The she obtains an overview to make sure that the “information team” is updated and have enough information to inform within each of their channel. Everything she has does so far is the repeated a few times. She is also included in phone meetings when STA request to “customer meetings”, where they discuss traffic setups and general traffic information to the customers. She also has a continuous conversation with the Operating Supervisor what is going on both in the traffic as well as with the information. She is responsible contacting the Press Duty and keep them updated with a clear message. She is also the one to make sure that there are people working as customer service at the train station which eventual will have a high number of customers which are waiting for their trains, and trying to get a clear overview of how the situation is with compensation busses etc. However, her focus during a disturbance is at the Cabin Crew, the managers, customers, and that STA have the corrected and most updated news.

Train Crew Co-Ordinators

It was 10 Train Crew Co-Ordinators which participated in the survey. They had worked as this as follow; 4 years, 8 years, 4.5 years, 15 years, 1 years, 18 years, 4 years, 6 years, 6 years, and 2.5 years.

When it comes to the communication within the Control room, all Train Crew Co-Ordinators think they talk most with the Rolling Stock Managers. However, they graded which they talked to, and the following order of communication was created after taking an average of their answers, where the first one is the one they talk the most to and the last one the least: Rolling Stock Managers, Operating Supervisor, Traffic Co-Ordinators, Technical Support, Information Co-Ordinators, and Customer Information Manager.

Besides the communication performed in the Control room they also talk with: short time planning, daily personal planners, Cabin Crew, Train Driver, and STA.

The three functions which they have most communication with, both inside and outside the control room are the following:

- Train Crew Co-Ordinators / Rolling Stock Managers / Operating Supervisor
- Train Crew Co-Ordinators / Operating Supervisor / Rolling Stock Managers
- Train Crew Co-Ordinators / Rolling Stock Managers / Traffic Co-Ordinators
- Train Crew Co-Ordinators
- Operating Supervisor / Rolling Stock Managers
- Operating Supervisor / Traffic Co-Ordinators / Customer Information Manager
- Train Crew Co-Ordinators / Rolling Stock Managers / Operating Supervisor
- Train Driver / Cabin Crew / Rolling Stock Managers

Operating Supervisor

It was five Operating Supervisors participating in the survey. They had worked at this function for 2 months, 2 years, 2 years, 8 years, and 2 years.

Before/Similarly they were Operating Supervisors they worked at the functions: Traffic and Information Co-Ordinators; Traffic and Information Co-Ordinators and Rolling Stock Manager; Traffic and Information Co-Ordinators, Rolling Stock Manager, and Chief Operating Officer; Traffic and Information Co-Ordinators; Rolling Stock Manager.

When it comes to the communication within the Control room, they graded which they talked to, and the following order of communication was created after taking an average of their answers, where the first one is the one they talk the most to and the last one the least: Customer Information Manager, Rolling Stock Managers, Traffic Co-Ordinators, Technical Support, Train Crew Co-Ordinators, and Information Co-Ordinators.

Traffic and Information Co-Ordinators

25 Traffic and Information Co-Ordinators, where four are only Information Co-Ordinators, participated in the survey. These had worked here for 2 years, 5 years, 5 months, 2 months, 1 year,

3 years, “many years”, 8 years, 2.5 years, 4 years, 2.5 years, 4 years, 4 months, 6 years, 2 years, 3 months, 13 years, 1 year, 6 years, 6 years, 13 years, 8 months, 7.5 years, 11 years, and 3 years.

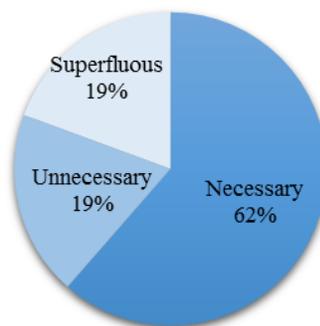
18 of them have not have an employment within the Control room beside this function, but the others have been: “Kundgrupp”, Rolling Stock Manager; Operating Supervisor; Rolling Stock Manager; Customer Information Manager; Chief Operating Officer and Rolling Stock Manager, and Information Clerk.

Outside the Control room ten have not have an employment, but the others have worked as; Cabin Crew, Cabin Crew, internship at Traffic Control Stockholm, Rolling Stock Operator, Snow Remover, Work Shop planner X2, SJ IT, SJ Ticket Store/Customer Service/Helpdesk, Cabin Crew, Call Center, Cabin Crew, Cabin Crew, and staff distributor.

During a question the Traffic Co-Ordinators were supposed to answer how many call they received which was necessarily. 21 participated and 20 answers could be used, below is the answers:

	Percentage (%)	Number of asked traffic co-ordinators	Mean (%)
Necessary	60 65 80 60 50 50 70 60 98 45 50 40 70 50 70 60 40 70 60 90	20	61,9
Unnecessary	30 10 10 30 40 30 10 20 1 20 20 20 10 30 10 20 30 20 20 5	20	19,3
Superfluous	10 25 25 10 10 20 20 20 1 35 30 40 20 20 20 20 30 10 20 5	20	19,6

Incoming Phone Calls



The Traffic Co-Ordinators (21) said the following about how they book hotels (more than one choice per person):

- 10 try to find a hotel a by using Hotelzon
- 15 call the hotel
- 9 use google
- 1 uses telephone directory



Feedback on the scenario.

- Good idea
- Positive
- Sounds like a good way to work proactive instead of waiting for the 30 minutes to pass. The only problem is that the forecast change and the train goes as normal. But if we start from the existing text message forms we have today, were we write “the train is delayed”, it would be of no harm due to that we do not write a time to the customer.
- Believe it is okay. Then send out another text message when decisions are fully made.
- If the train is cancelled, all affected customers receive a text message
- If we do not have a concrete decision we cannot send out a concrete text message. Then my opinion is to rather put information at the website that there is a disturbance in the traffic. When the concrete decision is made (e.g. cancelled) then we can send a text message to inform about this. Otherwise it will be wrong.
- I believe it is very good to send these small text so the customer (most likely) prepared on that there are disturbances in the traffic and she might be late to her destination.
- Good
- I believe it is a good way of approach
- This is good things
- If the storm is so serious that the train traffic will be affected, Media will publish this. This means that we can wait with the information directly towards the customer until we have made the decision.
- My opinion is that this is how we should work during all disturbances.
- Good to unburden the manually information channels
- Very good for both SJ and the customers
- Good, due to that the information today in unsecure and that we do not want to send out information to early due to the fact that the situation might change.
- Sounds like a good idea if the text message is extremely clear. However, I believe that it will appear misunderstandings and that the customers will call Service Center.
- Very good idea!
- Sounds like a good idea. However, I believe more resources are needed and SC would be overburden due to questions and assumptions regarding the text message during potential cancellations. Then I believe it is better to send out concrete decisions which are clear and will not change.
- Information in all forms which can give a notice is always best, for all parts
- If this text message could be sent out a day before the storm it would be good.

- Good to send a text message to dissuade the start of the journey for the customer
- If the customer is at the train no text messages should be sent. The problem with sending a text where we say that there is a potential risk that the train gets cancelled is that Service Center will be overburden by customers who calls and demand an answer because they need to know what is going on. When Service Center cannot give any more or better information than what we sent out it will be a bad experience for the customer. It is better to not send any texts at all, until you know or do not know if it is cancelled or not.
- A text message should only be sent out if traffic disturbances can occur due to the weather and there should be possible for the customer to rebook/cancel the trip due to that we activate the disturbance rebooking. The same information should be found by sj.se/trafikinfo
- Good
- Good!

Other:

3 employees who participated were counted as “other”.

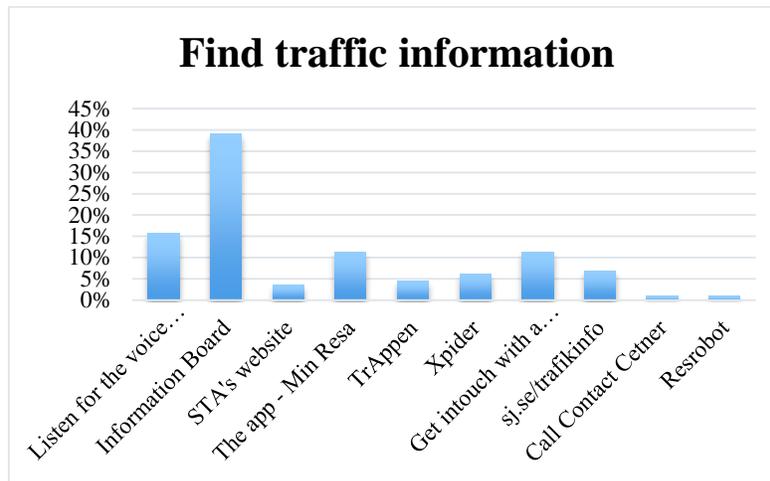
 She had had this position for 10 years and her main responsibilities is to make sure that all information reach the Cabin Crew and the customer, plan the traffic during disturbances and to order compensation buses, book hotels, and to makes sure there is consumption during the delays.

She talks most to the Operating Supervisor, and the Traffic and Information Co-Ordinators. Then Customer Information Manager, Rolling Stock Manager, Train Crew Co-Ordinator and last the Technical Support.

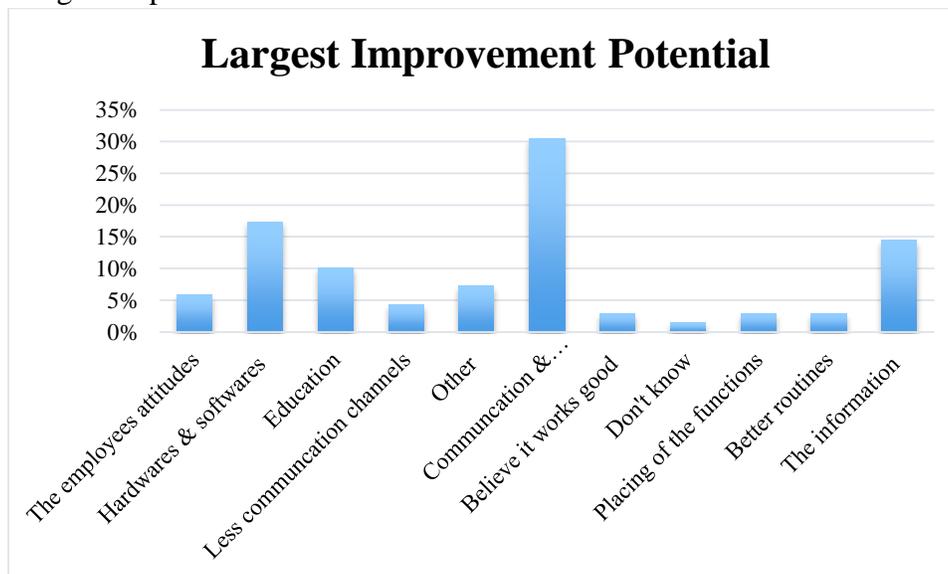
 The other one has a multi competence of a Rolling Stock Manager, for 33 years, and Traffic Co-Ordinator, for 10 years. She has not have another employment inside the control room, but has been a Rolling Stock Operator.

 The third one is responsible for the Train Crew Co-Ordinator and the Rolling Stock Managers. She has worked at this position for two months. Before this she has not worked at any other function in the Control room but has been a group manager and a Cabin Crew.

Last Part (for everyone):



Where is the largest improvement in the Control room?



- Less but better communication channels and better computer tools
- The correct staff and tools that works
- A clearer management better feedback from the higher managers
- Hard to tell. I believe it works okay
- Do not know.
- Technical Support
- The communication between the different functions
- To "RPS" to work
- I believe it works good
- In peoples attitude towards SJ who pays their salary
- Education and intern communication
- Everything would be so much better if everyone would understand each other's work tasks. Multi competences, sitting next to your colleague, and supplementary training would lead to a more coherent Traffic Control where it is the whole picture that is in focus instead of that everyone tries to solve their own problems without any understanding or consideration for the other functions.

However, the main problem is the lack of resources outside the Control room. Lack of employees and too bad education, too few and bad served trains, bad infrastructure, too few workshops with lack of personnel and bad education, to tight planning for trains and train crew. Requests for efficiency, profit, and outsourcing to external operators have contributed to that there is no buffer to anything outside “the plan” which results in a harder and more complicated work for us here at Traffic Control and a lower standard overall at the traffic of railway.

- Better communication with each other
 - Some functions/employees need to be more aware of the customers’ perspective
 - The collaboration
 - Good computers so we can work without computer disturbances. I would like Mac which works :-)
 - Communication, see each other
 - The placement in the room. Today everything is very limited due to how we sit, cannot walk to anyone easily. Also, better routine over all.
 - Better placing. I believe we should sit in groups divided after different lines or areas. For example Stockholm and northwards, Western Main Line and southwards, and Stockholm and southward and Southern Main Line. In each group there should be one Train Crew Co-Ordinator for Cabin Crew and Train Driver, one Traffic Co-Ordinator, one Rolling Stock Manager, and one information clerk. Decision making would go faster, no misunderstanding in the Control room. Things would not “slip between the chairs” and Cabin Crew and Train Drivers would get the correct information from us so no one misses anything. As we sit today it happens that the Traffic Co-Ordinator call the Cabin Crew to give them certain information without telling the Train Crew Co-Ordinators. The Train Crew Co-Ordinators then get the information from the Train Drivers or the Cabin Crew who calls to ask them what to do. Furthermore, it happens that the Traffic Co-Ordinators make a decision to cancel trains before looking to see if there is any Train Drivers or Cabin Crew available. The train employees do not follow the trains which implicate that the train employees is at the wrong place which result in that the consequence becomes larger than thought. Therefore it would be good if we sat closer and “talked” to solve the problem
- Another thing I thought of today.... The Information Co-Ordinators write traffic information in XOD. I believe that they should be able to write a more customer based information and send it out on one information board at the stations. (The stations which include a passenger lounge that earlier included staff). Today we are not satisfied with the information which reaches the customers from STA’s boards. Why don’t we put one up by ourselves?? We could write what happened, forecast, when the traffic could be going again, etc. We could write about specific trains etc. Then the customers would get rid of the part to “hunt down” information and call CC. You reach many customers at once. It would have been a good information flow.

One smaller thing... Why do they not “clean” the computers here?? There are many unnecessarily data and files which makes the computers slowly.

- Sometimes the colleagues, the mind to stop the knowledge gap is the largest
- The communication between the functions. Suggest that we introduce only personalized information only.
- More collaboration between the functions
- The computers

- The communication, how the workload is divided during a disturbance
- The communication between the function
- The communication between Train Crew Co-Ordinators and the other function
- Better IT tools that works
- The group of Traffic and Information Co-Ordinators
- In peoples attitude
- Clearer instructions for communication
- The collaboration
- I would say the collaboration between the colleagues. Both to unburden each other when it is needed.
- The communication between the different functions during a larger disturbance
- I can only answer for Traffic and Information Co-Ordinators.. We should work more together information/traffic at each district.
- Information
- Managers that are more committed and engage. They should also give me more feedback on how I work; praise and criticism
- An information group
- Usually (according to me) imperfect information to customers is due to our software and the bad IT environment. For example, text message do not work or other operative software which does not give us the presumption that we need.
- Better software so we can get the information out sooner. Be better at clear information.
- Better competences
- The work with information
- The information between the different functions
- To make sure all software works as they should (example XOD, RPS, Björks)
- Technical optimizations. For example one username and password for ALL IT-systems and tools.
- Fast and easy to learn tools and computes software's. Updated information during disturbances intern but mainly from the STA. Faster but easy intern education's when updates in the software's are made. Usually updates or changes are made without everyone getting the same information or update about it.
- Communication
- Better intern communication
- Information Co-Ordinators
- That more get the knowledge of what the Information Co-Ordinators actually do. Also that Traffic Co-Ordinators get more Rolling Stock knowledge would be good for larger disturbances.
- Proactivity
- Intern information

What did we miss to ask about?

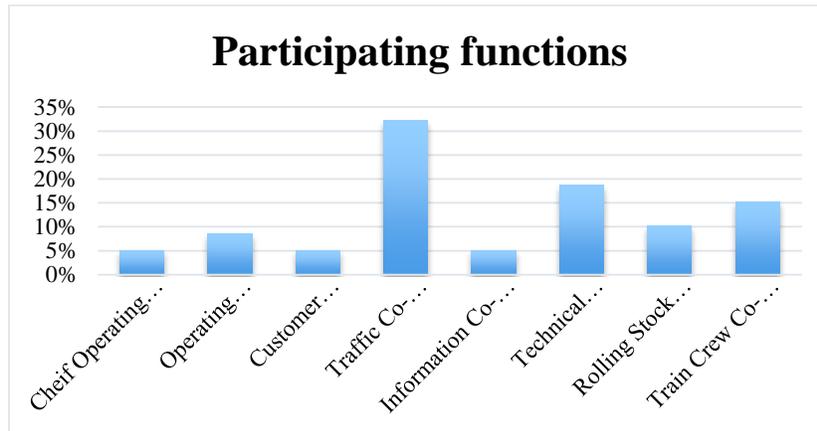
- The need of better infrastructure and the investment for this
- Staffing, stress, and management
- The work environment (schedule, working hours per week, hours of recovery, the working tools). It is impossible to be so productive and fast as we need to be in this working environment. What it means to work in an Control room do we know but to do the work in the right way is not in line with these conditions.

- Check how the development of the app is doing when it comes to traffic information
- How we work with other departments at SJ/competitors.
- I could not find any questions about sj.se/trafinkinfo (web). Sometimes when we send out text it happens that the text does not reach everyone. If we send 100 text maybe 98 has been received. That means that we miss 2 people who do not get the information. By working like this we need to be as focused at the web as the text.
- How it is divided between the two Traffic Controls in Gothenburg and Stockholm during larger disturbances.

Appendix I

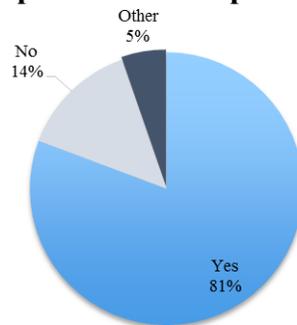
Summary of Survey Two preformed in the control room.

In total, 59 employees participated in the survey. Below is how many from the different functions which participated in the survey.



For the question if they believe their work is challenging and result in personal development the participated employees answered:

Challenging work which result in personal development

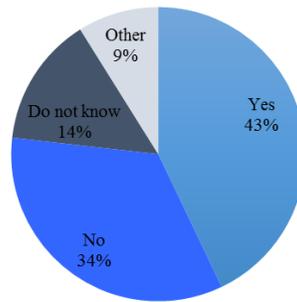


Where the ones who answered "Other" comment:

- Challenging yes, but does not result in personal development
- Not that much
- Sometimes

For the question "Do you feel that you perform your work in an ideal way?" The following was the answers:

Performing the work in an ideal way



Where the ones who answered “Other” comment:

- When too few employees = NO
- Both yes and not. Sometimes the work is working fine, but it depends on the situation, how the employees work and how the resources are divided in the Control Room.
- No due to “new at work”
- Mostly, as far as the software let me

At the question regarding if they were open minded to learn new ideal work ways 93.2% said yes and the rest answered “other” with the comments:

- Soon to be retired
- No and yes, usually the new methods have already been tried like the wheel !!
- As long as it does not create a mess in the group, which dividing out work can create.
- No sure what it means, but to develop the work: Yes

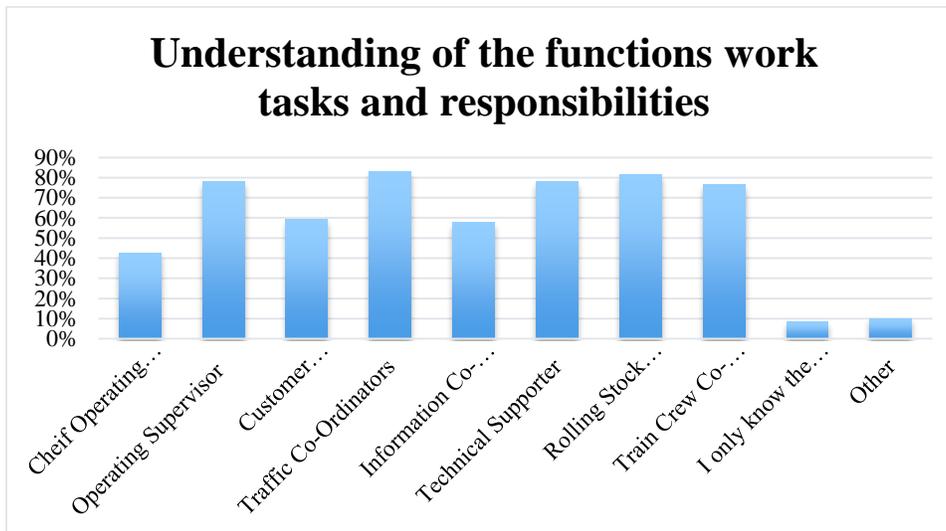
At the question “are you open to receive tips from co-workers do develop your way to work” 91.2% answered “Yes, from everyone in the Control Room”, 5.3% answered “Yes, but only from the ones working at the same function as I do”, 1.8% said “No”, and one employee answered “Other” with the comment:

- The question is not correct asked, co-workers includes all within the company and sometimes even consultants, and YES of course one wants to develop personal skills.

At the question “are you willing to help your co-workers to work in an ideal way?” 88.1% answered “Yes, to everyone in the Control Room”, 10.2% answered “Yes, but only to the ones working at the same function as I do”, 0% said “No”, and one employee answered “Other” with the comment:

- This is the opposite from the question before... and of course, this is obvious, or?

For the question regarding which functions work tasks and responsibilities one understood the answers can be found below.



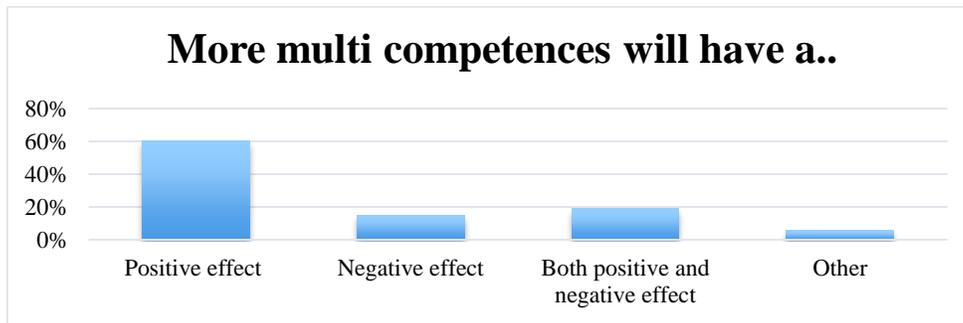
Where the ones who answered “Other” also comment:

- Could not choose to pick more than one alternative so here are all functions for which I understand the work tasks: Customer Information Managers, Chief Operating Officer, Operating Supervisor, Traffic Co-Ordinator, and Information Co-Ordinator
- Technical Support, Rolling Stock Managing, Customer Information Managing, Train Crew Co-Ordinator, Chief Operating Officer, Operating Supervisor, Traffic Co-Ordinator, and Information Co-Ordinator. That I choose these ones does not mean that I KNOW how the function works, but I understand and know what the different functions do.

On the question if they are interested in what other colleagues are doing at their function the answers were the following:

- Yes, everyone in the Control Room: 86.4%
- No: 3.4%
- I don't know: 1.7%
- Yes but only (please fill in function/functions below): 1.7%
 - o --
- Other: 6.8%
 - o I only have one more year
 - o I already know what all the functions are doing
 - o I know what all other functions do.
 - o I know what all other functions do.

By introducing more multi competences in the Control Room, they believed that it could result in:



- A better SJ Traffic Control
- I believe that double competence is the best for everyone. Everyone knows more and understands the chain.
- I believe in “the right person at the right place” more than everyone should know everything.
- Better customer service and understanding for a wider perspective
- Overall worse knowledge but during the same time some better understanding for each other’s functions.
- Increased understanding for the different functions work tasks and challenges. I also believe that the awareness of how my decisions affects and get consequences for the other function will increase.
- Being able to do the work better and more easier if one understood the other functions.
- One receive a better overview and understanding, fun with variety
- Better quality in the delivery
- It would definitely increase the understanding and increase the collaboration in the Control Room
- I believe it would be good to increase the understanding of how all functions work
- It would be positively if almost everyone had a multi competence. But it would actually be enough to have a very good understanding for what the other functions do in the Control Room (which not many employees have today). If everyone have the understanding, the employees could try to become experts in their own functions instead of trying to fix all functions at the same level
- It is good out of a planning perspective but then it is needed that the employees can be at the functions equally time so that the competence is remained. I believe that the more varied your work tasks get, the more fun is your work and you will become a better employee at the different functions. Good for the company, good for the individual.
- Would result in a highest “lowest” level, unfortunately also a lower “highest” level.
- I do not believe it is positive. I believe that one will loss her front edge competence when one should know everything.
- It would be the best. It would increase the efficiency a lot and take responsible for different areas/lines instead of just one function. How we are positioned today is old thinking and we will never become better if we do not change our way of working.

- Good way of thinking, but everyone does not have that interest or inclination for all functions.
- I can only see positive effects with it.
- Not that deep knowledge and a larger insecurity, but an increase for other
- Wider width
- SJ will obtain employees with higher knowledge and easier to fill in the vacancies. Also more stimulation for the employees.
- I am double competent today and it has resulted in a deeper understanding for the other functions as well as a better collaboration between the colleagues.
- Primarily deeper understanding for the others work tasks, but risk for not as deep knowledge at the functions.
- It is important that one will be scheduled at the functions for the competence
- It is most likely not a “job” for everyone. The risk is that the employee loses specific competence. The advantage is that the flexibility will increase, of course, and a better understanding for the other functions decision making process.
- Can result in worse competence
- I believe it is good
- A larger understanding for each other’s work
- We become more flexible and can handle larger disturbances better
- Chaos
- The employees will have a deeper knowledge and a clearer picture of the situation during disturbances. The understanding will increase and the employee will have different functions “think” when they make decisions, which I believe is positive.
- Larger understanding but also risk for that the competence decrease the flexibility.
- Easier scheduling
- Wider but less specialization.
- Increased understanding and shorter lead time for the decision making process. If the employee analyze the situation before a decision is made, the quality will increase.
- This is a risk. To put your mind into different work tasks is good but to deal with different work tasks with responsibility and a good result is something different. I do not want to be reluctant in this but it is easy that the quality will decrease. This is not the right place to share this, but this is noticed both within and outside the Control Room, by of customers.
- Here at Technical Support it is hard to understand if one is not used to it in practice.
- More knowledge, personal development
- More flexibility
- More efficient work
- The advantage is more flexibility of the work. The disadvantage is that you will never be good at anything if you “jump around” too much.
- As long as it is voluntary. One has to respect that people are different. Do not forget what front edge competence implicate, do not forget how much one person can learn and keep in her both brain halves.

- Lack of competence
- To become “half good” at everything instead of expert at her function
- More knowledge about Traffic Control from different perspectives.
- Good
- Lack of quality all along the line. I have a double competence and know how much work that is needed to maintain it.
- Positive! Increased flexibility and a higher delivery in quality
- There are already employees who has it.
- If one constant “exercise” her knowledge it can be a good idea

To educate yourself within the other functions, what would you want in return?

- Increased salary alternative better schedule
- One manager in the company said in the end of 1990 that competence should create benefits.
- Some sort of individual increased salary for each extra function that you can perform.
- I do not believe this is a good alternative
- Essential education and to work at the function continuously
- Increased salary
- In return? Salary? It should be that everyone should start work at a train, that is the starting point, then it should be that everyone needs to be out and work (no matter what function you have) to experience and have understanding. Then there are other areas where employees need to understand as well. In return? I do not understand is it salary, education, practice, the opportunity to choose function, work times, time at each function. It needs to be developed further.
- That Technical Support do not risk being short-handed, personally I do not know.
- I do not want to learn another function
- Nothing
- Education for me is done, and disarmament will soon be made
- Increased salary
- Working time
- Good education and increased salary
- The opportunity to obtain an understanding for everything and time to really obtain the education needed and keep the competence
- Increased salary
- 10 extra days of vacation
- Higher and a more monolithic salary, there are very big differences in the salaries today, but we all work hard to accomplish the goal.
- A specific supplement for each function
- Increased salary
- Increased salary =)
- More responsibility yeah they one wants more money for it

- More support from my managers and appreciation, also feedback of the competence
 - A good base education
 - Increased salary and to work at the different function continuously to not lose the knowledge
 - Competence
 - Increased salary and more feedback from the function managers
 - Increased salary and less worktime
 - I believe that more competences result in that the employee obtain a better understanding of the Organization, increased commitment, faster and safer analysis of the consequence during decision making, and larger flexibility in the Control Room. For this it make sense with some form of increased salary or similar. Also, it is needed to regularly be at the different functions to maintain the competence.
 - Nothing
 - More responsibilities, higher salary
 - Nothing
 - Want to know more of their function so both parties can make use out of it.
 - Nothing
 - Increased salary and salary trend
 - I do not need anything in return due to that it result in personal development, but an increase in salary should make sense to give to everyone who has a multi competes to make more employees interested in becoming it.
 - To have competence within different areas should result in an increase in salary
 - A small increase in salary
 - Regularity
 - Increased salary
 - I should be visualized in the pay envelope
 - Much higher salary. And work tool that actually work
 - Supplement for double competence!
 - An increase in salary! It is obvious where ever you go except here at Traffic Control. If you have a double competence, it should be an increase of at least 1500kr at the salary.
 - More competence should give an increase in salary.
 - Nothing
 - Increased salary
 - Increased salary
 - First of all a good schedule where one rotate the numbers of days depending on the functions, but also an increase in salary.
-

Text Message

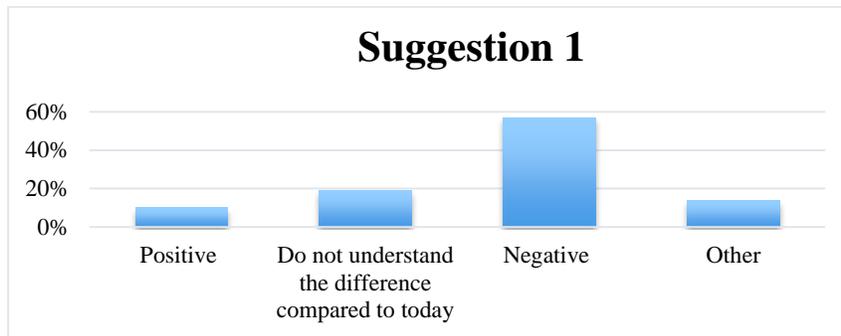
For the example regarding the text message the response was the following:

- Based on experience we know that this will result in a higher load at the phone if this statement turn out to be wrong. So we should make sure that the train is late or cancelled before we go out with the information.
- Faster and more often updates of sj.se/trafikinfo. That we as soon as we have information that is relevant for the customers publish it at the website.
- That everyone are at the same track. Alternative that there is something we will do otherwise it is easy that it depends on who is working at the function at the time.
- Increase in FTE, educations, and clearly stated rules.
- I am not sure if I understand the question correctly. But an improvement could be the software which we use sending out text messages. If we could choose more than one train it would go way faster to distribute the information.
- It would be possible to perform this due to that the work load at Text is not too high. No improvement is needed.
- More involved managers
- Do not know
- During some larger disturbances this way of working has already been implemented. The customer get information that her train might be affected but not how much and the customer can herself make a decision if she wants to re-book or cancel her journey due to contingency. This for example before SJ has cancelled the train.
- I do not understand the question
- A software which can send many text messages at once is then needed
- It is already possible
- I do not believe any changes are necessarily in the Control Room to improve the text message, but I do not think I understand the question either.
- A updated IT support
- Fixed templates for text messages
- Education... most of us do not have an education for Text/information, right now we are self-educated.
- First, a computer software which make this function easier to handle. Also, that all employees in the Control Room are aware of and presuppose that we work towards giving the customer the information that we promised.
- Fixed templates for text messages we are sending
- We are already working like this, mostly

Placing and furniture's in the Control Room

Regarding the three suggestions about positions in the room, the following response was given:

Suggestion 1, the "Rotation"



Positive

- Good with a Central place for the Train Crew Co-Ordinators.
- Should create a better information flow
- Would result in that Traffic Co-Ordinators have a better communication with the Train Crew Co-Ordinators. We who work at traffic coordinating already know what we are doing and therefore we can be divided without additional flaws in the information flow.
- The only negative with the picture is that the Traffic Co-Ordinators Regional is too far away from the other Traffic Co-Ordinators. Due to that they have continuously communication it would be better if they were placed close to each other.

Negative

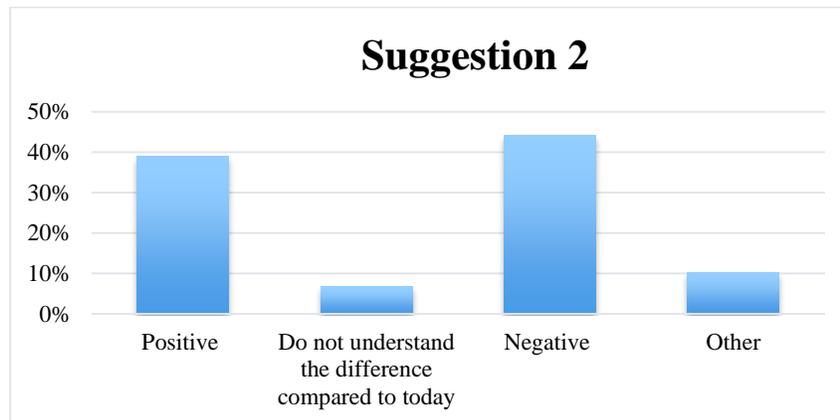
- Decrease front edge competence
- Technical Support will be too far away from Train Crew Co-Ordinators and Rolling Stock Managers
- Technical Support have a billboard which is not in the suggestion
- The distance from Technical Support to the other functions is too far. This will result in more environmental factors like sound and unnecessary movements which will increase time.
- I do not understand why this would be better
- Traffic Co-Ordinators Regional will be too far from Information Co-Ordinators
- Feels like this is a move just because we are supposed to move
- Already tried. Come up with something new!!
- The Train Crew Co-Ordinators usually have work while the other functions do not. We always have vacancies to take care of and then it is nice to be in the corner. When we were at Vattugatan we moved around, and it created a bad situation so we had to move back.
- The collaboration between the different Traffic Co-Ordinators will be lacking, more sound and the quality in the communication will be lacking.
- When there is almost no disturbances we at Train Crew Coordinating can have a lot to do with vacancies and similar. A lot can be interfere if we are located more in central.
- Train Crew Co-Ordinators should be located close to Technical Support due to safety questions.
- Traffic Co-Ordinators Regional will be too far away from the other Traffic Co-Ordinators

- Too far away between the Traffic Co-Ordinators and the Information Co-Ordinators. During fast decision making the need of publishing the information fast is a need. Here the quality of text messages will decrease.
- Traffic Co-Ordinators should be placed close to Operating Supervisor and Customer Information Manager. I don't understand why this would be better.
- Would create confusion in the room if a disturbance occur. It is better if everyone learns where every specific person is placed.
- Traffic Co-Ordinators Regional is too far away. The other Traffic Co-Ordinators will not know what is going on.
- Would not create an improvement
- I believe we are good as we are today
- Traffic and Co-Ordinators need to sit together. How we are placed today is optimal.
- Traffic Co-Ordinators Regional are cut off
- Due to that the Train Crew Co-Ordinators are dealing with sensitive phone calls they should not be placed in the center of the room.
- The Traffic Co-Ordinators need to sit together and as close to each other as possible, and not at different sides of other functions.
- Traffic Co-Ordinators Regional are cut off from the rest of the Traffic Co-Ordinators
- Traffic Co-Ordinators West/South cannot be placed so far away from the Regional
- Should not separate the Traffic Co-Ordinators
- What is the point ?
- The Traffic Co-Ordinators are divided, cannot help each other.
- I believe that the Traffic Co-Ordinators should sit together
- I do not understand why we should change. I like how we sit today

Other

- We will never know who sits where
- I believe in sitting close to Train Crew Co-Ordinators, Rolling Stock Managers, and Operating Supervisor
- Isolating the Traffic Co-Ordinators when the workload is uneven for the different areas. If they sit together they can help each other
- I believe it is good enough as we have it today
- Spontaneously I get the feeling that the different Traffic Co-Ordinators will be too far apart. Fast communication between them is a must.
- It does not matter how we are placed in the room, there is always be far to some other functions which one need to communicate with. Today I believe that to sit close to Traffic Co-Ordinators between the different areas, as well as the Information Co-Ordinators is good. During larger disturbances it is different.
- Carefully positive
- We cannot move Technical Support due to that the document and technical tools are specialized.

Suggestion 2, the “Teams”



Positive

- Due to that we soon will have a function in XOD which will make it possible to use the same tool for sending both text, use the web, and send telegram I believe that also an Information Co-Ordinator should be included.
- Better competence of line
- I believe this would be the best. It happens that different information from the room reaches the Train Drivers and the Cabin Crew due to that the information is delayed between the Traffic Co-Ordinators and the Train Crew Co-Ordinators. If we are placed in teams the quality of the information going out from the Control Room will be both better and faster. I am sure that you will receive feedback from other Train Crew Co-Ordinators that this will be hard during disturbances, who will use the on call, etc. But don't get affected by that but think in new lanes! Do not be affected by tired people here at Traffic Control. I believe it will be super. Of course the best would be that the employees in the teams have competence in all three areas, but you already figured that out. ;)
- Definitely worth a try
- This is a good alternative
- It would have been great if all areas had a “team”, but I doubt that SJ what that much personnel here.
- Carefully positive. Also disadvantages whith the suggestion will occur, for example that one will be too far away from the other working at the same function and therefore to unburden and divide the work will not be an option.
- In this way we would have a better and faster decision making process (traffic).
- I like it! But more personnel in the Control Room will be needed
- Could result in more effective work during a disturbance
- Good collaboration at the different areas and lines which would result in a faster and better decision making process and everyone would have front edge competence

Negative

- Will decrease the competence
- It is better to keep the functions together, otherwise it will be vulnerable.

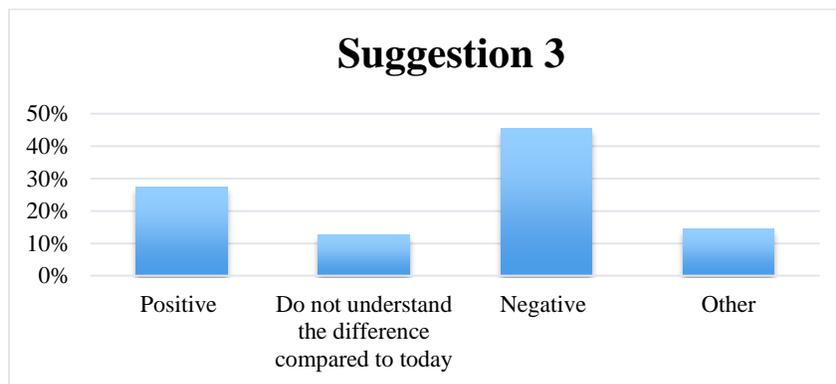
- In what team should the Train Crew Co-Ordinators and Technical Support be included? It will be very expensive to have one Technical Supporter in each team.
- Beyond the different train the rolling stock is working with, the Rolling Stock Managers like to know what the other Rolling Stock Managers are doing. We are helping each other and therefore we need to keep ourselves updated on what the other Rolling Stock Managers are doing
- Will lose the big picture
- This is bad for us Rolling Stock Managers due to that we usually help each other out when the work load increases, then the distance to the colleagues would be longer.
- I believe that the effect of synergism is better when the functions sits together. If a change would occur, clearer processes and responsibility areas are needed.
- Already tried, did not work at all
- We tried this at Vattugatan and it didn't work at all. The Train Crew Co-Ordinators have much more to do than just during the disturbances and therefore they need to sit together.
- Will not work due to that Train Crew Co-Ordinators are in all geographical areas and due to that the Cabin Crew's schedules are included in different geographical areas during one day.
- This suggestion is not good due to that personal and trains do not coordinate and this will be a huge problem during disturbances. For instance, that there will be no Train Drivers available to drive the trains from Cst, and this will result in more train lines or busy tracks due to that we do not have time to plan when the personal is going from regional to long distance. We have tried this before and it creates more stress and more "heavy" work for the Train Crew Co-Ordinators.
- In practice this will never work. For example a Train Driver are driving a high speed train to Uppsala and then another high speed train out from Uppsala, the conflict will be that the teams will only see their area and not care about the other areas. A second problem is that one will lose the Train Drivers when the whole picture is not included. Problem three; during disturbances, who will have priority of the stand-by personal or on call? To mix Rolling Stock Managers together with Traffic Co-Ordinators might work, but Train Crew Co-Ordinators needs to be a group themselves due to that the resources of personnel are hard to solve if it is not divided. (Separation within the team will be created and a new Stockholm – Gothenburg relation will be established).
- Hard due to that the Train Drivers and Cabin Crew are not in line with the trains.
- Would not work in practice
- It will be more work for the Rolling Stock Managers, due to that they today are working with a certain train model. But I don't know.
- This suggestion needs more Train Crew Co-Ordinators and Rolling Stock Managers of there is supposed to be any real teams, and for it to be better compared to today.
- We have had this discussion before and it needed too much personnel. The result would not be better for SJ.

- Cannot be performed due to that Cabin Crew and Train Drivers are not in line with the trains or the different geographical areas.
- It will be too confusing. However, I do believe that the Traffic Co-Ordinators and the Information Co-Ordinators should sit together at one geographical area.
- Would not work with the Train Crew Co-Ordinators
- If there is no Information Co-Ordinator it won't work
- Nice thought but when we worked like this before the information was disregarded. Also, one Rolling Stock Manager in each team is not necessarily due to that they are focused at different models.

Other

- I do not have a standpoint here
- If there are clear “area signs” so one can find the correct person easy
- Sounds interesting
- How many Rolling Stock Managers during each shift and are we still going to deal with the error reports and littera?
- Maybe, but there are more Traffic Ordinators compared to the other functions
- If this is the new positions, we need to change the planning so the Rolling Stock Managing and Train Crew Coordinating are in line with each other, so the Cabin Crew or Train Drivers work at different geographical areas and lines with different concepts. Alternative that each team have the on call production we have today for the whole Train Crew Coordinating. Otherwise we will need to communicate with each other ALL THE TIME.
- No opinion
- Can be interesting, maybe if the teams are “Team West”, “Team Regional”, etc
- The different functions are already communicating today

Suggestion 3, “One team”



Positive

- Could be a good try with a pilot for a change
- Worth a try
- Would be interesting to try and see if it has an impact at the punctuality

- It's great! The best would be if all lines/areas had their own team, but I doubt that SJ would spend money for this. If it is only Stockholm – Gothenburg I am skeptical toward who the rest of the shift would tackle it.
- It can be a good start to see if it is an optimal working strategy for all lines/areas, as well as the different functions keep their main tasks the work load in the room will be divided in an optimal way.

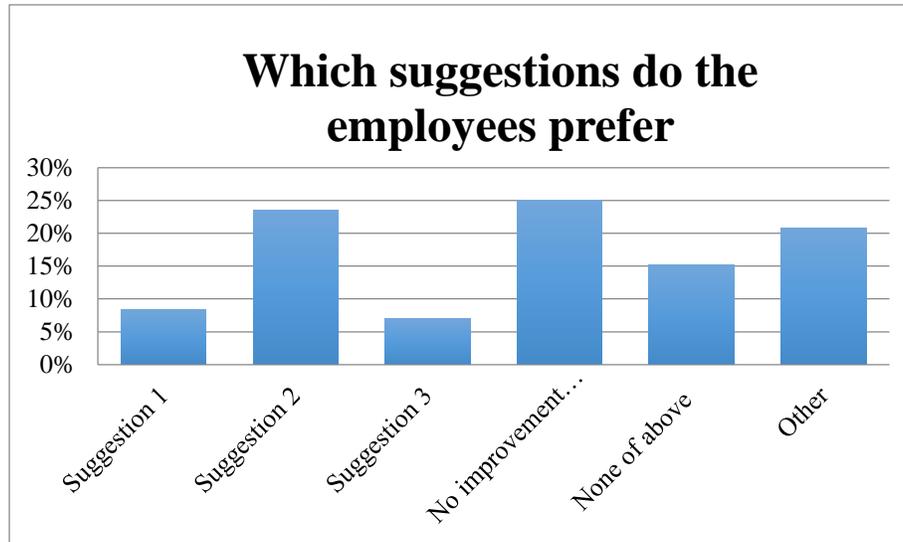
Negative

- I don't see the logic behind this
- We should not make any differences between the different areas/lines. When it comes to the future we will have a lot to do with "Tåg i Bergslagen"
- Good in basis but not effective through the aspect of planning. Especially for the Rolling Stock Managers, hard to be divided in teams depending on the train number, should follow the train model instead
- The customers who are travelling to Gothenburg are not just travelling there, they are usually just passing through. So to create this team would be a step back due to that they only see their own solution.
- No for the Train Crew Co-Ordinators but the Rolling Stock Managers and the Traffic Co-Ordinators can create a team
- The second alternative was better
- I believe that we should work in the same way towards all customers and lines
- I would rather focus at the Värmlandsbanan
- Personally I believe that we should create teams for all areas/lines or no teams at all. If we just create one team it will result in confusion
- I like how we are placed today
- The employees in this team would have nothing to do
- Due to that the mentioned line do not need an extra Rolling Stock Manager or Train Crew Co-Ordinator it is enough for the Traffic Co-Ordinator
- More confusing that suggestion 2. Either we have teams or we don't
- Waste of resources due to that this lane don't have that high load
- Why?? We have customers at the other lines as well
- Nothing
- No need for it according to me

Other

- Hard to believe that the advantages will create disadvantages
- Not part of this
- It won't work due to that Gothenburg have half the line
- Would most likely be better for the punctually for that certain line
- If there is no disturbance at the Western Main Line the resources might be needed somewhere else.
- The whole room should be working in the same way

Which of the three suggestion do you prefer?



Suggestion 1:

- I believe it is the best suggestion, but I think the best alternative is to keep it as we have it today

Suggestion 2

- If it includes that it is always the same employees working at the certain areas
- Team High-speed train can also be a suggestion

No improvement is needed; I like how it is today

- I like how it is today, but that does not mean that it is good. Improvements are needed.
- Every new Manager tries to invent the wheel again to put her “brand” at the organization.
- This will change when it comes to FOFS. This will affect Technical support and the Rolling Stock Managers. For the information flow to be good the two functions need to be located close to each other.
- - The communication in the room needs to be improved, but the rest is working fine
-

None of above:

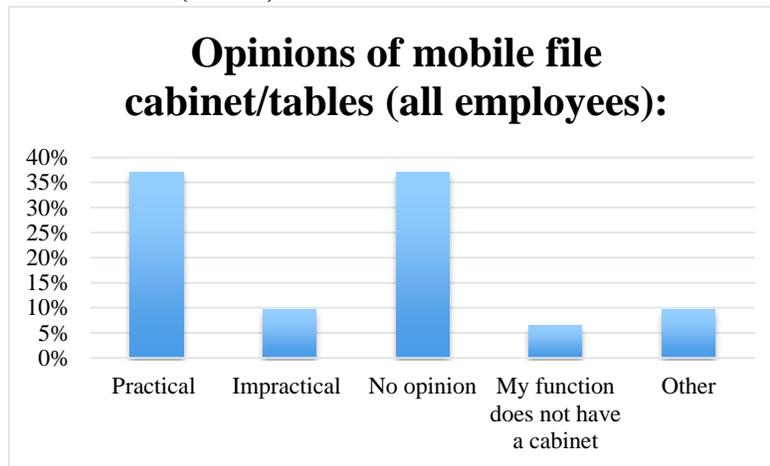
- Divide the suggestion but let the Train Crew Co-Ordinators work like they do today, they will get the bigger picture and more collaboration between the groups will occur. Important that the Train Crew Co-Ordinators are at point from the beginning, but with the personnel we have at Train Crew Coordinating today they cannot be divided into teams.
- Traffic Co-Ordinators/Rolling Stock Managers can be divided into teams, but not the Train Crew Co-Ordinators due to that need to be able to prioritize personnel and have the larger picture of the personnel.
- I would like it to be as before, with one Information Co-Ordinator and one Traffic Co-Ordinator at each area.
- One is usually working at one lane/area, but that does not stop one from help each other during larger disturbances. For example, the Information Co-Ordinators can “jump in” when needed.

- I believe that we should sit in couples, where one Traffic Co-Ordinator and one Information Co-Ordinator work together.

Other

- It is hard to answer due to that we here at Technical Support are using a lot of materials like schedule, books, and other paper material
- I believe that one should look at how we have worked before for the Traffic Co-Ordinators. That will say that two Traffic Co-Ordinators were placed at one area where one was responsible for the traffic and the other one for information. If this is not possible due to lack of recourses today, maybe two Traffic Co-Ordinators can share one Information Co-Ordinator.
- Due to that we have not had any teams (at least since I begun) I do not know how it would work. But I do prefer when we sat in teams of a couple for one line

Opinion of mobile file cabinet (tables):



Impractical:

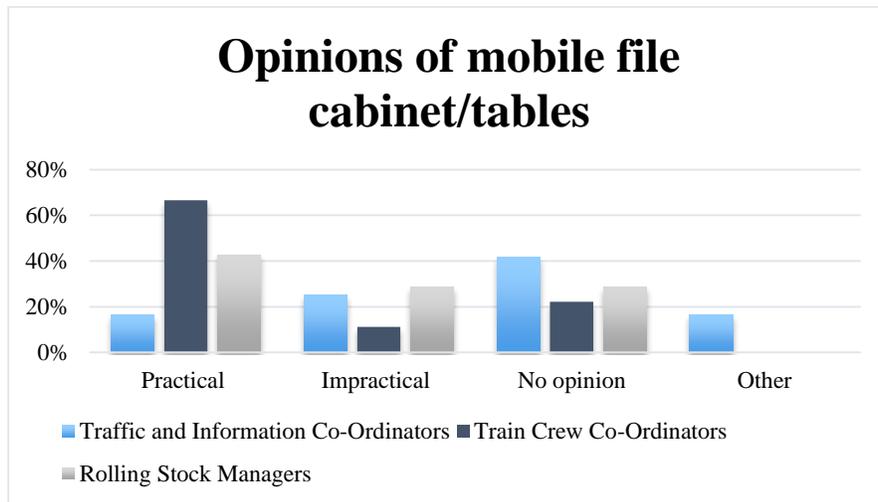
- They only work if there are candy at them

No opinion:

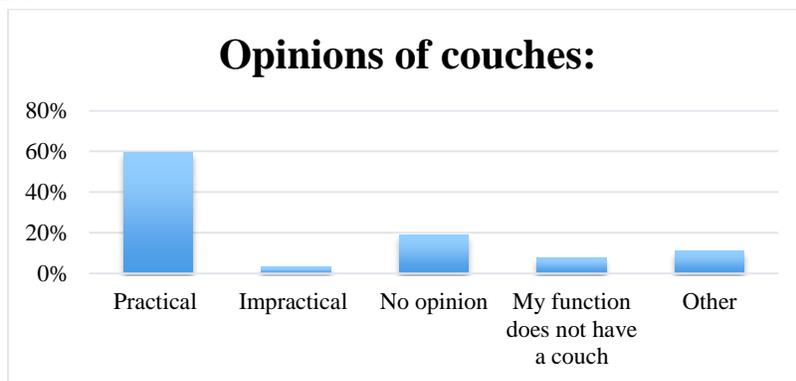
- They are good to put stuff at

Other:

- Use it to lean on, do not store anything in it
- A smaller size of the mobile file cabinet would be more optimal. The ones we have today are too large but good for free space.
- They are OK and are used when needed.
- They are used to put stuff at and during disturbances one can lean on them while talking to colleagues



Opinion of couches:



Practical:

- They are also used as extra seats for visitors. When needed.
- At Technical Support we usually have visitors who uses them

Impractical:

- But sure it is nice to swish from the office chair and lean back in it.

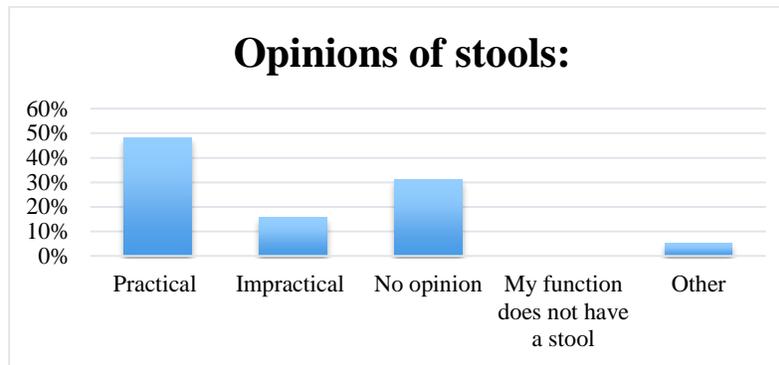
No opinion:

- It looks nice with couches

Other:

- Sure it is nice to
- Good for social, less good for the effectiveness
- They are OK and used sometimes
- Doesn't hurt anyone

Opinion of stools:



Impractical:

- Usually in the way but It can be nice to rest the legs somewhere sometimes

Other:

- I use them as a footrest sometimes so I would like them to be kept
- I use a stool sometimes...
- They are good and used when needed

Missed subjects around the placing and objects in the Control Room:

- The general lightning, it does not work to centrally control it with a dimmer which makes it dark in the whole room. Also, the office chair are not working.
- Cannot think of anything to add
- No.
- The chairs starts to be very bad again, would need some new ones. It can take a while before finding a good chair when starting to work
- You missed to think of dividing the information function. That might be a suggestion. Suggestion: create a team with an Information Co-Ordinator, Traffic Co-Ordinator, Rolling Stock Manager, and a Train Crew Co-Ordinator. What do you think about that?
- Nothing
- No, cannot think of anything right now
- The curtains!! There should be nice looking curtain which can obstruct the sunlight, even if the view is nice
- No
- No
- No
- Sound absorbing covers are needed
- The lightening which took so many years to fix. The air conditioning does not work. The chairs are not sent to service frequently. The computers and all the softwares which are shut down all the time. All broken chairs and computer screens which are just standing around.
- Better and more “homemade” room, maybe also some more activities between the groups. The meetings are good, due to that one feels more secure of what has happened during the shift
- The Operating Supervisor and the Customer Information Manager do not need to be placed in the middle of the room.
- When the need for meeting rooms are accurate the “Krisrummet” is not available. This need to change and has to be available for more employees working at SJ Traffic Control.

The level of sound can also be too high sometimes. Respect and understanding to keep the level of sound down, not to scream between the functions is important that everyone keep in mind. Sound absorbing walls would help here. The air condition is also not functioning after ordinate working times. Sometimes it is freezing during the night and at Sunday morning there is no air in the room.

- The placing as it is today works absolutely perfect with the right person during a disturbance. It is not the placing in the room that is lacking, it is the employees and how everyone else are working. Red flag to the Train Crew Co-Ordinators, if we divide the Train Crew Co-Ordinators in teams/areas, then a clear degradation to have time to finish the work will be noticed, during both disturbances and not.
- More hangers

Communication in the Control Room

Where is the problem regarding to the communication today?

- Hard to know who does what
- I don't feel like there is a problem regarding communication from us (Technical Support)
- The communication in the Control Room works good
- Undermanning's during high work load
- Technical Support receive bad information or rarely
- The correct manning
- I perceive that there sometimes is the "wrong" person who answers the questions asked. In those scenarios the information does not reach the correct employees who needs it.
- Sometimes it is hard to get what the employees at the other side of the room are saying. However, this is impossible to solve due to that many groups are having continuously conversation relatively loud which creates a high sound level.
- No experience
- Vainglorious and ungracious employees who such out the energy
- That employees do not make sure that the receiver has received the information.
- Nothing
- It is hard to reach all employees involved during a disturbance.
- The information flow is depending on who is working
- Many wrong decisions are made and employees at certain functions are missed in the "chain". For example, when we are locking trains during a cancellation. No one has the expressed responsibility to do this.
- We are dealing with a large amount of information and are expected to keep track on evertig. We don't have either checklists or routines for all working tasks we are performing today.
- The willingness
- High level of sound
- I believe that for the Train Crew Co-Ordinators to sit in the corner makes us miss a lot of information when something is happening. It is very compartmentally and we are working too far away from each other, even though we are placed in the same room. Another thing which this result in, besides the bad communication, is actually alienation. There are functions (groups?) in the room who never are asked to join the after works or the ski

trips, but then it is published at Facebook that SJ Traffic Control have been doing something, but everyone are not invited.

- One part the placing. Another is that during the disturbances there is a high load at the phones, so high that one cannot communicate with anyone else in the room
- We do not have the time to communicate with each other during larger disturbances
- No clear supervisor
- Traffic Co-Ordinators forget to talk with the Train Crew Co-Ordinators, decisions are made but they do not know if there are employees who can performed the tasks. If the Train Crew Co-Ordinators are connected form the beginning a good solution will come up, but 90% of the time we are connected in the middle or after.
- Bad communication. The Train Crew Co-Ordinators usually receive the information last or not at all.
- Some individuals to being with but also a strong leadership from the Operating Supervisors.
- The solution with the TV's are not a good one today. It should work to improve that communication tool.
- That all functions do not receive all information
- I would not claim that the communication is a huge problem
- The distance between the functions. Different workload result in that the information do not reach the different function and then is no one understanding what is going on due to the telephone etc.
- People are indifferent/lack of loyal skills. Just doing their own things.
- The information function is too far from the center of the action and can therefore not catch all the information needed.
- During a disturbance there is stress in the room. When it is no disturbance one is rather performing the tasks herself than to ask a colleague.
- How the distribution of the function regarding to the corners are. For example, the Information Co-Ordinators are placed in one corner whole the traffic functions are located in another one. Sometimes it is hard to understand what is going on in the Control Room. Also, the Traffic Co-Ordinators working at Regional are by the side. Apart from this there are also some co-workers who are not good in commination: education?!
- That employees are only taking care of their work tasks and no more. That employees are not making sure that the information actually was received.
- I am satisfied with the communication as it is today. It is more about that some employees can be worse in communicating but overall it is good.
- The time of the process of decision making is too long.
- There is no problem with the communication – if there is a need to talk with someone at a function placed a few steps away one can stand up and walk over there.
- All employees are too focused at their own working area and do not see how their work affect the other functions.
- The need of clearer routines around communication between the different functions
- Some employees are sitting down too much while they should talk to the different function in the room.
- Too much verbal information which is informed to too many functions
- That we promise to inform in a wider extension than what is realistic due to forecasts and incertitude etc
- The geographical distance between the functions
- I don't have any problems with the commutation in the room

- Many have bad education, do not know what is needed in the room for everyone to be on the same track
- The information does not reach the right person in the Control Room (and therefore not the customer in the end)
- During larger disturbances are everyone coming and sharing information which is supposed to be shared. It is usually creating a mess. I would prefer to only have one employee to walk to and tell who later share the information which everyone else.
- There is not always enough information written well in XOD. But in general I believe that the communication is working well.

What do you believe is necessarily for the communication to be improved?

- How hard can it be to ask for the information when it is missing?
- To find the problem early and increase the manning
- Include the Technical Supporter more in the context
- The old organization when there was a Chief Operating Officer in the room and an Operating Supervisor who had the overall understanding of the situation at Traffic Control.
- Insight
- That each function tries to report the other functions about “important events” without screaming it straight out. When I have a phone call I focus on that and shout the surrounding world out to be focused at the conversation I am performing.
- No opinion, no experience
- Don’t know
- That the employees make sure that the information reach the receiver.
- To understand each other better !
- Don’t know
- Common function meetings where we can discuss the information flow
- Routines for how the information should be transferred
- That we obtain a better understanding for what our colleagues in the Control Room and outside (Hagalund, Cabin Crew etc.) actually do, their work tasks
- XOD where all information should be collected is a step towards the right direction. Easier and faster handling of the written communication
- Larger willingness of the employees
- Better discipline
- Make sure that everyone receive the information
- That we work more together and learn from each other’s work tasks; Traffic Control, Train Crew Co-Ordinators etc.
- The understanding for other functions situation and needs. A general change of the focus from having a high answering frequency that there is no time to plan and communicate in the room and to be proactive.
- That we should prioritize important information before phone calls sometimes
- Clear leaders who buckle down the disturbance directly and coordinate this out in the room
- All functions need to be involved in the decision making process or the planning which will occur, not after the decisions are made.
- That the employees inform the Train Crew Co-Ordinators who actually works with the personnel. IMPORTANT that they get the information

- Introduce requirements at the employees who are “bad” in giving or receiving information
- You have to walk to the function which need the information
- Increase understanding for what other function do is a start
- It feels like we are sitting too disseminate, like the spontaneous communication is hard to perform.
- Important to get all function to become more active and to search for information about what is getting on and occurring in the traffic, through for example BASUN
- Common responsibility and interest in that all should be part of the disturbance
- Clearer education in what kind of information the different functions actually needs.
- Perceptiveness is A and O in the Control Room. We need to be better in listening at each other, even between and above the functions. In this way you obtain information faster than if someone needs to inform you. Also, it needs a feeling of commitment and understanding where you are aware of that the information you have can be of value for your co-workers in the room.
- That all knows how the information should be transferred in the Control Room. To map out how the information is transferred so everyone can see it clearly.
- More headsets when it comes to being on the phone
- All employees needs to stand up and walk around in the room. If everyone are searching for the information everyone will also give the information.
- That everyone obtain a better focus at the communication within the room and to get the information out to all parts affected.
- Better commitment
- Talk more with each other
- Don't know
- To walk around and talk more with others, alternative use the chat
- Don't know
- Changes in line with how we should work with information towards the customer
- A huge improvement has occurred since the briefings started. But it all depends on who is the Operating Supervisor
- Education, education, education
- That everyone knows who needs to know what
- Don't know
- Increased understanding to make sure that employees understand that it is important to send information to the customers

How do believe this should be reached?

- By asking
- Not wait too long before increasing the manning
- Education
- No clear opinion
- No opinion, no experience
- Don't know
- Better discipline
- Collective function meetings which will be implemented soon
- Compilation of routines

- Change of work place and better function work task descriptions. This so everyone knows what they are responsible for as well as to understand what will happen when I make a certain decision.
- Clearer work tasks distribution so everyone knows who is responsible for what and to understand her own part in the chain.
- More integration between the functions
- The level of sound needs to be repeated at the weekly meetings sometimes
- The Operating Supervisor can walk around and make sure that everyone has all information
- By getting everyone triple competence and working in teams divided by geographical area. Imagine how fucking awesome we would be!
- Partly by double competences and to solve the impossible equation; increase in manning to be able to answer and be available for Cabin Crew during disturbances and to disengage resources to make proactive planning. This vs the budget which would increase.
- We take one from each function and converge for better decisions.
- Start to educate/hire stronger individuals (natural leaders) to the Operating Supervisor function, which can control and setting during a disturbances when needed. Some individuals don't do or know what they should do during a disturbance, they need guidance
- Up and walk
- Change the functions in some way so we become closer to each other.
- Mainly own responsibility and to have a better picture over the train traffic
- To remind each other about what information we need and that we need it. Show commitment and interest.
- Understanding where you are aware of that the information that you have also can be of use/important for your colleagues in the room
- Mapping out the information in the Control Room
- Change placing in the Control Room, education, clearer rules
- Let us attend a fun and interested education about how to communicate maybe?
- Through inspiration from managers
- Don't know
- Collective meetings where we can go through how we want the communication to work, so we can decide something which will work for everyone
- Don't know
- More focus at the employee working as Operating Supervisor and Customer Information Manager
- The managers should start to take their responsibility and make sure that the correct employees are responsible for the educations and THAT the employees actually gets an education
- Better discussions
- Don't know
- Don't know

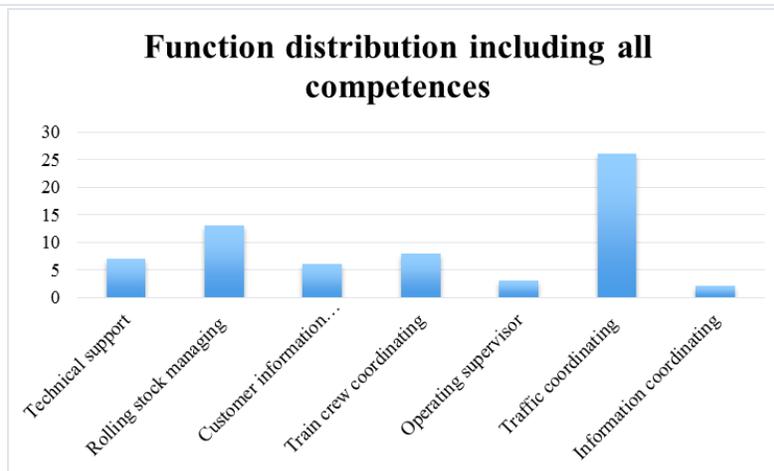
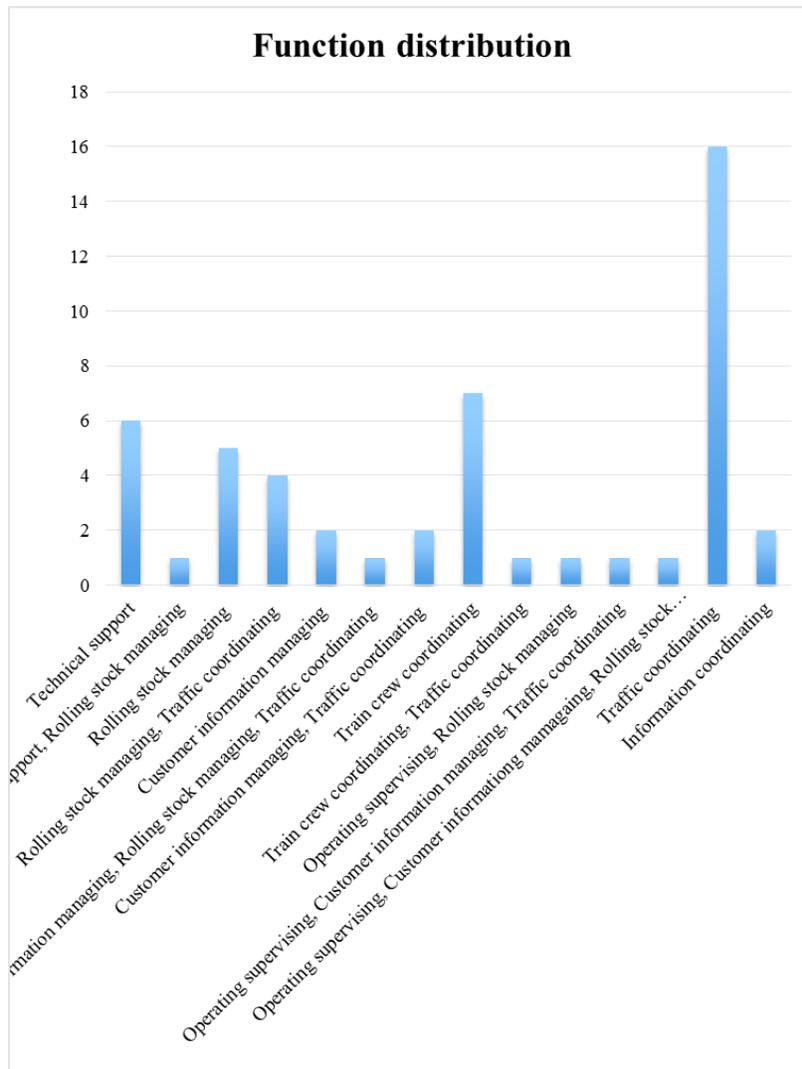
Is there something about the communication which we missed to ask about?

- I can't answer the question due to that I always ask when I need to know something
- No

- To communicate out the values which Traffic Control saves SJ each day so the budget can be double.
- The demonstration of the suggestion of the placing says a lot
- No opinion, no experience
- The sound
- We have the TV's which we do not use
- Nope
- Yes, confide everyone that there is problem in the traffic and to walk to each other instead of screaming it out in the room. If one is on the phone she won't hear it.
- No !
- No
- No
- No directly
- No.
- No
- Don't know
- Due to that all disturbances are not similar it is hard to put down specific rules for how the communication should work, but clear guidelines are needed.

Appendix J

Summary of Survey Three performed in the control room.



Function	Know who to inform	CI1.	CI2.	CI3.	CE1.	CE2.	CE3.	N1.	N2.	N3.	E1.	E2.	E3.
Technical support	4.43	4.29	4.29	4.57	3.71	4.29	4.71	3.29	3.29	3.29	2.43	2.43	2.71
Rolling stock managers	4.46	3.77	4.31	4.31	3.15	3.54	4.08	3.23	3.08	3.23	2.85	2.46	2.31
Customer information managers	4.67	4.17	4.00	4.17	2.83	3.00	3.83	4.00	3.67	3.67	3.33	3.33	3.00
Train crew co-ordinators	4.25	3.50	3.88	4.38	2.63	3.13	3.75	2.75	3.00	3.00	2.75	2.88	2.75
Operating supervisors	4.33	3.67	4.00	4.00	2.67	3.33	3.67	3.00	3.00	3.00	3.33	3.00	2.33
Traffic co-ordinators	4.26	3.67	3.74	3.89	3.11	3.26	3.74	3.44	3.30	3.37	3.00	2.70	2.70
Information co-ordinator	4.00	4.00	4.00	4.00	3.00	3.00	3.50	3.50	3.50	3.50	3.00	3.00	2.00
Three competences	4.67	4.00	3.67	4.33	2.67	2.33	4.33	3.33	3.00	3.00	3.67	3.33	2.33

Function	SC1.	SC2.	SC3.	SR1.	SR2.	SR3.	SFC1.	SFC2.	SFC3.	SFM1.	SFM2.	SFM3.	TW1.	TW2.	TW3.
Technical support	2.57	1.71	3.14	4.14	3.00	2.71	4.14	4.29	4.29	2.71	2.86	2.71	4.57	4.57	4.43
Rolling stock managers	3.69	2.92	3.77	4.23	4.00	3.69	4.15	3.85	3.92	3.46	3.15	3.08	3.92	3.69	3.77
Customer information managers	3.50	3.00	4.17	3.83	4.17	4.00	3.67	3.67	3.83	3.67	3.67	4.00	3.67	3.33	3.50
Train crew co-ordinators	2.25	2.25	3.50	3.63	2.88	2.50	3.13	3.38	3.63	2.50	3.13	3.38	3.88	3.50	3.50
Operating supervisors	4.00	2.67	3.67	4.33	4.33	4.33	4.00	3.67	3.67	3.67	3.33	3.33	4.00	2.33	2.33
Traffic co-ordinators	3.63	2.81	3.74	3.85	3.52	3.26	3.74	3.74	3.67	3.48	3.30	3.33	3.63	3.78	3.52
Information co-ordinator	3.50	2.00	3.00	3.50	2.50	2.50	2.50	2.50	2.50	3.00	3.00	2.50	4.00	4.00	3.50
Three competences	3.67	2.33	3.67	4.33	4.33	4.67	4.33	4.00	4.00	3.67	3.67	3.67	3.33	2.33	2.67

Function	TWE1.	TWE2.	TWE3.	M1.	M2.	M3.	M4.	PL1.	PL2.	PL3.	W1.	W2.	W3.
Technical support	3.71	3.29	3.71	2.71	2.86	2.71	2.86	4.29	3.71	4.29	4.14	4.43	4.43
Rolling stock managers	3.54	3.38	3.46	3.69	3.46	3.38	3.69	3.85	3.54	3.77	4.08	4.62	4.38
Customer information managers	3.50	3.50	3.17	3.83	3.83	4.00	4.33	3.50	3.17	3.33	4.17	4.50	4.33
Train crew co-ordinators	3.13	2.50	3.00	3.25	3.00	3.25	3.63	3.38	3.25	3.75	4.50	4.75	4.25
Operating supervisors	3.67	3.33	4.00	3.67	3.67	3.67	4.00	3.00	3.00	3.67	3.67	4.00	4.33
Traffic co-ordinators	3.41	3.26	3.48	3.59	3.63	3.59	4.00	3.41	3.37	3.37	3.85	4.59	4.22
Information co-ordinator	3.00	2.00	1.50	4.00	4.00	3.50	4.00	3.50	3.50	4.00	3.50	4.50	4.00
Three competences	3.33	3.33	3.33	4.00	3.67	3.67	4.00	3.00	2.67	3.00	3.33	4.33	4.33

Function	JS1.	JS2.	JS3.	LI1.	LI2.	LI3.
Technical support	4.00	4.43	4.43	3.14	2.86	3.43
Rolling stock managers	4.46	4.46	4.54	3.69	3.46	4.15
Customer information managers	4.33	4.33	4.33	4.00	3.50	4.50
Train crew co-ordinators	3.75	3.88	4.13	3.13	2.88	3.63
Operating supervisors	4.33	4.00	4.33	4.00	3.67	4.00
Traffic co-ordinators	4.37	4.37	4.48	3.56	3.22	4.22
Information co-ordinator	3.50	3.50	3.50	3.50	3.00	3.50
Three competences	4.67	4.33	4.67	4.67	3.67	4.33

Appendix K

Customer Survey, original version

Förklaringen av undersökningen var följande: ”Denna undersökning sker i ett samarbete mellan SJ Trafikledning och Chalmers Tekniska Högskola. Den handlar om trafikinformation, vilket är den informationen som kunderna erhåller under en trafikstörning. Syftet är att förstå hur SJs kunder uppfattar de olika informationskanalerna.”

Avsnitt 1: Kundundersökning SJ

1. Kön:

- Kvinna
- Man

2. Ålder:

- 16-25 år
- 26-35 år
- 36-50 år
- 51-65 år
- 66-99 år

3. Sysselsättning

- Egenföretagare
- Anställd
- Studerande
- Pensionär
- Arbetslös
- Militärtjänst eller GMU
- Annan sysselsättning

4. Hur reser du idag?

- 1:a klass
- 2:a klass

5. Hur ofta åker du tåg med SJ?

Fram och tillbaka räknas som en resa.

- 3-7 gånger i veckan
- 1-2 gånger i veckan
- 1-3 gånger i månaden
- 2-5 gånger per halvår
- 1-2 gånger per år

6. Är du medlem i SJ-Prio, SJ:s kundprogram?

- Ja
- Nej

- Vet inte

7. Vilka informationskanaler anser du vara mest aktuella gällande trafikinformation:

- Informationstavlan på centralen
- Rösten på centralen
- sj.se/trafikinformation
- SMS
- Ringer kundservice
- SJ Resebutik
- Appen
- Facebook
- Instagram
- Twitter
- Media

8. Jag använder mig av SJ's nya version av appen, den Gröna:

- Ja
- Nej
- Vet ej
- Använder inte appen

9. Jag har provat SJ's betaversion(nya versionen) av hemsidan:

- Ja
- Nej
- Använder inte hemsidan

10. Jag tror att följande informationskanaler kan ge mig relevant trafikinformation under min resa.

	Instämmer inte alls	Instämmer inte	Neutral	Instämmer	Instämmer helt	Vet ej
Personalen ombord	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Hemsidan	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Appen	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

11. Jag tror att följande informationskanaler är lätta att använda:

	Instämmer inte alls	Instämmer inte	Neutral	Instämmer	Instämmer helt	Vet ej
Personalen ombord	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Hemsidan	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Appen	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

[Öppna avsnitt 2]

Avsnitt 2: Trafikinformation

Tänk på en situation när någonting hände som påverkade din tågresa. Nedan följer olika påståenden relaterade till hur du erhållit trafikinformation vid den resan. Vänligen gradera dessa på skalan från "instämmer inte alls" till "instämmer helt". Om du inte har använt informationskanalen, vänligen lämna den raden blank.

PV1. Informationskanalen levererar den service och information som är precis vad jag vill ha:

	Instämmer inte alls	Instämmer inte	Neutral	Instämmer	Instämmer helt	Vet ej
Personalen ombord	<input type="radio"/>					
Hemsidan	<input type="radio"/>					
Appen	<input type="radio"/>					

PV2. Informationskanalerna ger mig kvalitetservice och kvalitetsinformation:

	Instämmer inte alls	Instämmer inte	Neutral	Instämmer	Instämmer helt	Vet ej
Personalen ombord	<input type="radio"/>					
Hemsidan	<input type="radio"/>					
Appen	<input type="radio"/>					

PV3. Informationskanalerna ger mig service och information utöver det jag förväntar mig:

	Instämmer inte alls	Instämmer inte	Neutral	Instämmer	Instämmer helt	Vet ej
Personalen ombord	<input type="radio"/>					
Hemsidan	<input type="radio"/>					
Appen	<input type="radio"/>					

EV1. Generellt, när jag frågar om/får trafikinformation från personalen ombord känner jag mig:

	Instämmer inte alls	Instämmer inte	Neutralt	Instämmer	Instämmer helt	Vet ej
Nöjd	<input type="radio"/>					
Avslappnad	<input type="radio"/>					
Tacksam	<input type="radio"/>					

EV2. Generellt, när jag använder SJ:s hemsida känner jag mig:

	Instämmer inte alls	Instämmer inte	Neutralt	Instämmer	Instämmer helt	Vet ej
Nöjd	<input type="radio"/>					
Avslappnad	<input type="radio"/>					
Tacksam	<input type="radio"/>					

EV3. Generellt, när jag använder SJ:s app känner jag mig:

	Instämmer inte alls	Instämmer inte	Neutralt	Instämmer	Instämmer helt	Vet ej
Nöjd	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Avslappnad	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Tacksam	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

SAT1. Jag är nöjd med trafikinformationen jag får från:

	Instämmer inte alls	Instämmer inte	Neutral	Instämmer	Instämmer helt	Vet ej
Personalen ombord	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Hemsidan	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Appen	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

SAT2. Det var ett klokt beslut att fråga om/erhålla trafikinformation från:

	Instämmer inte alls	Instämmer inte	Neutral	Instämmer	Instämmer helt	Vet ej
Personalen ombord	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Hemsidan	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Appen	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

SAT3. Följande informationskanaler gör ett bra jobb med att tillfredsställa mina behov av att hitta relevant trafikinformation:

	Instämmer inte alls	Instämmer inte	Neutral	Instämmer	Instämmer helt	Vet ej
Personalen ombord	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Hemsidan	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Appen	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

LI1. Jag kommer att vända mig till följande informationskanaler för att hitta trafikinformation i framtiden:

	Instämmer inte alls	Instämmer inte	Neutral	Instämmer	Instämmer helt	Vet ej
Personalen ombord	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Hemsidan	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Appen	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

LI2. Jag funderar på att vända mig till följande informationskanaler för att hitta trafikinformation i framtiden:

	Instämmer inte alls	Instämmer inte	Neutral	Instämmer	Instämmer helt	Vet ej
Personalen ombord	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Hemsidan	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Appen	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

LI3. Jag kommer att säga positiva saker om följande informationskanaler till andra personer:

	Instämmer inte alls	Instämmer inte	Neutral	Instämmer	Instämmer helt	Vet ej
Personalen ombord	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Hemsidan	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Appen	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Customer Survey, translated version

The explanation of the survey to respondents is the following: “This customer survey is in collaboration with SJ Traffic Control performed by graduate students from Chalmers University of Technology. It is about traffic information, which is the information customers receive when their trains are affected by something and for instance are delayed. Hence, when something is changed with the trains. The objective is to understand how SJ’s customers perceive different information channels”.

Part 1: Customer Survey

1. Gender:

- Woman
- Man

2. Age:

- 16 - 25 years
- 26 - 35 years
- 36 - 50 years
- 51 - 65 years
- 66 - 99 years

3. Occupation:

- Self-employed
- Employee
- Student
- Retired
- Unemployed
- Military Service or GMU
- Other

4. How do you travel today?

- 1st Class
- 2nd Class

5. How often do you travel by train with SJ?

Forth and back to one destination is one trip.

- 3-7 times a week
- 1-2 times a week
- 1-3 times a month
- 2-5 times a half year
- 1-2 times a year

6. Are you a member of SJ's customer program, SJ Prio?

- Yes
- No
- Don't know

7. Which information channel do you consider to be most updated?

- The information board at the train station
- The voice at the station
- sj.se/trafikinformation
- Text Messages
- Call Centre
- SJ's store
- The app
- Facebook
- Instagram
- Twitter
- Media

8. I use the new version of SJ's app, the Green one:

- Yes
- No
- Do not know
- Do not use the app

9. I have tried SJ's beta version (the new version) of the website:

- Yes
- No
- Do not use the website

10. I believe that the following information channels can give me relevant traffic information during my trip.

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	Do not know
Cabin Crew	<input type="radio"/>					
Website	<input type="radio"/>					
The App	<input type="radio"/>					

11. I believe that the following information channels are easy to use:

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	Do not know
Cabin Crew	<input type="radio"/>					
Website	<input type="radio"/>					
The App	<input type="radio"/>					

[Open part 2]

Part 2: Traffic information

Think about a situation when something happened that affected your train trip. There are different statements below, concerning how you received traffic information for that trip. Please scale the statements about them on the scale ranging from “strongly disagree” to “strongly agree”. If you have not used the information channel, please leave the row empty.

PV1. The information channels stated below deliver exactly the service and information that I want:

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	Do not know
Cabin Crew	<input type="radio"/>					
Website	<input type="radio"/>					
The App	<input type="radio"/>					

PV2. The information channels stated below deliver quality services and quality information:

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	Do not know
Cabin Crew	<input type="radio"/>					
Website	<input type="radio"/>					
The App	<input type="radio"/>					

PV3. The information channels stated below deliver services and information that exceed my expectations:

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	Do not know
Cabin Crew	<input type="radio"/>					
Website	<input type="radio"/>					
The App	<input type="radio"/>					

EV1. In general, when I ask for or receive traffic information from the Cabin Crew I feel:

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	Do not know
Satisfied	<input type="radio"/>					
Relaxed	<input type="radio"/>					
Grateful	<input type="radio"/>					

EV2. In general, when I use the website I feel:

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	Do not know
Satisfied	<input type="radio"/>					
Relaxed	<input type="radio"/>					
Grateful	<input type="radio"/>					

EV3. In general, when I receive a text message about my trip or my train I feel:

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	Do not know
Satisfied	<input type="radio"/>					
Relaxed	<input type="radio"/>					
Grateful	<input type="radio"/>					

SAT1. I am satisfied with the traffic information which I receive from the information channels below:

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	Do not know
Cabin Crew	<input type="radio"/>					
Website	<input type="radio"/>					
The App	<input type="radio"/>					

SAT2. My choice to ask for/receive/retrieve traffic information from the information channels below was a wise one:

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	Do not know
Cabin Crew	<input type="radio"/>					
Website	<input type="radio"/>					
The App	<input type="radio"/>					

SAT3. The information channels below do a good job of satisfying my needs to find relevant traffic information:

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	Do not know
Cabin Crew	<input type="radio"/>					
Website	<input type="radio"/>					
The App	<input type="radio"/>					

LI1. To find relevant traffic information in the future, I will use the information channels below:

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	Do not know
Cabin Crew	<input type="radio"/>					
Website	<input type="radio"/>					
The App	<input type="radio"/>					

LI2. I am thinking of to use the following information channels to find traffic information in the future:

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	Do not know
Cabin Crew	<input type="radio"/>					
Website	<input type="radio"/>					
The App	<input type="radio"/>					

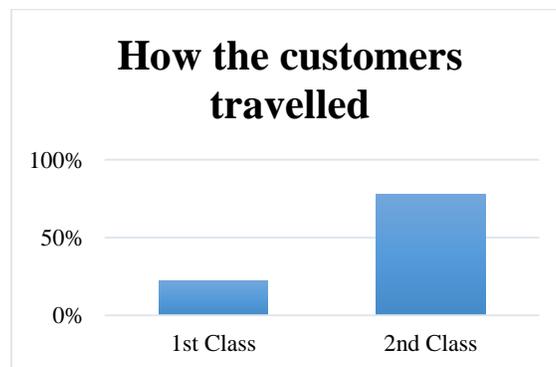
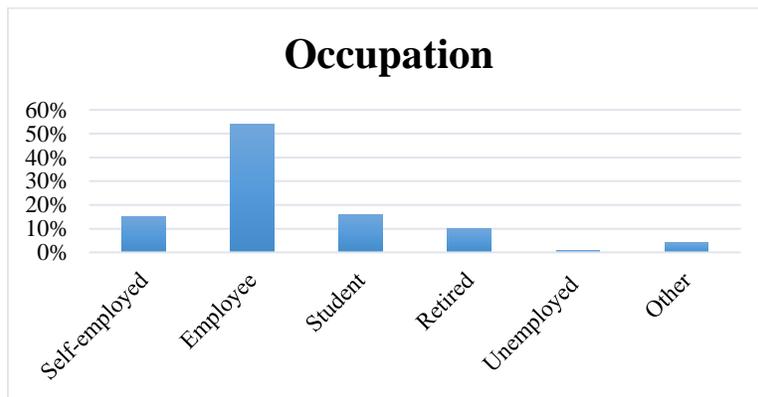
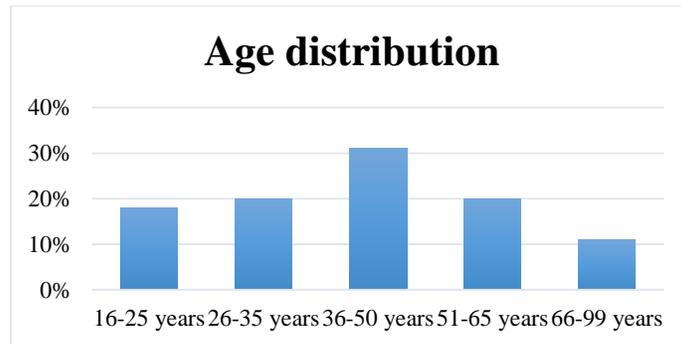
LI3. I will say positive things about the information channels below to other people:

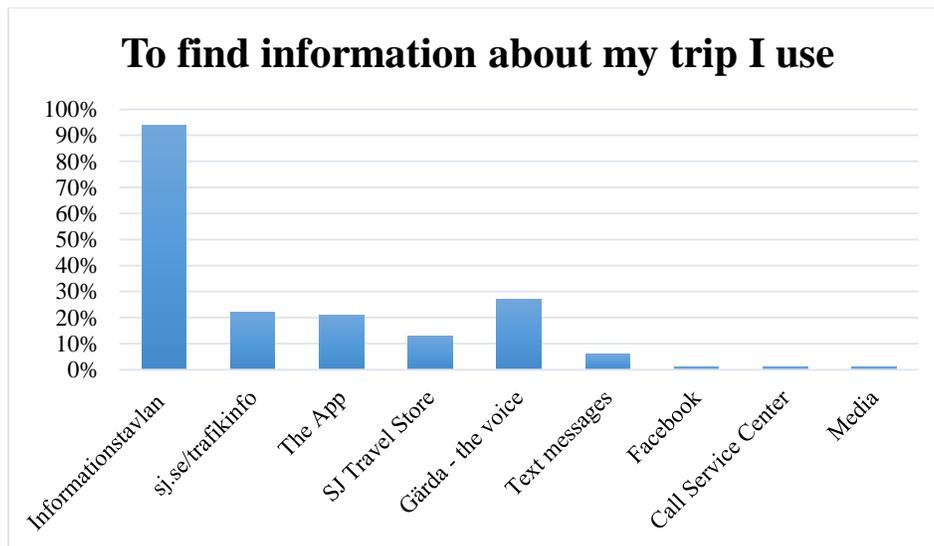
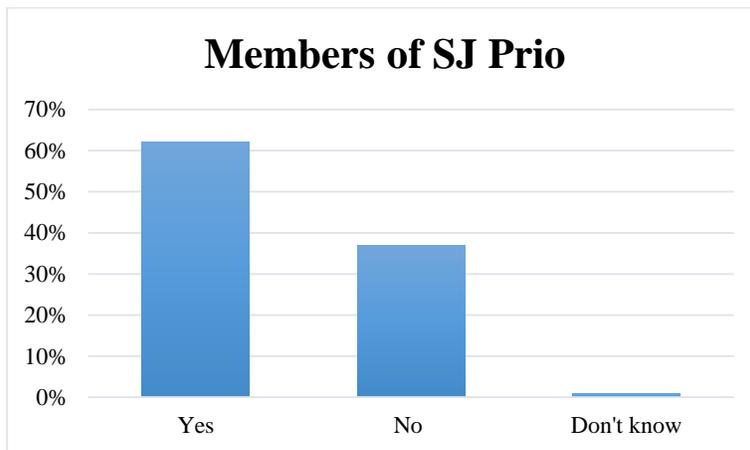
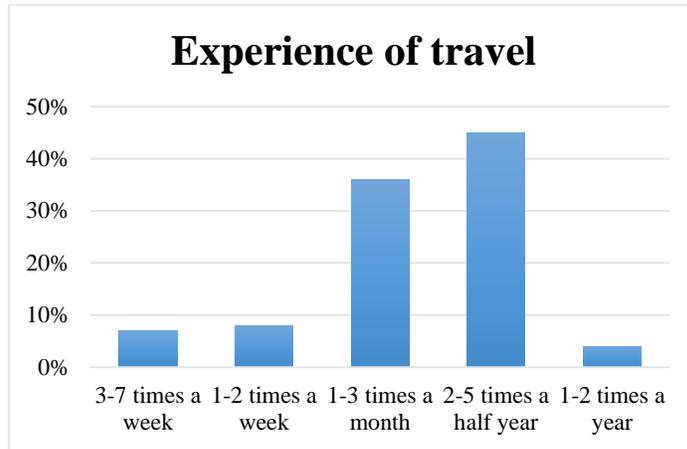
	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	Do not know
Cabin Crew	<input type="radio"/>					
Website	<input type="radio"/>					
The App	<input type="radio"/>					

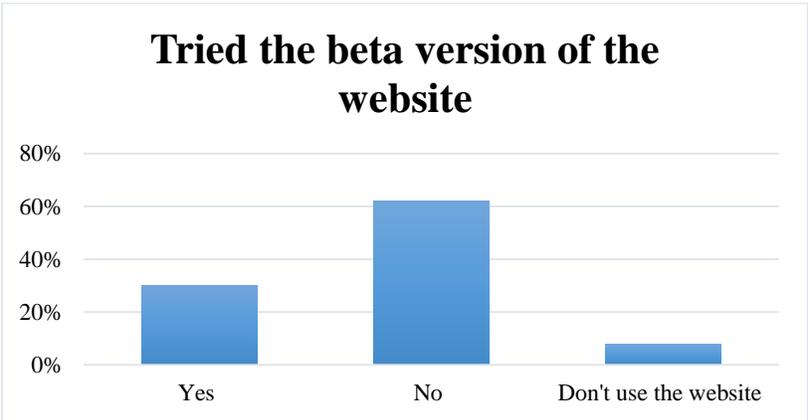
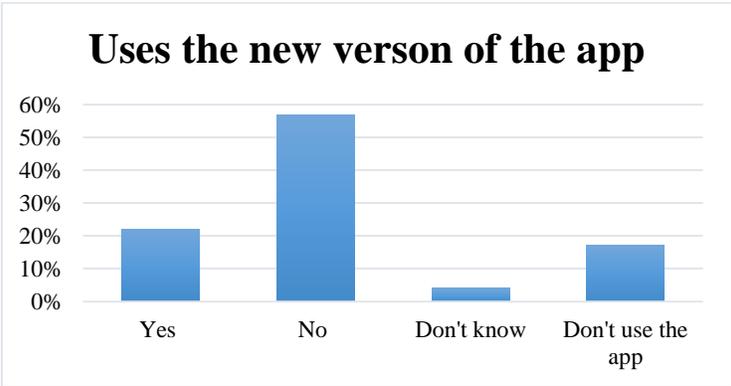
Appendix L

Customer Survey Summary

In total 100 customers answered the survey. Out of these, 57 were men and 43 were women.



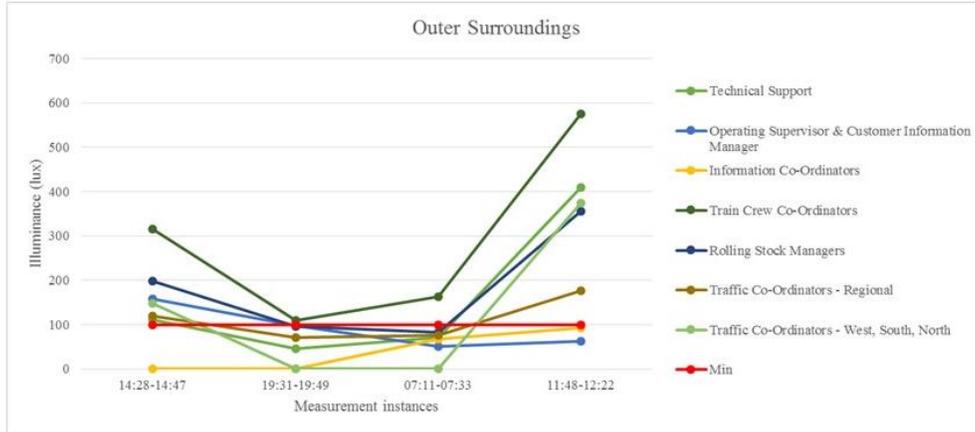




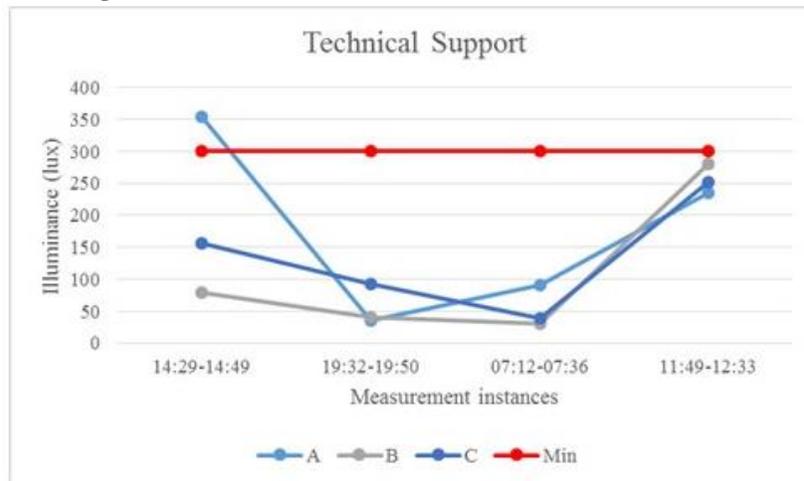
Appendix N

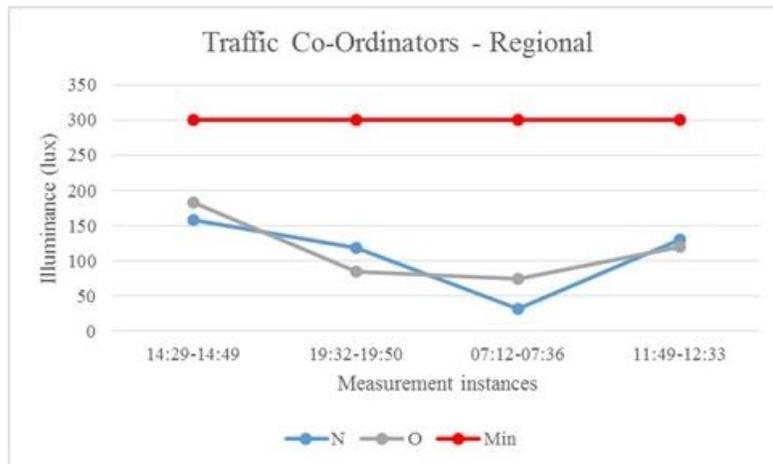
Illuminance Measurement in the Control Room

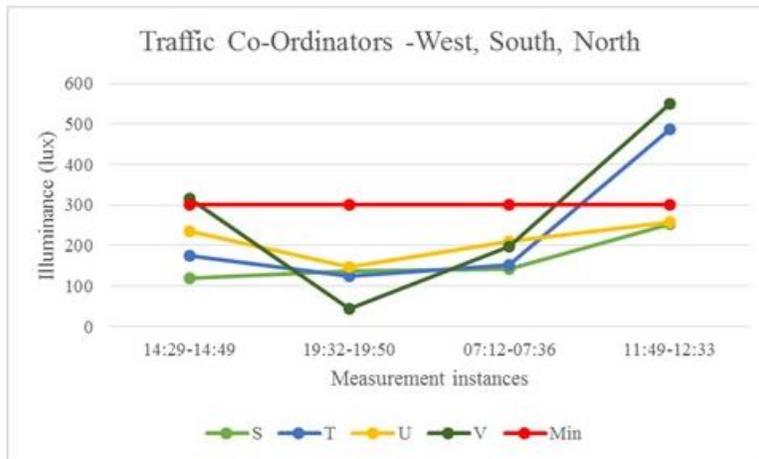
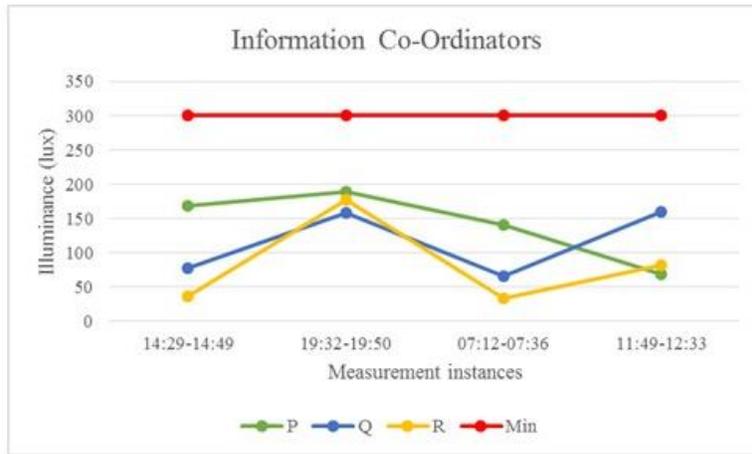
Outer Surroundings



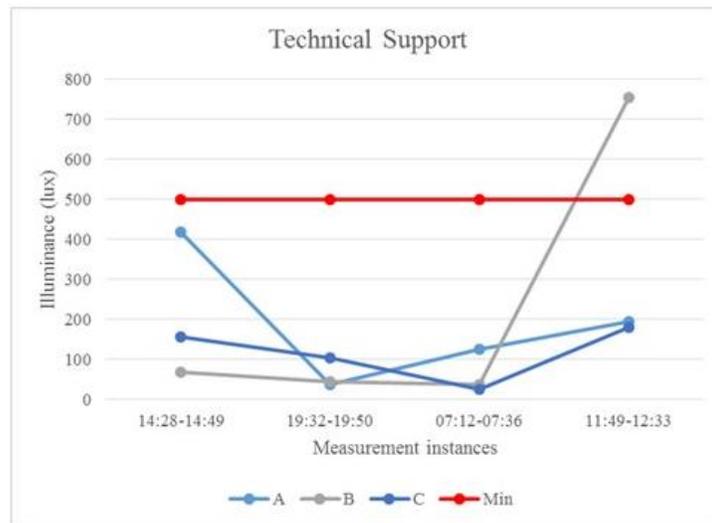
Immediate Surroundings

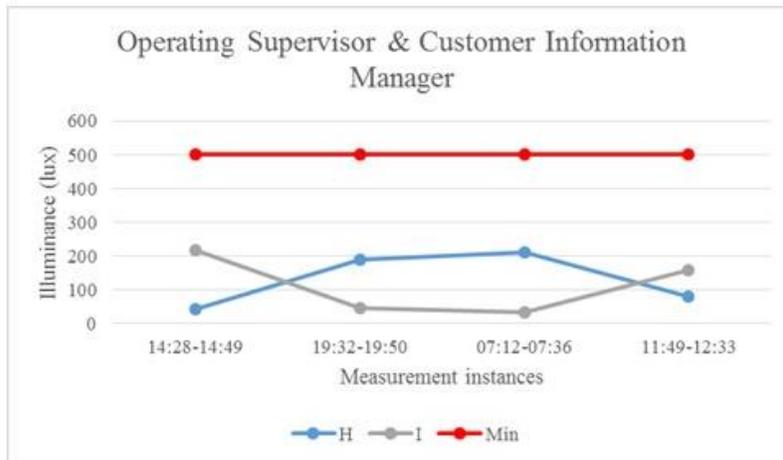


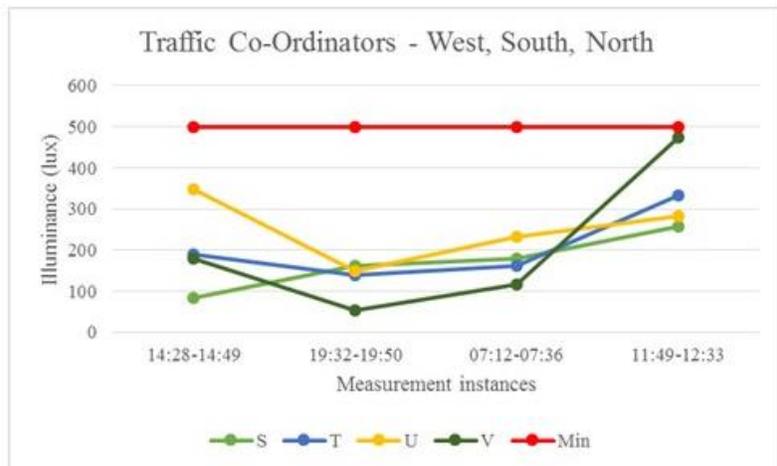
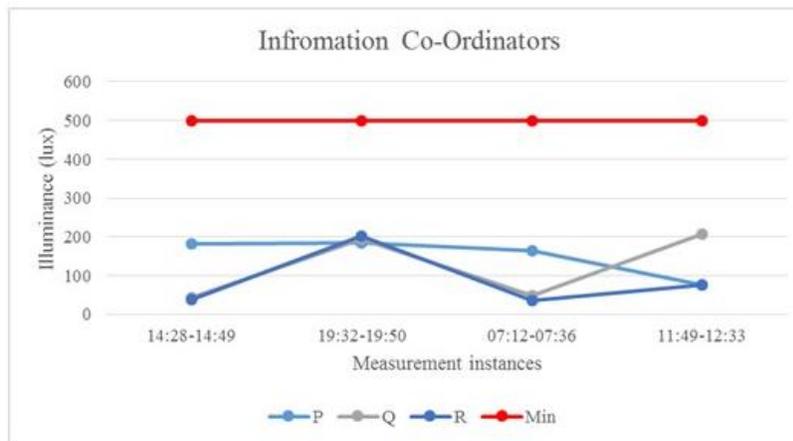
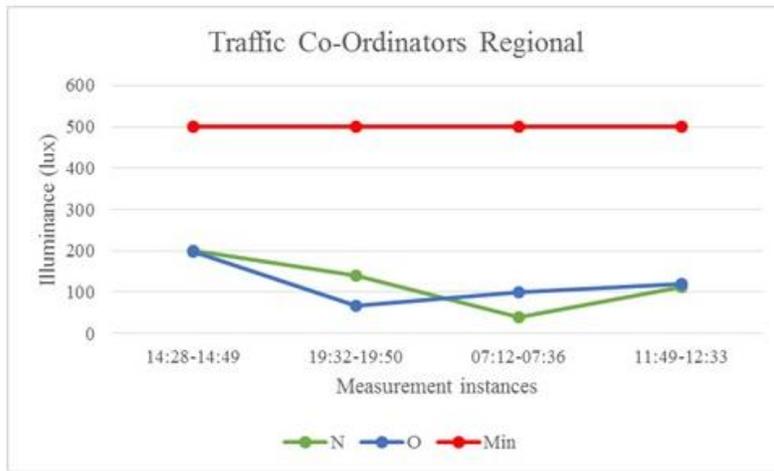




Work Area







Appendix O

Explanations of abbreviations in House of Quality

How's – The Improvement Suggestions

A: Education

B: Information improvements for faster information flow

C: More even distribution between the double competencies

D: Collect data

E: Reduce text messages

F: Connect supplementary train's numbers with correct train

G: Reduction of incoming phone calls

H: The creation of teams and replacement

What's - The Different Values

Customer:

PV: Performance value

EV: Emotional value

TAM1: Perceived usefulness

TAM2: Perceived ease-of-use

Employees:

CTS: Communication and teamwork satisfaction

- External communication, between functions
- Internal communication, within the function
- External teamwork, between functions
- Internal teamwork, within the function

SCS: Schedule satisfaction

- Schedule

RSV: Social Relations and support value

- Management
- Support and feedback managers
- Social relationships