



A Maintenance Management System

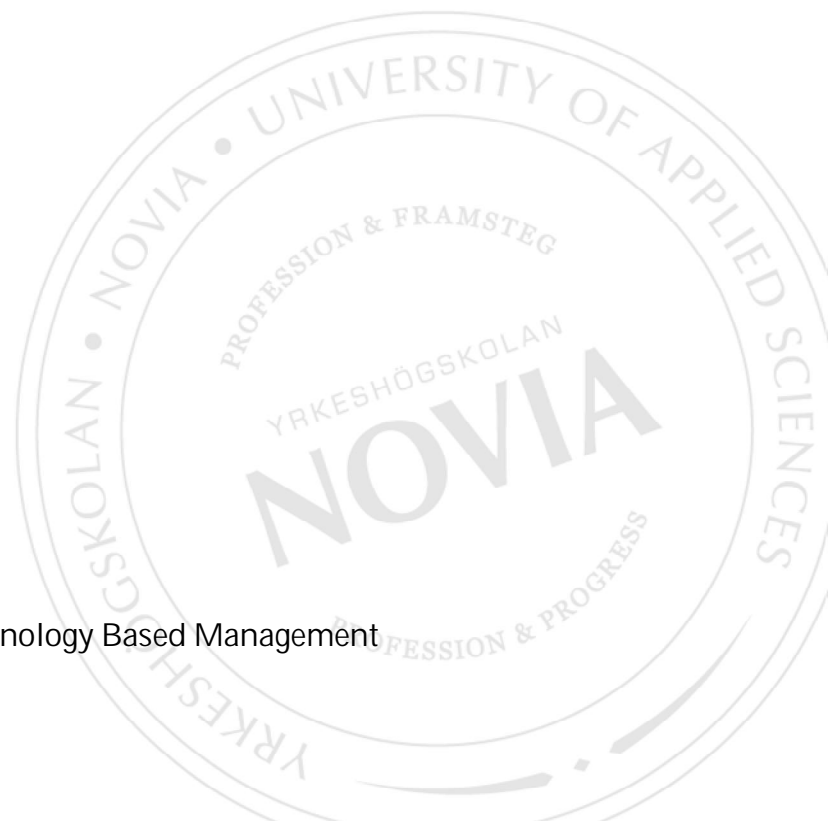
Optimization of a data loading process

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MASTER'S THESIS

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Abstract:

The purpose of this study is to analyse a specific deployment process, how it was built up and how it worked since there was a need to optimize the process to reduce the risks in the process and to reduce both costs of loading and time spent.

The background to this thesis is that an old maintenance management system is being replaced with a new one in order for the system to have the needed flexibility and quality to support the growing business and the growing focus on quality, efficiency and larger volumes.

The optimization of data loading process is based on literature studies in business process improvement, risk analysis and risk management. The optimization was executed through a risk assessment study with action plans and the usage of the 12 streamlining cornerstones.

The results of the study includes mapping of skills, graphs showing the reduction of both loading cost and time spent and the different improvements that have been done to the process. The results were measured over a time of 7-9 months depending on type of data loading.

Language: English

Key words: Maintenance Management System, Business Process Improvement, Risk Assessment, Streamlining

EXAMENSARBETE

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Abstrakt

Syftet med detta arbete är att analysera hur grupperingsprocessen är uppbyggd och hur den fungerar eftersom det finns ett behov för att optimera denna process för att reducera riskerna, dataladdningskostnaderna och tidsåtgången.

Bakgrunden till arbetet är att vårt gamla underhållssystem byts ut mot ett nytt system som är tillräckligt bra och flexibelt för att kunna klara av det växande antalet affärer och den ökande fokuset på kvalitet, effektivitet och högre volymer.

Optimeringen av dataladdningsprocessen är baserad på litteratur studier inom affärsprocessförbättringar, riskanalys och riskhantering. Optimeringen utfördes genom en riskanalys med åtgärdsplan samt genom användandet av rationaliseringens 12 stötestenar.

Arbetets resultat inkluderar kartläggning av färdigheter, grafiskt material förevisande reduktion av både laddningskostnader och tidsåtgång samt på vilka olika sätt processen har förbättrats. Resultaten mättes under en tidsperiod av 7-9 månader beroende på vilken typ av dataladdning.

Språk: Engelska

Nyckelord: Underhållssystem, Processförbättring,
Riskanalys, Rationalisering

Contents

1	INTRODUCTION	6
1.1	Wärtsilä.....	6
1.2	Background.....	7
1.2.1	AMOS (MAMA) system.....	7
1.2.2	Maximo Project.....	7
1.3	Purpose	8
1.3.1	Targets and dataloading background.....	8
1.3.2	Purpose	8
1.4	Delimitation	9
2	THEORY	10
2.1	Business process improvement	10
2.1.1	The Principles of Streamlining	11
2.1.2	Benefits of Streamlining.....	13
2.2	Risk Management.....	13
2.2.1	Risk management process	13
2.2.2	Risk assessment tools	14
3	ORGANIZATION.....	17
3.1	Maximo Project Organization.....	17
3.2	Maximo Application Organization.....	17
3.3	Maximo Deployment Organization.....	17
4	PROCESS	18
4.1	Original process	18
4.1.1	Process Phase 1 – Preparation	19
4.1.2	Process Phase 2 – Data loading	20
4.1.3	Process Phase 3 – Go-live / Training / Support.....	20
4.2	Original process - Unsuitability.....	21
4.3	Rollout document.....	22
5	DATA COLLECTION	23
5.1	Time follow up.....	23
5.1.1	Time follow up – Areas.....	23
5.1.2	Time follow up – Consultants.....	25
5.2	Data loading cost.....	25
6	REVIEW OF PROCESS.....	26
6.1	Review intro.....	26
6.2	Risk identification and evaluation.....	26
6.3	Risk analysis – response development and control.....	27
6.4	Skill Matrix	28
6.5	Streamlining.....	29
6.5.1	Value-added assessment.....	30
6.5.2	Simplification.....	30
6.5.3	Process cycle-time reduction	31
6.5.4	Error proofing	31
6.5.5	Upgrading	32
6.5.6	Simple language.....	33
6.5.7	Standardization	33
6.5.8	Supplier partnerships.....	33
6.5.9	Automation and/or mechanization	33
6.5.10	Improvement summary.....	34
7	RESULTS	35

7.1	Updated data loading process	35
7.1.1	Deployment process - Task breakdown	36
7.1.2	Simplified process	36
7.2	Risk analysis review	37
7.2.1	Skills matrix.....	39
7.3	Cost and Time savings.....	41
7.3.1	AMOS Site loading	41
7.3.2	New Site loading (without AUX)	43
7.3.3	Average cost and hours all types.....	47
7.4	Future data loading prices.....	48
7.5	Data loading targets.....	49
7.6	Data Quality	51
7.6.1	Loading and specification errors.....	52
7.6.2	Global Questionnaire.....	53
7.7	Results summary	54
8	FUTURE DEVELOPMENT.....	56
8.1	Unfinished tasks and development.....	56
8.2	Future improvements and development	57
9	CONCLUSION	59
10	REFERENCES	60
11	APPENDIX.....	61

Appendix

- Appendix 1 - Original process
- Appendix 2 - Phase 2 rollout document template
- Appendix 3 - Excel timesheet follow-up
- Appendix 4 - Original data loading process, task responsibilities
- Appendix 5 - Original Phase 2 data loading process, task breakdown
- Appendix 6 - Phase 2.1 data loading process, task breakdown
- Appendix 7 - Phase 2.2 data loading process, task breakdown
- Appendix 8 - Phase 2.2 rollout document template
- Appendix 9 - Maximo deployment survey

1 INTRODUCTION

This thesis is made for a global company in the power generation business. Sales volumes are estimated to more than double from 2011 to 2016. In order to meet these estimates Maintenance Management is moving towards centralisation of maintenance planning. This will increase efficiency, improve quality and enable larger volumes. To be able to load the huge amount of data that is connected with this increase in service agreements and centralization of maintenance planning we need to have a very effective and well working data loading process.

What I wanted and needed to analyse were how the deployment process was built up and how it worked so that I could use the business process improvement theory to make the deployment process as smooth and cost effective as possible.

1.1 *Wärtsilä*

Wärtsilä is a global leader in complete lifecycle power solutions for the marine and energy markets. By emphasizing technological innovation and total efficiency, Wärtsilä maximizes the environmental and economic performance of the vessels and power plants of its customers.

In 2014, Wärtsilä's net sales totaled EUR 4,779 million with approximately 17,700 employees. The company has operations in more than 200 locations in nearly 70 countries around the world. Wärtsilä is listed on the NASDAQ OMX Helsinki, Finland.ⁱ

Wärtsilä Finland is split into 3 main parts, Power Plants, Ship Power and Services. I work in Services under Contract & Project Management as Global Deployment Manager, Maintenance Management Operations. I am responsible for the global deployment of both our current Central Maximo and our upcoming Local Maximo system. This thesis treats the data loading process of the Central Maximo System and every time Maximo is mentioned it will refer to the Central Maximo system.

1.2 Background

1.2.1 AMOS (MAMA) system

AMOS was the old system that had been used with several consecutive version, the latest being called MAMA. This system was felt to be outdated and at the end of its lifecycle and that it would not be able to support the future need even with developing it further.

A few key factors that made the MAMA system insufficient:

- MAMA can't deliver the higher demand on quality in planning that is need for future business.
- MAMA does not support new requirements that is needed (ex: Dynamic Maintenance Planning)

1.2.2 Maximo Project

IBM Maximo Asset Management is an enterprise asset management software solution product produced by IBM. It is a solution that is used to operate, maintain and dispose of enterprise assets. It focuses on the following types of assetsⁱⁱ :

- Plant and production (for example oil, gas, chemicals, mining, manufacturing, pharmaceuticals, food, electronics and power generation)
- Infrastructure (including railways, highways, telecommunications, water and wastewater, and electric and gas distribution networks)
- Transportation (for military, airlines, trucking, shipping, rail and other use)
- Real estate and facilities (for example, in offices, schools and hospitals)

Since the AMOS system could not fulfill the requirements that Wärtsilä had on a new Maintenance Management System the search started for a new platform that would serve as a base for building our new Maintenance Management System. There were a few systems evaluated during the vetting period and in the end Maximo was chosen as the system that would best suite our needs.

The Maximo project started in 2010 and was first planned to be completed by 2012, but several reasons, vendor change, limited internal resources, problems and major complications in development etc. made the project drag out long past the first scheduled completion date. It was later decided that the final closure date of the project would be in June 2014, but that both the Maximo Deployment organization and Maximo Application organization would start its work in January 2014. Organizations will be presented under chapter 3. "Organization".

I was appointed as Global Deployment Manager for the Maximo Deployment in end of January 2014. This was a new position and a new organization, before the few sites that had been loaded was handled and coordinated by the Maximo Project team.

1.3 Purpose

1.3.1 Targets and dataloading background

In order to better understand why we needed to improve the deployment process it is important to know the targets also. The targets for 2014 where to load 170 sites to Maximo. During the previous year 2013 we had only loaded 6 pilot (included in the 170 site target) sites and all of those had more or less been a struggle, since the loading scripts were developed during the loading itself. During January and February 2014 we managed to load another 3 sites, so the situation was that we needed to load the rest of the 170 (161sites) sites in 10 months.

Thus my situation in beginning of March was that I had a lot of sites to load and a brand new data loading process and loading tools that were still in development. So if there were any chance of reaching my target then I would need to get the process up and running and also optimize it so that we could manage with the resources we had.

1.3.2 Purpose

The Purpose of my thesis is to analyze, understand, change and improve the deployment process enough for me to be able to reach the targets for 2014. I decided together with my managers to focus on the following things to improve:

Speed of loading: To reduce the time it takes to load a site. The faster it goes to load sites the more sites we can load.

Cost of loading: We also of course want to be cost effective so we also want to reduce the loading costs at the same time as we reduce the time it takes to load sites.

Risk Management: We also needed to look at what risks are present that can affect the data loading in a negative way and what we can do to reduce the probability of those risks happening and also to reduce the impact of that those risks have if they happen.

1.4 Delimitation

The whole process of deploying a site is made up of 3 phases. Phase one is where the preparation work is done out in the areas (“areas” refers to people working with us in the many network companies Wärtsilä has around the globe, I will use the term areas throughout the text) to gather the required information and schedule when the site should be loaded. Then phase two is the data loading itself and phase three is where the training, support and Go-live activities happen.

I have chosen to only look into phase 2 of the process in my work, the data loading itself. It is here where a lot of money is spent and where I think that the most time and money can be saved.

For the phase 1 and phase 3 that are happening out in the areas, there are so few similarities from case to case and the money and time spent is low, especially in part 1. It was also very hard to collect any good data to analyze.

Data quality is monitored by the number of service requests we get for corrections and also through a global questionnaire that we send out to a number of sites at selected occasions.

Loading times and money spent is monitored through the invoices we get from our supplier.

2 THEORY

2.1 *Business process improvement*

Business process improvement (BPI) is a systematic approach to help an organization optimize its underlying processes to achieve more efficient results. The methodology was first documented in H. James Harrington's 1991 book *Business Process Improvement*.ⁱⁱⁱ

Business processes never remain static. They either improve or they deteriorate. Streamlining is one way to improve the performance of your organization and achieve the goals of your team. You should have two primary goals (Dr. H. J. Harrington 1991, s.162):

- Develop practical and effective principles to follow in improving work methods
- Develop an organized approach to improvement, from identification of opportunities to the implementation of the desired change.

Improvement does not mean increased work-load. It does mean eliminating meaningless activity in the jobs, it means completing work more easily, safely and efficiently with fewer errors. It means understanding more about the process and its results.

Business process improvement is something that you do not necessarily just do as a onetime improvement on a process but instead is a cycle that you can and will do several times during the lifetime of the process.

The business process improvement cycle varies in length (number of steps) depending on what literature you read and Dr H. J. Harrington uses a 5 step model in this book (Dr. H. J. Harrington 1991, p.23). I have however used a four step model since I think that is more suitable for my needs.

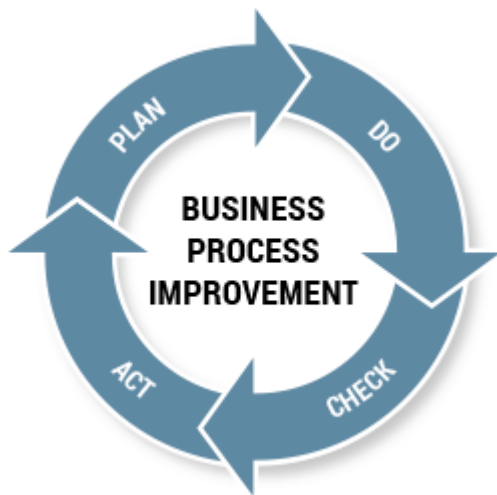


Figure 1. Business Process Improvement cycle^{iv}

- **Plan:** Organize, analyze and understand the process. Decide how to improve the process. This step in the process are represented in my thesis by the 3 following topics: 4. PROCESS, 5. DATA COLLECTION and 6.REVIEW OF PROCESS
- **Do:** Execute the planned improvements. This part is not really taken up in detail in my thesis, it is shortly described throughout 6.REVIEW OF PROCESS how it's planned to be executed but I have chosen not to go into detail how we executed the improvements. In general all improvement information and tasks to be done where presented to the organization through meetings, phone conversations or emails.
- **Check:** Follow-up on the results, have the improvements led to the wanted results? This part is presented in my thesis under 7. RESULTS
- **Act:** Based on the results you do further fine-tuning to achieve the results. The act step in my thesis is presented under 8. FUTURE DEVELOPMENT where I present the findings we had after reviewing the results. It's more or less divided between tasks that were planned during the improvement phase but were not finished and new improvements ideas that were identified when reviewing the results and are planned to do in the next phase of improvements.

2.1.1 The Principles of Streamlining

Streamlining suggests the trimming of waste excess, attention to every minute detail that might lead to improved performance and quality. It suggests contouring to provide the smoothest flow, the least resistance to progress and performance with the minimum

amount of effort. With streamlining, the process will operate with the least disturbance to its surroundings (Dr. H. J. Harrington 1991, s.131).^v

There are 12 cornerstones in streamlining, and they are usually applied in the following order:

1. **Bureaucracy elimination.** Removing unnecessary administrative tasks, approvals and paperwork.
2. **Duplication elimination.** Removing identical activities that are performed at different parts of the process.
3. **Value-added assessment.** Evaluating every activity in the business process to determine its contribution to meeting customer requirements. Real-value-added activities are the ones that customers would pay you to do.
4. **Simplification.** Reducing the complexity of the process.
5. **Process cycle-time reduction.** Determine ways to compress cycle time to meet or exceed customer expectations and minimize storage.
6. **Error proofing.** Making it difficult to do the activity incorrectly.
7. **Upgrading.** Making effective use of capital equipment and the working environment to improve overall performance.
8. **Simple language.** Reducing the complexity of the way we write and talk, making our documents easy to comprehend by all who use them.
9. **Standardization.** Selecting a single way of doing an activity and having all employees do the activity that way all the time.
10. **Supplier partnerships.** The output of the process is highly dependent in the quality of the inputs the process receives. The overall performance of any process improves when its suppliers input improves.
11. **Big picture improvement.** This technique is used when the first 10 streamlining tools have not provided the desired results. It is designed to help the PIT (Process improvement team) look for creative ways to drastically change the process.
12. **Automation and/or mechanization.** Applying tools, equipment, and computers to boring, routine activities to free up employees to do more creative activities.

These tools are proven techniques. Some have been so successful in the industry during the last 30 years that they have evolved into entire disciplines. But in Business Process Improvement they are not viewed as separate methods but are used in concern with each other.

2.1.2 Benefits of Streamlining

Once the process has been analysed and streamlined, there will be several benefits in improved efficiency, effectiveness, and adaptability (Dr. H. J. Harrington 1991, p.161):

- The customers will get what they want when they want it.
- Cycle time of the process will be reduced
- Space requirements will be reduced
- The number of steps and approvals will be reduced
- Noncritical output will be reduced
- Cost of process will be reduced
- Cost of management will be reduced.

2.2 Risk Management

Risk management is the identification, assessment, and prioritization of risks (defined in ISO 31000 as the effect of uncertainty on objectives) followed by coordinated and economical application of resources to minimize, monitor, and control the probability and/or impact of unfortunate events or to maximize the realization of opportunities.^{vi}

2.2.1 Risk management process

Risk management is a process consisting of^{vii}:

- Risk identification
- Evaluation
- Response development
- Response control

Risk identification

Identification involves reviewing the project and past experience to identify areas of risk and uncertainty. What can happen? What can go wrong? What can change?

Risk evaluation

Risk evaluation is where you analyse the risks that have been identified. You try to determine the probability of them occurring and the impacts they would have on the project or process.

Response development and control

Once you have identified and evaluated the risks the next step is to come up with solutions on how the risks can be controlled. What can be done to minimize the probability that something happens and can you do something to decrease the impact it would have if it happened?

2.2.2 Risk assessment tools

Risk assessment consists of risk identification and evaluation. The tools used for identifying and evaluating the risks are a risk assessment checklist a risk severity matrix. It's a short 3 step way when doing the risk assessment.

Step 1:

Your team identifies and lists down the risks in the risk assessment checklist and also writes down the probability of them happening and what the impact would be:

Risk Assessment Checklist					
Nr	Risk Event	Probability	Impact	Severity	Action Plan
#1	Errors in loaded data	High	low		
#2	Server crash	low	high		
#3	Key person gets sick, leaves the company	medium	high		
#4	Rollout documentation not received on time	medium	low		
#5					
#6					

Figure 2. Risk assessment checklist step 1

Step 2:

You look up the identified risks in the risk severity matrix and list down the severity rating in the checklist.

		Risk Severity Matrix		
Probability	HIGH	Medium	High	Extreme
	MEDIUM	Low	Medium	High
	LOW	Minimal	Low	Medium
		LOW	MEDIUM	HIGH
		IMPACT		

Figure 3. Risk severity matrix

Risk Assessment Checklist					
Nr	Risk Event	Probability	Impact	Severity	Action Plan
#1	Errors in loaded data	High	low	medium	
#2	Server crash	low	high	medium	
#3	Key person gets sick, leaves the company	medium	high	high	
#4	Rollout documentation not received on time	medium	low	low	
#5					

Figure 4. Risk Assessment checklist step 2

Step 3:

Once you have identified the most severe risk you sit down with your team and make up action plans for those. It's not necessary to do an action plan for low-medium severity risks if you find it unnecessary.

Risk Assessment Checklist					
Nr	Risk Event	Probability	Impact	Severity	Action Plan
#1	Errors in loaded data	High	low	medium	Try to improve sourcedata, loading procedures and data validation
#2	Server crash	low	high	medium	No actions can be taken to reduce this
#3	Key person gets sick, leaves the company	medium	high	high	Make skills matrix and see that all tasks have enough able persons
#4	Rollout documentation not received on time	medium	low	low	No actions taken to reduce this other than reminding persons the importance of keeping deadlines
#5					

Figure 5. Risk Assessment checklist step 3

There are normally 4 different ways to treat a risk, Avoid, Mitigate, Transfer, Accept (Project Management Fundamentals, p. “6-5”)

- Avoid
 - You manage to find a way to eliminate the risk
- Accept
 - You accept that this is a risk and you are willing to accept the consequences should they occur.
- Mitigate
 - You are aware of the risk and will take specific actions to minimize its occurrence and/or its impact
- Transfer
 - You are aware of the risk and will try to transfer all or a portion of the risk onto another party.

3 ORGANIZATION

During Q1 (Quarter 1. I will use Q1, Q2, etc. throughout the thesis) and Q2 we had overlapping organizations due to the Maximo project team still working with finalizing their development activities while the new organization with Maximo Deployment and Maximo Application organizations starting their work. Due to Wärtsilä's policies I am not able to show you any organizational pictures so I will just shortly present them in text format.

3.1 Maximo Project Organization

The Maximo Project organization contained a project team whose members worked with the day to day development activities and a Steering Committee overseeing the progress and working with the more complicated matters like funding and business support from other internal organizations.

3.2 Maximo Application Organization

The Maximo application organization is made up of 4 dedicated members and 2 part time members. These are the ones that will run, support and continue develop the Maximo system. This organization also includes external resources such as consultant firms and Wärtsilä non-core team members. This will be a permanent organization.

3.3 Maximo Deployment Organization

The Maximo deployment organization is a temporary organization that's sole task is deploy Maximo to our installations worldwide. This includes, training, data loading, etc... A steering group heads up the organization with members from all 5 areas and from the Global Contract Management team.

Then there is a Global Deployment team that consists of a Global Deployment Manager and 5 Area Deployment Managers. The Area Deployment Managers have their own teams who are the ones that are responsible for the training and Go-live activities at site. The Global Deployment Manager reports to the Steering group and is also a member of the Steering group.

4 PROCESS

The whole deployment process can be split up into 3 phases. Phase 1 is the preparation phase, where information is gathered about the site and installed equipment.

Phase 2 is the phase I will be focusing on in this thesis, the data loading phase. This phase is actually 2 different phases that have are very similar but have small differences in way of working. I will be calling them Phase 2.1 and 2.2

Phase 3 is the phase that contains all activities after the data loading is completed, like training and support and taking the site into use. Phase 3 can same as phase 2 be split up into 2 very similar phases that just differ in a few small ways in the way of working. I will call these phases 3.1 and 3.2.

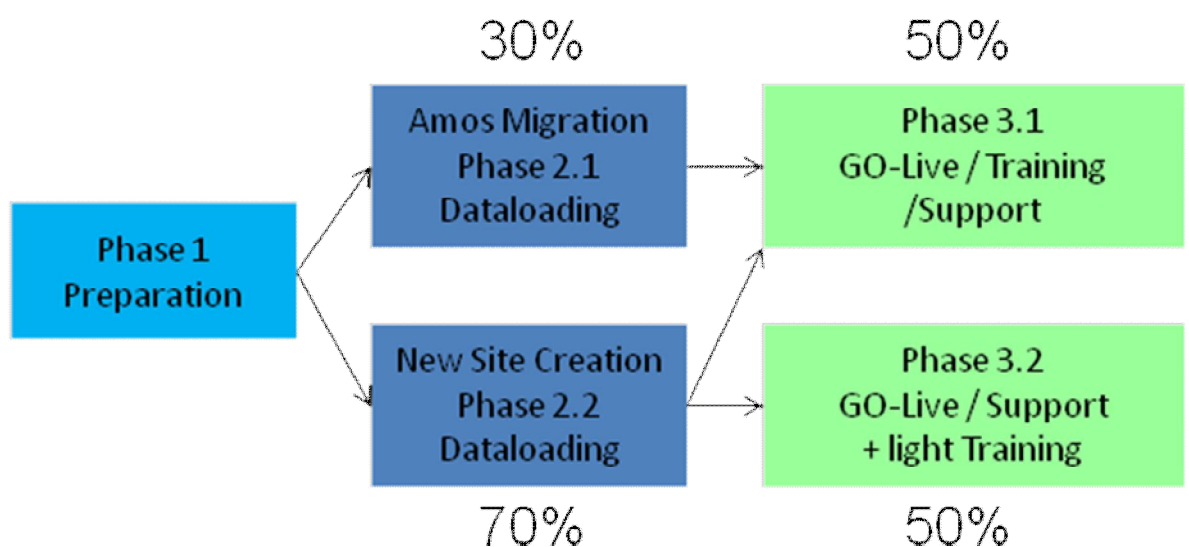


Figure 6. Estimated split between phase 2.1/2.2 and phase 3.1/3.2

4.1 Original process

The original process (Appendix 1 – Original Process) that was given to me when I took over the deployment was technical and detailed but it only took into account the Amos migration type of deployment scenario. Also the tasks was split up according to what person should do each task. The work hours per task that had been estimated for each task also looked a bit high.

I came to the conclusion that this have to be improved in many ways if were to have any chance of reaching our targets.

4.1.1 Process Phase 1 – Preparation

Below is a cut out from the process phase 1 that contains the most important information regarding tasks and its predecessors.

Task	Description	Predecessor
	PHASE 1 - PREPARATION	
10	Identify Prerequisites 1. Identify sites under contract 2. Introduce Maximo and deployment plans to planner and CM 3. Identify deviations from normal way of working (eg contract specific requirements) 4. Identify key stakeholders to the contract	
20	Complete planning for rollout document	10
30	Verify planning for rollout document	20
40	Review of data in old system 1. Review data quality in old system (create query) - if applicable 2. Coding of parts	30
50	Training Plans 1. Training approach (live vs at site) 2. Mapping of roles (contract stakeholders-->Maximo) 3. Training plan (high level)	20
60	Cost and change management planning 1. Implementation cost estimate 2. Change management plan	50
70	Write and distribute communication plan 1. Write communication plan 2. communication to customer	60
80	Risk planning 1. Risk mitigation plan 2. Roll-back plan	70
90	Success targets and measurements	80
100	Post go-live support plan	90
105	@@ Go ahead for data creation in Maximo	100

Figure 7. Process phase 1 – preparation

4.1.2 Process Phase 2 – Data loading

Below is a cut out from the process phase 2 that contains the most important information regarding tasks and its predecessors.

PHASE 2 - DATA LOADING		
110	Initiate data loading (4)	100
120	Prepare new site in Maximo (3-10)	110
130	Send Engine creation data (13)	120
140	Load engine data (14, 15)	130
150	Generate locations and assets (16-21)	140
160	@DATALOAD@ MAMA2i at site on hold!!	150
170	Load spare parts, inventory, PM's and Job plans (23-28)	160
180	Update cross reference (29)	170
190	Finalize loading (30-33)	180
195	Disable old system (if applicable)	190
197	Backups, Archive MAMA data	195
200	Creation of User accounts to Maximo	190
210	Create / Update Meter reading template	200
215	@DATALOAD@ Maximo site handover to Area	210
	1. Contents Delivery Engineer informs Area Key User and Area Deployment Manager that site creation in Maximo is ready. Information is sent by e-mail.	
	2. Area Key User and Area Deployment acknowledge the message and continue the deployment.	

Figure 8. Process phase 2 – data loading

4.1.3 Process Phase 3 – Go-live / Training / Support

Below is a cut out from the process phase 3 that contains the most important information regarding tasks and its predecessors.

PHASE 3 - GO LIVE / TRAINING / SUPPORT		
220	Manual check of location hierarchy completeness	215
240	Arrange kick-off meeting	215
250	Perform Training	240
260	Create Labours	250
	1. Create Labours	
	2. Create PM Hierachies	
	3. Verify "last done dates"	
265	GO LIVE @ site	260
280	Update system data	260
290	Post go-live checks	280
300	Post go-live monitoring and support	290
310	Closing	300

Figure 9. Process phase 3 – Go-live/Training/Support

4.2 Original process - Unsuitability

Even though our 3 main goals for optimizing the process was to save time, money and reduce the risk there is also another reason that would have forced us to change the process. The original process is specifically made for the phase 2.1 data loading and not taking into account the phase 2.2 possibility. As the phase 2.2 would already take up 70% of the data loading during 2014 it will later increase to almost 100% in the future. So for us having a process not taking the phase 2.2 into consideration is a big problem.

The phase 2.2 can further be split down 3 different types of loading types as showed in below table. But they all follow the same process, it's just that some steps are optional. There is also a special type of loading where all source data is located in an excel table and loaded into Maximo from that. This is something that I will not go into in this thesis because we will have very few (2-3/year) and they don't really follow any process, they are all done with lots of manual work. The excel template loading is something that we try to avoid as much as possible but it needs to exist because of some special cases where this is the only option. I will present the costs of these types of loadings together with the rest so that we can compare the differences between loading from our databases vs. loading from excel templates.

	Type of loading	Phase
1	AMOS conversion	2.1
2	New site, engines only	2.2
3	New site, engines + CITEC AUX	2.2
4	New site, engines + AUX Templates	2.2
5	Templates, engines + AUX	special

Figure 10. The different types of data loading and corresponding phases

4.3 Rollout document

The Rollout document is a loading specification form that the areas fill in when ordering a site to be loaded into Maximo. It contains all the necessary information we need to know about the site in order for us to load the data with correct settings into Maximo. Some examples on the data it contains are: Site name, installation number, engine numbers, engine type, installation date and names of users that should be created in the system. The rollout document template can be found in the attachments (Appendix 2 – Phase 2 rollout document template).

It's very important that this document gets filled in correctly. Errors in the document can in some cases lead to the loaded data not correct, for example the maintenance intervals for certain activities could be wrong.

5 DATA COLLECTION

So before we start to change anything in the process we first need to know the actual work hours and cost of the original process. Thus we need to collect that data and we needed to do a time follow up and cost review.

5.1 Time follow up

5.1.1 Time follow up – Areas

First the plan was to include Phase 1 and Phase 3 in the improvement process and we started by collecting data on actual work hours so that we could see how long the Phases took. The estimate in the original process was 99 hours for Phase 1 and 235 hours for Phase 3.

It was very obvious from the original process that the amount of work hours were highly over exaggerated and that several steps in the process were things that would only be done the first time a site in the area was loaded and would be skipped in the sites to come after.

Examples of steps that are “one timers”:

- 01. Identify sites under contract
- 50. Training Plans
- 90. Success Targets and measurements
- 100. Post Go-live support plan.

To get a better picture of the real amount of work Phase 1 and Phase 3 took in reality we to set up a system to collect actual work hour data. The plan was to use the same system to do the follow both for our people out in the areas and our consultants.

5.1.1.1 Time follow up - Maximo

Our first idea for time follow up was to use our Maximo system and collect the data there. We set up a time reporting site inside Maximo where everyone could log in and fill in

their work hours. The plan was that each and every one that did a task during the deployment process of a site would fill in the actual hours that they had spent on the task.

The feedback received from everyone was quite positive when we presented it but as soon as they were told to start using the system the problems started. The biggest problems were that people would not do one deployment task in one go so to say, instead the task could be dragged out over several days and then they would not be able to keep track on the amount of time they had spent on the task. Also the consultants that were doing the data loading complained that it took a long time to fill in and this in turn added additional costs to the data loading since they invoice all hours spent on the project.

After the initial failure and several pushes to get the people to use this time follow up in Maximo had all failed we had to come up with another solution.

5.1.1.2 Time follow up – Excel spreadsheet

After the failure of the work hour follow up in Maximo we had a discussion with our people out in the areas about how we should do the follow up. What would be the best way to follow up on the work hours per task in the deployment process? The feedback from the areas was that the favoured way of follow up would be in Excel.

The result was that we set up a timesheet in Excel (Appendix 3 – Excel timesheet follow up) which was distributed out to the Area managers and key users with the instructions to fill this in for the next site they deployed.

Again the result was the same as with the follow up in Maximo. They were so positive when discussing but when it came to execution there were no results. We did not receive a single spreadsheet back even though we reminded them several times.

5.1.1.3 Time follow up – conclusion

So since the time follow up out in the areas did not seem to happen despite our wishes we still could see from the emails and conversations that the we came to the conclusion that we would skip that part of the follow up. From our point of view that information is not crucial or even that important for the Phase 2 data loading. It would only be good to have

for the follow up on Phase 1 and Phase 3 but since it's more or less the areas that are handling both Phase 1 and Phase 3 the only important thing is that they will keep the deadlines and deliver the needed documentation at the end of Phase 1 before the scheduled start date of the Phase 2 data loading.

5.1.2 Time follow up – Consultants

Since the consultants were also a bit sceptic regarding filling in their hours in Maximo, that it took too much of their time we sat down with them and discussed on how we would do the follow up in a way that we all were happy about.

They of course already had an internal time reporting for invoicing purposes but that data was in a format that was very hard for us to use due to the fact that they invoiced everything Maximo related in the same invoice and this had not been a problem for us before.

We decided that the best way for both to have an acceptable follow up on the data loading was to start splitting up the loading hours and cost per installation and they would send us that data on a monthly basis as attachment to their invoices.

5.2 Data loading cost

The only 2 direct cost for us with the data loading is consultants fee's for loading the data and for some sites we order the AUX data from Citec and that is agreed as a fixed fee per installation.

So for the consultant's costs we had a similar problem as with the time follow up. Since everything had been under the Maximo Project before everything was invoiced in one invoice and there were no good split up on the data loading costs, it was just a big lump sum and no way of splitting it up between installations.

But this was rectified at the same time the time follow up was improved, so starting from May 2014 we got both hours and costs per installation.

6 REVIEW OF PROCESS

6.1 Review intro

The original process (*Figure 10. Process phase 2 – data loading*) was far from perfect as earlier mentioned. In order to be able to optimize the data loading we first need to dive down a bit deeper in the process description to get a better picture of what really happens when data is being loaded. The more detailed process description (Appendix 4 - Original data loading process, task responsibilities) showed that there are a many steps and a lot of informing back and forth between Wartsila and its consultants.

The question then is what can be done to improve this process in order for us to improve on our 3 main goals. Reduce time spent, money spent and reduce the risk of loading process standing still. Which of the 12 streamlining cornerstones can be implemented? What risk are there and what can be done to reduce those?

6.2 Risk identification and evaluation

The first thing we did was to sit down and start doing a risk analysis. Since it's a data loading process many of the risks are of course data related. The risks and their respective probability and impact are the following:

Nr	Risk Event	Probability	Impact
#1	Errors caused by loading data	High	low
#2	Server crash	low	high
#3	Key person gets sick, leaves the company	medium	high
#4	Rollout documentation not received on time	medium	low
#5	Loading software crash	high	low
#6	Change of setup for data in Maximo	medium	medium
#7	Errors in source data	High	low
#8	Errors in loading specifications	High	low

Figure 11. Risk identification, probability and impact

Once the risks are identified we checked them against the risk severity matrix (*Figure 3. Risk severity matrix*) to get the severity rating of the risks.

Nr	Risk Event	Probability	Impact	Severity
#1	Errors caused by loading data	High	low	medium
#2	Server crash	low	high	medium
#3	Key person gets sick, leaves the company	medium	high	high
#4	Rollout documentation not received on time	medium	low	low
#5	Loading software crash	high	low	medium
#6	Change of setup for data in Maximo	medium	medium	medium
#7	Errors in source data	High	low	medium
#8	Errors in loading specifications	High	low	medium

Figure 12. Risk identification, probability, impact and severity

6.3 Risk analysis – response development and control

When we had identified the risks and how severe they were on our process then we needed to come up with a proper plan to handle these risks. Do we choose to accept them as they are or should we try to find a way to eliminate or decrease their impact should they happen? Below picture shows the responses chosen and the corresponding action plans.

Risk Assessment Checklist						
Nr	Risk Event	Probability	Impact	Severity	Response	Action Plan
#1	Errors caused by loading data	High	low	medium	Mitigate	Try to improve loading procedures and tools.
#2	Server crash	low	high	medium	Transfer	No actions can be taken to reduce this, servers already handled by 3rd party
#3	Key person gets sick, leaves the company	medium	high	high	Mitigate	Make skills matrix and see that all tasks have enough able persons
#4	Rollout documentation not received on time	medium	low	low	Accept	No actions taken to reduce this other than reminding persons the importance of keeping deadlines
#5	Loading software crash	high	low	medium	Transfer	Transferred to the responsibility of consultants
#6	Change of setup for data in Maximo	medium	medium	medium	Accept	This is something that naturally happens sooner or later when taking new systems into use, no actions to be taken other than keeping in mind that it will happen at some point so that it will not come as any surprise.
#7	Errors in source data	High	low	medium	Accept	Try to improve source data when possible
#8	Errors in loading specifications	High	low	medium	Mitigate	Communicate out to the people ordering the data loading the importance of filling in correct data

Figure 13. Risk assessment checklist

Most of the actions taken are simple ones like calling for a meeting with concerned people to inform them about that certain risk and that we should work to decrease the probability of it happening other action include sending out informative emails reminding people that they need to be thorough when filling in loading specifications etc...

The one risk that stands out the most is #3, “Key person gets sick or leaves the company”. To tackle that one we decided that the best solution would be to go with a Skills Matrix. A skills matrix is a good tool for listing down the different tasks in a process and how many of the persons involved in the process that can do that specific task. The goal is to have minimum 2 persons that can do every task so that the process doesn’t stop completely if someone gets sick or leaves the organization.

6.4 Skill Matrix

The whole idea with skills matrixes I picked up from an excursion to KWH Mirka AB that I attended a few years back. Their HR department used a similar but much more complex skills matrix to map their employee’s competence.

So here below is the skills matrix that was made when the improvement work started and under the results section I will later present the updated skills matrixes.

From start of deployment	Wärtsilä Staff					Consultants Staff			Total
Task /Person	Pers.1	Pers.2	Pers.3	Pers.4	Pers.5	Cons.1	Cons.2	Cons.3	
Location Template (130)	X		X						2
Overhaul Calendar (110)	X								1
Site Creation (120)						X	X		2
1st & 2nd CR Integration (140)						X	X		2
Check 1st CR Integration (140)	X	X							2
Take Amos Snapshot (110)	X								1
Update Task reference (180)	X		X						2
Load Amos data to Maximo (150, 170, 190)						X	X		2
Load New Site Engine data to Maximo (150, 170, 190)						X	X		2
Load New Site AUX data to Maximo (170)								X	1
User accounts creation (200)					X				1
Create/Update meter reading template (210)				X					1

Figure 14. Skills matrix

As you can see from above matrix 5/12 tasks have only 1 person that can do them while 7/12 are on an acceptable level with 2 persons. Especially the 5 tasks with only 1 person are high risk elements. If the responsible persons for these tasks is sick then the data loading can’t be finalized since all of these tasks are critical steps in the data loading. The probability of this happening is also high when there are 4/8 persons that have a task that is unique to them.

So in order to improve on this and reduce the risk of the process shutting down if a key person would get sick or leave the company we started an training process both internally

and also instructed the consultant firm to do the same with their staff. We planned to do 2 followups in 2014 to see that the training process were going in the right way and that we had at least 1 back up person for every task.

The skills matrix tasks does not match the data loading process task numbers exactly. The reason being that we have done a bit of a different grouping with the skills matrix tasks and that all tasks in the original data loading process. The skills matrix tasks contains numbers withing the parenthesis that corresponds to the task numbers in the original data loading process.

6.5 Streamlining

For the streamlining part we sat down with the original process and asked ourselves which of the 12 cornerstones of streamlining that could give us some kind of benefit in the optimization work. The result of the review was the below table. X in the review column marks which of the cornerstones that we think we will be able to use and the blank “end result” column is where we will mark the results at the end of the optimization work. Many of these cornerstones are quite similar so it’s common to get a streamlining proposal that falls under several cornerstones.

#	Step	Review	End Result
1	Bureaucracy elimination		
2	Duplication elimination		
3	Value-added assessment	X	
4	Simplification	X	
5	Process cycle-time reduction	X	
6	Error proofing	X	
7	Upgrading	X	
8	Simple language	X	
9	Standardization	X	
10	Supplier partnerships	X	
11	Big picture improvement		
12	Automation and/or mechanization	X	

Figure 15. Review of streamlining cornerstones

Lets take a closer look on the cornerstones we think can be used for the optimization process.

6.5.1 Value-added assessment

Value-added assessment is as described earlier in the theory part of the thesis a check into every part of the process to see if that certain part of the process gives any value or if it is something totally unnecessary check that just consumes time and money. What parts of the process would a customer be willing to pay for?

If we take a look at the “Original phase 2 data loading process, task breakdown” (APPENDIX 5 – Original Phase 2 data loading process, task breakdown) we can see the tasks are already quite straightforward. There are clear instructions on who (Wärtsilä or consultant firm) should do what but the thing that stands out the most is that there are a lot of checks. There are there are 13 different times where it’s stated that consultant firm should inform Wärtsilä that something has been done, but only 4 times when Wärtsilä needs to answer back. So for sure there must be room to decrease the amount of communication that goes from consultant firm to Wärtsilä, when most of the communication seems to be one-way communication. Even though it doesn’t take long to send one email it stills adds up to some amount of time if you multiply it with 13 times per process cycle and around 170 cycles per year. Also, would a customer be willing to pay for all our internal checks?

6.5.2 Simplification

Simplification, what is it and what does it mean?

“Simplification means to reduce complexity wherever feasible. It leads to fewer stages, fewer tasks, fewer independencies etc... It means making everything easier: easier to learn, easier to do, easier to understand.” (Dr. H. J. Harrington 1991, p.144).

When you apply simplification to a business process, you evaluate every part of the process in an attempt to make it as easy as possible, less complex. In one way it goes hand

in hand with value-added assessment since when you remove steps that don't add any value to the process you also reduce the steps in the process making it simpler.

Is there anything else we can do to the process to make it more simple other than the things proposed under value-added assessment? One thing that we think could be done are possibly combining different steps into one and having one person doing a whole step. This would reduce the lost time between one person stopping his work, handing over to another person and then wait for that person to continue its work. The think we need to keep in mind here is that from a risk perspective we still need to make sure that every step in the process still have at least 2 persons with the knowledge on how to do that certain step in the process.

6.5.3 Process cycle-time reduction

“Critical business processes should follow the rule of thumb that time is money” (Dr. H. J. Harrington 1991, p.146). The longer a process takes the more expensive it gets and also it ties up the resources that could be used for other things or for running another instance of the process.

The time=money part is even more true if you are using external people in your process (consultants, suppliers etc.) So process cycle time reduction is very important for us in the optimization process since 2 of our goals were to reduce time spent and money spent.

After we have applied both the value-added assessment and the simplification cornerstone to our process we should already have quite a compact and simple process. So what else can be done to get the process to take up less time? Well another thing that we can do is to try to improve our hours spent on the remaining tasks in the process. Of course it's hard to put an exact number on how much time that can be saved on a specific task we should be able to expect at least some automatic decrease in time spend after we have repeated the process a few times as long as it is the same person that does the task most of the times.

6.5.4 Error proofing

It's very easy to make an error, the slightest distraction while doing a task can lead to an error. As a result, almost nothing is truly error-free. What we have to do is to make it difficult to create errors. You can do that in almost any way.

From the risk assessment we already identified the 3 main areas where errors can be made. It was:

- Errors in source data
- Errors in loading specifications
- Errors caused by loading data

And the action plans for above were to improve the source data when possible, improve loading tools and scripts and through communication and training try to reduce human errors.

Also try to make the forms for loading specifications (rollout document) more simple to understand and also make them harder to fill in wrong.

6.5.5 Upgrading

You can split upgrading into two parts, upgrading equipment, tools, etc. or upgrading people. Upgrading people means investing in them, do they have the right education and training? If not, then is it possible to do something about it.

We saw quite early when doing the skills matrix that even if we thought that we had the right people in the right places we still had high risk with many tasks only being known by one person. So we through training spread the knowledge around to get the people involved to be more flexible, to have more knowledge.

Training people into new tasks reduces the risk of a process standing still in case someone is sick, but if the “backup” person for a certain task only needs to do that task if/when the person that usually does it gets sick or is on vacation then of course the risk of human errors being done increases since the backup person is not that familiar with the task even though he have the training for it. So it’s important to have them from time to time do their backup tasks to keep their skills fresh.

For the upgrading of tools we see the same possibilities as with the error proofing, that we see an upgrade possibility of the loading tools and scripts.

6.5.6 Simple language

Simple language is all about making the forms and documentation as easy to understand as possible. In our case we had the rollout document that the areas fill in when ordering a site to be loaded. This is the prerequisite for the data loading process and contains all the necessary information for how we should load the site into Maximo. Since this document was also designed for the phase 2.1 data loading (Amos sites) we found that it contained a lot of unnecessary fields that was not relevant for the phase 2.2 data loading cases. So together with the areas we will go through this and make a new lighter and simpler version to use for the phase 2.2 data loading. We think that this will reduce the filling in errors a great deal.

6.5.7 Standardization

The one thing we know needs to be standardized is the Excel loading template we use for loading certain types of engine and auxiliary data into our system. This template is mainly used for the special type of data loading that is not included in either phase 2.1 or phase 2.2.

A standard template is needed in order for us to more easily be able to check for fault and also for our consultants to be able to create tools that work without every time some makes a change to the template.

6.5.8 Supplier partnerships

Our vision for developing the supplier partnership is that our suppliers would start sharing the risks with us meaning that we should not have to pay for correcting errors and faults that they are responsible for.

6.5.9 Automation and/or mechanization

We want to look into ways of automating as much as the data loading activities as possible. But we also need to balance the cost of automating tasks vs the monetary

benefits we would get from automating those tasks. If it looks like the return on investment would be low then of course we don't want to automate that part even though the human errors would be reduced and process would become simpler.

6.5.10 Improvement summary

To summarize what improvements we will implement on our process the below improvements have been proposed. We have split them into 2 groups, first group is something that we have implemented from the start when doing the new process and the other group is something that we will try to improve step by step or when we get the chance.

6.5.10.1 One time implementations

- Improve rollout document for gathering loading specifications (make simpler to understand and harder to fill in wrong)
- Remove non valued-adding tasks from process
- Simplify process by grouping tasks
- Create standard template for the Excel data loading form

6.5.10.2 Step-by step implementations

- Improve loading tools and scripts (to reduce errors, save time and money)
- Reduce time spend on tasks
- Train people so that they can be backup persons for other tasks in the process
- Develop our supplier partnership in a direction that saves time, money and decreases our risks.
- Automate the process tasks that have a good return on invested development costs.
- Correct source data when possible

7 RESULTS

We chose to measure the data loading costs and time spent over a period of 7 months starting from May 2014 and ending in November 2014. We started the process evaluation and risk assessment in February 2014 and in May we had the foundation ready. As earlier explained in the thesis we had problem doing a cost follow up on the data loading due to everything being invoiced in a big lump sum and paid by the Maximo project. Unfortunately it took us until May before we got this changed and could start following the data loading cost per installation. However we could extract the data loading costs from March and April month's invoices and divide with the number of loaded sites in those months to get an average for those months also and luckily there were only AMOS sites loaded during those 2 months. We didn't take January and February into account because there were 0 sites loaded in January and only 2 sites loaded in February. Below is a timeline the give a better picture of progress of the optimization process.

* Process Assessment done * Risk Assessment done	* Process Improvement started * First skills matrix done	* Updated process done	* Invoicing changed, cost follow up starts * Skills Matrix review 1			* Skills Matrix review 2				* Measuring period ends
February	March	April	May	June	July	August	September	October	November	

Figure 16. Process improvement timeline

7.1 Updated data loading process

So for the optimization of the process itself we had decided to do 2 improvements, those were:

- Remove non value-adding tasks
- Simplify process by grouping tasks

7.1.1 Deployment process - Task breakdown

When we updated the “Original phase 2 data loading process, task breakdown” (APPENDIX 5 – Original Phase 2 data loading process, task breakdown) we made 2 separate versions, one for phase 2.1 and the other for phase 2.2. Phase 2.1 (APPENDIX 6 – Phase 2.1 data loading process, task breakdown) is made from the original process and the fields marked in yellow are the fields that have had changes to them compared to the original process. The phase 2.2 (APPENDIX 7 – Phase 2.2 data loading process, task breakdown) is then based on the phase 2.1 process and the same goes there that the fields marked yellow in 2.2 are the fields that have had changes to them from 2.1

7.1.2 Simplified process

After removing the non-value adding tasks and grouping the similar task together into more compact packages the updated process looked like this:

PHASE 2 - DATA LOADING		
110	Create and send data package (110)	100
120	Site creation and CR Integration (120, 140)	110
130	Send AMOS Database to Sigma (160)	120
140	Load AMOS data to Maximo (150, 170, 190)	130
150	Create users (200)	140
160	Create/update meter reading template (210)	150
170	Maximo site handover to Area (215)	160

Figure 17. Simplified process AMOS

PHASE 2 - DATA LOADING		
110	Create and send data package (110)	100
120	Site creation and CR Integration (120, 140)	110
130	Load New site engine data and do task reference (150, 170, 180, 190)	120
140	Load New site AUX data to Maximo (170)	130
150	Create users (200)	140
160	Create/update meter reading template (210)	150
170	Maximo site handover to Area (215)	160

Figure 18. Simplified process New site

The numbers inside the parenthesis are the tasks corresponding tasks in the Phase 2.1/2.2 “data loading process, task breakdown”. So we compacted the process from 14 task down

to 7 tasks. There were only 2 non-value adding tasks, in the process, the others disappeared when we compacted the process. The reason for them not adding any value to the process were that they were not considered core tasks in the data loading process and that they also were performed very seldom. The non-value adding tasks were:

- Disable old system (if applicable)
- Backups, Archive MAMA data

7.2 Risk analysis review

From the 6.3 Risk analysis we had 8 risks identified and of those we had 5 that we made up some kind of action plan for. The first plan we reviewed was the skills matrix and that was done first in May and then later in August. The rest of our action plans were reviewed at the end of the measuring period in November. The skills matrix review will be presented in a separate part further down and the rest will be presented below:

#1 Errors caused by loading data

Action plan: Try to improve loading procedures and tools.

Result: During the measuring period we located some bugs in the loading tools that in some cases were causing error in the loaded data. The bugs were fixed and amount of errors was reduced.

#5 Loading software crash

Action plan: Responsibility transferred to consultants.

Result: During the measuring period we had a few times that the loading software crashed. However our consultant firm have a good internal procedures for getting it up and running again so this is not an issue anymore.

#7 Errors in source data

Action plan: Try to improve source data when possible.

Result: To have a good source data is important for us but unfortunately the data is not always up to the standard that we would want to have. We try to give feedback to the persons responsible for the master data that which parts are most commonly found to be wrong or missing and some improvements have been done but still there is a long way to go before we can consider our source data to be in good shape. More or less this action plan will be a never ending one. But we have the procedures in place for when errors are found and how they should be corrected.

#8 Errors in loading specifications

Action plan: Communicate out to concerned people the importance of filling in the correct data and what the consequences can be when filling in wrong data

Result: Our information that went out to the areas combined with improvements done to the rollout document (APPENDIX 8 – Phase 2.2 rollout document template) have significantly reduced the loading specification errors. We have not had a single error for several months.

Another thing that has been noticed (through feedback by end users) and rectified in the rollout document is that there was no field to specify what fuel the engine is running on. This information has earlier been taken from another internal system we have in Wärtsilä and we have noticed that this system doesn't always contain the correct info regarding fuel type. If the engines get loaded with the wrong fuel type it will cause Maximo to generate the maintenance work orders with wrong intervals, basically the system will tell you to do service at wrong times. Correcting a site loaded with wrong fuel type takes a lot of time.

7.2.1 Skills matrix

When we did the risk assessment the main finding was that there was one risk with severity rating HIGH and that was the “key person gets sick or leaves the company”. So the action plans for that was to make a skills matrix where we could keep track on which tasks in the process that didn’t have any back-up person(s). So when we made the first matrix is showed that there were 5/12 tasks that were covered by only 1 person. To rectify this we made a training program that included both our staff and consultant’s staff.

From start of deployment	Wärtsilä Staff					Consultants Staff			Total
Task /Person	Pers.1	Pers.2	Pers.3	Pers.4	Pers.5	Cons.1	Cons.2	Cons.3	
Location Template (130)	X		X						2
Overhaul Calendar (110)	X								1
Site Creation (120)						X	X		2
1st & 2nd CR Integration (140)						X	X		2
Check 1st CR Integration (140)	X	X							2
Take Amos Snapshot (110)	X								1
Update Task reference (180)	X		X						2
Load Amos data to Maximo (150, 170, 190)						X	X		2
Load New Site Engine data to Maximo (150, 170, 190)						X	X		2
Load New Site AUX data to Maximo (170)								X	1
User accounts creation (200)					X				1
Create/Update meter reading template (210)				X					1

Figure 19. Skills matrix

We did the first follow-up in May to see how the progress was going and below you can see the progress. An (X) means that there is a person in training there that can’t yet be considered a full back-up person, but still has some knowledge in the task. There were 4 new people added to the process, 2 consultants and 2 internally, one of ours were just a summer worked and the plan was to have him reduce the work load during the summer months. So 4/5 of those task that only had 1 person are now in the progress of getting at least 1 back-up person. The task that is still left with only 1 person is a bit tricky because this task is a task were the tools and procedures are still under development and this is the reason why the consultants don’t want to involve any other person before it can be considered fully developed. Luckily this is one of the task in the process that is optional as can be seen in the phase 2.2 process description.

From start of deployment	Wärtsilä Staff							Consultants Staff					Total
Task /Person	Pers.1	Pers.2	Pers.3	Pers.4	Pers.6	Pers.5	Pers.7	Cons.1	Cons.2	Cons.3	Cons.4	Cons.5	
Location Template (110)	X		X	(X)			(X)						2+2
Overhaul Calendar (110)	X	(X)											1+1
Site Creation (120)								X	X		(X)	(X)	2+2
1st & 2nd CR Integration (140)								X	X		(X)	(X)	2+2
Check 1st CR Integration (140)	X	X											2
Take Amos Snapshot (160)	X	(X)											1+1
Update Task reference (180)	X		X	(X)									2+1
Load Amos data to Maximo (150, 170, 190)								X	X		(X)	(X)	2+2
Load New Site engine data to Maximo (150, 170, 190)								X	X		(X)	(X)	2+2
Load New Site Aux data to Maximo (170)										X			1
User accounts creation (200)					(X)	X							1+1
Create/Update meter reading template (210)	(X)			X			(X)						1+2

Figure 20. Skills matrix May review

We did the second follow-up in August and this time there were both good and bad news. The good news was that 11/12 now have at least 2 persons that can do the task so the risk is now much smaller that the data loading process would come to a complete stop if someone get sick or leaves the company. The bad news is that consultant nr.1 left the firm with just a few days' notice and this really shows how important it is to have a backup person. There is still one task (the same as earlier) that doesn't have any backup person and the reasons are the same as last time that this task in the process is still marked as "under development". It is a working task but the loading tools are not ready so it's don't more or less manually.

From start of deployment	Wärtsilä Staff							Consultants Staff					Total
Task /Person	Pers.1	Pers.2	Pers.3	Pers.4	Pers.6	Pers.5	Pers.7	Cons.1	Cons.2	Cons.3	Cons.4	Cons.5	
Location Template (110)	X		X	X			X						4
Overhaul Calendar (110)	X	X											2
Site Creation (120)									X		X	X	3
1st & 2nd CR Integration (140)									X		X	X	3
Check 1st CR Integration (140)	X	X											2
Take Amos Snapshot (160)	X	X											2
Update Task reference (180)	X		X	X									3
Load Amos data to Maximo (150, 170, 190)									X		X	X	3
Load New Site engine data to Maximo (150, 170, 190)									X		X	X	3
Load New Site Aux data to Maximo (170)										X			1
User accounts creation (200)					X	X							2
Create/Update meter reading template (210)	X			X			X						3

Figure 21. Skills matrix August review

7.3 Cost and Time savings

7.3.1 AMOS Site loading

The Amos site data loading are for many parts actually a data migration since. The database snapshot contains historical maintenance history, job plans etc. Since this data comes from another system where it has already been in use for a long time the data can vary heavily from site to site. It's impossible to say beforehand how smooth it will go into Maximo, there are usually a few surprises in the data for every AMOS site.

When checking the average loading prices and hours spent we clearly see a sharp downward trend from March to July and then after that it starts fluctuating a bit up and down. Note that there are a slight increase in loading price in August and then again a big jump in November, these will be interesting months later down when we check against price/engine.

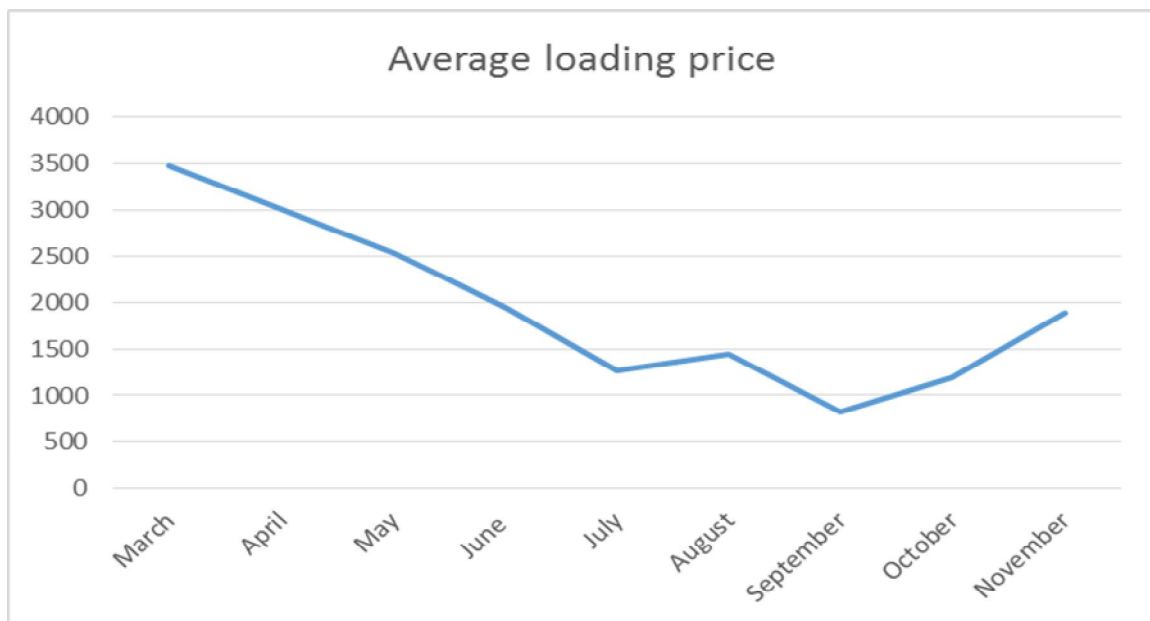


Figure 22. Average loading price per site for AMOS

For average hours spent per site we can also see a downward trend even if it's not as significant as the loading cost. We also have a big increase of hours spent per site for November month same as for the average loading price.

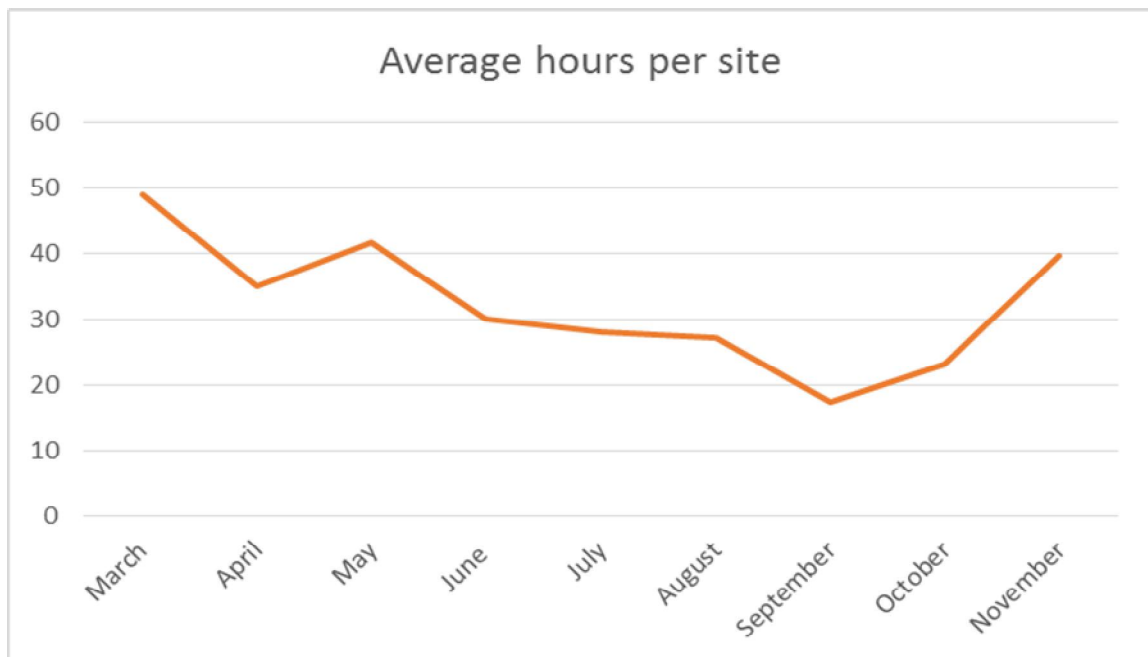


Figure 23. Average hours spent per site for AMOS

When checking prices per site and spent hours per site its easy to forget that all sites are unique both in configurations, size, amount of users etc.. The easiest way to take the size of the site into consideration is to look at the number of engines a site have. So if we divide the average price with the average number of engines per site for the same month we get a graph that looks very different from the average loading price. Suddenly August that had a slight increase in average price and November that had a huge bump in average price are now the 2 lowest when you look at the price per engine.

So even if it's more expensive in total price to load a big site the data is acutally cheaper to load, since there is more of it. If it would be same price to load big chunks of data compared to smaller chuncks of data then the average loading price per engine graph would look similar to the average loading price.

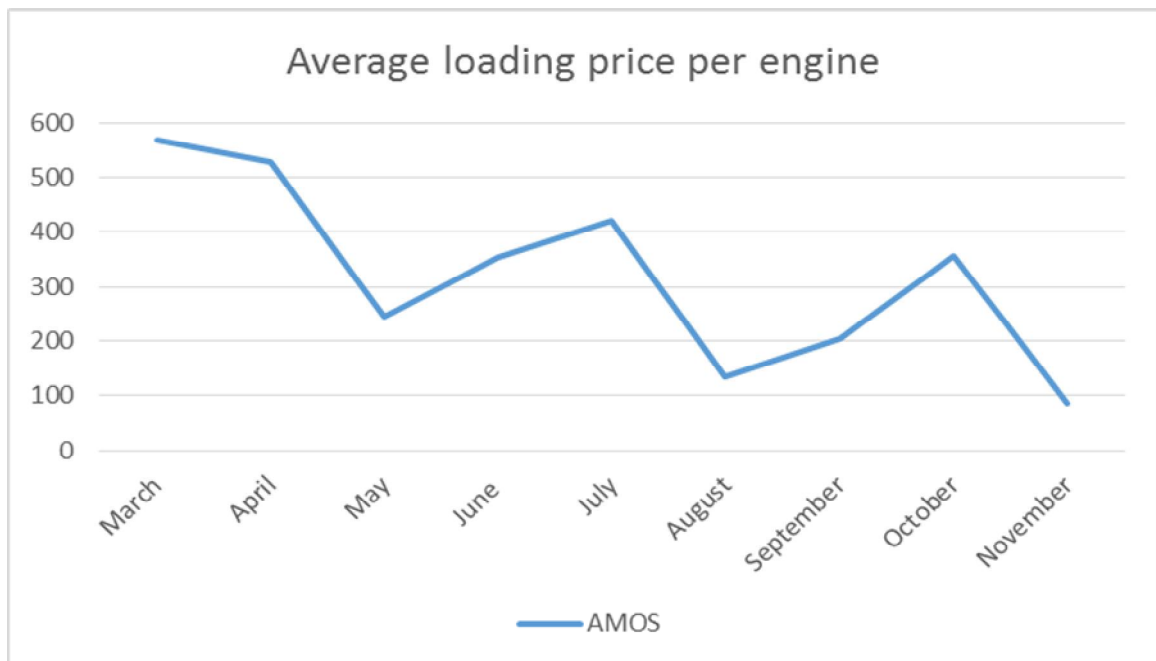


Figure 24. Average loading price per engine for AMOS

So even if the price of loading an AMOS site has gone down during the measuring period it's still difficult to say to what extent the process have been improved, but all 3 graphs shows a decrease in price/hours. Since every AMOS site is more or less unique when it comes to the data being loaded it's impossible to forecast a correct loading price for those even in the future.

7.3.2 New Site loading (without AUX)

The new site loadings Phase 2.2 where we only load engine data, most commonly used for marine vessels are by far the biggest group of data loadings that have been done during 2014 and will also be the biggest group in the future. This type of loading is much easier to do an validation on in seeing how big the improvement have been over the measuring period since the number of engines for these type of installations are usually very low.

The most common setup on a vessels under our agreements are 4 engines (60%). The average value for all vessels loaded during the measuring period are 4.3 engines per installation. Lowest number is of course 1 engine and highest we have had are 8 engines.

If we take a look at the below graphs we can see that there was a big drop in loading price between June and July. The average price for May was 1100€, June 1290€ and then for July only 850€. Between July and November the average price then ranged between a 850€ average high and an 700€ average low.

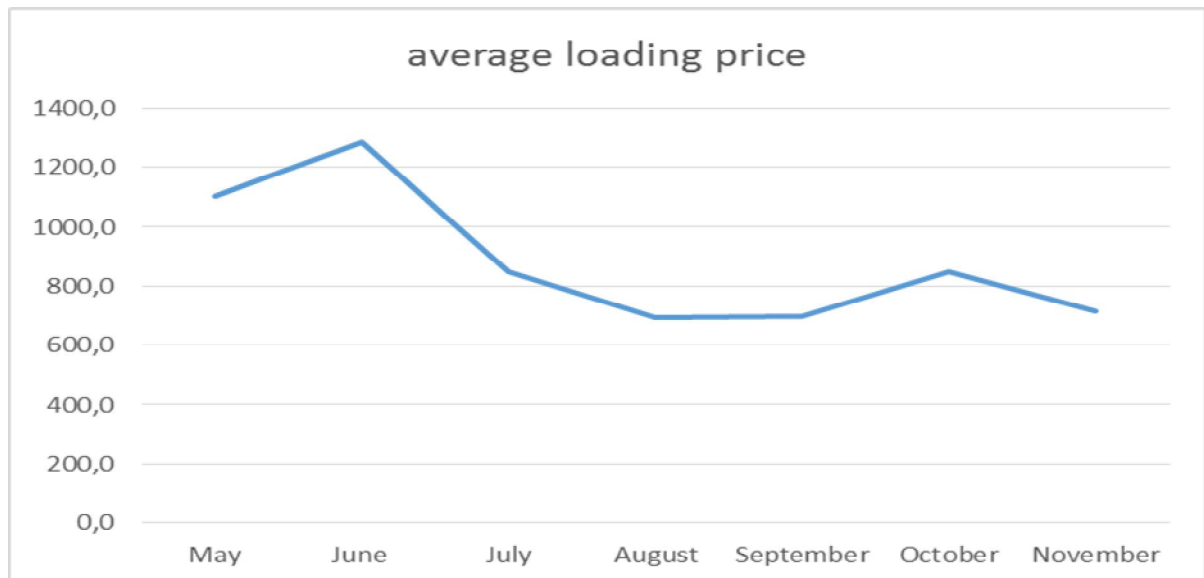


Figure 25. Average loading price per site for New site

One interesting thing here is that when we look at the average hours spent per installation we see that the average here hasn't been reduced as much as the loading price. For May the average was 16.2 hours per installation compared to an average of 14.6 hours per installation for July-November period with a high of 17.8 and a low of 13.2 hours.

So even if there have been a small reduction in the work hours over the measuring period it doesn't explain the whole reduction in average loading price. The other reasons are that we have been able to reduce the consultants costs by using junior consultants that have a reduced hourly rate.

The big peak of average workhours in June corresponds with the introduction of these junior consultants (can be seen in the skills matrix also) and this is of course something natural that untrained people take longer time to do a task in the beginning and also there will be some small need for senior staff do check up on them in the beginning and that will also lead to an increased amount of hours spent.

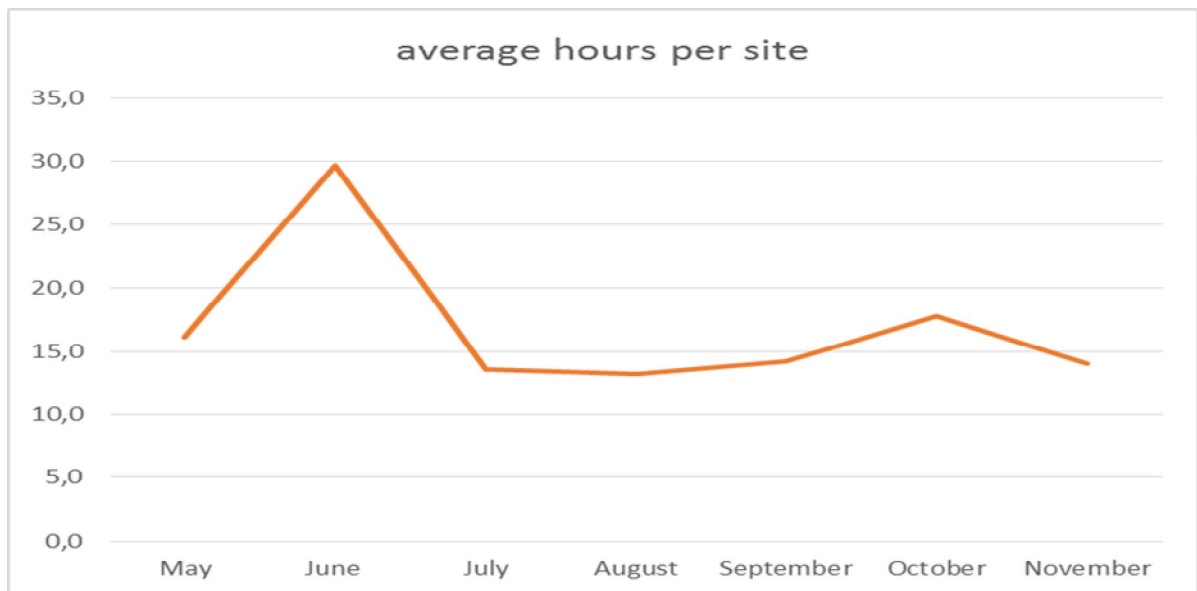


Figure 26. Average hours spent per site for New site

The average loading price per engine graph here below looks very similar to the average loading price and that is not a big surprise since the installations are quite similar in size so we can't see any "big site" effect here that we could see in the AMOS graphs. Same as in the average loading price we can clearly see an reduction in price here from July an onwards.

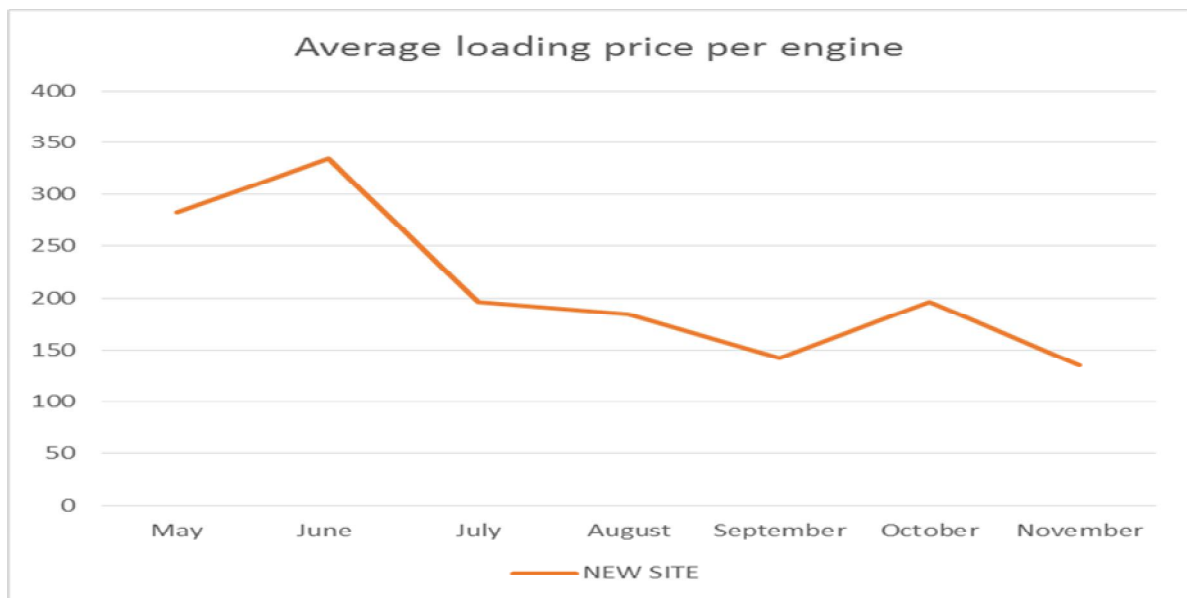


Figure 27. Average loading price per engine for New site

Another thing that we found quite interesting were to compare the Max and Min value per month for these new site data loads. Since 60% have 4 engines, and the average for all new sites are 4.3 engines they and all new sites have fresh data loaded straight from source data it could be considered that they should all need more or less the same amount

of hours and money to be loaded. Of course there will always be some small difference but what we found were that there are huge difference between the Max and Min value.

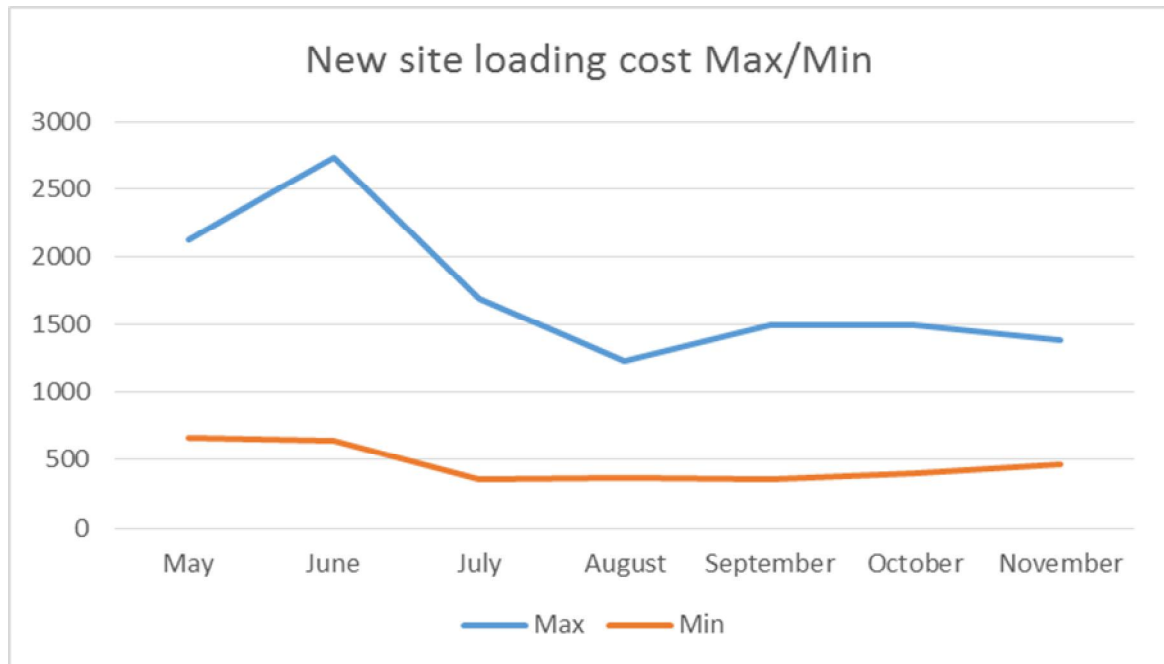


Figure 28. Min/Max loading cost for New site

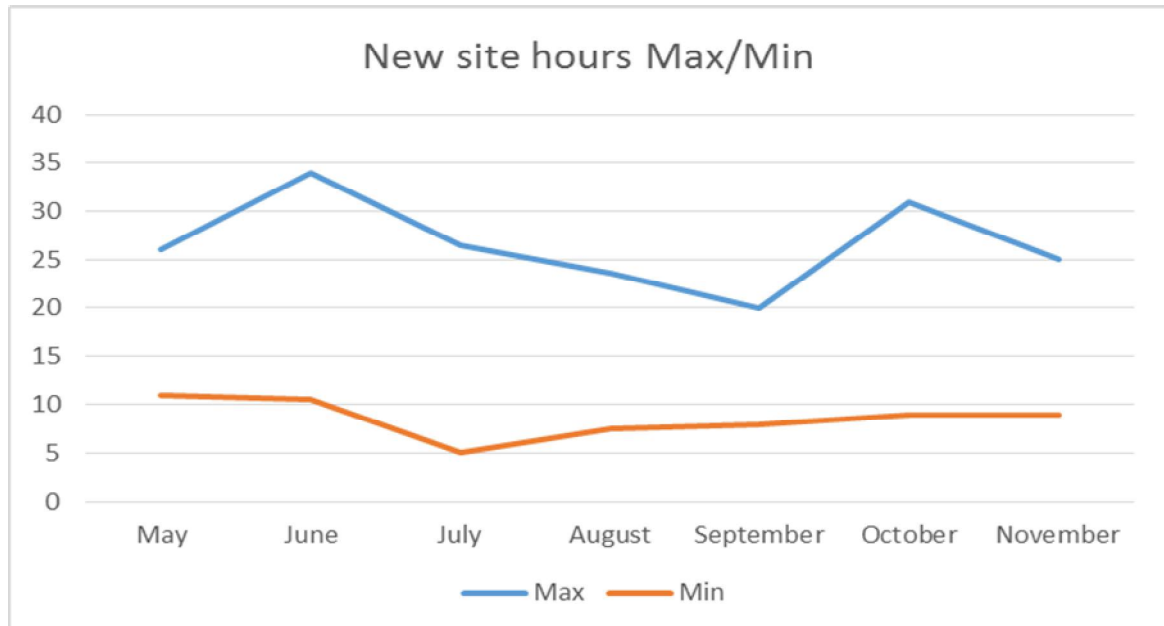


Figure 29. Min/Max hours spent for New site

The question now is that what is causing the huge difference in between the Max/Min value? The min value is much more stable also comparing to the max value. There are several factors that can have an effect on the loading price being very high on a certain

site, but the 2 main factors we think lies behind this are the following. First of all if we have any kind of data errors (source data, loading errors, specification errors) there will of course take more time and money to correct them. Another thing is that since these analyses are based on consultant firms invoices we can't be 100% sure that they have booked the hours correctly to all sites, so if they would have booked more hours than they have actually spent on that particular site then it will of course show that this site becomes very expensive and the other site that don't get all hours booked becomes cheaper.

This is also a reason why we chose to present all months with their average hours and average price to give a more realistic view of the situation since the extra costs of fixing errors and any wrong booked hours will be divided between all sites loaded that month.

7.3.3 Average cost and hours all types

This is a summary of average loading prices for different types for the whole 2014. As earlier mentioned in the thesis we have kind of a "special case" type of loading where we load data from an Excel template. This is something we try to avoid as much as possible but sometimes we need to use that and it is also very handy to have as a backup tool of getting data into Maximo.

The graphs below gives an interesting overview of the price difference in getting a site into Maximo the normal way compared to the special way through excel template. An interesting thing is that it looks to be more expensive to load only part of a site (aux data) from Excel templates rather than loading the whole site from Excel templates. I think the explanation here is that there have been very few sites loaded for both types (3 installations for both types) so if you run into major complications when loading a site then it will affect the average price enormously. But still it gives a good point in the right direction in how expensive a site can become when using special cases and lots of manual work.

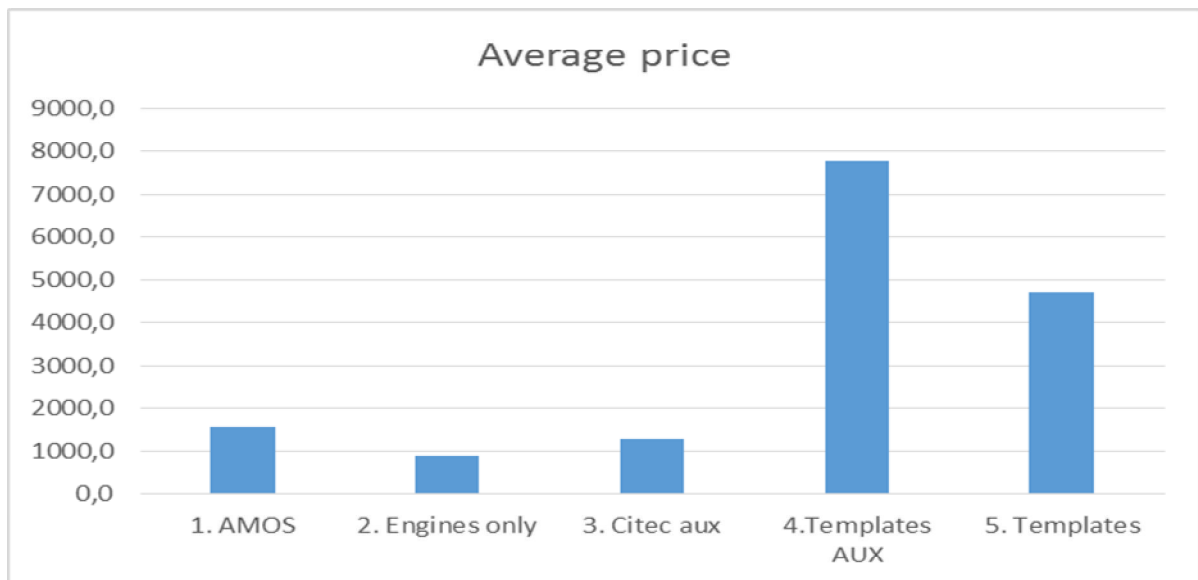


Figure 30. Average loading price for all types of sites

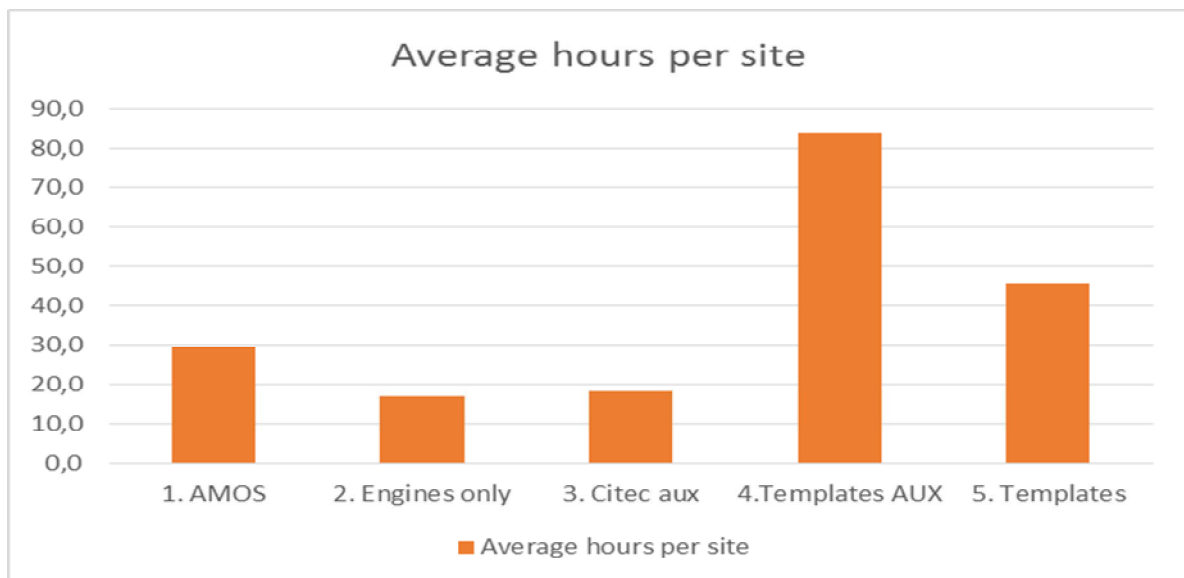


Figure 31. Average hours spent for all types of sites

7.4 Future data loading prices

During the measuring period we saw a decrease in both average loading cost and average hours spent per site for both the AMOS and New Site (engines only) type of data loading. But we also saw that the loading costs fluctuates a lot both for the AMOS and New Site data loads. This makes it very hard to do a proper forecast or budget for these activities. What if we could pay a fixed price for certain types of data loads? Then that would make it possible to do a good forecast and budget and also secure that data loading costs for a site doesn't soar.

The AMOS sites that still remains to be loaded to Maximo are not that many so that type of loading will disappear during 2015 so we decided that there is no point in spending time trying to make those loading prices more stable. Also both the data loading types (4 & 5) that contains loading elements where the excel template is used for data gathering will be impossible to put a fixed price on since the data quality there is very poor in some cases.

The 2 remaining types of data loading then (2&3) are the ones that we will have as our main types of loadings in the future. Type 2, the new site with engines only were already the most common one during 2014 and is forecasted to increase even more during 2015. Type 3, the new site with Citec aux data will be the one that takes the place of AMOS in the future since all new power plants will not of course have their data in AMOS system and that means their AUX data needs to be loaded from the Citec source data instead.

We approached our consultants with the idea and they responded positively. We decided that we should first start with fixing the rate for the type 2 since type 3 is still under testing and development (very few sites have been loaded as type 3). The fixed rate would include all normal data loading activities that the consultants normally do for us and it would also include fixing loading errors free of charge for those errors that were done by them (errors in their loading scripts, human errors done by them, etc). If loading errors could be traced back to source data, loading specifications or human errors committed by us, then they could charge extra for fixing those. During 2014 when we have been paying them by hourly rate all error correction have been paid by us even those that have been caused by them.

In January 2015 the fixed price for type 2 data loading started and the plan is to also have the type 3 as a fixed price package by the end of 2015.

7.5 Data loading targets

So the targets we had been given for data loading 2014 were 170 sites. This high number was the reason that we started to optimize the process in the first place even if we defined the 3 main points of improvement as improving the speed of loading, reducing the cost and managing the risks. Of course the speed of loading have very much to do with being able to reach the targets, but there are also of course other factors like getting the site

specifications from the areas (phase 1), doing proper planning, scheduling etc... Below graph shows the monthly loading figures for 2014. We can see a clear and sharp rise in loaded sites per month that peaks in July-August before starting to decline towards the end of the year. There is a reasonable explanation for the decline and I will present that further down in the text.

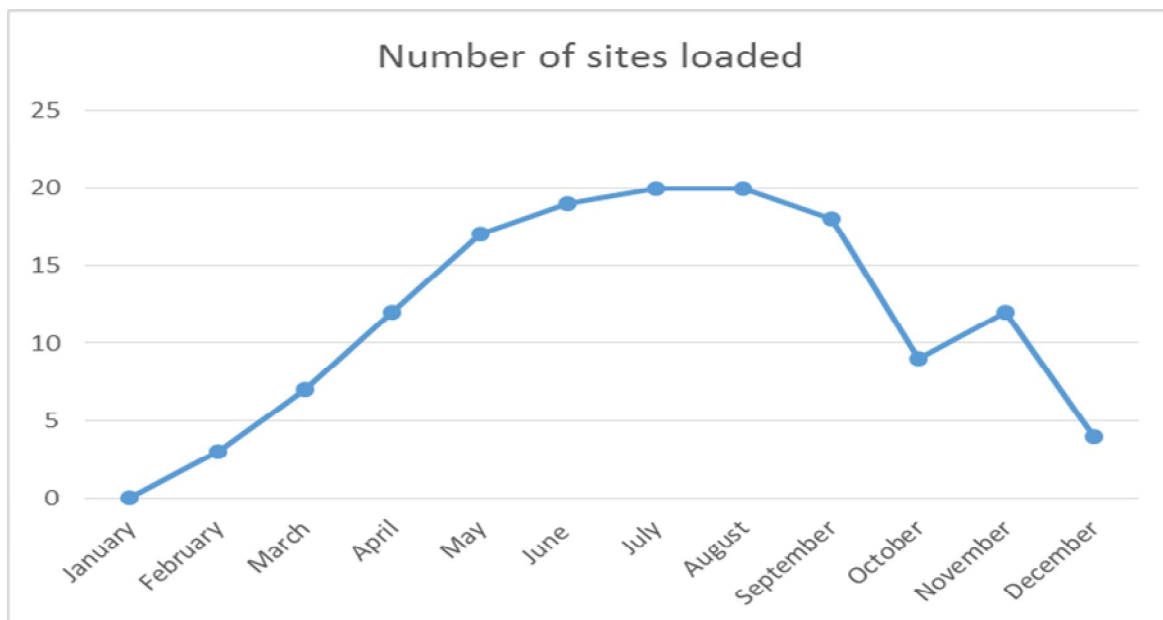


Figure 32. Number of sites loaded per month 2014

The decline in sites loaded per month can be explained by the very low Go-live rate achieved by the areas. Basically they didn't take the sites into use as fast as were were loading them. There are several reasons why the Go-live became a problem, there were some key features that weren't ready in the Maximo system making some sites impossible to take into use before those features were ready. Also a lot of bugs were found in the system that caused a lot of extra work for the people giving support to the end users. These persons were usually the same person that should be giving training at new sites and that of course also reduced the Go-live rate since they were busy giving support for the old sites that had a lot of problems due to the bugs. It was decided in the Steering committee that we would drop the target of 170 sites in order for us on a global level to put focus on helping the areas to get the Go-live rate up.

Below graph shows the data loading targets and actuals and also the Go-live rate. The data loading actuals were the target for several months until October, the same month we had a huge drop in loaded sites due to the new focus on Go-live set by the Steering committee. When looking at the Go-live rate the change of focus were indeed needed. By end of

september we had only 40 sites Go-live but with the change in focus we could push out another 60 sites for Go-live in the 3 last months. This doesn't mean that 60% of phase 3 was done in the 3 last months, in many cases the training were already done and the only thing needed to get the site Go-live was to give them that last helping hand with correcting some system bugs.

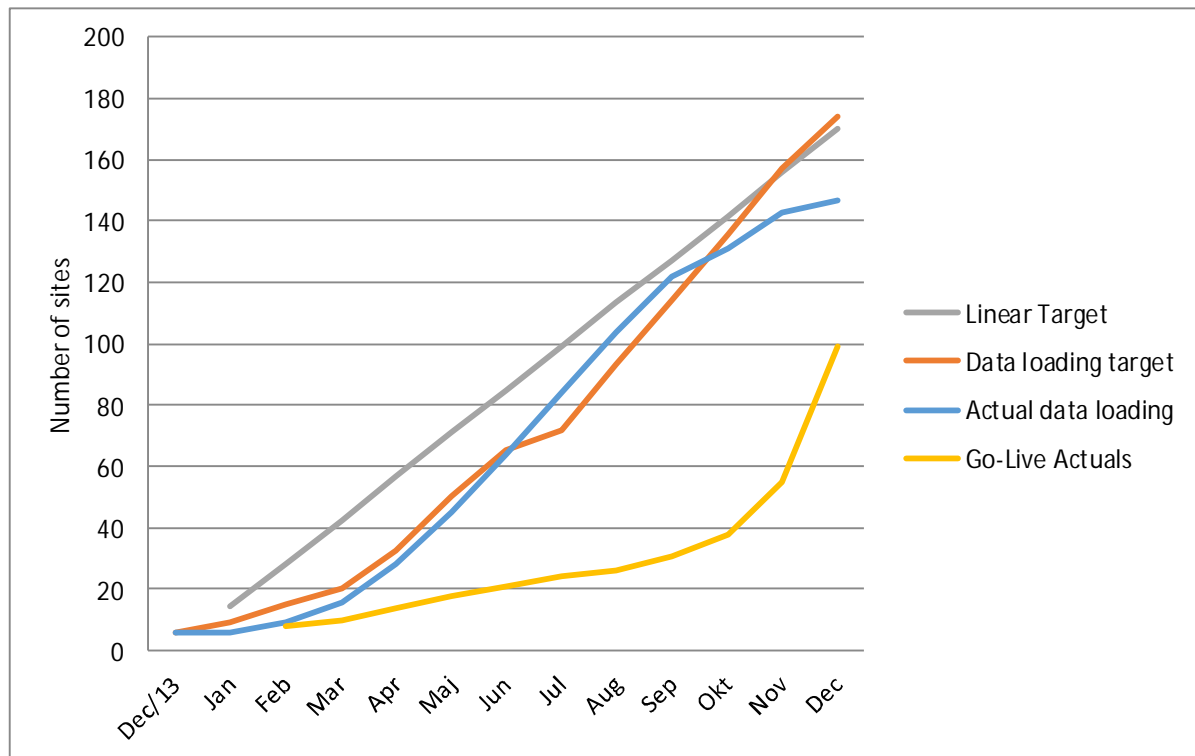


Figure 33. Targeted and actual data loading/Go-live for 2014

So in retrospect the updated loading process did its job and we achieved good numbers and we could have reached the 170 target if we really wanted to, but then we wouldn't have had such a good Go-live rate as we had by the end of the year. The actual number of sites loaded at end of the year was 147 sites.

7.6 Data Quality

For fixing loading errors we decided to use email as the method of sending service requests to us. With service request we mean a request from end user to correct data errors that they have in the system for their installation. In some cases it's possible for end user to fix the errors without contacting us and of course that is something that we like since its reducing the workload for us. The down side is that we don't get any info regarding this and then it might be that the same errors gets replicated to some other installation. So in

order to have some idea how happy the end users are with our system and the data quality we sent out a global questionnaire with a few question regarding the Maximo system and how happy they are with it. This questionnaire was done together with the Maximo Application team in charge of development and support for the system.

7.6.1 Loading and specification errors

The follow up on errors in loaded data were done by counting and analysing the service request we received through email. We separated them valid ones into 2 different groups, loading errors and specification errors. Loading errors group contains all the errors (source data, application caused errors and human errors) caused by us or our consultants. The specification errors include all the errors that was caused due to end users providing us wrong data from the start. Below are the received service requests per month.

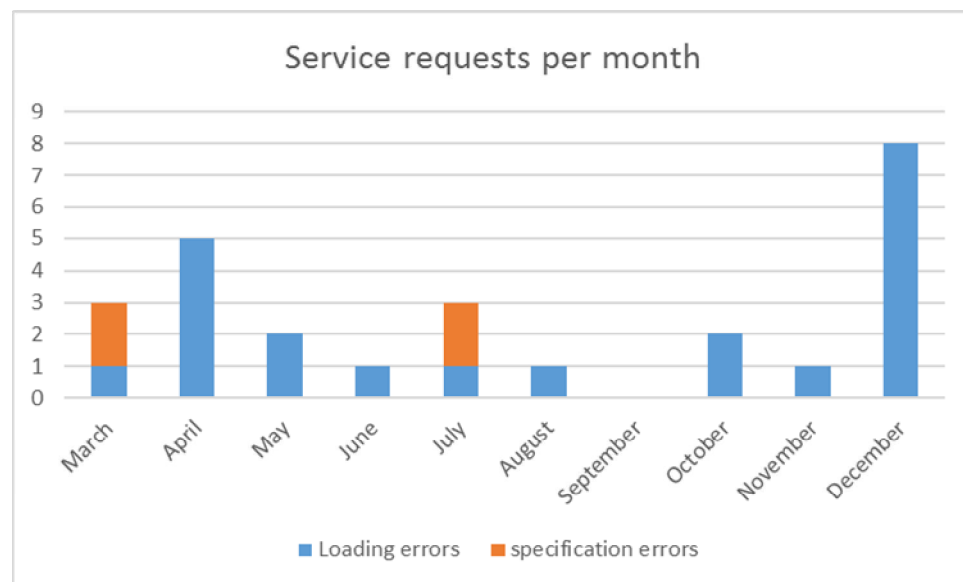


Figure 34. Number of service requests per month

The number of service requests per month have been on quite a stable level the year through except in December when there was an increase. We noticed that many of the service requests in December were regarding installations loaded much earlier in the year but hadn't been taken into use due to high work load by the responsible persons. We find the number of requests to be on an acceptable level so those will not lead to any major changes. However we were not satisfied with the system of receiving service request to email, since we noticed that it was very hard to keep track on since the one opening up a request just sent it randomly to one of our 4 core team members, so it's very hard to keep

track on the service request. We have decided to change the system of receiving service request and this will be presented more under section “8 FUTURE DEVELOPMENT”.

7.6.2 Global Questionnaire

In June 2014 we sent out a questionnaire (Appendix 9 - Maximo deployment survey) to 18 sites globally that were already using Maximo. It was just 5 general questions, nothing too specific and a comment field where they could give specific feedback. We had a response rate of 70% (13/18 sites). Below are the 5 questions with scores (1-10, 10 being the most positive):

1. Do you think Maximo is helping you in a better way to organise your Maintenance Management Activity?
Score: 6.8/10

2. Did you/your site personnel get enough training?
Score: 8.4/10

3. Was the training to your satisfaction?
Score: 8.8/10

4. Are you getting enough support from your Maximo key user when facing problems in Maximo?
Score: 9.3/10

5. Overall satisfaction with data quality in Maximo system?
Score: 7.9/10

For the commentary fields we got several interesting comments and the 3 most common of them were the following:

- System slow due to poor internet connectivity at site (5 sites)
- System interface could be improved (3 sites)
- Training material could be improved (3 sites)

So for the questions relating to Maximo deployment (training and data quality) the results were ok. We were happy with those figures. The training material could be improved, we already knew about that but the comments regarding the same just showed us that also the end users have noticed the training material.

7.7 Results summary

To try to summarize the results. The purpose of the thesis was to improve both the speed and the cost of loading and also manage the risks. The process was improved mainly through streamlining and the risk analysis.

For the streamlining part the below figure shows what cornerstones were planned to be implemented and the status at the end of the measuring period. There are a few that are still ongoing and are planned to be done during 2015 but for the error proofing cornerstone we feel that it will more or less be something we will work with for a long time, that there will always be something in this kind of process that can be better “error proofed”.

#	Step	Review	End Result
1	Bureaucracy elimination		
2	Duplication elimination		
3	Value-added assessment	X	Implemented
4	Simplification	X	Implemented
5	Process cycle-time reduction	X	Implemented
6	Error proofing	X	Still ongoing
7	Upgrading	X	Implemented
8	Simple language	X	Implemented
9	Standardization	X	Still ongoing
10	Supplier partnerships	X	Implemented
11	Big picture improvement		
12	Automation and/or mechanization	X	Still ongoing

Figure 35. Review of planned streamlining cornerstones and their status

So for the 3 the goals of the thesis, speed, cost of loading and risk management the summary is:

Speed of loading: The overall hours per site spent were reduced, maybe not reduced as much as we would have hoped but we are still satisfied with the results.

Cost of loading: The average cost of loading the sites reduced a lot and we are were satisfied with the results since we got the price set to a very good fixed rate.

Risk Management: For the risk analysis, the identified risks were overall reduced and the most critical one was more or less eliminated from being a risk to the process.

8 FUTURE DEVELOPMENT

The plan is for the Maximo deployment teams to end their work during 2015. What this means, is that all already existing installations will be reviewed and of those we will load all to Maximo where we see an added value of using the system. When an area has been reviewed and loaded all of their already existing installations that area deployment team will be closed down.

When the area deployment teams are closed down we will go into what we call operational mode, meaning that the whole deployment process will evolve into something that will work with much less people. For the data loading process itself we don't expect much changes to happen.

8.1 Unfinished tasks and development

There were a few improvements and developments that were planned to be completed during the measuring period but weren't. So these are still ongoing and are being worked on for completion as soon as possible. The following task improvements and developments are currently still ongoing:

1. Finalise the development work to get loading tools and scripts ready for the Citec AUX data loading. Due to problems with the source data from Citec and also due to having very few sites (5 sites) loaded we have still yet not been able to get a standard way of loading the data into place. This is however being worked on currently and we hope to have it ready by end of Q2 2015. We have much more of these sites waiting to be loaded in 2015 so we should be able to work out a standard way of loading and thus also be able to train more people in doing this task and not only the 1 person from consultant firm side that is currently sitting on all the knowledge on how to do the loading task.
2. **New version of Excel data loading template.** We noticed that loading data through the Excel data loading templates were often very time consuming and expensive. One of the reasons being a lot of human errors when filling in the data into the template and the other being changes done to the template itself when filling in the data. The first is impossible to eliminate and thus is something we

need to live with but the other we think that we can solve by doing a new version of the Excel data loading template. The idea was to gather a few people from all the parties (the ones filling the data, our consultants and our own department) and sit down and make a template that fulfils everyone's needs so that there will be no reason to change the template later on when filling in data. Once we have agreed on a format for the new template we will also lock the columns in the template so that it will be impossible to add or remove columns. This will hopefully eliminate many of the problems we have faced earlier.

8.2 Future improvements and development

Since the Maximo deployment organization will cease to exist in current format latest by end of 2015 there will of course be a need to do a few changes. This combined with a few things we think could still be improved in the process we came up with some improvement targets for 2015:

1. **“Productify” the Maximo deployment.** Meaning that we need to think about how the process of loading installations will work after the deployment organization cease to exist. The idea is to package all the parts of the process Phase 1-3 into an even tighter loading package and reduce as much as possible of the back office coordination. This only still exists in our heads as a few ideas but during 2015 it will become reality.
2. **New error monitoring system.** During 2014 our way of doing error correction to the loaded data was that when the end user noticed an error he contacted one of us by email. We noticed that even though this worked it was almost impossible to follow up in a proper way. We noticed that they usually sent the emails to different persons all the time and didn't have any other people in copy so since there were 4 different people that were receiving emails the requests were scattered all over. We decided that we would implement a new way of working and take into use a new system to follow up on the data loading errors. The plan is to start using a module in Maximo to do the follow up. An end user can create an SR (service request) ticket in Maximo where they describe the error. Since all request will be collected at one place we can do a better follow up, even prioritize

and sort the tickets. This will hopefully reduce or workload and improve the data quality and give us a way of following up the amount of corrections that are done on a monthly basis.

9 CONCLUSION

The conclusion is that the set up improvement goals were achieved even though a few process improvements are still ongoing.

I personally learnt a lot during this thesis and the 2 things that sticks out as most important to me was the risk management and business process improvement theory parts. Even though you can do a lot of improvements already with just plain old common sense you will still get lots of new ideas when diving down into the theoretical jungle of risk assessment and business process improvement. The risk severity matrix, risk assessment checklist, skills matrix and the streamlining cornerstones are things that I will never forget and feel that I will have a lot of use for in future work.

When thinking about what have could be done better I think that the main thing that pops out for me is the service requests for data loading errors could have been followed up in a better way, that we would have needed to have a better framework and guidelines in place to enable us to backtrack, analyse and categorize the errors we have had. This is something that we will rectify during 2015 when the new error monitoring system will be taken into use.

If someone would continue on this thesis to make it even more comprehensive or to improve the process even further then I suggest looking into the data loading scripts and tools. I feel that there is a lot that could be improved and automated with that part but to really understand how those work you would need to have a deep knowledge into how both the scripts and tools are built up and how the integrations between different tools work.

10 REFERENCES

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- ⁱⁱⁱ http://en.wikipedia.org/wiki/Business_process_improvement (2.3.2015)
- ^{iv} <http://www.mtcglobal.com.sg/services/research> (9.4.2015)
- ^v DR. H. J. Harrington (1991). Business Process Improvement. Ernst & Young, San Jose, California
- ^{vi} http://en.wikipedia.org/wiki/Risk_management (5.3.2015)
- ^{vii} Project Management Fundamentals (2005-2013). International Institute for Learning INC, New York

APPENDIX 2 - Phase 2 rollout document template



Check list for Maximo Rollout (landbase)

Please fill in this form as accurately as possible, fields marked are mandatory fields.
 Note that many of the fields have a menu, so you don't need to type in the answers manually.

Contract Details			
Customer Number:		Customer Name:	
Base Currency Used:		Agreement Type:	
Area:		Service Unit:	
Planning Center:		First Day of Week:	
Installation Number:		Installed Power:	MW
Installation Name:		Country:	

CEMUM Usage				
Maintenance Management				
Amos Module	In use?	Amos/Cemum Activities	In Use?	Frequency (how often)
Work Orders		Run Hour Reporting		
Work Planning		Work Order Reporting		
		Measurement Records (as attachments)		
		Work Requisition		
		Unplanned Work Reporting		

Are you Sharing or Lending "Inventory Items/Rotating Assets" with other Installations?

Installation number	Installation Name	Installation number	Installation Name

Inventory Quantity Management				
System Used				
Amos Module	In use?	Amos/Cemum Activities	In Use?	Frequency (how often)
Stock Items		Performing Stock take		
Purchase Forms		Parts Issuing		
		Trough Storekeeper		

Amos Inventory top Location to be Used as Default Storeroom in Maximo

Support Functions	
Amos Module	In use?
Rounds	
Components/Hierarchy	
Functions/Hierarchy	

Maximo Implementation Risk Assessment Questionnaire	
<i>Purpose: To identify possible risks that could impact the implementation of Maximo to your contract(s).</i>	
Contract	
Customer Contract Closing date	
Is the contract with the customer stating what maintenance management and/or inventory management systems are to be used?	
Is the contract specifying customized customer reports(s)?	
Does the customer need to have access to maintenance management system?	
Data	
Is current maintenance management and inventory system used systematically and the data for all activities entered into the system?	
Have you had issues with data quality of the current system?	

Key User				
Maintenance Planner				
2nd Maintenance Planner	-			
Plant Manager				
Operations Manager				
Maintenance Manager				
Site Warehouse Manager				
Technical Support / Op. Analyst (WOTS)				
Env. Health and Safety Officer				
Plant Supervisors (Operations Lead)				
	-			
	-			
	-			
	-			
	-			

Team/Group (If only one group, use this otherwise use the other groups)	HOD-Team Manager	Team Lead			
	Shift Supervisors (Team Leaders)				

For more rows click on the + sign on the left

Team/Group (Optional)	HOD-Team Manager	Mechanical			
	Shift Supervisors (Team Leaders)				

For more rows click on the + sign on the left

Team/Group (Optional)	HOD-Team Manager	Electrical			
	Shift Supervisors (Team Leaders)				

For more rows click on the + sign on the left

Team/Group (Optional)	HOD-Team Manager	Instrumentation			
	Shift Supervisors (Team Leaders)				

For more rows click on the + sign on the left

Store Keepers	Stores Management				
	Stores Management				
	Tools Management				
Site W/S					
Workshop supervisor (Team Leaders)					
Off-Site W/S					
Workshop supervisor (Team Leaders)					
Logistics Coordinator					

People Competence and Roles				
Role	Name	Can create Inv. Usage Document?	Virtual/Physical?	Approve Work Orders? Yes/No
Contract Manager				
Key User				
Maintenance Planner				
2nd Maintenance Planner	-			
Plant Manager				
Operations Manager				
Maintenance Manager				

	-						
	-						
Team/Group	Electrical						
HOD-Team Manager	-						
Shift Supervisors (Team Leaders)	-						
	-						
	-						
	-						
	-						
	-						
	-						
	-						
	-						
	-						
	-						
	-						
Team/Group	Instrumentation						
HOD-Team Manager	-						
Shift Supervisors (Team Leaders)	-						
	-						
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	-						
	-						
	-						
	-						
	-						
	-						
	-						
Store Keepers Stores	-						
Store Keepers Stores	-						
Store Keepers Tools	-						
Site W/S	-						
Workshop	-						
Off-Site W/S	-						
Workshop supervisor (Team Leaders)	-						
Logistics Coordinator	-						

APPENDIX 3 - Excel timesheet follow-up

Site Name	
Installation number	

Task	Description	Comments	Total Actual Work hours	Area Deployment Manager	Area Key User	Contract Manager	Planner
	PHASE 1 - PREPARATION						
10	Identify Prerequisites						
	1. Introduce Maximo and deployment plans to planner and CM						
	2. Identify deviations from normal way of working (eg contract specific requirements)						
	3. Identify key stakeholders to the contract						
20	Complete planning for rollout document						
40	Review of data in old system						
	1. Review data quality in old system (create query) - if applicable						
	2. Coding of parts						
50	Training Plans						
	1. Training approach (live vs at site)						
	2. Mapping of roles (contract stakeholders->Maximo)						
	3. Training plan (high level)						
60	Cost and change management planning						
	1. Implementation cost estimate						
	2. Change management plan						
70	Write and distribute communication plan						
	1. Write communication plan						
	2. communication to customer						
80	Risk planning						
	1. Risk mitigation plan						
	2. Roll-back plan						
90	Success targets and measurements						
100	Post go-live support plan						
	PHASE 3 - GO LIVE / TRAINING / SUPPORT						
220	Manual check of location hierarchy completeness						
240	Arrange kick-off meeting						
250	Perform Training						
260	Create Labours						
	1. Create Labours						
	2. Create PM Hierarchies						
	3. Verify "last done dates"						
265	GO LIVE @ site						
280	Update system data						
290	Post go-live checks						
300	Post go-live monitoring and support						
310	Closing						

APPENDIX 4 - Original data loading process, task responsibilities

Wärtsilä Site Set up Responsibilities	Wärtsilä	Consultants	Responsible	Finished Date
<i>Prerequisites</i>		- Verify that Currency Code exists - Create new Company sets	Cons.1	4.10.2013
<i>Creating an Organization</i>	- Send Consultants information package about new site - Provide asset installation date to Consultants - Send other external data to Consultants - Send AMOS (csv file) to Consultants	Create new organization - Create General Ledger Account - Deactivate GL Validation	Cons.1 Cons.2	4.10.2013 5.11.2013
<i>Supporting base data</i>		- Import data into staging area - Manually create organization supporting base data: calendar, crafts, qualifications, failure codes, hazards, work type, addresses - Set-up autonumbering system - Create new site under Organization	Cons.2 Cons.2	5.11.2013 5.11.2013
<i>Creating the Site</i>				
<i>Site specific base data</i>				
<i>Main Location</i>		- Manually create site specific base data, items under section Main Location - Inform that new site has been created	Cons.2	5.11.2013
<i>Security Group</i>		- Create new site security group with same name and access to the site.	Cons.2	5.11.2013
ENGINE CREATION				
Location and Asset Template option				
	- Send data in Excel template for Consultants about site assets, location, rotating items etc. (File name: ...engine location template and SPN as rot items - EPN add-on.xlsx)		Pers.1	17.9.2013
<i>Preparation tasks</i>		- Create Rotating item for engine - Create Engine assets - Run CR integration - Check amount of created items and inform Wärtsilä.	Cons.2	6.11.2013
	- Check number of created items correspond to amount of lines in SAP CR data		Pers.1	6.11.2013

			<ul style="list-style-type: none"> - Mark Rotating items. Use engine location template as reference. - Create Asset template and Location template - can be created based on the engine location template. - Inform Wärtsilä when created - Generate locations and assets - Perform "post generation tasks" - Visual verification of structure - check if there are assets in locations - Inform Wärtsilä when created 	Cons.2	6.11.2013
<i>Generating Locations and Assets</i>				Cons.2	6.11.2013
<i>CR Integration</i>			<ul style="list-style-type: none"> - Populate spare parts for the engine sub components using Associate Spare Parts action in Assets (SP) application - Inform Wärtsilä when created 	Cons.2	6.11.2013
<i>Non-engine locations and assets</i>			<ul style="list-style-type: none"> - Import non-engine locations and assets through script Options: Landbased, Marine 2-stroke & Marine 4-stroke - Inform Wärtsilä when created 	Cons.2	7.11.2013
SPARE PARTS, INVENTORY, PM'S AND JOB PLANS					
<i>Companies</i>			<ul style="list-style-type: none"> -Import Companies through script -Inform Wärtsilä when created 	Cons.2	7.11.2013
<i>Storeroom</i>			<ul style="list-style-type: none"> -Create storerooms and mark one storeroom as default for the site -Inform Wärtsilä when created 	Cons.2	7.11.2013
<i>Items and Inventory</i>			<ul style="list-style-type: none"> -Import inventory and inventory balances through script -Inform Wärtsilä when created 	Cons.2	7.11.2013
<i>Spare parts</i>			<ul style="list-style-type: none"> -Import spare parts through script -Inform Wärtsilä when created 	Cons.2	7.11.2013
<i>PM and Job Plans</i>			<ul style="list-style-type: none"> - Prepare Import by running scripts until cross reference list is generated. - Send cross reference list to Wärtsilä to link job plans to the assets 	Cons.2	7.11.2013
			<ul style="list-style-type: none"> - Update cross reference list to link job plans to the assets 	Pers.1	8.11.2013
			<ul style="list-style-type: none"> -Import local PM's and Job Plans through script -Inform Wärtsilä when created 	Cons.1	8.11.2013
<i>Work Orders & Work Log</i>			<ul style="list-style-type: none"> - Run Work Order and Work Log scripts 	Cons.1	12.11.2013

<p>USERS, SECURITY AND START CENTER</p>	<ul style="list-style-type: none"> - Wärtsilä will check and import the users from SAP - Add new persons to the correct Person groups, set up Start Centers Data provided in the information package 			
<p>VERIFICATIONS, UPDATES AND CONSIDERATIONS</p>	<ul style="list-style-type: none"> -Import Meter readings Key users, planner and MMO: - Spot checks -Sign off loaded data 	<ul style="list-style-type: none"> -Update asset move date -Update needed Organization options -Verify loaded data and send information to Wärtsilä 	<p>Cons.1</p>	<p>12.11.2013</p>
<p>BEFORE GOING TO PROD ENVIRONMENT</p>	<ul style="list-style-type: none"> -Let Consultants know if PM & PM Forecast generation can be set up 	<ul style="list-style-type: none"> -Update PM dates/readings, inventory levels & prices, work order status & date 		
		<ul style="list-style-type: none"> - Set upt cron tasks for PM & PM Forecast generations 		

APPENDIX 5 - Original Phase 2 data loading process, task breakdown

Task	Description	Wärtsilä	Consultants	Email
110 Initiate data loading	Creating an Organization	<ul style="list-style-type: none"> - Send Consultants information package about new site - Provide asset installation date to Consultants - Send other external data to Consultants - Send AMOS (csv file) to Consultants 	<ul style="list-style-type: none"> - Create new organization - Create General Ledger Account - Deactivate GL Validation 	->
120 Prepare new site in Maximo	Creating an Organization		<ul style="list-style-type: none"> - Verify that Currency Code exists - Create new Company sets - Import data into staging area - Manually create organization supporting base data: calendar, crafts, qualifications, failure codes, hazards, work type, addresses - Set-up autonumbering system - Create new site under Organization 	
	Prerequisites			
	Supporting base data			
	Creating the Site			
	Site specific base data			
	Main Location		<ul style="list-style-type: none"> - Manually create site specific base data, items under section Main Location - Inform that new site has been created 	<
	Security Group		<ul style="list-style-type: none"> - Create new site security group with same name and access to the site. 	
130 Send Engine creation data	ENGINE CREATION Location and Asset Template option			
140 Load Engine data	Preparation tasks	<ul style="list-style-type: none"> - Send data in Excel template for Consultants about site assets, location, rotating items etc. (File name: ...engine location template and SPM as rot.items - EPN addon.xlsx) 	<ul style="list-style-type: none"> - Create Rotating item for engine - Create Engine assets - Run CR integration - Check amount of created items and Inform Wärtsilä. 	->
150 Generate locations and assets	Generating Locations and Assets	<ul style="list-style-type: none"> - Check number of created items correspond to amount of lines in SAP CR data. Inform Consultants if OK 	<ul style="list-style-type: none"> - Mark Rotating items. Use engine location template as reference. - Create Asset template and Location template - can be created based on the engine location template. - Inform Wärtsilä when created - Generate locations and assets - Perform "post generation tasks" - Visual verification of structure - check if there are assets in locations - Inform Wärtsilä when created 	<-
	CR Integration		<ul style="list-style-type: none"> - Populate spare parts for the engine sub components using Associate Spare Parts action in Assets (SP) application - Inform Wärtsilä when created 	<-

	<i>Non-engine locations and assets</i>					
					- Import non-engine locations and assets through script Options: Landbased, Marine 2-stroke & Marine 4-stroke - Inform Wärtsiä when created	<
160 MAMA ON HOLD !!						
170 Load spareparts, inventory, PM's and job plans	SPARE PARTS, INVENTORY, PM'S AND JOB PLANS					
	Companies				- Import Companies through script - Inform Wärtsiä when created	<
	Storeroom				- Create storerooms and mark one storeroom as default for the site - Inform Wärtsiä when created	<
	Items and Inventory					
	Spare parts				- Import inventory and inventory balances through script - Inform Wärtsiä when created	<
	PM and Job Plans				- Import spare parts through script - Inform Wärtsiä when created - Prepare Import by running scripts until cross reference list is generated. - Send cross reference list to Wärtsiä to link job plans to the assets	<
180 Update Crossreference						<
190 Finalize Loading					- Update cross reference list to link job plans to the assets	>
	Work Orders & Work Log				- Import local PM's and Job Plans through script - Inform Wärtsiä when created - Run Work Order and Work Log scripts	<
	VERIFICATIONS, UPDATES AND CONSIDERATIONS					
195 Disable old MAMA system					- Update asset move date - Update needed Organization options - Verify loaded data and send information to Wärtsiä	<
197 Backups, Archive MAMA Data						
200 Creation of User accounts to Maximo	USERS, SECURITY AND START CENTER				- Import Meter readings Disable old system (if applicable) - Wärtsiä will check and import the users from SAP - Add new persons to the correct Person groups, set up Start Centers Data provided in the information package Create meter reading template and send to key user Key users, planner and MMCO: - Spot checks - Sign off loaded data	
210 Create / Update Meter reading template						
215 Dataloading site handover to Area.						
	BEFORE GOING TO PROD ENVIRONMENT				- Update PM dates/readings, inventory levels & prices, work order status & date	>
						<
					- Let Consultants know if PM & PM Forecast generation can be set up	>
					- Set up cron tasks for PM & PM Forecast generations	<

APPENDIX 6 - Phase 2.1 data loading process, task breakdown

Task	Description	Wärtsilä	Consultants	Email
110 Initiate data loading	<i>Creating an Organization</i>	<ul style="list-style-type: none"> - Send Consultants information package about new site - Provide asset installation date to Consultants - Send other external data to Consultants - Send data in Excel template for Consultants about site assets, location, rotating items etc. (File name: ...engine location template and SPN as rot items - EPN addon.xlsx) 	<ul style="list-style-type: none"> - Create new organization - Create General Ledger Account - Deactivate GL Validation 	->
120 Preapre new site in Maximo	<i>Creating an Organization</i>		<ul style="list-style-type: none"> - Verify that Currency Code exists - Create new Company sets - Import data into staging area 	
	<i>Supporting base data</i>		<ul style="list-style-type: none"> - Manually create organization supporting base data: calendar, crafts, qualifications, failure codes, hazards, work type, addresses - Set-up autonumbering system - Create new site under Organization 	
	<i>Creating the Site</i>			
	<i>Site specific base data</i>			
	<i>Main Location</i>		<ul style="list-style-type: none"> - Manually create site specific base data, items under section Main Location 	
	<i>Security Group</i>		<ul style="list-style-type: none"> - Create new site security group with same name and access to the site. 	
140 Load Engine data	<i>Preparation tasks</i>		<ul style="list-style-type: none"> - Create Rotating item for engine - Create Engine assets - Run CR integration - Check amount of created items and inform Wärtsilä. 	<-
150 Generate locations and assets		<ul style="list-style-type: none"> - Check number of created items correspond to amount of lines in SAP CR data. Inform Consultants if OK 		->
	<i>Generating Locations and Assets</i>		<ul style="list-style-type: none"> - Mark Rotating items. Use engine location template as reference. - Create Asset template and Location template - can be created based on the engine location template. - Generate locations and assets - Perform "post generation tasks" - Visual verification of structure - check if there are assets in locations 	
	<i>CR Integration</i>		<ul style="list-style-type: none"> - Populate spare parts for the engine sub components using Associate Spare Parts action in Assets (SP) application - Inform Wärtsilä when created 	<-

160 MAMA ON HOLD !!			- Send AMOS (csv file) to Consultants		->
170 Load spareparts, inventory, PM's and job plans	SPARE PARTS, INVENTORY, PM'S AND JOB PLANS Non-engine locations and assets				
	Companies			- Import non-engine locations and assets through script Options: Landbased, Marine 2-stroke & Marine 4-stroke -Import Companies through script	
	Storeroom			-Create storerooms and mark one storeroom as default for the site	
	Items and Inventory			-Import inventory and inventory balances through script	
	Spare parts			-Import spare parts through script	
	PM and Job Plans			- Prepare Import by running scripts until cross reference list is generated. - Send cross reference list to Wärtisliä to link job plans to the assets	<-
180 Update Crossreference				- Update cross reference list to link job plans to the assets	->
190 Finalize Loading				-Import local PM's and Job Plans through script	
	Work Orders & Work Log			- Run Work Order and Work Log scripts	
	VERIFICATIONS, UPDATES AND CONSIDERATIONS			-Update asset move date -Update needed Organization options -Verify loaded data and send information to Wärtisliä	<-
200 Creation of User accounts to Maximo	USERS, SECURITY AND START CENTER			- Wärtisliä will check and import the users from SAP - Add new persons to the correct Person groups, set up Start Centers Data provided in the information package Create meter reading template and send to key user Key users, planner and MMCO: - Spot checks -Sign off loaded data	
210 Create / Update Meter reading template					
215 Dataloading site handover to Area.	BEFORE GOING TO PROD ENVIRONMENT			-Update PM dates/readings, inventory levels & prices, work order status & date -Let Consultants know if PM & PM Forecast generation can be set up	
					->
				- Set up cron tasks for PM & PM Forecast generations	<-

APPENDIX 7 - Phase 2.2 data loading process, task breakdown

Task	Description	Wärtsilä	Consultants	Email
110 Initiate data loading	Creating an Organization	<ul style="list-style-type: none"> - Send Consultants information package about new site - Provide asset installation date to Consultants - Send other external data to Consultants - Send data in Excel template for Consultants about site assets, location, rotating items etc. (File name: ...engine location template and SPN as rot items - EPN addon.xlsx) - Send AUX data Citec or Excel template data 		->
(OPTIONAL)	Creating an Organization		<ul style="list-style-type: none"> Create new organization - Create General Ledger Account - Deactivate GL Validation 	->
120 Preapre new site in Maximo	Prerequisites		<ul style="list-style-type: none"> - Verify that Currency Code exists - Create new Company sets 	
	Supporting base data		<ul style="list-style-type: none"> - Import data into staging area - Manually create organization supporting base data: calendar, crafts, qualifications, failure codes, hazards, work type, addresses - Set-up autonumbering system - Create new site under Organization 	
	Creating the Site			
	Site specific base data			
	Main Location		<ul style="list-style-type: none"> - Manually create site specific base data, items under section Main Location 	
	Security Group		<ul style="list-style-type: none"> - Create new site security group with same name and access to the site. 	
140 Load Engine data	Preparation tasks		<ul style="list-style-type: none"> - Create Rotating item for engine - Create Engine assets - Run CR integration - Check amount of created items and inform Wärtsilä. 	<-
150 Generate locations and assets		<ul style="list-style-type: none"> - Check number of created items correspond to amount of lines in SAP CR data. Inform Consultants if OK 		->
	Generating Locations and Assets		<ul style="list-style-type: none"> - Mark Rotating items. Use engine location template as reference. - Create Asset template and Location template - can be created based on the engine location template. - Generate locations and assets - Perform "post generation tasks" - Visual verification of structure - check if there are assets in locations 	
	CR Integration		<ul style="list-style-type: none"> - Populate spare parts for the engine sub components using Associate Spare Parts action in Assets (SP) application - Inform Wärtsilä when created 	<-

APPENDIX 8 - Phase 2.2 rollout document template



Check list for Maximo Rollout (marine)

Please fill in this form as accurately as possible, fields marked are mandatory fields.
 Note that many of the fields have a menu, so you don't need to type in the answers manually.

Contract Details			
Customer Number:		Customer Name:	
Base Currency Used:	EUR	Agreement Type:	
Area:		Service Unit:	
Planning Center:		First Day of Week:	
Installation Number:		Installed Power:	MW
Installation Name:		Country:	GLOBAL
		Proposed Implementation Date:	
Estimated Annual Licensing Fees			
Number of Total Users:	2	Required Licenses:	0
Price Group:	#REF!	Price Group Cost:	#REF!
		Excess User Fee:	#REF!
		Licensing Costs:	#REF!

Maximo Implementation Risk Assessment Questionnaire	
<i>Purpose: To identify possible risks that could impact the implementation of Maximo to your contract(s).</i>	
Contract	
Customer Contract Closing date	
Is the contract with the customer stating what maintenance management and/or inventory management systems are to be used?	
Is the contract specifying customized customer reports(s)?	
Does the customer need to have access to maintenance management system?	
Network connectivity	
Is the site connected to internet?	
Is the internet connection stable, no connection outages during the working day?	
Can the network connection be used for live meetings?	
Training facilities at site	
Have the contract planner received Maximo training?	
Can the training be given in English language?	

Engine Order and Serial Number			
Fill in the correct order of each engine			
Engine Order	Ref. Type	Engine Serial Number	Fuel Type
6011 Engine 1			
6021 Engine 2			
6031 Engine 3			
6041 Engine 4			
6051 Engine 5			
6061 Engine 6			
6071 Engine 7			
6081 Engine 8			
6091 Engine 9			
6101 Engine 10			
6111 Engine 11			
6121 Engine 12			
6131 Engine 13			
6141 Engine 14			
6151 Engine 15			
6161 Engine 16			
6211 Engine 21			
6221 Engine 22			
6231 Engine 23			
6241 Engine 24			
6251 Engine 25			
6261 Engine 26			
6271 Engine 27			
6281 Engine 28			
6291 Engine 29			
6301 Engine 30			
6311 Engine 31			
6321 Engine 32			
6331 Engine 33			
6341 Engine 34			
6351 Engine 35			
6361 Engine 36			

MAXIMO DEPLOYMENT SURVEY

Site Name:
CM Name:

1
 2
 3
 4
 5
 6
 7
 8
 9
 10

Very negative > Barely Positive > Somewhat Positive > Mostly Positive > Very Positive

1 Do you think Maximo is helping you in a better way to organise your Maintenance Management activity?

1	2	3	4	5	6	7	8	9	10

2 Did you / your site personnel get enough training?

1	2	3	4	5	6	7	8	9	10

3 Was the Training to your satisfaction?

1	2	3	4	5	6	7	8	9	10

4 Are you getting enough support from your Maximo key user when facing problems in Maximo?

1	2	3	4	5	6	7	8	9	10

5 Overall satisfaction with data quality in Maximo system?

1	2	3	4	5	6	7	8	9	10

Comments(If any):
