DELFT UNIVERSITY OF TECHNOLOGY

A Proposal and Selection of a Document Management System for Staatsolie Suriname

Final Thesis Project Report

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Dedication

I would like to dedicate this thesis to my family.

To my mother, Diana, who has imprinted us with the importance of an education. She has supported us, cared for us, and made us into the strong women we are today. All this she did as a single mom. Never complaining and never showing how hard this must have really been for her. Throughout my research she has encouraged me to continue when I was ready to give up. Without her constant encouragements and support I would not have finished this thesis.

To my two sisters, Nathalie and Nicole, who have both scolded me for my lack of interest in finishing my thesis, on numerous times. Nathalie always being the responsible one and a strong woman I can look up to. The one that stepped in when I showed a lack of initiative to acquire a thesis project and helped me obtain an internship in the company she works at. Nicole with her carefree personality can always see the fun and comic stuff in any situation. Without them I would be overly stressed out by now.

And finally I'd like to dedicate this thesis to my Grandfather, Anton. Sadly he isn't here anymore and will not see me graduate. But without his financial support and only accepting the best from us, I would have never been able to further my studies. He was the support pillar in my family and the father figure for me and my sisters. I can never forget the proud smile on his face when one of us had achieved something. And I know if he were around today that smile would again be present now.

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Abstract

The documentation process at Staatsolie refinery concerning the Test and Inspection turnaround (T&I), has many shortcomings. This fact has led to many problems during the T&I, a process that has a strict timeline and schedule that is very work intensive. During a T&I turnaround which takes place every 4 years, the plant at Staatsolie refinery is shut down. This costs money, because normal work is ceased. The fact that the documentation process has many shortcomings is therefore a crucial problem, because it has contributed to many documents not being created or documents gone missing. It has also contributed to the T&I getting behind schedule, which is a loss of money for Staatsolie. Furthermore it has hindered the creation of reports that need to be archived and accessible for at least 2 years.

What the T&I turnaround requires is the ability to manage, store and share the documents acquired during the turnaround in a fast and reliable way. This can be achieved by using an information system, more specifically an Electronic Document Management System (EDMS). Such a system should allow users to store, access and modify information quickly and easily.

The aim of this thesis is to select an EDMS for the T&I turnaround. This EDMS should allow users to store, access and modify information quickly and easily, and thus aid in keeping to the T&I schedule. It should also thoroughly remove the problem of missing documents or documents not being created.

The start point of this thesis is an analysis of the T&I organization and the documents involved in the processes, to get a general idea of the working methodologies and deficiencies of the current system. These findings will then be used to set up a thorough requirements specification for a selection of an EDMS for the T&I turnaround.

After the analysis has been made, this report will go on to evaluate and select the right tool for use at the refinery of Staatsolie.

This evaluation and selection process is conducted using a basic information framework for EDM systems. For this evaluation, the output from the analysis is used to create an official Request for Proposal (RFP). This RFP is then sent out to multiple vendors. The vendors that reply are then tested against the selection criteria that were created by the project group at Staatsolie.

Finally, a tool is selected and this vendor will then further design and implement this system for an effective Document Management System for the Test and Inspection turnaround.

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1. Introduction

1.1 Introduction

The refinery at Tout Lui Faut, a part of Staatsolie Maatschappij Suriname N.V. , has a Test and Inspection turnaround (Hereafter referred to as T&I) every 4 years. This year will be the third inspection since the birth of the refinery at Tout Lui Faut. These inspections are necessary because it is essential for everything to work properly at the plant. During a turnaround, a lot of documents concerning equipment aging, deterioration, and operational influence ranging from pictures, drawings and inspection documents of the different Units are collected. These documents need to be processed and easily accessible for the creation of reports. All these Documents need to be archived in such a way that they can be easily found, edited, printed and removed by authorized users when needed.

The Documents and data of the previous T&I's at Tout Lui faut are all "somewhere" as most employees here say. Everyone knows where he or she could get certain information or who to go to for certain documents. But many authorized personnel don't have immediate access to documents they should have access to. Most information is found in Document Control, which is a part of the department, Maintenance Engineering and Document Control. They are all filed away neatly, but a closer inspection shows that a lot of documents are missing or were never created. Staatsolie has documented Guidelines for document control that should be followed organization wide. From the observations made here it hasn't been implemented.

Through this report, I propose an EDMS tool for the refinery of Staatsolie at Tout Lui Faut. The report consists of the analysis and tool evaluation and selection parts. During the analysis phase the goal will be to collect and gather the requirements of the EDMS tool for the organization selected. In this case the T&I organization. This requires an understanding of what the organization does and how it does it. Each group of users or business functional groups must be understood in sufficient detail to determine where and how documents or information impact these jobs. The documents, which carry the knowledge and work processes of the users, must be completely and clearly understood. The goal of the tool evaluation and selection phase is to evaluate vendors that meet Staatsolie's preliminary requirements and select only one that closely meets the requirements gathered during the analysis phase.

1.2 Problem Statement

The problems with documents mentioned in the introduction, are not inherent for the T&I organization alone. These problems are also evident at other departments. Several user groups, such as the department of Engineering, Maintenance Control Center and Public Relations at Staatsolie, have requested ICT support for a solution to improve the management of electronic documents.

From this information a clear problem definition, including the many problems all departments seem to have concerning document management was made:

Efficiency: It takes a long time (if possible at all) to find a document in the present situation, especially for new employees.

Knowledge Sharing: It is not clear which documents have been created in the past. Because of this, new documents are regularly created from scratch, while these could have been based on existing documents. As a result of this a lot of time is wasted.

Document flow: The business process cycles (creation – verification – modification – approval – etc.) related to all sorts of documents, are currently not enforced through a system. Because of this, defined standards for these processes set in the guidelines for document control by Staatsolie, are not followed.

From this information, Staatsolie formulated their problem as follows:

Staatsolie has an inefficient way of managing its electronic documents, making it difficult to keep track of documents, share knowledge and follow the guidelines set for document control.

The problem formulation for the T&I organization differs only slightly:

Staatsolie has an inefficient way of managing its electronic documents, making it difficult to keep track of documents during their periodic T&I turnarounds.

In order to reach the desired situation from the current situation we should keep in mind that there are some constraints. To give some insight into these constraints I have also formulated the following problem statement for the T&I organization:

How can we store and manage large amounts of documents of various types during our periodic T&I turnarounds in an efficient way.

1.3 Aims and Objectives of the Thesis

The aim of this thesis is to make an analysis of the business needs and processes of Staatsolie's T&I organization and the documents involved, and to select an EDMS tool that will support these needs.

Therefore I can formulate the objective as follows:

"To have reliable, correct and the latest version of documents available and enable improvement in efficiencies and document processing time drastically."

From this objective it becomes apparent that there are two options. Try and implement such efficient system, or do nothing and have the same problems faced with the two previous T&I's. Because an EDMS is such a complex system, not just any solution can be used. A closer look must be taken to comply with many laws, standards, guidelines and regulations. Also Staatsolie's mandated guidelines and standards must not be overlooked. Furthermore the needs of the users of the system should not be overlooked. These areas of research mentioned here will ensure that problems that will and can arise in the future, will be spotted on time and quick and efficient actions can be taken to steer the project back into the right direction.

The scope of this thesis is the T&I organization and the selection of an EDMS. Furthermore the system to be designed should take the following aspects into account:

- Identify current bottlenecks and specify user functional requirements for proper document life cycle. Workshop with key users to gather information on current problems/issues and specify a list of user functional requirements.

- Evaluation and proposal on package selection. Review short list of packages and perform product evaluation and advise preference.

- Prepare implementation of selected system. Advise on implementation rollout (transfer old documents vs. new documents), documentation conventions and rules, system use, functional setup

As mentioned before, several user groups throughout Staatsolie have requested ICT support for a solution to improve the management of electronic documents.

The system that will be implemented for the T&I, will serve as a demonstration for other user groups at Staatsolie. From here on out Staatsolie will decide if it will implement the EDMS companywide.

1.4 Limitations and Delimitations

- The system will only be focused on the management of T&I documents and not the records management of Staatsolie.

- The system will consider each document as an entity, and not as a possible group of information to be split.

- The system's language will be English and it will not be translated into Dutch not at present and also not in the future. Staatsolie uses English as its base language.

- At present, no immediate integration with other applications at Staatsolie will be considered. Still their will need to be looked at integration possibilities for future roll-out at all Staatsolie departments.

1.5 Outline of the Thesis

Chapter 1 provides an introduction, theoretical grounding and justification of this project. The purpose of the thesis is presented in addition to the main aims and objectives.

In Part A, a definition of what Electronic Document management is, is provided. This part discusses and presents the methodology that will be followed to do the analysis of the current system for information collection during the T&I along with the project plan.

Chapter 2 is an introduction into Electronic Document Management. In this chapter a clear definition of an EDMS is provided, and the evolution of document management is addressed. Furthermore the advantages and disadvantages of such a system are discussed and the differences of such a system compared to an Electronic Records Management System. Finally the laws, regulations and guidelines that need to be taken into account for an EDMS are presented.

Chapter 3 is an introductory coverage of the methodology to be used to implement an EDMS for Staatsolie's T&I organization. The chapter begins with an introduction to software development models and goes on to explain the waterfall model and the modified waterfall model. Then it introduces an EDMS methodology based on the waterfall model. This chapter concludes with a methodology based on the models and EDMS methodology explained. This methodology will be used throughout the project.

Chapter 4 concludes the first part of this thesis with the project plan to be used. Here the phases from the methodology to be used, in scope are worked out. The research methods and deliverables of each phase are also described.

Part B consists of the analysis phase of the project. During the analysis the business approach of the methodology by (Bielawski & Boyle, 1997) will be put to use. During this phase the organizational profile, the user profiles and the document profiles will be worked out. The results of the analysis from all the profiles shall be used to formulate the requirements for the tool evaluation and selection phase and later the design phase.

Chapter 5 provides an insight into the T&I organization. Here the T&I organizational charts are presented and explained. Top functions and processes will be identified and the business goal of this organization will be revealed.

Chapter 6 presents the actor analysis. In this chapter the types of users for the EDMS will be identified. The problem that the T&I organization faces, will be formulated again to get an idea of which actors are involved. Once the problem is formulated, an inventory of all the actors involved in the T&I organization will be made. The problem owner will be identified and for each actor their interests, and desired situation will be documented.

Chapter 7 addresses the documents in use during the T&I. First an inventory will be made of all the documents in use during the T&I. A final list including what type of documents we are dealing with and what type of relationships they have to each other will be presented. Furthermore this chapter will focus on the attributes of these documents. What metadata needs to be collected to structure the documents in the EDMS in the way that best fits the T&I organization. This chapter will also identify all processes during the T&I and the documents involved in them. For each process a flowchart will be presented and the flow of documents in the process will be explained.

Chapter 8 presents the final list of requirements. Here, it was taken into account that Staatsolie needs to comply with SOX law and needs to follow ISO 15489 standards if it wants to implement this EDMS company wide. Finally with the use of MoReq as guideline the list of requirements are presented.

Part C consists of the tool evaluation and selection phase of the project. During this phase, a project group worked together to turn the requirements from the analysis phase into an official Request for Proposal document. With a list of important criteria and a scoring system a final selection is made. This part closes of with the final remarks on the whole project.

Chapter 9 explains what an RFP is and what makes up such a form. It also explains why it should be used in the evaluation and selection process of the development of an EDMS. Furthermore this chapter presents us with the companies that were selected to receive such an RFP. This chapter concludes with the results of these RFP's.

Chapter 10 provides a list of criteria to use to evaluate the RFP's received. Furthermore a score is given to each criterion separately. Each tool will then be tested against this list of criteria and will be scored on how well each criterion is met. At the end of this chapter, each tool will have a final score. The final selection is made and it is explained why the vendor was chosen.

Chapter 11 concludes this thesis with the final remarks. In this chapter the problem statement will be formulated again. The aims and objectives will also be presented again. The results of this thesis will be presented in a clear structure. And finally, we will see if the problem has been solved with these results.

The references to the sources can be found in the Literatures section. And in the appendixes all information that is of relevance but not in this paper, can be found.

PART A – PROJECT APPROACH

2. Electronic Document Management Systems

2.1 Introduction

In an information intensive project, like the T&I, the document management can play an important role. The outcome of such a project is typically a set of documents that describe the developed product, re-engineered process, project to be delivered or in the case of the T&I results of the inspection. If the organization can define the documents needed during the many intermediate steps of the T&I processes and the documents that form the output of these processes, it can monitor the progress of the project using the document management system.

The problems that Staatsolie faces with their T&I turnarounds are not uncommon in organizations. Managing information is something all companies need to do.

Staatsolie has expressed their needs for implementing an electronic document management system (EDMS) to solve these problems.

The relevance of a study in the needs of an EDMS at Staatsolie Tout Lui Faut is pretty apparent. The study will be to see if an EDMS could be a solution and if so, what type of EDMS would suit the T&I turnaround best. Questions, like what do we understand by such a system and what laws and regulations need to be taken into account, will arise. All these need to be addressed.

2.2 Definition of Electronic Document Management Systems

What is an Electronic Document Management system exactly? Below I will write down a few descriptions by different sources of what en EDMS is:

An EDMS is not a single entity but rather a collection of different, converging technologies. (Bielawsky & Boyle)

It is the interaction of information and different users in a business process, combined with the technology that permits this interaction. (Bielawsky & Boyle)

DM systems are software products that provide support for effective document use by delivering controlled, location-transparent access to (and storage of) large volumes of documents. They can store, track, index and route (publish) documents. The control that DM systems offer over the documents in their charge is not limited to access control: they also track and control document changes. (Staunton et al.)

Electronic Document Management Systems are widely used in organizations to provide management and control over electronic documents. Many EDMS functions and facilities overlap with ERMS. EDMSs typically include indexing of documents, storage management, version control, close integration with desktop applications and retrieval tools to access the documents. (MoReq, 2008)

A document management system (DMS) is a computer system (or set of computer programs) used to track and store electronic documents and/or images of paper documents. (Wikipedia)

If we look at these definitions, we'll notice first that Bielawsky & Boyle have two definitions for an EDMS. The first one is descriptive. It states what such a system is made up of, and the second definition states what an EDMS is. This second definition differs from the two next descriptions in that it doesn't just see an EDMS as a means to provide management and control of documents, but rather as an interaction between information and different users in a business process. These two descriptions are purely functional. The definition by Staunton et al. defines an EDMS as a support system in helping its users effectively use documents. The last description can be seen as both analytical, as it explains what an EDMS is in the first part, and functional, as it explains what an EDMS does in the second part of the description.

As can be seen from the definitions above, there are many different ways of interpreting an EDMS. I will try and break this definition down by looking at the definition of each word in an EDMS.

First, to really understand what an EDMS is we need to define what a document is. In the American Heritage Dictionary, a Document is described as:

1. a written or printed paper that bears the original, official, or legal form of something and can be used to furnish decisive evidence or information. 2. Something, such as a recording or a photograph, that can be used to furnish evidence or information. 3. A writing that contains information. 4. A piece of work created with an application, as by a word processor. 5. A computer file that is not an executable and contains data for use by applications.

This is a global description of a document and not the concept of what a document is from an EDMS perspective. So let's now look at another definition, one more closely related to EDMSs, a definition by K. van der Meer is:

A document is any object which has the purpose or which is intended to be used for obtaining knowledge from the information it contains.

This definition does not differ much from the second part of our previous definition. It states that a document can be any object, so not just text files or writings on paper. Here we can already see that our definition has broadened. The last definition looked at is from Staunton et al. They state that:

A Document may be quite complex, having several content types, for example, graphs and photographic images as well as text. It also has attributes, for example, its date of issue, its revision number and its author. An electronic document may be published in different formats at different times. It may be compound; a single, viewed document may use information from other, linked documents.

This definition, defines a document as a complex object that not only has content but also attributes.

From these definitions I can now define a document analytically, functionally and constructively.

- Analytical: A Document contains information in many different content types and it contains attributes.
- Functional: A document has the purpose of furnishing evidence or information.
- Constructive: A document is created and maintained by someone with the intention of publishing its contents and eventually being viewed.

In chapter 1 it was stated that Staatsolie had many different types of information it needed to store during its periodic T&I inspection. This information was defined as pictures, CAD drawings, text documents and numbers. From the definitions of a document stated here, I can safely conclude that this information can be classified as documents.

Now that we know what a document is, we are a little closer to understanding what an EDMS is. The second word we need to define in context to EDMS is Management. What is the concept of management in an EDMS? Below is an assortment of definitions of what Management is:

"Management" (from Old French ménagement "the art of conducting, directing", from Latin manu agere "to lead by the hand") characterizes the process of leading and directing all or part of an organization, often a business, through the deployment and manipulation of resources (human, financial, material, intellectual or intangible). (Wikipedia)

The act, manner, or practice of managing; handling, supervision, or control (American Heritage Dictionary)

Wise use of means to accomplish a purpose. (Barron's Marketing Dictionary)

Effective utilization and coordination of resources such as capital, plant, materials, and labour to achieve defined objectives with maximum efficiency.

From these definitions I can find clues as to the definition of management in an EDMS environment. From all these definitions I can derive that management is a practice of handling, controlling, or using certain resources efficiently to obtain an objective. From the last definition we can also derive that management isn't just getting from point A to point B. It is getting there by choosing the best possible path.

Now let's define Management, analytically, functionally and constructively.

- Analytical: The definition of the American Heritage Dictionary can be used here.
- Functional: The purpose of management is to achieve defined objectives with maximum efficiency.

- Constructive: For management to be needed, an objective or goal is needed. Then the available resources can be managed. Management of the resources will be needed until the goals or objectives are reached.

Let us now look back at Staatsolie's objective, which I formed in the first chapter:

"To have reliable, correct and the latest version of documents available and enable improvement in efficiencies and document processing time drastically."

From this objective we can see that the problem with inefficiencies and time constraint can be nicely solved with the functional definition of management.

In (Maier & Rechtin) a system is described as:

A collection of things or elements which, working together, produce a result not achievable by the things or elements alone.

With this definition we can see that a system can be many things such as: Social system, collaborative system, an organization and even an EDMS.

Let me break it down. An EDMS consists of a collection of different, converging technologies, different types of documents, processes and people. These can be considered as the *collection of things or elements* in the system. Furthermore interaction between document processes and people need to be made. Also interaction between the different technologies used. This also follows the definition: *working together*. Furthermore with an EDMS you want to reach certain goals, and the many technologies, different documents and the people need to work together to reach them. As you can see this is the last part of the definition of a system. *Produce a result not achievable by the things or elements alone.*

Now that we've defined system, let's look at its definition from an analytical, functional and constructive point of view:

- Analytical: a system in the context of an EDMS consists of information, people, processes, and converging technologies.

- Functional: produce a result not achievable by the things or elements alone. That result in this case would be, efficient Management of documents.

- Constructive: the first stage of a system is its development. After its creation the system will need input for it to function, and to keep it functioning, all parts of the system must be managed.

As can be seen from the many definitions I've supplied in this chapter, the definition of an EDMS can mean so many different things to so many people. Nevertheless there are 4 major elements that should always be present to be considered an EDMS: Documents, people, processes and technology.

More and more industries are falling under the influence of legislation that requires specific procedures for record keeping. For example, all companies need to be able to prove that information is unaltered to comply with Sarbanes-Oxley.

For businesses in these more regulated industries, document management systems are by far the best way to ensure compliance with strict security and record-keeping rules. It's important to note that such systems only help an enterprise to become compliant, they don't guarantee it. But, the right procedures and behaviors do. ISO 9000/9001 certification efforts can also benefit from document management. Manufacturing and government are two sectors that pursue document management for these broader regulatory reasons.

Any EDMS will have some or all of the following features:

- *Creation:* When we talk about creation concerning EDMS we have to take into account two possibilities. Do we think of creation as the starting point of the document life cycle? Thus the making of a document in let's say a Microsoft Office application. Or do we think of the start of the document life cycle as it being ingested into the EDMS repository. Both are viable and can be considered the starting point of a document life cycle. Think for example of images and/or paper documents that aren't yet in the EDMS. These need to be scanned in (captured) and thus are ingested into the system. The EDMS will prompt the user to provide information for its appropriate storage. The life cycle of these types of documents in an EDMS start from the ingestion. Another example is of documents that are already in electronic format but not yet entered in the EDMS. Think of local documents that are stored on an individual's computer. These can be entered into the system, again, aided by storage information the user would provide. If we think of creation in the sense of the first possibility we must note that the creation of a document doesn't have to be by one individual. The creation of a document from scratch intended for the EDMS, could also be a collaboration of many individuals who take part in the creation process. Here the document will already be part of the EDMS even in an unfinished state, for the collaboration to take place. For this to be possible, the EDMS needs some integration possibilities with office tools like Microsoft Office applications or other editing/creating tools.

- *Conversion:* Between which types of formats should conversion be possible? Conversion is the act of converting one document's format to another, which allows the document to be read in many more applications. Documents can be converted into other source document formats, consumer formats and structured data. The conversion of the document is usually done by the EDMS when the document is ready to be stored in the repository. The task of converting scanned paper documents to useful electronic formats is one of the most important applications for document conversion. Documents, scanned to image formats have lots of limitations such as large file size, impossibility of context search and content reuse. So they should be converting to more useful formats such as read-only PDF or TXT, DOC, RTF, XLS, PPT if it should be editable.

- *Version Control:* This is the ability to track and manage multiple versions of the same information. This is quite an important aspect of an EDMS. In order to correctly manage the ongoing development of digital data it is necessary to create and correctly store multiple versions of data as it progresses through the system. An EDMS can manage version control in two ways. The EDMS can lock the document for other users, when in use, to ensure that only one user can access a document at any one time. Or in cases where it is necessary for several users to collaborate simultaneously on the same document, An EDMS could enable concurrent use. This is where a CVS system is essential. A CVS system allows concurrent access by storing a master copy of the document. In this way the users can make changes only to the most recent version. Multiple users can then submit their changes to the most recent version. This process is also known as checking in. The master copy remains unchanged during the whole process. Multiple users are expected to regularly use the update command of the software, which will refresh their copy of the document to incorporate the most recent changes. Versioning is useful for documents that change over time and require updating, but it may be necessary to go back to or reference a previous copy.

- *Workflow:* Most EDM systems have a built-in workflow module. There are different types of workflow. Manual workflow requires a user to view the document and decide who to send it to. Unfortunately, when documents are manually pushed through a process there is the risk that they can be lost or overlooked. Rule-based workflow allows an administrator to create a rule that dictates the flow of the document through an organization. For example to ensure that the document is forwarded to the appropriate user automatically at a specified time, alerting the user of the necessity to process it. Another type of workflow uses dynamic rules. Dynamic rules allow for branches to be created in a workflow process. A simple example would be to enter an invoice amount and if the amount is lower than a certain set amount, it follows different routes through the organization. A workflow system ensures the smooth flow of documents through the enterprise.

- *Search and Retrieval:* How will searching be handled? What can users search for? Individual electronic documents are assigned metadata to assist in their correct filing and tracking. Metadata typically includes the date of storage and the identity of the user storing it. In addition to these basic details, an EDMS can attach additional data to allow users to locate documents quickly using keyword searches. This additional data can be either from user input or automatic extraction from the document content. Documents must be indexed correctly to ensure that retrieval is possible.

- *Security:* Who has access to which documents? In any enterprise it is vital that the security of electronic documents is appropriately managed. An EDMS ensures that access to the system is restricted only to those with the correct access permissions, both to ensure the integrity of data and to reduce the number of documents presented to the user only to those documents that are relevant to his or her role.

- *Distribution:* A published document for distribution has to be in a format that cannot be altered. Once a document is distributed it becomes available to the users that have access to it.

2.3 Evolution of Document Management

The documents used during the T&I turnarounds have not undergone major changes since the start of these T&I's at Staatsolie Refinery. Plant drawings, workorders, etc., all look the same as they did from the first T&I. The technology for producing, managing, and distributing such documents, has however, undergone many fundamental changes (Björk, 2001).

In the 60's, the introduction of photocopying reduced the cost of duplicating information tremendously.

Only 20 years later, a technological revolution started with the introduction of technologies such as personal computing and software for word-processing. Mass use of CAD-systems and the fax became popular too. This introduction helped to reuse information to a greater extend then before.

Finally, in the late 80's and early 90's internet made possible the document transfer via mail, which was a great step for document management. Still it took a couple of more years to utilize this advancement, because companies were still dependent on manual systems using photocopying.

The development in network technology these days has reached a level where it is relatively easy for companies to offer services and improve their contents for relatively low costs. EDMS is one of such methods currently applied. In an EDMS, documents are stored centrally on a web server and users interact with this central repository through interfaces implemented using standard web browsers (Björk, 2002).

2.4 EDMS vs. Electronic Records Management Systems

At the refinery of Staatsolie it has been decided that the best move for the T&I, would be the implementation of an EDMS. Requirements for an EDMS are not as well documented as those of an Electronic Records Management System (ERMS). In fact, Standards for electronic document management systems are less formalized than ERMS standards. But let's go back a little, because I have yet to explain what an ERMS is.

ISO standard 15489: 2001 defines Records Management (RM) as the field of management responsible for the efficient and systematic control of the creation, receipt, maintenance, use and disposition of records, including the processes for capturing and maintaining evidence of and information about business activities and transactions in the form of records. AIIM expands this definition to include records of all types including those maintained in electronic format.

Another definition of an ERMS:

The management of electronic records is complex, requiring a large range of functionality to be implemented well. Clearly, a system to meet these needs – an ERMS – requires specialized software. This software may consist of a specialist package, a number of integrated packages, custom-designed software or some combination; and in all cases, there will be a need for complementary manual procedures and management policies.(MoReq, 2001).

So what are the differences between these two types of systems? It is noted that many EDMS functions and facilities do indeed overlap with ERMS. Some typical functions of EDMS are indexing of documents, storage management, version control, close integration with desktop applications and retrieval tools to access the documents. From these definitions of an ERMS and our previous definitions of an EDMS we can make the assumption that an EDMS can be seen as a more dynamic archive whereas an ERMS is somewhat static. After creation of a document or in the case of an ERMS, a record, it will be archived and not possible to edit until its disposition. In table 1, a couple of differences are shown between the systems (MoReq, 2001). With this knowledge, a thorough study will be done for what requirements for an ERMS should also be adapted for an EDMS. For this, a closer look will be taken at the MoReq specifications and the DoD 5015.2-STD.

Table 1: Differences of EDMS and ERMS

An EDMS…	An ERMS…
• Allows documents to be modified and/or exist in several versions	• Prevents records from being modified
• May allow documents to be deleted by their owner	• Prevents records from being deleted except in certain strictly controlled circumstances
• May include some retention controls	• Must include rigorous retention controls
• May include a document storage structure, which may be under control of users	• Must include rigorous record arrangement structure (the classification scheme) which is maintained by the administrator
• Is intended primarily to support day-to-day use of documents for ongoing business	• May support day-to-day working, but is also intended to provide a secure repository for meaningful business records

2.5 Advantages and Limitations of EDMS

Any growing company will one day feel the need for some kind of EDMS to control their ever-increasing number of various documents and drawings. But even with all the benefits such a system can provide, companies still often resist this urge and are deterred by the costs and complexity involved in implementing such a system. Using an EDMS effectively, requires a major change in working practices.

2.5.1 Advantages of EDMS

When looking for the benefits in an EDMS application, the tendency is to look at the distribution aspect alone. The first major advantage includes lower production costs for information products defined in terms of both dollar savings and reduced time investments for individual staff members.

Another advantage of the paperless distribution model is ease of access and maintenance. Electronic documents can be presented in several different forms or listed in custom tables of contents based upon user needs or the context in which the document might be used. Often a major reason for online distribution is to keep documents up to date.

A document management system can also become a document production and distribution system, even if the final product remains in paper. This frees the author from the rather mundane tasks of making sure the documents get printed and mailed, and the workflow engine can drive this process. On the authoring side, the workflow engine can also help to reduce the time it takes a document to get from one step in the production process to the next, or will support parallel reviewing, which can cut days or even weeks off the business processes or document cycle.

When all documents are properly cataloged and indexed, this provides the means to quickly and accurately find the desired information. This not only reduces the time spent searching, but the time spent re-creating it if it was not found. This effort can be enormous when information is recreated, either by simply re-keying or more often by being reworked. More importantly, if information in a usable form can be located quickly and easily, people in cross-functional teams can better share and collaborate; doing the things that add the most value, rather than simply shuffling electronic files back and forth.

The ability to reuse information, either directly or indirectly, allows organizations to begin to leverage corporate knowledge resources. Information can be reworked into guidelines for experienced operators, demonstrating a leveraging effect.

Another benefit of an EDMS is control over corporate knowledge contained within its documents. This allows for more complete regulatory compliance and enhanced document control and security.

2.5.2 Limitations of EDMS

On the other hand, there are also drawbacks. The problems and changes in working culture and practices, which is a requirement for a successful implementation of an EDMS, very often deter the users.

Implementing an EDMS solution only partially is one of the major risks. With so many benefits from the online distribution of document-based information, and the relatively low cost of related tools and technologies such as the Web, organizations often look at only this one aspect of the overall issue. They put documents online and provide access to them, while the creation and management aspects are ignored. Document distribution on the Web without some type of control is a serious issue for many organizations. Despite this issue, there is a much larger issue on the user side of EDMS applications. The user will lose confidence in the system, because they cannot trust the information online, this because the information in the repository is either incomplete or an outdated version of what they need. Once

this happens, the costs to regain their confidence, is several times more than the costs of implementing it in the first place.

Another risk involved with the implementation of an EDMS application is that the system will be driven by the documents instead of the users. This can result in high costs for training and support because the users will have to be taught how to use the system. Many systems have died at the implementation stage from not adequately addressing the users' needs up-front than from a poor implementation plan.

A very common risk with the implementation of an EDMS is information overload. Just making documents electronic will not help. Careful organization and presentation of these materials is very important. Searching must not take too long and users must be able to find what they need, whether the user is searching for one page, a folder containing transactions or a file. There are two ways a user could look for information, namely deterministically or probabilistically. A deterministic search is a search where the user knows what he's looking for. He knows for example the exact document name or the author of a document or a file number and needs to find that. The results are then exactly the document that is searched for, or if the search was for an author, all documents of that author or in the case of a file number all documents that are part of that file and thus have that file number. If information is just stored without any proper indexing this person would have to go through all the documents in the system to find a match. A probabilistic search on the other hand is a search where the user only knows a certain aspect of what he's looking for, the results of this search are usually documents that contain this certain aspect and are usually what the user was looking for, but not definitely. It is easy to see how such a search would be extremely difficult in a system that just makes the documents electronically available. An EDMS uses metadata to store information about documents. What metadata to use and the consideration of full text search, is of great importance to make it possible to be able to search both deterministically and probabilistically. If careful consideration is not taken here, the users of the system might not always find what they need. Focusing on the user, and not forcing them to wade through lots of unimportant information to complete a task, is crucial.

Lastly, there is the risk that users might find the advantages not outweighing the difficulty of use of the system.

2.6 Government Guidelines and Standards

As mentioned in the previous section, guidelines and standards for an EDMS are not as formalized as ERMS standards. Still, for a company to be compliant of today's standards and laws it is highly recommended to follow certain standards and laws of ERMS. In this section I will look at the standards and guidelines to look at for the functionality of an EDMS. They are the DoD 5015.2-STD a standard of the U.S. department of Defense, which was created in 1997 and the MoReq, a European specification. I will also look at the ISO 15489 and the Sarbanes Oxley act for the must have requirements of an ERMS to comply with appropriate national standards, laws, regulations, and related legal requirements.

2.6.1 DoD 5015.2 – STD

The U.S. Department of Defense's (DoD) Design Criteria Standard for Electronic Records Management Software Applications, better known as DoD 5015.2-STD, was created in 1997. Since then it has become the standard for government agencies and many private sector businesses. It is also the starting point for the European Union's Model Requirements (MoReq, 2001).

This standard is such a well-known standard in the ERM world that it will be hard to find someone who hasn't heard of it. But if asked what it covers, almost no one will be able to answer. This of course is normal, because it would be unrealistic to assume that software configured to a federal department's specifications would apply just as well to commercial enterprises.

The focus of the DoD 5015.2-STD is primarily for the military. Business operates very differently from the Government. In a business there are internal goals and budgets, and most businesses can't afford unnecessary requirements. While it is a good step in the right direction for bringing accountability, it is impractical for many businesses.

The DoD 5015.2 standard defines mandatory functionality for records management application (RMA) software used within the DoD. These are listed in the standard document's references section. The standard starts off with a glossary of terms and a list of acronyms and abbreviations. This list is a useful part of this standard as I myself was not yet familiar with all the terms used in records management.

The DoD 5015.2 standard appeared while electronic recordkeeping techniques were in their infancy. It offers an objective test of basic functionality within prescribed conditions, with particular emphasis on authenticity and reliability of electronic records with archival value.

2.6.2 MoReq

The DLM Forum Foundation, a community of interested parties in archive, records, document and information lifecycle management throughout Europe and the makers of MoReq, defined the purpose of MoReq as:

"To achieve the widest possible adoption of good records management practice across Europe, and beyond."

With this definition they want as wide a set of users from many different fields and practices to make use of the MoReq, to adopt good record management practices.

MoReq was designed to be a very practical specification. It does not specify a particular ERMS, instead it outlines the essential elements an ERMS should have to ensure that records are properly managed, can be accessed at all times, are retained for as long as they are needed and are properly disposed of once the obligatory retention and disposition period has expired. An organization which implements an ERMS based on the requirements of MoReq can be assured that its records will be properly managed.

MoReq defines the core functionality required of ERMS whether they are deployed in public bodies, private organizations, and the third sector. MoReq is a generic, modular specification which means that each organization that uses it can incorporate into its records management policies those parts of the

specification that are relevant and applicable to the type of organization; and help the organization to comply to regulatory requirements within its business sector.

Because of these characteristics; that it can be used in all kinds of sectors, that only relevant specifications can be used, and that it has the DoD 5015.2-STD as a starting point, the MoReq will be used in my research and requirements analysis.

2.6.3 ISO 15489 standard

The ISO 15489 standard, an international standard that was published in 2001, provides guidance on metadata for the various tracking requirements for records, including the actions taken on or related to a record, its locations throughout its lifecycle, information on who accessed the record, and on final disposition activities.

This standard also provides a formal method for establishing, maintaining, and auditing an organization's records management program. This standard was developed under the guidance of the International Standards Organization (ISO). It consists of two documents and the whole of it is called the ISO 15489. Specifically, the titles of the two documents are:

- ISO 15489-1-Information and documentation -Records management, Part 1: General
- ISO/TR 15489-2-Information and documentation -Records management, Part 2: Guidelines

The standard applies to managing records from internal or external sources, either in the public or private domain. Part 1 provides guidance in establishing and maintaining a comprehensive records management program, while Part 2, a technical report, provides procedures that can help to ensure compliance with the program. Organizations that follow the guidance of 15489 can meet or exceed the recordkeeping requirements for most laws or regulations, and ensure that the program will protect the information that is vital to the organization.

Part 1 applies to all types of records, not only paper, but one can think of electronic and/or audiotapes. It also gives guidance on establishing the responsibilities that organizations must meet to ensure that their records are maintained safely and in a manner that provides the necessary legal compliance. This accountability applies to records management policies, systems, processes, and procedures. In addition to this, ISO 15489 establishes the requirements for a sound records management program. Records management processes and related controls are discussed, as are tracking requirements, proof of authenticity, and storage and handling requirements for records, regardless of the media. It is also pointed out that the records management program and related systems must be monitored routinely, and audited periodically to ensure compliance.

The second part of ISO 15489, provides a method of implementing the requirements of ISO 15489 Part 1. However, in it, it is stated that this is only one approach and that organizations implementing ISO 15489 should be sure that their program meets all of the appropriate national standards, laws, regulations, and related legal requirements, including contractual obligations. And, of course, the organization's overall business goals should be matched to the requirements of the records system.

ISO 15489 provides guidance on metadata for the various tracking requirements for records, including the actions taken on or related to a record, its locations throughout its lifecycle, information on who accessed the record, and on final disposition activities. This information can be crucial to complying with regulatory requirements, but also can provide a sound legal audit trail should the record's authenticity be challenged.

2.6.4 Sarbanes Oxley Act

The Sarbanes-Oxley Act of 2002 is mandatory. All organizations under US jurisdiction or organizations who have their main business with the US, large and small, MUST comply. The legislation came into force in 2002 and introduced major changes to the regulation of financial practice and corporate governance. The act is named after Senator Paul Sarbanes and Representative Michael Oxley, who were its main architects.

The Sarbanes-Oxley Act is arranged into eleven titles. As far as compliance is concerned, the most important sections within these are often considered to be 302, 401, 404, 409, and 802. They pertain to respectively Corporate Responsibility for Financial Reports, Disclosures in Periodic Reports, Management Assessment of Internal Controls, Real Time Issuer Disclosures and Criminal Penalties for Altering Documents.

Suriname doesn't fall under US jurisdiction, so in actuality no company or organization in Suriname needs to comply. It is however, advised for companies that work on an international level, or companies that have business with US clients, to comply with SOX law.

2.7 Summary

The first thing we explored in this chapter is what exactly an EDMS is. I have been able to define what is minimally required for something to be called an EDMS. Additionally, I have been able to define a set of common features that can be expected from an EDMS. Through this definition I could confirm that the objective of Staatsolie could be achieved by using an EDMS.

A different, but related, system is the ERMS. An ERMS has a lot of similarities with an EDMS, but also some differences. The differences with an EDMS are explained, as well as the reason for preferring the EDMS over this. All in all, the ERMS could be used alongside the EDMS in Staatsolie, but with the ERMS the emphasis lies more on the archiving and long-term storage of records instead of the dynamic usage and editing of documents.

The ERMS also has very clear standards defined, whereas the EDMS does not. Luckily, because there are many similarities between ERM Systems and EDM Systems, these standards and guidelines can be applied to EDM Systems as well. The MoReq, which builds upon the DOD 5015.2-STD standard, has been found to be the best suited for acquiring functional requirements for an EDMS for Staatsolie. It also insures compliance with the ISO 15489 standard and the Sarbanes Oxley act.

3. Methodology

3.1 Introduction

This chapter discusses various models and methodologies used in software engineering projects with the aim to define the Project Methodology of this thesis.

3.2 Waterfall model

The waterfall model was first presented by Winston W. Royce in 1970 as a flawed and non-working model. Despite this it became a very popular model in the world of software development because of its various advantages towards software designing and implementation. The defining aspect of the waterfall model is that none of the stages can be started with if the previous stage hasn't been completed. The original waterfall model consisted of the following seven stages:

- Specification of Requirements
- Design
- Construction
- Integration
- Testing and Debugging
- Installation
- Maintenance

However these stages are not defining of this model, various modifications were brought over to this waterfall model as and when required.

3.2.1 Waterfall Model Advantages and Disadvantages

In the previous section we've seen that this model was considered flawed and non-working. But still it became quite popular. The advantages must have been great enough to overlook the flaws. What are these advantages and disadvantages? I will try to answer this question below.

Advantages of the Waterfall Model

The waterfall model is the oldest and most widely used model in the field of software development. This model has certain advantages that has made it so popular over the years. Below I have listed a few of these advantages:

- It is a linear model and linear models are the most simple to be implemented.
- The amount of resources required to implement this model is very minimal.
- After every stage of the waterfall model development, documentation is produced. This makes it easier to understand the product designing procedure.

- After every major stage of software coding, testing is done to check the correct running of the code.

Disadvantages of the Waterfall Model

As can be seen from the advantages, there are a lot of positive points of this model. But like most everything there are two sides. This model has some major disadvantages as well. Let us look at a few of these disadvantages:

- The biggest disadvantage of the waterfall model just happens to be one of its greatest advantage. It is not possible to go back to previous phases. If the something in a previous phase has gone wrong, things can get very complicated in the present phase.

- It happens quite often that the client is not very clear of what he exactly wants from the software. Any changes that he mentions in between may cause a lot of confusion.

- Small changes or errors that arise in the completed software may cause a lot of problem.

- A working model of the software does not lie in the hands of the client before the final stage of the development cycle is completed. Thus, he is hardly in a position to mention if what has been designed is exactly what he had asked for.

As has been mentioned before, the waterfall model is the most widely used model in software development projects. This model has many disadvantages but just as many, if not more, advantages that ensures that it remains one of the most popular models used in the field of software development to date. There are many versions of this model to take away these disadvantages, one of these will be looked at in the next section.

3.2.2 The Modified Waterfall Model

The modified waterfall model is closely based on the waterfall model. The reason for its existence is to minimize or erase the defects or disadvantages of the traditional waterfall model. The main change of this model, compared to the waterfall model, is that the phases in the modified waterfall model life cycle are permitted to overlap. This makes this model a lot more flexible to work with. It also makes it possible for a number of tasks to function concurrently, which ensures that the defects in the software are removed in the development stage itself and the added costs of making changes to the software before implementation is saved. Because there can be a number of phases active at one point of time, making changes to the design and rectifying errors introduced can be easily dealt with.

To every phase of the modified waterfall model diagram, a verification and validation step has been added. Another advantage of the modified waterfall model is that it takes a less formal approach to procedures, documents and reviews. Because of this, it reduces the huge bundle of documents. Due to this the development team has more time to devote to work on the code and does not have to bother about the procedures. This in turn helps to finish the product faster.

There are not only advantages to the modified waterfall model. This model also has a drawback. Because of its flexible nature, tracking the progress on all the stages becomes a difficult task. Also, this model still uses the stages from the traditional waterfall model and the dependency between stages still exist. This dependency can cause complications during the software development process. The development team may be tempted to move back and forth between the stages for fine tuning. This results in delay in project completion. This problem however, can be solved by setting up certain benchmarks for every phase. This helps to ensure the project is on schedule and does not go haywire. The modified waterfall model is extensively used in the software industries. This model still has all the advantages of the traditional waterfall model without the drawbacks and this has made it easier to work in the advanced stages.

3.3 An EDMS Methodology

The Electronic Document Management System methodology by (Bielawski & Boyle, 1997) is a methodology that shows quite a resemblance to a waterfall methodology. That is not a coincidence, since this methodology originated from the waterfall software development process. Despite this, there are a number of distinct differences between the two. The methodology follows three critical elements:

- Philosophy
- Business Approach
- Technical Approach

The philosophy is aimed at providing a common foundation or vision of how to approach the problem. The business approach is to provide an overall framework for the EDMS implementation. The technical approach gets down the detailed phases, tasks and deliverables required in order to successfully implement an EDMS.

The Philosophy used in this methodology is one that focuses on the user and not the document. In this approach, the user is the central focus because the user is the one who needs the information stored in the documents, not the creator. This philosophy therefore approaches this problem from the distribution back to the creation.

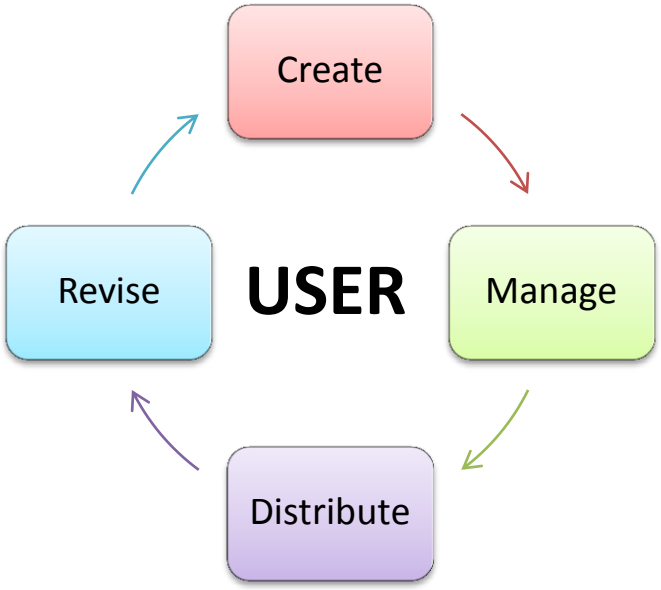


Figure 1: The user centered Paradigm

Figure 2: Simplified Document Lifecycle

Figure 3: Philosophy for this Methodology

The Business Approach can be divided into three distinct parts, Planning, Infrastructure and System & Content. Planning is used to define the overall project scope, objectives, team and to select a pilot organization. The analysis, which is the first stage of the System & Content part, is used to determine

the needs and requirements for a particular organization both in terms of users and documents as well as from an information systems perspective. This is where the EDMS process departs from traditional software development methodologies. With these requirements the right tools and technologies for the infrastructure can be determined.

The Technical Approach should be considered as a guideline because technologies keep changing at an accelerating pace. It is important that this approach be treated as a living process, constantly growing, evolving, and adapting. It must also be flexible to deal with different tools, people, organizational structure and ever-changing requirements. That is why this methodology stresses on the fact that the technical approach must be modified to fit the situation.

The EDMS methodology of (Bielawski & Boyle, 1997) is divided into six major phases. They are, in order, the Analysis phase, the prototype phase, the design phase, development, Implementation, and the Post-implementation phase.

3.4 Project Methodology

The scope of this project is the T&I organization and the selection of an EDMS. Because of this, the phases to be used during the project will be one following the same waterfall method as the EDMS methodology in the previous section (Bielawski & Boyle, 1997). Instead of the six major phases of that methodology, I've reduced this methodology into 5 different phases more relevant for the purposes of Staatsolie's T&I organization. These phases are:

- Analysis
- Tool Evaluation & Selection
- Design
- Implementation
- Post-Implementation

As you can see, this approach is a more straightforward waterfall model. It starts with an analysis. Once this phase is completed the input can be used in the next phase, the tool evaluation and selection phase. This phase was added to this methodology, because for EDM systems it is common practice to use an off the shelf product instead of implementing one from scratch. Here is where this model differs from the waterfall model because the design phase will be implemented differently than is custom and there is no need for a develop phase, since the product will be an existing one. The design phase will also be more about the integration of the product with existing infrastructure and how the system will be filled in, instead of the design of the system itself. The implementation will be the EDMS that will be used during future T&I's and from there on Staatsolie will decide if it will implement the EDMS companywide. Below I will discuss each phase separately.

Analysis phase

During the analysis phase, the high level needs, goals and objectives of the EDMS will be determined and the requirements of the EDMS for the T&I will be gathered. In this phase the needs for the creation

of the EDMS and management of the T&I will be made clear. During this phase, interviews, Observations and collection of relevant documents will be done. At the end of this phase a complete functional requirements specification, which outlines all facets of the system, will be produced. A series of profiles, which will document the information gathered, which supports not only the functional requirements specification but also the tool selection and design phase will also be produced. The profiles to be created are:

- Organization profile
- Document profile(s)
- User profile(s)

Tool evaluation & Selection phase

During this phase an evaluation will be made of the available tools currently on the market against the requirements acquired during the analysis phase. Here technical capabilities, platform support, open architecture, cost and the level of integration required between individual applications will be considered. Because it would be foolish to think that the set of tools selected during this phase will exactly meet the requirements of the system, a gap analysis will be made in this phase. This will then be used to aid in the decision on what will be done to fill the gaps. This could be, finding of add-on applications, designing custom ones, or leaving the requirement unfulfilled.

Design phase

In the design phase, requirements for the hardware needed to support the applications will be made. In this phase a lay out of the overall architecture and design of the system will be made. The design lays out the major pieces or functions of the system and how they will work together to meet the objectives of the system. This includes how information or documents will flow through the system, and where processes will be automated or manually accomplished. It will also lay out the details of how each piece of the system or task will be accomplished.

Implementation phase

In this phase the achievement lies with a completely installed and tested infrastructure and a document that details the installation configuration. It will also include a set of tools that make up the system. This phase is where the system becomes real. The users will be trained on the system. Document loading and conversion begins here and will probably take a couple of weeks or even months.

Post-implementation phase

In this phase a look will be taken into the success of the implemented system. This will be done by measuring results, including user perceptions and business metrics. From this phase important lessons can be learned and can be used as future reference for other projects.

For this project only the two first phases are in scope.

3.5 Summary

In this chapter we explored the EDMS methodology from Bielawsky and Boyle (Bielawsky & Boyle, 1997). This methodology was specifically created for development projects of EDM systems. Furthermore, it is based off of one of the earliest known software engineering models, which make it also the most widely used, the waterfall model. This made this methodology all the more desirable for me to use, as a software engineering approach is one that with my background, I feel most comfortable using.

Nevertheless a few changes to this methodology were made to fit the scope of this project and the needs of the organization. A look was taken at the modified waterfall model, a model that takes care of most of the drawbacks of the traditional waterfall model by making it possible for phases to overlap.

Finally, the methodology to be used during this project was introduced. The phases follow the traditional waterfall methodology with some minor changes and adds the advantages of the modified waterfall model. Furthermore it has taken some of the aspects of the EDMS methodology by Bielawsky and Boyle.

4. Project Plan

4.1 Introduction

This section discusses the development process of the project. The project consists of two phases which are derived from the methodology of (Bielawski & Boyle, 1997); the analysis phase [4.2] and the tool evaluation and selection phase [4.3]. The goal of the analysis phase is to study the current situation i.e. the "as is" system and elicit the requirements for the "to be" system. The produced requirements will then be used as input for the tool selection and evaluation phase. At the end of this phase a selection of a vendor and tool will be made.

4.2 Analysis Phase

During this phase, the goals and objectives of Staatsolie will be determined. Furthermore, the users of the EDMS and the documents that will be part of it, will be identified. Also, the requirements for the type of users and the requirements the documents need to adhere by will be gathered and worked out. This, to determine the overall requirements of the EDMS for the T&I. To get these results, interviews, research and observations will be made. Relevant documents will also be collected. At the end of this phase a complete functional requirements specification, which outlines all facets of the system, will be produced. A series of profiles, which will document the information gathered, which supports not only the functional requirements specification but also the tool selection and design phase will also be produced. These profiles were mentioned in [3.4].

In Figure 4 the analysis process is shown. Here we can see the process of how these profiles are going to be created. To begin we must first see how the T&I organization works. From here we can depict the organizational profile, the list of user groups and a document list. Once these two deliverables have been derived, the following steps can be started. From the user job task analysis we can then produce the user profiles and review the document list to come up with the complete document list for the organization. After completing these steps, sessions will be held to complete the document profiles.

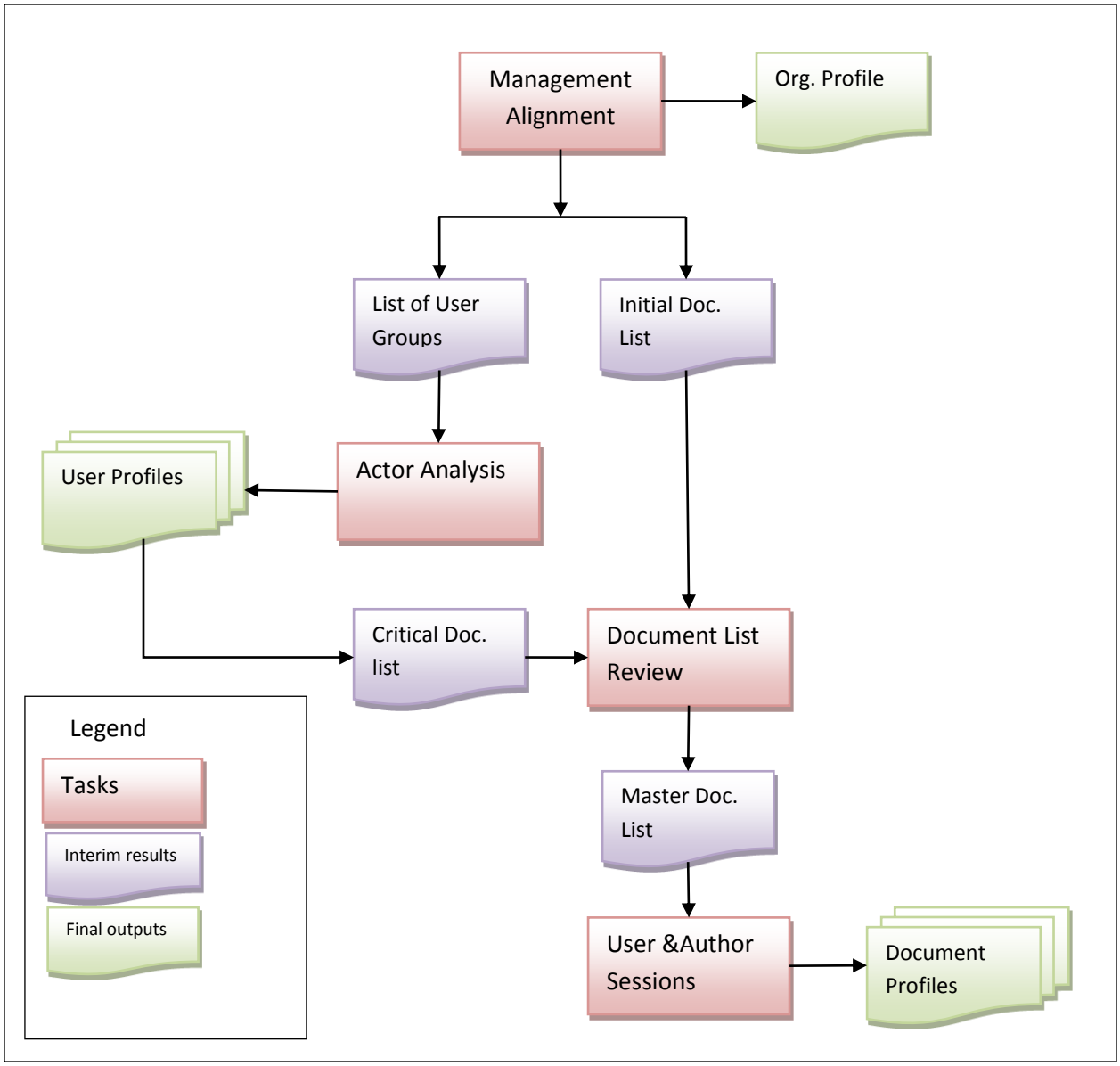


Figure 4: Analysis Process

4.2.1 Research Methods

Literature research, interviews, brainstorming sessions and an actor analysis are the research methods to be used in this analysis. Below is a short list of the methodologies followed:

1. Problem owner identification and Actor analysis [6.3]: In this part of the analysis all the important stakeholders or actors involved shall be identified and grouped according to their concerns.

2. Knowledge gathering: During this part, background research, an actor questionnaire [6.3.1] and interviews shall be conducted with the actors. The purpose of these methods is to get a clear picture of the needs and wants of the actors involved.

3. Present evaluation of current situation: The results from the previous part will be compiled to create the profiles mentioned in [4.2]. These profiles shall be the input for the next phase i.e. the tool evaluation and selection phase.

4.2.2 Reporting

Meetings shall be held at regular intervals with the Tout Lui Faut supervisor. Meetings will be held every Monday to discuss progress on the analysis.

4.3 Tool Evaluation and Selection Phase

This phase starts of the tender process. A first selection will be made by Staatsolie of EDMS companies they want to consider. Out of this preliminary selection an evaluation will be made based on the responses of these vendors against the requirements acquired during the analysis phase. Each tool will get scored on the criteria set by the project group. Finally a selection will be made on a tool to be implemented for Staatsolie's T&I organization.

4.3.1 Selection Methods

Vendor questionnaires, Request for Proposals and a Selection criteria list are the methods that will be used during this phase. Below a short list of the methods to be used:

1. Knowledge gathering of tools on the market: During this part research will be done on the many tools out on the market. Here an unscientific selection will be made of which vendors will participate in the future selection process.

2. Training of group members: During this part of phase 2 the members of the project group will be trained what to look for in EDM system. Here the benefits and needs for such a system will be made clear and each group member will have a clear understanding of the requirements specifications.

3. Request for Proposal [9.2]: During this part members of the small project group will work together to put together a Request for Proposal form. This form will include a vendor questionnaire, the requirements specification and costumer references.

4. Selection [10]: The Proposals that are returned will be evaluated against a list of selection criteria, put together by the project group. The vendor with the highest overall score, will be the one selected.

More on each of these methods will be discussed in PART C – TOOL EVALUATION & SELECTION of this document.

4.3.2 Reporting

Meetings shall be held at regular intervals with a special project group consisting of the members reported in [Appendix E]. These people were put together for the evaluation of the tools. The group meets every Wednesday to discuss and evaluate the results.

4.4 Summary

The project plan was presented in this chapter. Here it was described that only the two first phases of the methodology discussed in the previous chapter are part of the plan. They are the analysis phase and the tool evaluation and selection phase. For each phase the deliverables and the work methods were presented.

The deliverables for the analysis phase are the organizational profile, the user profiles, the document profiles and the complete requirements specification. These deliverables were achieved by using literature research, conducting interviews, holding brainstorming sessions and conducting an actor analysis.

The deliverable for the tool evaluation and selection phase will be the EDMS tool from the vendor selected. To select a vendor, a couple of methods and best practices will be used. First knowledge gathering of the products and tools on the market, secondly the project group will have regular training sessions to get a clear understanding of the requirements specifications. Thirdly, a RFP will be sent out to the vendors selected. And last, the proposals that are returned will be evaluated against a list of selection criteria, put together by the project group. The vendor with the highest overall score will be the one selected.

PART B – ANALYSIS

5. Organizational Profile

5.1 Introduction

In this chapter a clear idea will be given of the T&I organization, what it does and how it works. This means that I will identify the functions, processes and user groups within the T&I organization. This will allow us to pinpoint the department in which the EDMS will be used.

5.2 Organization Charts

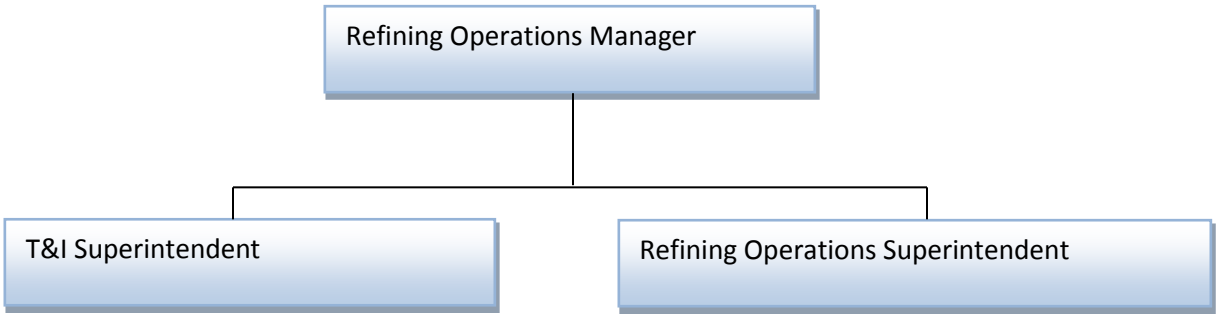
During the T&I turnaround, the regular organization of the Refinery Operations department is put aside for the T&I organization. This organization is the same, each turnaround but is not entirely static. The roles of the individuals differ every turnaround. During this period, engineers, managers, etc. all fulfill different roles that contribute to the success of the T&I. During the T&I the whole plant will be shut down. Vessels, heaters, columns, heat exchangers will all be tested and inspected. Where needed, corrective actions will be taken. All these areas will have their own supervisor whom in return will all report to the T&I superintendent.

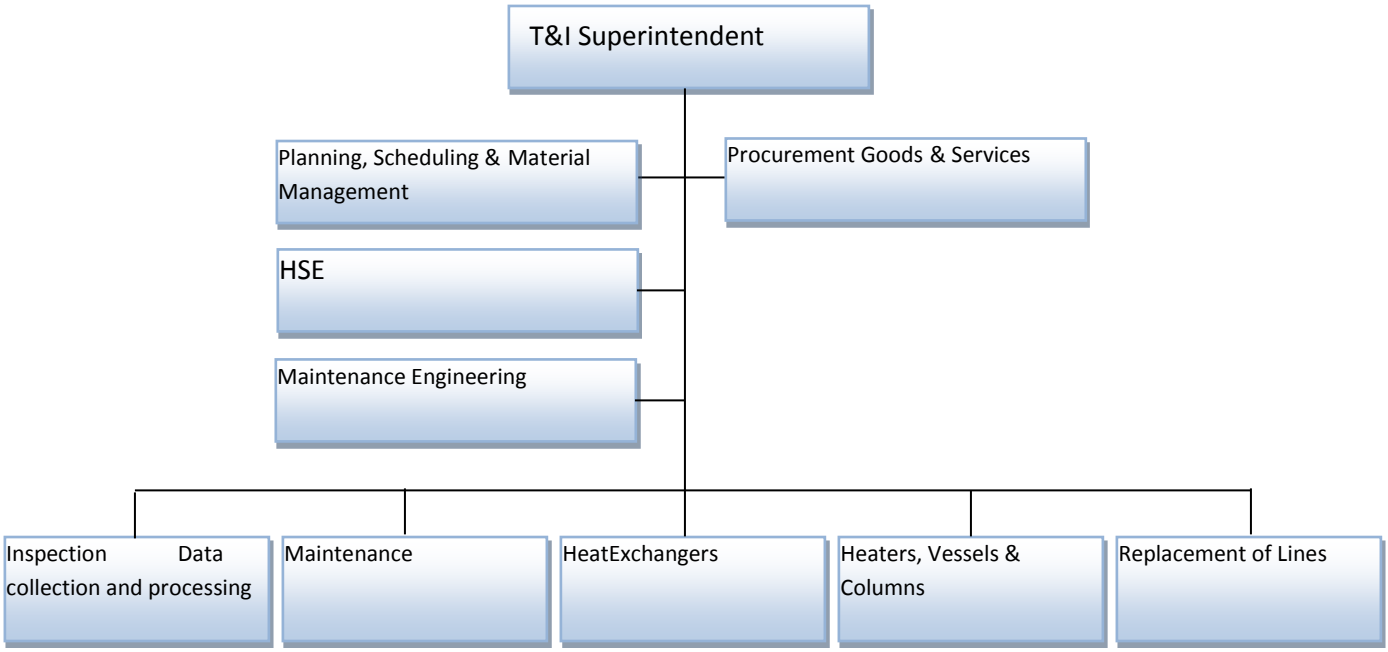
The figures below describes the organizational structure of the T&I organization. As stated in [1.3], only the T&I organization is in scope, it must thus be noted that the EDMS proposed in this paper will be for the Refinery Operations department only. This can be done with almost no complications because Staatsolie's organization can best be described as a divisionalized company. Each department runs as a separate entity, with the head office at the top (Mintzberg, 1992).

That is not to say that if this implementation of an EDMS proves successful that Staatsolie won't implement this proposed EDMS company-wide. A nice analogy was brought to my attention that can explain the effects of a successful implementation at the Refinery Operations department: The so called Camel's Nose effect. This effect is from an Arab proverb:

"If the camel once gets his nose in the tent, his body will soon follow."

This is usually seen in a negative way and the camel's nose is usually used as a metaphor for a situation where permitting some undesirable situation will allow gradual and unavoidable worsening. In the Netherlands we have a saying that is quite similar, "You give them one finger, and they'll take your whole hand." In this situation though, the Camel's nose effect isn't used in the negative sense. If the implementation is successful at the department of Refinery operations, the other departments will follow. This is exactly what Staatsolie is hoping for.


Refining Operations Manager
T&I Superintendent
Refining Operations Superintendent


T&I Superintendent
Planning, Scheduling & Material Management
Procurement Goods & Services
HSE
Maintenance Engineering
Inspection Data collection and processing
Maintenance
HeatExchangers
Heaters, Vessels & Columns
Replacement of Lines

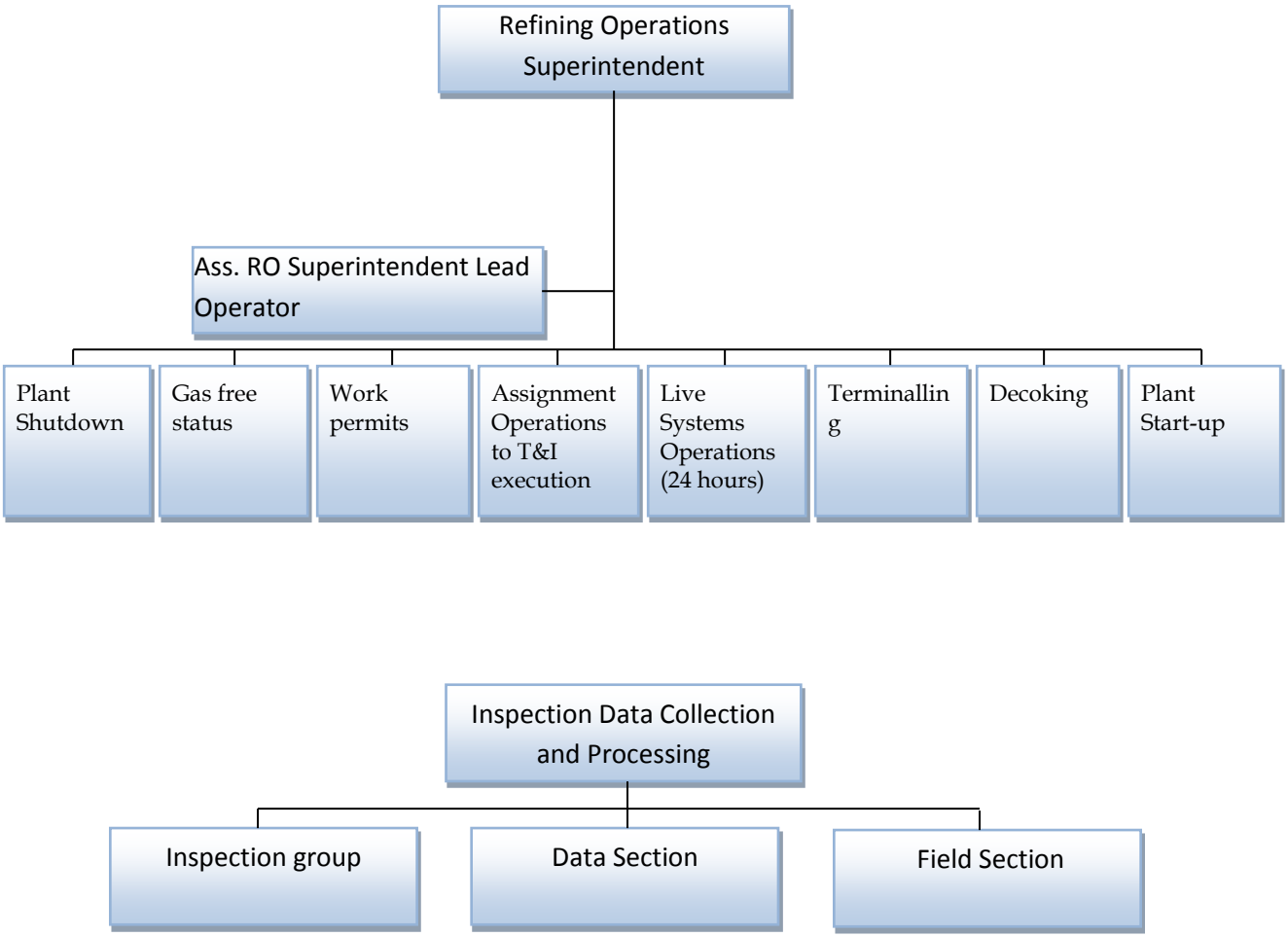


Figure 5: Organizational Charts T&I

In figure 5 the Organizational Charts used during the T&I are presented. From these charts it becomes apparent that the T&I organization is part of the Refinery Operations Department. The Refining Operations manager is in charge of the whole T&I organization. Even though regular work is put aside for the T&I turnaround, the tasks of shutting down the plant and all that is involved with the startup of the plant are still part of regular refining operations work. Normal daily procedures that go on at the Refinery Operations Department still need to be overseen. That is why during a T&I turnaround a Refining Operations Superintendent is put in charge of these operations. The T&I superintended is in charge of everything else from planning, scheduling and safety measures to data collection and maintenance of the various parts of the plant.

5.3 Top functions or Processes

In [5.2], the Organizational Charts were presented and explained. From those charts it becomes apparent what the top functions are during the T&I. We saw that the T&I superintendent, the Refining Operations superintendent and the Refining Operations Manager all have top functions during a T&I turnaround. Furthermore, the Inspection Data Collection and Processing supervisor also plays an important role.

To find out what the top processes are during the T&I, it is essential to know in detail, what exactly goes on during such a turnaround. Before the start of a T&I the planning, scheduling and material management takes place. The T&I turnaround requires a full plant shut down so time is of the essence. The planning and scheduling is thus a very important part of any T&I. It is also essential that the people involved can think ahead and plan beforehand what materials will be needed to order them in beforehand, so as to not stagnate the T&I turnaround. Another essential detail that should not be overlooked before the start of a T&I is safety. Before any T&I, many safety training sessions will be held under all the personnel that will be involved in the eventual turnaround. Once these phases have been completed satisfactory, the T&I can start. Figure 6 shows this process using ArchiMate concepts (Marc et al., 2005).

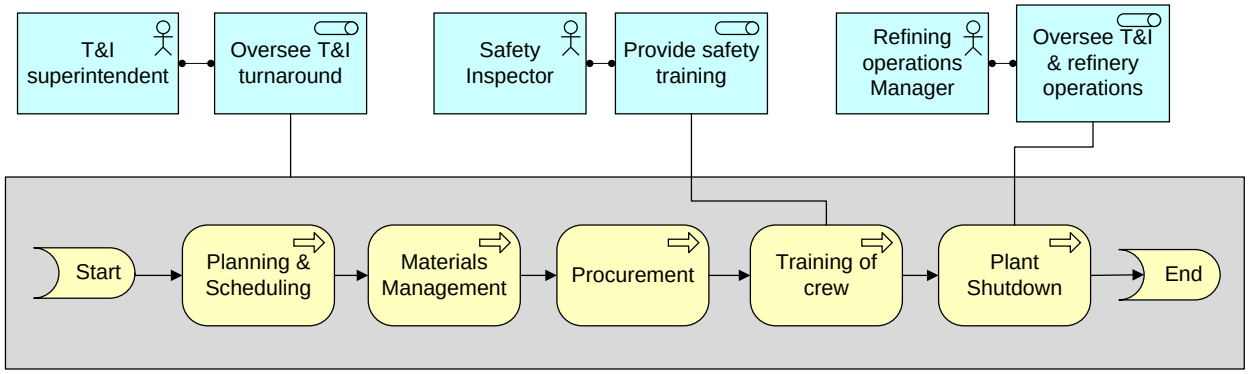


Figure 6: Shut down process

At the start of the T&I the first thing that is done, is a complete plant shut down. The schedule for the T&I will determine which units will be inspected. Before an inspection can take place the equipment has to be deemed safe for inspection. One must keep in mind that this is an oil plant and many toxic fumes and dangerous substances are part of everyday processing. The operators must decoke the equipment if necessary and a safety inspector must then test if it is safe to inspect. Once this is done the maintenance control center will provide a work order so the inspector can start the inspection. There are two types of inspections the inspector will make. The first one is an as found inspection, here they will just check on the condition of the equipment before it will be inspected. The second type of inspection is a close visual inspection. Here the internal and external condition of the equipment will be inspected. In the figure below, the process of an inspection is shown.

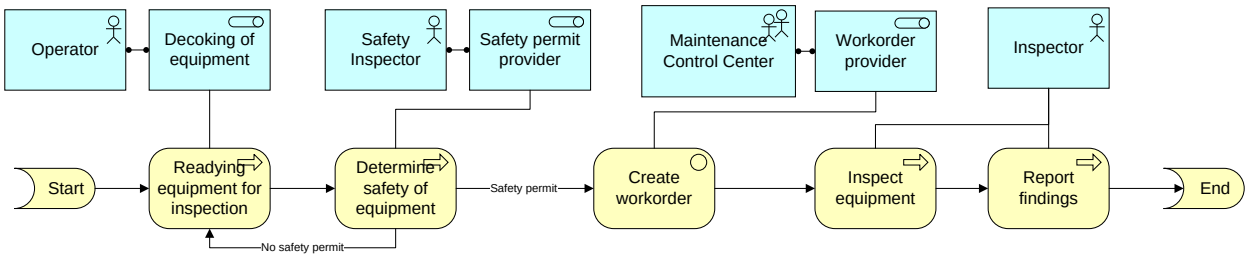


Figure 7: inspection process

After an inspection, if corrective action needs to be taken, the inspector will file a request for corrective action. This needs to be signed off by the inspection supervisor. Once the request is signed off on, Maintenance can go about fixing any and all faults and problems mentioned on the request. For each job to be done, a work permit is needed. Once corrective action has been taken, the inspection supervisor can sign off on the equipment and close off the equipment and deem it ready for use. The T&I superintended and Refining Operations Manager, both need to sign off on the equipment too. This cycle of inspecting and fixing will go on until every unit has been inspected. The figure below depicts a single piece of equipment being inspected and the process of corrective action taken.

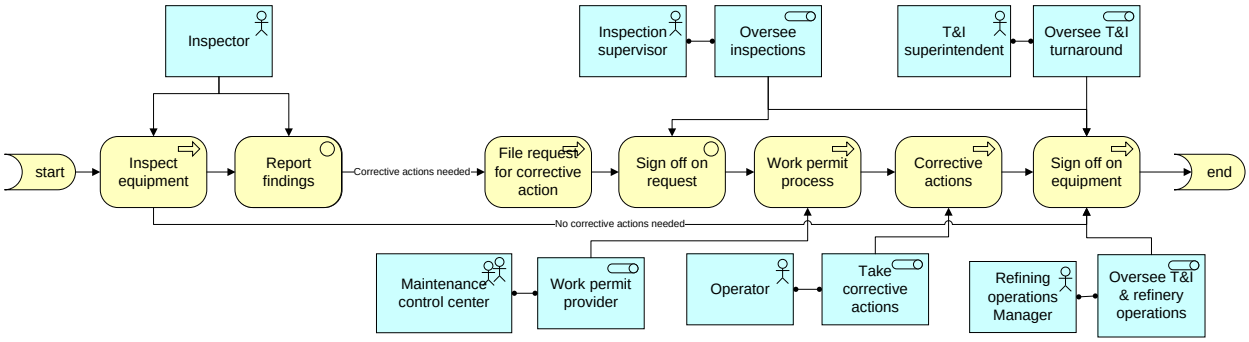


Figure 8: Corrective action process

Once all the units at the plant have been inspected, and corrective action has been taken where needed, the plant is ready to start up again. The T&I superintended must make sure all equipment is deemed ready for use as must the Refining Operations manager. Once this is done, the plant will start up equipment by equipment. The figure below shows this process.

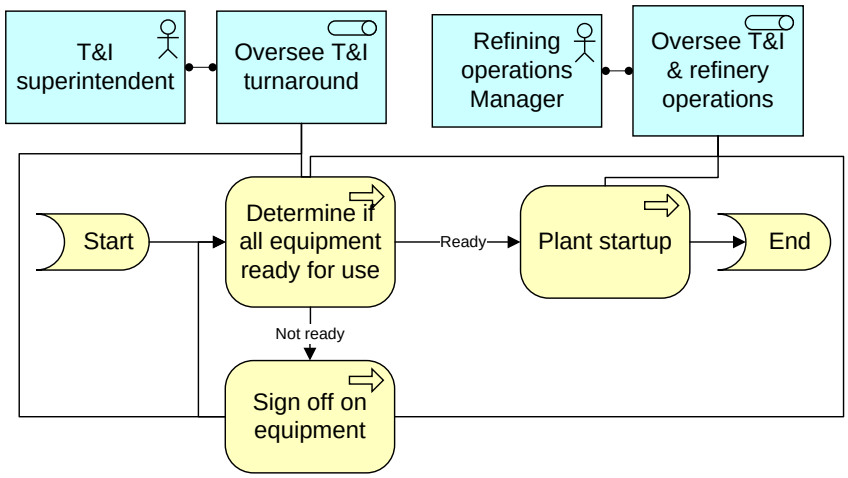


Figure 9: Plant startup process

After the T&I, the T&I superintended must write a report of all that was done during the T&I. This report must contain among others all the equipment inspected, all the corrective actions taken and the people involved and their tasks. This report and all the other documents used during the T&I must then be archived for future use by maintenance engineers working on the plant.

5.4 User Groups by Function and Documents used by them

In [5.3], the T&I processes were thoroughly discussed. It should now be clear what exactly goes on during a T&I turnaround. From the figures in [5.3], the roles of the actors involved could be determined. They also provide us with the functions necessary for the processes. From these findings, a categorization can be made of the user groups. The user groups can be the creator of the documents or a consumer of the document.

The user groups have mostly been defined as the departments that are part of the T&I or interact with these departments. This has been done since these departments operate semi-independently, which means there is a minimal of overlap in document usage between these departments. There are of course some exceptions, most notably the T&I Superintendent. This is a separate user group for a single person. This was necessary due to the crucial role this person plays in the T&I organization.

Table 2: User groups by function and documents used by them

User Groups	Function	Documents
Refining Operations	• Signing off on equipment • plant shutdown • plant startup • corrective actions	• Final closing authority
Maintenance Engineers	• corrective actions • Maintenance	• Final T&I report

Inspection group	• Inspect equipment on the plant • Create reports of findings • Sign off on corrective action request • Sign off on equipment	• As found Inspection document • Close visual inspection document • Corrective Action Request document • Work orders • CAD drawings • Photos • Photo caption documents • Final closing authority • Heat Exchanger Test reports • schedule
Health Safety & Environment (HSE) personnel	• provide safety permits • Inspect safety of equipment • Train crew for safety	• Safety permits • Safety report
T&I superintendent	• Oversee planning, scheduling and materials management • Oversee procurement • Sign off on equipment • Determining readiness of plant start up • Write final report of the T&I	• As found Inspection document • Close visual inspection document • Corrective Action Request document • Work orders • CAD drawings • Photos • Photo caption documents • Final closing authority • Heat Exchanger Test reports • Safety report • Final T&I report • Schedule
Maintenance Control Center	• provide work orders • provide work permits	• Schedule • Safety permit • Corrective Action Request document • Work orders • Work permits

The group refining operations consists of the refining operations manager, the refining operations superintendent and the work crews who are responsible for the corrective actions, decoking of

equipment, plant shutdown and startup. The only document this group uses is the final closing authority. This group is not only a creator of this document but also the consumer.

The maintenance Engineers group is a group that will make use of the documents after the T&I, and namely the final T&I report. This report is necessary for maintenance and corrective actions and also for checking consistencies in measurements.

The inspection group consists of the inspectors, the inspection supervisor, field team and the data processing group. This group is the creator of almost all documents that will be part of the EDMS. They are the consumers of the work orders and schedule for all other documents listed, they are the creators.

HSE personnel are the creators of both the safety permits and the safety report. This report must include all the safety incidents that happen during the T&I.

As stated before, the T&I Superintendent is also considered a user group, even though he is but a single user. He is a consumer of most documents created by the inspection group and the creator of the schedule and final T&I report. He is also co-creator of the final closing authority report.

Finally, the Maintenance control center is the consumer of all the first three documents listed for this group and the creator of the work orders and work permits.

5.5 Summary

The first thing explored in this chapter, were the organizational charts of the T&I turnaround. From these charts it became apparent that the T&I organization is part of the Refinery Operations Department. The Refining Operations manager is in charge of the whole T&I organization, the Refining Operations superintendent is in charge of all operations pertaining to the refining operations department, and the T&I superintendent is in charge of everything else from planning, scheduling and safety measures to data collecting, inspections and maintenance of the various parts of the plant. Each T&I these organizational charts stay the same, but the roles of individuals can differ significantly. During these periods, engineers, managers, etc., all fulfill different roles that contribute to the success of the turnaround.

Furthermore, in this chapter the top functions during a T&I turnaround were identified and the processes that are involved were presented. The Refining operations manager, who is in charge of the whole organization, definitely has a top function. He must foresee the whole turnaround and have the final say in shutting down the plant and starting it back up. The T&I superintended, who foresees everything from planning to the inspections and maintenance done on the equipment, also fulfills an important role. Furthermore the Refining Operations superintendent has a top function too. The major processes all revolve around the inspectors, making them quite an important actor in the T&I organization.

The identification of the user groups by function and the documents used was the last part of the organizational profile.

6. User Profiles

6.1 Introduction

In this section the user profiles for this project will be created. To do this an actor analysis will be made. From this actor analysis a clear picture will be given of which actors are involved and which role each actor will have in the future EDM system for the T&I. The actor analysis will follow the following steps:

1. Formulation of the problem as a point of departure
2. Inventory of the actors involved
3. Send out user surveys to actors involved
4. Determining the major tasks of actors
5. Determining documents and information used for each task
6. Using these findings to map the actors to a role.

6.2 Problem formulation

As stated in the introduction the main objective of the T&I organization is the following:

"To have reliable, correct and the latest version of documents available and enable improvement in efficiencies and document processing time drastically."

Over the years at Staatsolie, it has been apparent that during their periodic T&I the documenting process has not been up to par. In fact, many important documents were never created or never stored away to be easily accessible.

This is a huge problem for the Refining operations and Maintenance Department who need these documents after these periodic T&I turnarounds and the main objective here is to implement a system that will enable the T&I organization to optimize their documenting process since this has a great effect on the factors mentioned in the problem statement.

6.3 The Users

In the previous chapter [5], the T&I organization was explained and presented. The user groups and their functions were identified and the documents they used to fulfill those tasks. In this section, the user groups will be broken down into the individual users of the final EDMS.

The inspection group has 4 different users, namely the Inspectors, Inspection supervisor, data collection supervisor and field section supervisor. Refining operations and HSE on the other hand, have only one user of the EDMS, for the former it is the refining operations manager and for the latter, it's the HSE superintendent. The Maintenance control center and the Engineers all have multiple users of the final EDMS. The department of Refining operations has a subsection, document control where all documents

concerning the department are stored. The T&I final documents will also be stored there. The Document control supervisor will therefore also be a user of the final EDM system. Below a list of all the actors involved, is presented.

- Inspectors
- Refining operations Manager
- T&I superintendent
- HSE superintendent
- Inspection supervisor
- Data control
- Field section supervisor
- Maintenance Control Center
- Document control supervisor
- Engineers

During this T&I there were 3 inspectors and 2 assistant inspectors. The number of inspectors may vary from turnaround to turnaround but the consensus is that there should be at least 2 inspectors and 2 assistant inspectors each turnaround. The role of T&I superintendent, field section supervisor, data control supervisor and the inspection supervisor vary each year and can be any of the engineers from the refining operations department. The inspection supervisor is never an inspector. The HSE superintendent is always the HSE top man stationed at the refining operations department. The Maintenance control center, document control supervisor and engineers don't switch roles. Furthermore, with the introduction of an EDMS and in house inspectors for future T&I turnarounds, the data collection supervisor might become obsolete.

6.3.1 User surveys

To get a better idea of each individual user of the future EDMS, a user survey was created and distributed to all the actors identified in [6.3]. This was done at a weekly meeting of all T&I personnel who aren't field workers and mostly consisted of Engineers and the assigned roles for the T&I. This meeting led by me, had EDM systems as the main focus and was aimed at creating an understanding of what an EDMS is under T&I personnel. After the meeting, each actor was asked to fill out the questionnaire and hand it back in once completed. The questionnaire consisted of 18 questions and takes about 15 minutes to fill out. The questionnaire focused mainly on the tasks the user has during the T&I and which documents are needed to fulfill these tasks. It also focused on which documents the user needs to create. Furthermore it questions the user's computer knowledge and satisfaction with document access. The questionnaire used can be found in [Appendix F] and the results of these questionnaires can be found in [Appendix G: Questionnaire Results]

User Job Title

This questionnaire was handed out to 24 people who each had a role described in [6.3]. From the 24 questionnaires handed out, 22 were filled in and sent back for analysis. From the 22 users, 3 were inspectors, 2 were assistant inspectors, 3 were electrical engineers, 2 mechanical, 1 construction, 1 junior mechanical engineer, the HSE superintendent, the T&I superintendent, the inspection supervisor,

the data control supervisor, the document control supervisor, 2 data collectors, the refining operations manager, The maintenance control supervisor and 1 maintenance control worker.

In [6.3], ten actors were identified. Some of these actors are groupings of one or more specific actors. For example there are many types of engineers but for all purposes I have put them under the single actor heading “engineers”. The data collectors and data control supervisor were collectively represented by the actor “data collection”. Furthermore the maintenance control supervisor and maintenance control workers fall under the actor “Maintenance control center”. The assistant inspectors are also represented by the actor “inspectors”. The pie chart in figure 10, shows the representation of the actors that participated in this user survey.

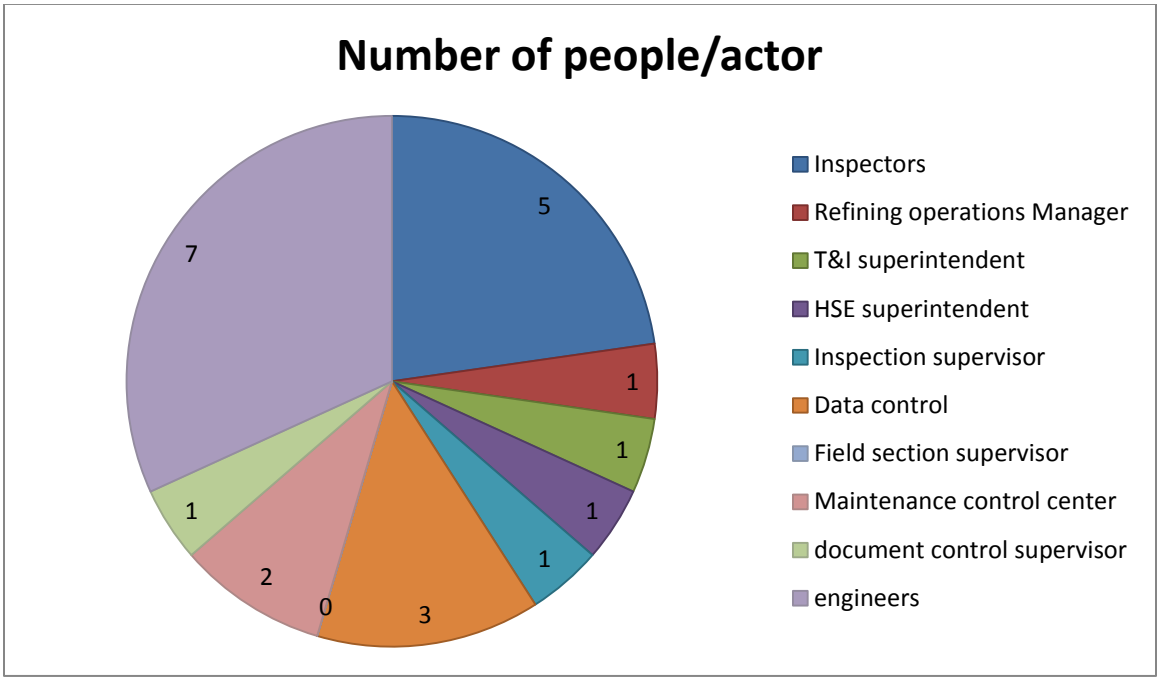


Figure 10: Pie chart of the number of people per actor role

Job description

Analyzing open questions is of course a harder task then the multiple choice questions. Here a semantic understanding of the answers is needed. Different word formulations might still mean the same thing and need to be categorized as such. A good example would be to look at the actor inspectors. Overall their job description was the same but each one had formulated it differently. The two assistant inspectors’ job description differ a little as they had learning experience in there too. The engineers’ job description did not differ that much from one another, with the exception of field specific tasks. There were two actors, where major differences were noted. They were the data control and Maintenance control center. That was also expected as the Data control supervisor has a supervisory role and the data controllers don’t have that. The same can be said of the actor Maintenance control center.

Major tasks and documents consumed and created to fulfill these tasks

Each respondent had to list their tasks and the documents they used to aid them in those tasks. Some of these tasks have no relevance for the EDMS to be implemented for the T&I, but some of them are major and very critical. Each respondent had to give an indication of the importance of the documents they use to fulfill their task, the frequency with which they use these documents and how helpful these documents are to fulfill these tasks. These results can be found in [Appendix G: Questionnaire Results].

User satisfaction

Questions 12 and 13 from the user questionnaire address the user satisfaction with the current situation. These questions are both simple yes or no questions that reveal a great deal about the satisfaction of the user. *Is the respondent satisfied with the time it takes to find the documents needed?* And *is the respondent always sure the document is the latest and correct version*? If both answers are answered with a no, it can be assumed that the respondent is not satisfied with the ways things are going. The sub questions of question 11 about the usefulness and importance of the documents used can also be seen as a measurement for user satisfaction. If the documents are not very helpful in completing their tasks but just a burden to them, the user will not be motivated to create or use these documents. From the questionnaires filled out, here are the results of these questions.

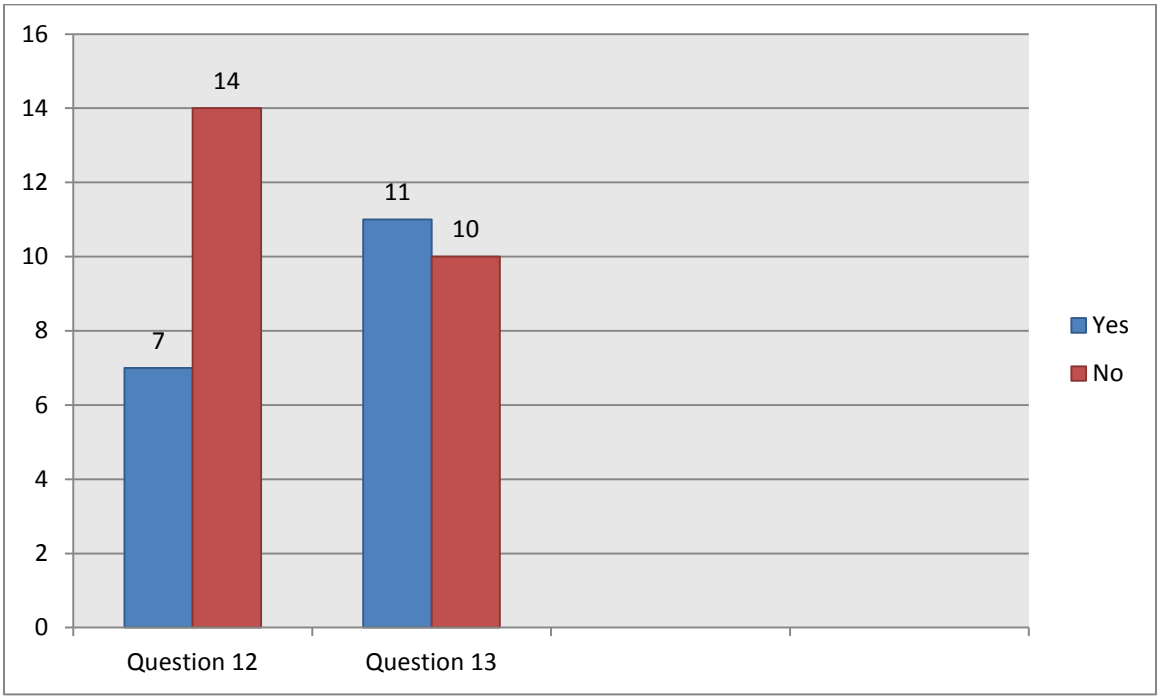


Figure 11: bar graph of the ratio yes/no answered

As can be seen from figure 11, most respondents are not satisfied with the time it takes to find the documents they need. In fact 14 of the respondents would like to have faster access to documents they need. On the other hand a majority of respondents however, do think they have the latest and correct version of the documents they need. This majority, although small, is very surprising. Further analysis is

needed to see if the job titles of these respondents and the type of documents they use might have had an effect on the outcome of this analysis.

From the 22 questionnaires received, a surprising 7 engineers responded no to the question *if they were satisfied with the time it took to find the documents they need*. That is all the engineers that participated. Furthermore Data control, the T&I superintendent, the inspection supervisor and the Maintenance control center all answered no to this question. If we look at the documents each of these respondents use, it becomes clear why these respondents answered no. These respondents are mainly consumers of documents and need those documents to aid and complete their tasks. Out of these respondents, the majority stated that the documents they use for their tasks are very important and very helpful. In fact, only the inspection supervisor filled in helpful for his documents. For this question the respondents that replied no, could also give a time that they found reasonable. From the 14 respondents that replied no, 11 of them filled in a time they deemed reasonable. The average of this time is 46.5 seconds, a fairly long time for document retrieval. But considering that for these respondents, finding their documents can take up to as long as a whole workday this time is on the extreme side.

The inspector group, all answered yes to the question *if they were satisfied with the time it took to find the documents they need*. The refining operations manager and the document control supervisor also answered yes. These findings can also be explained by looking at the documents these respondents use to complete their tasks. These respondents are all mainly document creators with the exception of the document control supervisor, who makes sure the documents all comply with the rules set up by document control.

From all the questionnaires received, 10 respondents answered no to the question *if the documents they need were the latest and correct version* and 11 respondents seem to think that the documents they need for their tasks are always the latest and correct version. These findings can be rationalized if the documents they need to fulfill their tasks are taken into account. The respondents that answered yes are mainly supervisors. During the T&I they rarely have to deal with the everyday documents and are usually needed to sign off on specific documents only. The engineers and the inspectors seem to be divided. The majority of the Engineers answered yes which is expected as they make use of the final report of the T&I turnaround. The other two engineers must have had incidents were the files they were looking for might have had wrong data in them. This could have been the case with specific CAD drawings they might have used that weren't updated. The two inspectors that answered yes could have been assigned to equipment were work orders were received on time and didn't need updating. The schedules on the other hand were changed almost daily so this answer was not expected from these inspectors.

It should also be noted that the HSE supervisor did not fill in these two questions. This is because it seems this respondent doesn't need any documents to aid him in his tasks. The results to these two questions can be found in [Appendix G: Questionnaire Results].

Document Control

Questions 15, '*How do the people who use these documents know where they are stored?'* is a multiple options question and allows the respondent to select one or more of the given choices. Question 16, '*Are users allowed to change copies of the document you created? If yes how will the users know which one to use? If no how do you keep them from changing the original document?* 'consists of 3 questions. The main question is a yes or no question. But for each option chosen the user must supply more detail in the form of multiple choice selection. These two questions, address document control in the current situation. The actors, engineers and document control supervisor, skipped these questions because they are not document creators.

All 5 inspectors said they told people were the documents are. Three inspectors also answered other for this question with all three of these answers being, *they give the original copy to Data Control and they should know that these documents are stored at DCC*. The refining operations manager chose 3 options; he tells them, he notifies them by email and other with his answer being, *he doesn't actually store documents he uses them in the document life cycle before storage*. The T&I superintendent answered that the users never knows where the document is stored and that he gives them copies. He contradicts this though, by answering with other: *the documents are stored at DCC and everyone should know*. An explanation for this is that the T&I superintendent is the creator of 2 very different documents. One being the T&I schedule and the other the T&I Final report. Everyone should know where the T&I Final report is stored, but that probably isn't necessary for the schedule. The HSE supervisor answered with other, namely *that everyone should know that the documents are stored at DCC* and *He doesn't store the safety permits, rather he gives the original one to MCC for use and they store it*. The inspection supervisor tells the users of his documents, they ask him, he sends email notifications to the users and other, namely *the documents I create are not stored until the document users have used them, so all user make use of the original document*. Data control handles most of the document storage during the T&I. The group as a whole chose many options but all 3 answered with other *that everyone should know that the documents are stored at DCC*. The data control supervisor also tells the users, they can ask him, he sends email notifications and other, *namely Documents are stored on the available computers used during the T&I and put in some sort of data system.* One data controller also said that users ask him. Both MCC respondents answered with other, namely, *the user never knows, they give them original*.

The engineers, document control supervisor and Data control did not answer question 16, *Are users allowed to change copies of the document you created? If yes how will the users know which one to use? If no how do you keep them from changing the original document?* All but one of the respondents answered no to the question *if users are allowed to change copies of the document created*. Of the ones that answered no, all but one answered that they made sure documents could not be edited. MCC is the only one that answered that they don't distribute copies. This can be explained by looking at the types of documents MCC creates. Work orders and Work permits. With these types of documents only the original is valid so it's only logical that no copies should be distributed. The T&I superintendent is the only one that answered yes to this question. He also stated the user should know which one to use by using the original and the copy with the most current date. This is again a contradicting answer but can be explained if we look at the documents the T&I superintendent creates. He is the creator of the T&I schedule and the T&I Final Report. For the T&I schedule we can assume that the one with the most

current date should be used and for the T&I Final report it seems logical that the original one is the one, users should use. These findings are presented in [Appendix G: Questionnaire Results].

6.3.2 Mapping the Actors to a user role

In [5], the user groups were identified. In this chapter the main actors are presented. Each actor belongs to a user group. For the EDM system to be created, roles were identified. Each actor can have one or more of the roles we have identified. The roles are:

- viewers: The consumer is the one who'll use the document
- Reviewer: Reviews the document before it is ready for distribution
- Publisher: Publishes and distributes the document to all that have access to it
- Creator: Creates the document. Creators can also be all parties that have to sign a document.
- Enabler: Actors that provide documents that won't be part of the EDMS but are necessary for the users to complete their tasks

Table 3: Mapping of Actors to EDMS user roles

User groups	Actors	roles
Refining operations	Refining operations manager	Creator Viewer
	Document control supervisor	Reviewer Publisher
Maintenance Engineers	engineers	Viewer
Inspection group	Inspection supervisor	Creator
	Inspectors	Creator
	Data control	Reviewer Publisher
	Field section supervisor	Enabler
HSE personnel	HSE supervisor	Enabler
T&I superintendent	T&I superintendent	Creator Viewer
MCC	MCC	Enabler Viewer

6.4 Summary

Each T&I consists of the same roles, but the individual role a person has can differ. This indicates that each T&I, different actors are brought together and put in existing roles. Because of this occurrence each previous T&I has been different. This has also affected the documents that need to be created during these T&I turnarounds. Previous T&I superintendents enforced their own filing systems and document identifying methods that they deemed appropriate. There was no standard way of documenting the T&I. This year, however, a project team was set up to standardize this T&I process.

In this chapter, the actors and their roles during the T&I are defined. Furthermore their major tasks and the documents they use to aid them with these tasks were identified. A survey was carried out, with the aim to obtain an idea of what the actors think of the current situation and what they expect of the EDMS. It also gave me insights of how important the documents created during the T&I are for these actors to complete their tasks.

Looking back at our original objective, the results and findings confirm that it could and should be realized with an EDMS.

"To have reliable, correct and the latest version of documents available and enable improvement in efficiencies and document processing time drastically."

7. Document Profiles

7.1 Introduction

The information obtained during the T&I is formalized in unstructured documents. Due to their intrinsic characteristics, management of unstructured documents presents critical issues such as difficult information search and retrieval and poor reuse of content.

In order to cope with these issues, it is necessary to classify the documents and specify metadata for them. This process of classification and metadata specifications is focused on the selection of a set of labels representing contents as well as context-related properties of documents. Content properties relate to what the document contains or is about, thus providing to users and applications useful hints to help document search and retrieval and to improve the reuse of documented information. Context-related metadata express the “by whom, where, how, under which constraints and for which purpose” a document is being accessed, transmitted and modified.

This chapter contains the document list and identifies the purpose of each document and how these documents are used within the T&I organization. In this chapter we will analyze the information needed to classify these documents in a structured manner.

7.2 Documents and their Purpose

As we have seen in [5] and [6], during a T&I turnaround a lot of documents are created. These documents are created in an extremely short time span which is very work intensive. Because of this it is essential to have a good system to manage these documents without slowing down the work. Not all documents created during a T&I turnaround will be part of the EDMS. Work orders, safety reports, safety permits, schedules and work permits fall outside of the scope of this EDMS. These documents are stored in their respective systems. The documents that are going to be part of the EDMS are listed below:

- AFI Documents: AFI stands for As Found Inspection. The purpose of this document is to report on the condition of the equipment before it will be inspected.
- Photo Caption Documents: Documents used to write down short captions of the photos taken in the field.
- CVI Documents: CVI stands for Close Visual Inspection. The purpose of this document is to report on the internal and external condition of the equipment being inspected.
- Heat Exchanger Hydro Test forms: The purpose of this document is to report on the Hydro measurements being performed on the heat exchangers. The measurement data is to be collected on this form.
- CAR Documents: CAR stands for Corrective Action Request. The purpose of these documents is to request a corrective action to be taken to fix any of the unacceptable conditions of the equipment.

- FCA Documents: FCA stands for Final Closing Authority. The purpose of this document is to close of equipment that has past the inspection, and had all the Corrective Actions taken and deemed it ready for use after the T&I.
- Photos: The purpose of the photos is to show the areas that were inspected and to give a visual of what was found.
- AutoCad drawings: The purpose of these documents is to give a visual of the equipment being inspected. These documents sometimes contain data pertaining to some measurements.

The documents created during the T&I turnaround contain information on the equipment of the plant. An individual piece of equipment is part of a unit and can be either categorized as a Heater, Vessel, Exchanger, or Other. Each unit has a unit number and each piece of equipment has a number that identifies what type of equipment it is and to which unit it belongs. For each piece of equipment, standard documents are collected. During an inspection an AFI, CVI, Photos, and Photo-caption documents would most likely be collected per equipment. Each document should therefore also contain the identifier of the equipment.

7.3 Document Metadata

The term "metadata," or data describing stored information, captures the combined essence of indexing or profiling attributes. Metadata values provide descriptive information used for searching and retrieval of electronic documents stored in the repository. The document metadata may also automatically associate electronic documents with electronic file folders, workflow tasks, or other activities in the work process (Strong, Karen V., 1999).

In this paper, the term document metadata refers to the set of properties which describes and identifies the document, such as the name, the description, the date it was created, etc. This metadata can then for example be used to search and retrieve the documents in an organized and efficient manner. The search can be performed more effectively by using metadata, because it allows us to search for specific characteristics of a document that would not ordinarily be available. This is but one of the examples of how metadata is used by the EDMS to efficiently manage your documents.

In collaboration with document control and the IT department, I reviewed the metadata standards used in paper based practices that Staatsolie has in place as well as the structuring methods of the company's shared folders. A look was taken at a couple of metadata standards such as the Dublin Core and the ISO/IEC 11179-3 and some elements of these were also adopted.

Using these metadata standards, I was able to define a set of attributes which are to be used as metadata. These attributes are defined and explained in the following sections.

7.3.1 Document Title

The Document Title is the identifying characters by which a document is known. The title of the document might give useful and practical information about the content of the document. Many different ways to define the document name can be used.

For the T&I it was decided to name documents in a certain way. Each document title starts with T&I then two numbers that represent the year, this is followed by the document type and the number of that document, which is incremental and consist of 4 digits. Finally the equipment code is added. This code consists of one capital letter and 3 digits. For example the document title of the first AFI document of this year's T&I which is for a specific heater in unit 100, could be T&I08-AFI0001-H122. The title of the final T&I report would be T&I08-REP0000-P001. There is only one final report so the incremental number is 4 zeros. The final report is also not on specific equipment but for the whole plant. The plant code at Tout Lui Faut is indicated as P001.

7.3.2 Document Type

The document type explains the type of information stored in the document. Each document can be classified depending on the stored information.

Table 4: Document Types

Document	Identifier
As Found Inspection Forms	AFI
Close Visual Inspection Forms	CVI
Corrective Action Request Forms	CAR
Final Closing Authority Forms	FCA
Heat Exchanger Hydro Test Forms	HEH
Photos	PIC
Drawings	CAD
Photo Caption documents	CAP
Reports	REP

A description of all these documents and their purpose was given in the previous section with the exception of reports. The document type, Reports, refers to the final T&I report.

7.3.3 Document Format

This metadata gives the format of the document such as a Word Document, or an Excel document. The different formats the T&I organization uses are: word, excel, CAD, image and pdf.

Table 5: Document Formats

Format types	Identifier
Word Document (.doc, .docx)	doc
Excel Document (.xls, .xlsx)	xls
Drawing document (.dwg)	dwg
Image document (.jpg,. png, .bmp, .gif)	img
PDF document (.pdf)	pdf

7.3.4 Relation

The documents created during the T&I have relations to each other. Related documents are all the documents which are necessary for the understanding of a certain document document. For example,

an AFI document has a relation with photos, CAD drawings and possibly the CVI document. Documents that share a relation can be identified by the equipment code.

7.3.5 Date

The date of the document is the date that the document is created. This field is important to the T&I as everything is time based during such a turnaround. When certain documents are created, will give an insight into the daily activities during the T&I and how the schedule was followed.

7.3.6 Description

The description of a document is the information that is of importance to the understanding of said document. This field should be a brief description of what information is stored within the document. This field is optional.

7.3.7 Creator

The creator attribute reveals the person responsible for the document. This could be the author of the document, but also the people responsible for signing the document. In some cases the publisher could be the one responsible for the document, and therefore be the creator.

7.3.8 Keywords

The keywords describe the document content. The purpose of this field is to be able to search by keywords. For now there are a fixed set of keywords the T&I organization will use. This list might grow in the future. These keywords are:

- Heater
- Vessel
- Exchanger
- Unit100
- Unit200
- Unit700
- Unit800

Each of these keywords can be added as metadata to all of the documents mentioned in this chapter.

7.4 Revision and review process

The documents in use during inspections of the plant are mostly forms, standard document templates that need to be filled out. Revisions to most documents are only made when there is a need for more thorough inspections or an omission is made by an inspector. The documents are reviewed by the creators first and then by the data controller, who'll make sure everything is filled out and if not, send it back to the inspectors for revision.

7.5 Document Workflow

During this turnaround the activities performed by the Inspection Team Members were regulated and tracked by work orders, in the same way as for the T&I execution teams. A separate room was prepared for Inspection where all relevant data was stored in file drawers and two computers with SQLDesktop running. We have identified the documents used during the T&I, we also know their purpose, and we've assigned relative metadata to each of them to be able to retrieve them in the future. But who sees these documents and when? Which documents need signatures and which ones can be immediately inserted into the EDMS? In which business processes are these documents used? For each document I will try to answer these questions, which can be found below.

The As found condition forms (AFI) and the Close Visual Inspection forms (CVI) are initially created after an as found inspection or a Close Visual inspection respectively. The document creator is thus the inspector. Once the document is created the inspector will give this document over to a data controller who will insert it into the system for the inspection supervisor to approve. If no corrective actions need to be taken the inspection supervisor approves this document and the document can be archived into the EDMS.

If corrective actions need to be taken, the inspector will create a Corrective Action Request form (CAR) and give the finished CAR form to Data control. Data control will then email this CAR document to the T&I superintendent who'll see to it that the corrective actions are taken by sending this document to MCC. Once MCC receives it, it will create the necessary work orders or permits for Maintenance to perform the corrective actions needed. After completion of these corrective actions the CAR document is send back to the inspector, who'll inspect the actions taken and sign off on the CAR document, the inspector will once again give this document to Data control who'll store it in the EDMS.

During each type of inspection, pictures are taken by the inspectors. These photos also need to be stored into the EDMS. For all these pictures the inspectors will create a photo caption document, and write in detail what is seen in the pictures. These documents with the photos are then handed to Data control, who will then store it into the EDMS.

The CAD drawings created during the T&I need to be reviewed upon completion by the inspectors. Once they have approved them, Data control can put them into the EDMS.

No inspections can take place without a work order. The work orders indicate what needs to be inspected and when. The work orders are created in Datastream a system that will not be part of the EDMS. These work orders are then send to Data control. Each morning Data control hands out the work orders for the day to the inspectors. Once they've done the inspections specified on the work orders and fill them out they must return them to Data control who'll send them to MCC for archiving into Datastream.

In the case of pressure testing which was done for the heat exchangers the test pressures and durations were recorded in the Hydro test forms and witnessed by 3 parties, the T&I supervisor, an inspector and a refining operations representative. This form is then delivered to Data control for archiving into the EDMS.

The Final Closing Authority documents are used to close off on equipment. These are filled out when the equipment in question have been inspected and where needed corrective actions have been taken. This form needs to collect a lot of signatures before it can be published in the EDMS. Once the Inspection Supervisor verifies all the documents are collected for a specific piece of equipment, he will draw up a Final Closing Authority form (FCA) and sign off on it. He will then send it to the inspector responsible for the inspections on that equipment and that inspector will have to sign off on it too. A refinery operations representative, then the T&I superintendent and finally the refinery operations manager all need to sign off on the FCA before it can be considered complete and ready to be stored into the EDMS.

The key users of this system are the inspectors. As of now, Staatsolie personnel don't do these inspections themselves so an intervention of a Data controller is called upon. In the future though, Staatsolie plans on having its own inspectors to do the inspections.

The inspectors are the creators of the documents with the exception of the FCA's. The data controller would then review them and publish them. The viewers are the maintenance engineers, the supervisors and the Maintenance control center, which is responsible for getting out work orders and seeing to it that the jobs are getting done.

The FCA is created by the inspection Supervisor. This document is only ready for processing when all the signatures have been collected.

7.6 Summary

In this chapter, I have created a document list, based on the documents that were found in [5] and [6]. I have also identified the purpose of each of those documents and how these documents are used within the T&I organization. Furthermore, an analysis of the information needed to classify these documents in a structured manner was made.

This information is known as metadata. In collaboration with document control and the IT department, the metadata standards used in paper based practices that Staatsolie has in place as well as the structuring methods of the company's shared folders was reviewed. A couple of metadata standards, such as the Dublin Core and the ISO/IEC 11179-3, were also reviewed and some elements of these were also adopted. The metadata elements obtained were: Document title, document type, document format, relation, date, description, creator, and keywords.

Revisions to most documents are only made when there is a need for more thorough inspections or an omission is made by an inspector. De documents are reviewed by the creators first and then the data controllers who will eventually publish them.

Finally, the flow of each document is presented in this chapter. Here we see what actors are part of the document life cycle and how the document is used.

8. Software Requirement Specifications

8.1 Introduction

To get the requirements needed for the EDM system, it was required to go through the profiles, interview notes, and other documents to extract them. Also, weekly meetings with Staatsolie personnel who participated during the T&I and participants from each department of Staatsolie were held to identify the problems and bottlenecks Staatsolie and particularly the T&I organization have concerning documents. Furthermore, these meetings also served as a starting point to come up with the set of requirements for the EDMS. Because this system will also make use of some ERM, a look was also taken at MoReq (MoReq. Model Requirements for the Management of Electronic Records. Moreq Specifications) and the US Department of Defense 5015.2 standard (DoD 5015.2-STD Electronic Records Management Software Applications Design Criteria Standard). It was noted that although the DoD 5015.2 is a standard, the MoReq was quite an easier read, with far more useable information. This information was more on the lines of what Staatsolie would need for the implementation of its EDM system. After thorough discussion with Staatsolie personnel during the weekly meetings and collaborations a decision was made to make use of MoReq. For the requirements of this system it must thus be noted, that it is an implementation of the MoReq. What also must be noted is that the DoD 5015.2 standard and the MoReq are for ERMS applications, so a full implementation of either two is not a possibility. The requirements presented here were created by the project group after an initial lists of requirements was set by me. First I had to make an initial list of problems and issues related to document management within Staatsolie, and help the project group understand how an EDMS could solve such problems. Once everyone was on the same line of what exactly the problems concerning document management were, each member had to set up a list of requirements of their department. Once this was done, group collaboration took place to set up the requirements specifications.

8.2 Functional Requirements

8.2.1 Creation

1. The system must provide a means to create documents in .doc format.
2. The system must provide a means to create documents in .xls format.
3. The system must provide a means to store and use templates so that the final copy of a document will look the same electronically and on paper regardless of who created it.
4. The system must have a tool that provides style types to control document formatting.
5. The system's tool for providing templates must also have an option of inserting boilerplate text. Examples: Headers and footers that need to be on all documents of a certain type.
6. The system must have a tool that allows a template to be constructed with basic form elements.
7. The system must have a tool that will be able to implement the guidelines for document control standard of Staatsolie.

8.2.2 Conversion

1. The system must be able to convert .doc documents to pdf documents.
2. The system must be able to convert .xls documents to pdf documents.
3. The system must be able to convert .cad documents to pdf documents.
4. The system must be able to convert between different Graphic files.
5. The system must be able to convert scanned papers into editable document types.

8.2.3 Management

1. The system must allow administrators, in a controlled manner and without undue effort, to retrieve, display and re-configure system parameters and choices made at configuration time. Example: re-allocate users and functions to user roles.
2. The system must include functionality to recreate the documents and metadata to a known status, using a combination of restored back-ups and audit trails.
3. The system must provide recovery and rollback facilities in the case of system failure or update error, and must notify the administrators of the results.
4. The system must monitor available storage space, and notify administrators when action is needed because available space is at a low level or because it needs other administrative attention.
5. The system should monitor error rates occurring on storage media, and report to the administrators any medium or device on which the error rate is exceeding a parameter set at configuration time.
6. The system must support the movement of users between organizational units.
7. The system must allow the definition of user roles, and must allow several users to be associated with each role.
8. The system must provide flexible reporting facilities for the administrators. They must include, at a minimum, the ability to report the following:
    - Number of files;
    - Transaction statistics for files, volumes and records;
    - Activity reports by user
9. The system must allow administrators to enquire on and produce reports on the audit trail. These reports must include, at a minimum, reporting based on files, users, time periods.
10. The system should allow administrators to enquire on and produce audit trail reports based on security categories, user groups or other metadata.
11. The system should allow administrators to restrict user's access to selected reports.
12. The administrator must be able to change the security category of files.
13. The administrator must be allowed to delete documents he did not create, however, in the event of such a deletion the system must record the deletion comprehensively in the audit trail, and must not allow deletion of documents that are part of another set of documents.
14. The administrator must be able to change any user-entered metadata element. Information about any such change must be stored in the audit trail.
15. The system must be able to check-in any reviewed and approved document.
16. The system must allow to checkout any document a user has authority to view.
17. The system must allow viewing of a document by more than one person at a time.

18. The system must not allow simultaneous editing of a document by more than one person.

8.2.4 Workflow

1. The system's workflow feature must provide workflows, which consist of a number of steps, each step being for example, movement of a document from one participant to another for action.
2. The system should not practically limit the number of steps in each workflow
3. The system's workflow must provide a function to alert a user participant that a document has been sent to the user for attention and specify the action required.
4. The system must allow the use of email for a user to notify other users of documents requiring their attention. (This implies integration to an existing email system)
5. The system's workflow feature must allow pre-programmed workflows to be defined and maintained by the administrator
6. The system's workflow feature must prevent pre-programmed workflows from being changed by users other than the administrator
7. The administrator should be able to designate the individual users are able to reassign tasks/actions in a workflow to a different user or group. (A user may wish to send a document to another user because the assigned user is on leave)
8. The system's workflow feature must record all changes to pre-programmed workflows in the audit trail.
9. The system's workflow feature must record the progress of a document through a workflow so that users can determine the status of a document in the process.
10. The system must not practically limit the number of workflows, which can be defined.
11. The system workflow feature should provide conditional flows depending on user input or system data.
12. The system's workflow feature should allow users to interrupt a flow temporarily in order to be able to attend to other work.
13. The system's workflow feature should be able to pause the workflow to await arrival of related electronic documents. When the awaited item is received, the flow resumes automatically.

8.2.5 Searching

1. The system must be able to automatically index documents
2. The system must support search by Author, editors, viewers, document type, or by folder.
3. The system must allow some text contents to be searchable
4. The system must allow the user to set up a single search request with combinations of metadata and/or document content
5. The system must allow administrators to configure and change the search fields
6. The system must provide searching tools that cover the following techniques:
    - Free text searching of combinations of metadata elements and content
    - Boolean searching of metadata elements
7. Where a graphical user interface is employed, the system must provide a browsing mechanism that provides graphical or other display browsing techniques.

8. The system must be able to search for and retrieve a complete list of documents, making out a specific report for a certain equipment at the plant
9. The system must be able to search for and retrieve a document by all implemented naming principles, including filename and file identifier
10. The system must display the total number of hits from a search on the user's screen and must allow the user to then display the search results or refine his search criteria and issue another request.
11. The system must allow documents listed in the search results of a user, to be selected then opened.
12. The system must allow metadata of any document to be searched.
13. The system should allow users to save and re-use queries.
14. The system should allow users to narrow searches.
15. The system must allow users to retrieve documents directly by a unique identifier.
16. No system search or retrieval function must ever reveal to a user any information, which the access and security controls are intended to hide from that user.

8.2.6 Security

1. The system must allow the administrator to limit access to documents, data and metadata to specified users or user groups
2. The system must allow the administrator to attach to the user profile attributes, which determine the features, metadata, fields, documents or data to which the user has access. The attributes of the profile will:
    - Prohibit access to the system without an accepted authentication mechanism attributed to the user profile
    - Restrict user access to specific files or data
    - Restrict user access according to the user's security clearance
    - Restrict user access to particular features (example: read, update and/or delete specific metadata fields)
    - Allocate the user to a group or groups.
3. The system must be able to provide the same control functions for roles as for users.
   This feature allows the administrators to manage and maintain a limited set of role access rights rather than a large number of individual users.
4. The system must allow only administrators to set up user profiles and allocate users to groups.
5. The system must allow changes to security attributes for groups or users to be made only by administrators.
6. If a user performs a full text search, the system must never include in the search result list any document or data which the user does not have the right to access.
7. If the system allows users to make unauthorized attempts to access files, it must log these in the audit trail.
8. The system must keep an unalterable audit trail capable of automatically capturing and storing information about:

- All the actions that are taken upon a document or any data
- The user initiating and/or carrying out the action
- The data and time of the event

9. Once the audit trail functionality has been activated, the system must track events without manual intervention, and store in the audit trail information about them.
10. The system must provide an audit trail for all changes made to the system.
11. The system must ensure that audit trail data is available for inspection on request
12. The system must be able to capture and store violations and attempted violations, of access control mechanisms.
13. The system must provide automated backup and recovery procedures that allow for regular backup of all documents, data, metadata and administrative attributes of the systems repository.
14. The system must allow the administrator to schedule backup routines
15. The system must allow only the administrator to restore from its backups.
16. The system should be able to notify users whose updates may have been incompletely recovered, when they next use the system, that a potentially incomplete recovery has been executed.

8.2.7 Systems

1. If there is only a client-server solution, the system must support Microsoft Windows server 2003 or IBM OS as server operating system.
2. If there is only a client-server solution, the system must support Microsoft Windows XP and higher as client operating system
3. The system must use either Microsoft SQL or Oracle DB as its database server
4. The system should have integration possibilities with Datastream (Staatsolie's workorder system), Microsoft office and Lotus Notes.

8.3 Non-Functional Requirements

1. The system must provide online help or costumer support.
2. The system must provide end users, functions that are easy to use.
3. The system should be closely integrated with the organization's email system in order to allow users to send electronic documents and files electronically without leaving the system.
4. If requirement 3 is met, the system should provide this by sending pointers to the documents rather than copies, whenever a file or record is sent to another user of the system. With the exception of course if the document is send to a remote user who does not have access to the system.
5. The system must provide adequate response times for commonly performed functions under standard conditions.

6. The system must be able to perform a simple search within 3 seconds and a complex search (combining four terms) within 10 seconds regardless of the storage capacity or number of files on the system. In this context, performing a search means returning a result list.
7. It must be possible to expand the system, in a controlled manner while providing effective continuity of service.
8. The system must be available to users during work hours, from 07:30 to 15:30 on all weekdays/365 days per year.
9. The planned downtime for the system must not exceed 24 hours per three-month period.
10. Unplanned downtime for the system must not exceed 8 hours per three-month period.
11. In the event of any software or hardware failure, it must be possible to restore the system to a known state (no older than the previous day's backup).
12. If the system includes scanning of paper documents, it should comply with the leading standards. (for example: TWAIN and/or Isis scanner interfaces, JPEG, PNG, GIF or other user-selectable format if color or grey-scale images are supported).
13. The system must support the storage of documents using file formats which are standard to Staatsolie or which are fully documented.
14. The system must conform to applicable standards concerning document control at Staatsolie and must process all dates accordingly.
15. The system must comply with any relevant, national, local and international requirements or code of practice for the industry.
16. The system should use only widely accepted standards, which are the subject of open and publicly available specifications.

8.4 Summary

The requirements for the EDMS were presented in this chapter. These requirements were created with the help of the project group set up by Staatsolie to select an EDMS. The DoD 5015.2-STD and the MoReq were consulted as were the rules and regulations Staatsolie has for document control. All these requirements can be grouped by importance: Must haves, should haves and could haves. The functional requirements consist of 7 separate sections. There are functional requirements for creation, conversion, management, workflow, searching, security and system. Finally, the non-functional requirements are presented at the end of this chapter. Although these requirements might seem like overkill for the T&I organization, we must keep in mind that Staatsolie is thinking of implementing this system company wide.

PART C – TOOL EVALUATION & SELECTION

9. Tool Evaluation

9.1 Introduction

The evaluation of software vendors is a best practice used in the EDM industry. Not only will the tools be evaluated on how well they meet the requirements, but also on how the different tools compare to each other.

Tool evaluation entails testing software tools against a carefully defined set of criteria and requirements to meet expectations.

Choosing the right document management software can be imperative for the acceptance of the system. There are several types of software which offer a myriad of options.

Choosing document management software is not an easy task. Before you choose document management software, you should compare the features of these products and other information about the product and evaluate these findings.

The evaluation of vendors is needed because once this part is done we can say that the best available technology to solve the problems the T&I turnarounds face has been implemented in a way that will produce the strongest results. It is important to note, that “best” doesn’t necessarily equate to the document management software with the most bells and whistles. Rather, it means finding the best solution that fits Staatsolie’s needs.

Each document management solution has specific features and benefits, and each is designed to solve different types of document management problems. Applications range from simple document scanning and retrieval systems to sophisticated applications tightly integrated with enterprise information systems. These applications may employ traditional EDMS technologies such as document imaging, workflow, computer output to laser disk (COLD), and document management library services. They may also employ technologies for content searching, intra/Internet access and publishing, as well as collaborative work management.

From [PART B – ANALYSIS] we have acquired the requirements, the organizational profiles, the documents that will be part of the EDMS and the users of the system. These will all be used to evaluate the vendors that were contacted and who replied.

This chapter presents the techniques used to evaluate the different vendor software and the obtained results.

9.2 Request For Proposal (RFP)

During this phase, the tool evaluation and selection, Staatsolie has opted for the use of an RFP. An RFP is a document containing a detailed list of technology and business requirements for a given project. This document is typically sent to a targeted group of vendors to solicit their proposals to work on your project.

Writing an RFP requires a great deal of time and effort, but these proposals aren't essential for every technology project. Relatively simple projects can often be addressed with a request for information (RFI) document or simply by reaching out to "best of breed" vendors. An RFI is a document that can be compared to a fact sheet. It is used to gather information about the product of the vendor, but not in as much detail as the RFP. In the case of small projects, such a document should be used instead of an RFP.

An RFP is essentially a list of questions for vendors. In small projects, an informal list of these questions could be used instead of an RFP. The reason why a format such as an RFP is suggested for larger projects is for the convenience of the company comparing different vendors. A structure is helpful when trying to determine which vendor to choose.

One could consider that the selection of an EDMS for the T&I organization would fall under a small project and a simple RFI would suffice. This however is not the case. Staatsolie is thinking of implementing the system, chosen for the T&I organization, companywide. The list of requirements produced during the analysis phase also took the whole organization of Staatsolie in account.

Setting up an RFP proved more difficult than thought. What exactly do we want to know of each vendor? Of course, if they can meet our requirements is a given. But what extra information could be the deciding factor? And must this all be incorporated in the RFP? These questions were discussed with the project group. It was decided that background information of each vendor and their financial situation for longevity purposes was required. Also, knowing how dedicated they are about their product and if it is a product that is used by companies seemed important to the project group.

Once the RFP was completed, we had to select vendors to invite them to fill in the RFP. During one of the weekly sessions held by the project group, each person in the group was responsible to gather a list of vendors to send the final RFP to. These lists would then be evaluated during the next session. Criteria used to make this initial list were:

- Is it an existing vendor we've used before
- Is the system the vendor is providing in use at other big companies and government agents in Suriname
- Is the vendor stationed in Suriname or does it have a reseller in Suriname.
- Does the vendor offer full support of product in Suriname.

The group eventually ended up with 10 vendors of which three were big names, two were open source, two were oil and gas specific solutions and the rest up and coming vendors in this field. These vendors are:

- IBM – Lotus Domino Document Manager
- Oracle – Oracle Universal Content Management
- Microsoft – Microsoft SharePoint
- DocuWare – DocuWare Document Management
- Alfresco – Alfresco Document Management
- KnowledgeTree
- ManualMaster
- Decos – Decos Document Management
- SwordAchiever – Achiever Plus Document Control
- BlueCielo – InnoCielo Meridian Enterprise

The T&I turnaround, which was scheduled at the end of august 2008 needed a quick application to store their documents. Because of this a choice was made by the IT department to buy a small application for just that purpose. The decision was made to pull in SQL Desktop a very light document filing system that could be used temporarily until this project had progressed some more. This application did its job very well; everything was neatly documented, making it the first time that a final report was produced in such a short time. In [Appendix D] an evaluation of this system can be found.

All these vendors were contacted and a formal request for proposal was sent to each of them. They each had a time span of 21 days to complete these RFP's and send them back. The request for proposal consists of 3 main parts that I will discuss: The vendor questionnaire, costumer references and system requirements. Each vendor can also provide additional documentation. In [Appendix C] you can find the official request for proposal sent to each of the above mentioned vendors.

Out of the 10 vendors selected, only 5 of these replied to our request for proposal before the given deadline. For each of the 5 companies that responded, I will write a quick summary of their company.

ManualMaster is a company that specializes in Quality document control. The company was founded almost 20 years ago and has a couple of hundred clients, mostly in the Netherlands. The company currently has 17 employees that work closely together to realize their projects. Their product, Manual Master, is aimed at mid-sized and large companies that have problems in the areas of document and process management. They do not have viewer licenses because viewers can make use of their system by simply having a browser installed on their computer. Depending on the agreed service level agreement, the support desk can answer any questions or help with any problems via telephone, email, remote access or a personal visit. Manual Master has a growing consultancy network. They even have a consultant in Suriname, Tjin Consultancy.

Decos is a Dutch company focused on developing high-tech and knowledge intensive products. Decos was founded December 1st, 1987 by Paul Veger and since 1997 it is based in Noordwijk in the Netherlands, but they have a distribution partner here in Suriname, I-Frontier. Decos is specialized in solutions for document and information management. Over the years, Decos has evolved into a group of companies that bring innovative products on the market in various fields. With the introduction of Decos D5, a document and records management solution, Decos has made itself one of the important

players in the Netherlands concerning document management. More than 500 organizations world-wide make use of Decos for the management of information. As an organization, Decos attaches great importance to quality. It is ISO 9001 certified and their products developments follow the guidelines set in NEN-ISO 15489. Decos D5 is also NEN 2082 certified which is the standard for information and records management software. Since 2007 Decos has a new department that is specifically aimed at the realization of integrating Decos with other applications: Decos Integration Solutions. Since its birth in 2007 more than 100 integrations with different applications have been realized. The use of standardized interfaces and an own development center in India make it possible for integrating Decos with other applications at a fast and effective pace. Decos has many consulting partners, solution partners and distribution partners. They even have a distribution partner, I-Frontier in Suriname.

Alfresco is an open source document management system. They too have a licensed dealer in Suriname, Qualogy, who'll offer full support for the system.

AchieverPlus is a company located in Texas. They have a range of products and tools and Staatsolie is using one of them, the incident management system. Staatsolie has 3 site licenses for this and 200 user licenses. These licenses are for any system from AchieverPlus that Staatsolie wants to use. So the costs for the AchieverPlus Document Management System will only be for training and implementing, which makes this system extremely appealing.

BlueCielo ECM Solutions B.V. is a company whose headquarters are located in the Netherlands. They offer a wide variety of Enterprise Content Management solutions for industries that make use of CAD systems.

During this phase an evaluation of these 5 tools will be made, based on how they replied to the RFP. Because of legal reasons this thesis will not go into detail about the responses of the vendors.

9.2.1 Vendor Questionnaire

The first part of the RFP is the vendor questionnaire. This part is to get an idea of who the vendor is, how long it has been in business, how big it is and how well it is doing. Another part of this questionnaire is the product they are offering. How well is it used? How is the support? How often is it updated? These are all very important questions that will play a great role in the eventual selection of an EDMS.

9.2.2 Costumer References

The Costumer References is the second part of the RFP. In the RFP made, it was decided that a maximum of four costumer references should be adhered by. From each costumer of the vendor, contact information was asked so that the project group could make inquiries on how satisfied these costumers are with the vendor product.

9.2.3 System Requirements

The best investment in electronic document management software is the one that gives you the most compatibility with the widest range of hardware and software platforms. This ensures seamless

integration into your business. And it should also give you the flexibility to manage and store documents in the file formats that you choose. Do you have the right operating system, processor and RAM requirements to run the software? Do you have the required disk space needed to accommodate the software and electronic document storage? Is the software compatible with your network? Does it support the authentication that you're currently using? Does it meet the requirements set in [8]? All these questions need to be answered with this part of the RFP. The project group was set to look over all the RFP's and grade them on how well they met the requirements specifications. This part was conducted without me.

9.3 Additional Documentation

With the RFP the vendors could also send back additional documentation presenting their products. This could range from pamphlets to folders, to demos and even online presentation. Each vendor send in additional documentation to support their answers in the RFP. Business cases, websites and pamphlets were all received. Presentations at Staatsolie were scheduled for Alfresco and a group outing was scheduled to one of the costumer references of Decos.

9.4 Summary

In this chapter we have looked at evaluation techniques, specifically the RFP. An RFP is a document containing a detailed list of technology and business requirements for a given project. This document is typically sent to a targeted group of vendors to solicit their proposals to work on your project.

Setting up an RFP proved more difficult than thought. Through brainstorming sessions, it was decided that background information of each vendor and their financial situation for longevity purposes was required. Also, knowing how dedicated they are about their product and if it is a product that is used by companies seemed important to the project group.

Once the RFP was completed, we had to select vendors to invite them to fill in the RFP. During one of the weekly sessions held by the project group, each person in the group was responsible to gather a list of vendors to send the final RFP to. These lists would then be evaluated during the next session.

The group eventually ended up with 10 vendors of which 3 were big names, 2 were open source, 2 were oil and gas specific solutions and the rest up and coming vendors in this field. These vendors are:

- IBM – Lotus Domino Document Manager
- Oracle – Oracle Universal Content Management
- Microsoft – Microsoft SharePoint
- DocuWare – DocuWare Document Management
- Alfresco – Alfresco Document Management
- KnowledgeTree
- ManualMaster

- Decos – Decos Document Management
- SwordAchiever – Achiever Plus Document Control
- BlueCielo – InnoCielo Meridian Enterprise

All these vendors were contacted and a request for proposal was sent to each of them. They each had a time span of 21 days to complete these RFP's and send them back. The request for proposal consists of 3 parts: The vendor questionnaire, costumer references and system requirements. Each vendor can also provide additional documentation. In Appendix C you can find the official request for proposal sent to each of the above mentioned vendors.

Out of the 10 vendors selected, only 5 of these replied to our request for proposal. These 5 vendors are: ManualMaster, Decos, Alfresco, Achiever Plus and BlueCielo

Their answers to the RFP were evaluated by the project group and a grade was given on each part. This grade will be used in the next chapter in the selection process of an EDMS vendor.

10. Final Selection

10.1 Introduction

In the previous chapter each vendor was evaluated not only against the requirements Staatsolie presented, but also against each other. In this chapter we will present these findings in a clear way to make the selection process easier. We will do this, by making use of a decision matrix were we have the criteria on one axis, and the solutions on the other. Each criterion will be assigned a weight dependent on their respective importance in the final decision to be taken. After the RFP's were received, the selection group worked intensively to evaluate each vendor before the decision deadline. Each vendor was given points on a scale from 1-10 for each criterion separately.

10.2 The Decision Matrix

The decision matrix is a widely used evaluation method in the tender process. This is because it is a systematic way to identify, analyze, and rate the strength of relationships between sets of information. It is a helpful way to determine the winning proposal among those sent in.

The decision matrix usually consists of a set of criteria, solutions, weights, ratings and scores. The solutions are the vendors who submitted an RFP. The criteria that will be used in evaluating the submitted reactions to the RFP for this decision matrix were decided by the project group and are as follows in order of importance.

- Ability to meet requirements as stated in the Requirement Specifications
- Vendor qualifications and financial stability
- Regulatory and compliance
- Implementation services including application training, conversion assistance, etc.
- Support services including maintenance, new releases, hot lines and responsiveness
- Installation ease, system adaptability to change and expandability
- Cost (initial and on-going)
- References

Each criterion has an importance level, with 1 being not that important and 5 being a must. Theses "importance levels" are the weights assigned to the criteria. The project group will rate the vendors based on how these criteria are met. This grade can range from a 0, criterion not met at all to a 10, criterion fully met. The decision was made to use this scale from 0-10; because this is the grading scale used in all educational facilities in Suriname and is widely known. There can thus be no misunderstanding of what a high score is or what can be considered a low score. The Surinamese grading scale is listed below:

Grade	**Definition**
10	Outstanding
9	Very Good

8 Good
7 Satisfactory
6 Pass
0-5 Fail

The more “high importance level” criterion met, the more chance a vendor has to be selected. The score for each criterion is calculated by multiplying the weight of that criterion with the grade of the solution. The overall score of a solution is the sum of all the scores per criterion. The vendor with the overall highest score will be the one selected. In table 6 the decision matrix used in this project is presented.

Table 6: Decision Matrix

selection criteria	Importance level (1-5)										
		AchieverPlus		**Decos**		**Alfresco**		**ManualMaster**		**BlueCielo**	
Vendor profile											
Product Name:		AchieverPlus		Decos		Alfresco		ManualMaster		InnoCielo	
Firm Name:		Achiever Business Solutions SWORD Group		Decos Technology group. Distribution partner: I-Frontier		Alfresco. Licensed dealer: Qualogy		ManualMaster Consultant: Tjin Consultancy		BlueCielo ECM Solutions B.V.	
Street Address:		2500 City West Blvd. Suite 300		Henck Arronstraat 16		Kerkplein 1		De Wederik 4		Handelskade 49	
City/ State:		Houston, Texas		Paramaribo		Paramaribo		Papendrecht		Rijswijk ZH	
Country:		USA		Suriname		Suriname		Netherlands		Netherlands	
ZIP:		77042						3355 SK		2288 BA	
Sales Contact:		Amy Shavor		Marian Lieuw A Soe				Patricia Tjin			
Phone:		1-713-267-2330		00597 424073		00597 470217				+31-70-413-3700	
Email:		Amy.Shavor@achieverplus.com		info@i-frontier.net		info@qualogy.sr		tjinconsultancy@xs4all.nl			
Sales Support Contact:											
Phone:											
Email:											
Web Site URL:		www.achieverplus.com		www.i-frontier.net		www.qualogy.sr		www.manualmaster.nl		www.bluecieloecm.com	
Criteria		**Rating**	**Score**	**Rating**	**Score**	**Rating**	**Score**	**Rating**	**Score**	**Rating**	**Score**
1. Requirements met	5	7	35	9	45	8	40	5	25	9	45

2. Vendor qualifications	5	10	50	10	50	9	45	7	35	9	45
3. Stability	5	8	40	9	45	9	45	9	45	9	45
4. Installation ease	4	10	40	8	32	9	36	8	32	8	32
5. System adaptability	4	7	28	9	36	8	32	4	16	9	36
6. System expandability	5	7	35	8	40	8	40	5	25	8	40
7. References	3	9	27	10	30	9	27	9	27	10	30
8. Regulatory & Compliance Requirements:	5	10	50	10	50	10	50	8	40	10	50
9. Implementation services	5	10	50	9	45	9	45	9	45	9	45
10. Support services	5	7	35	9	45	7	35	6	30	8	40
11. Initial Costs	3	10	30	5	15	9	27	6	18	7	21
12. On-going Costs	3	10	30	8	24	9	27	7	21	9	27
Total	**53**	**105**	**450**	**104**	**457**	**104**	**409**	**83**	**359**	**105**	**456**

10.3 Final Selection

From the previous section it can be concluded that three of the five vendors stand out. AchieverPlus and BlueCielo both have the highest rating, whereas Decos has the highest score. For a better interpretation, we can visualize the data in histograms. To do so, let's consider, as the data source, the ratings and scores of evaluated solutions. Here is the result:

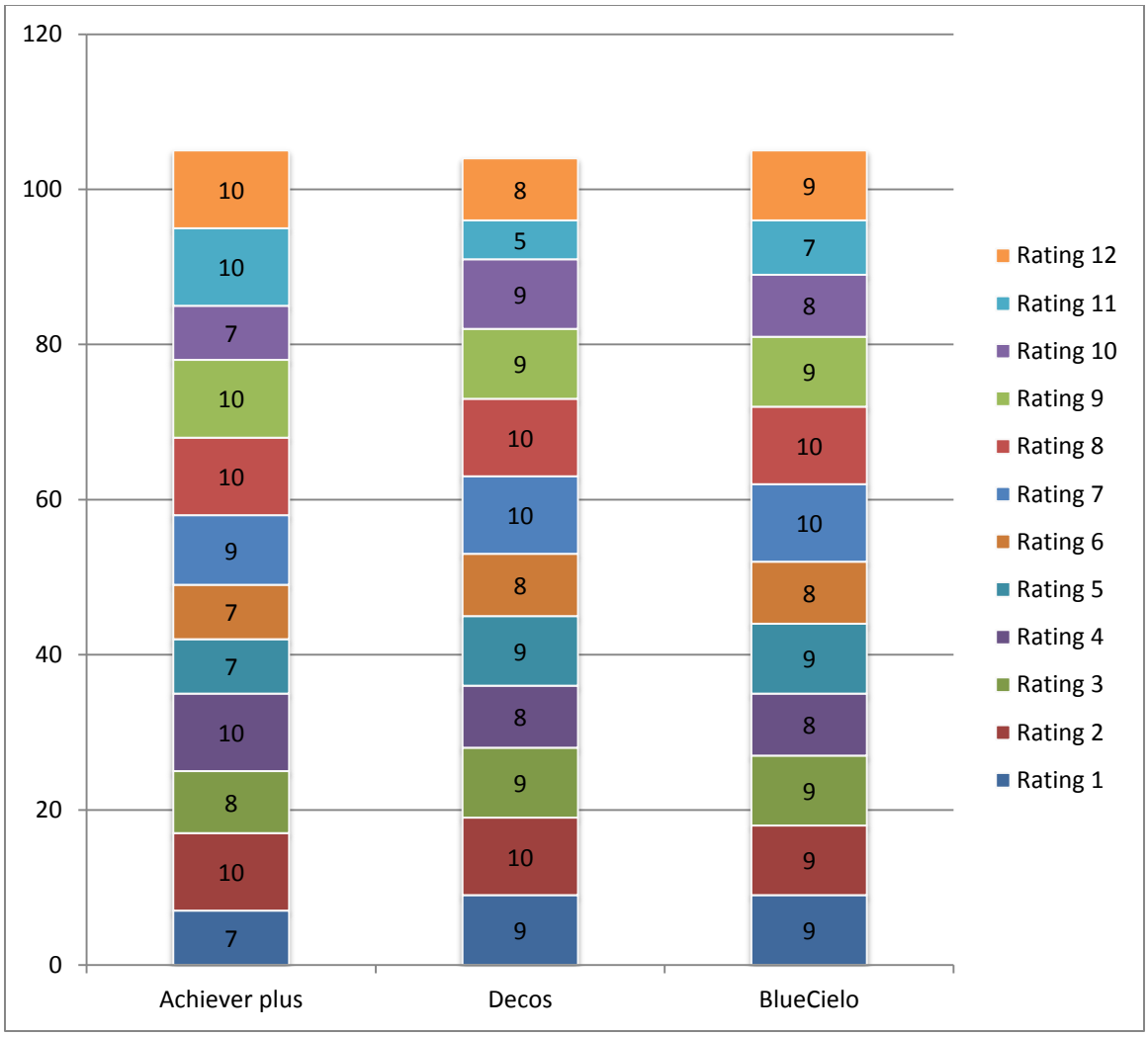


Figure 12: Solution Ratings

When we sum up the ratings, both Achiever Plus and BlueCielo are equivalent and outperform Decos. While similar globally, Achiever Plus and BlueCielo present different intrinsic strengths and weaknesses. Indeed, Achiever Plus is better than BlueCielo for the criteria 2,4,9,11 and 12, but weaker on 1,3,5,6,7,8 and 10. Interestingly, Achiever plus has these same weaknesses against Decos, but is better in one less criterion, criterion 4, than against BlueCielo. Furthermore Decos shows a weakness for criteria 11 and 12 but is very strong for most other criteria. From the graph it can be seen that Achiever Plus did very well on criteria 4, 11 and 12 compared to both BlueCielo and Decos. Let's take a closer look at these 3 criteria that seem to give the edge to Achiever Plus and take away from the two other vendors. As was expected, when taking a closer look, it becomes quite clear why Achiever Plus scores so high on those criteria. Criteria 4, *installation ease*, will definitely give Achiever Plus the edge since no initial installation is needed at all. Achiever Plus is already installed at Staatsolie. Criteria 11 and 12, *initial costs* and *on-going costs*, are also to be expected advantages for Achiever Plus. Achiever Plus does not have any costs attached to it initially and the only costs would probably be for training. These high scores are therefore only because Staatsolie is already making use of Achiever Plus and its licenses.

Let's apply the weights to the ratings now to obtain the solution scores:

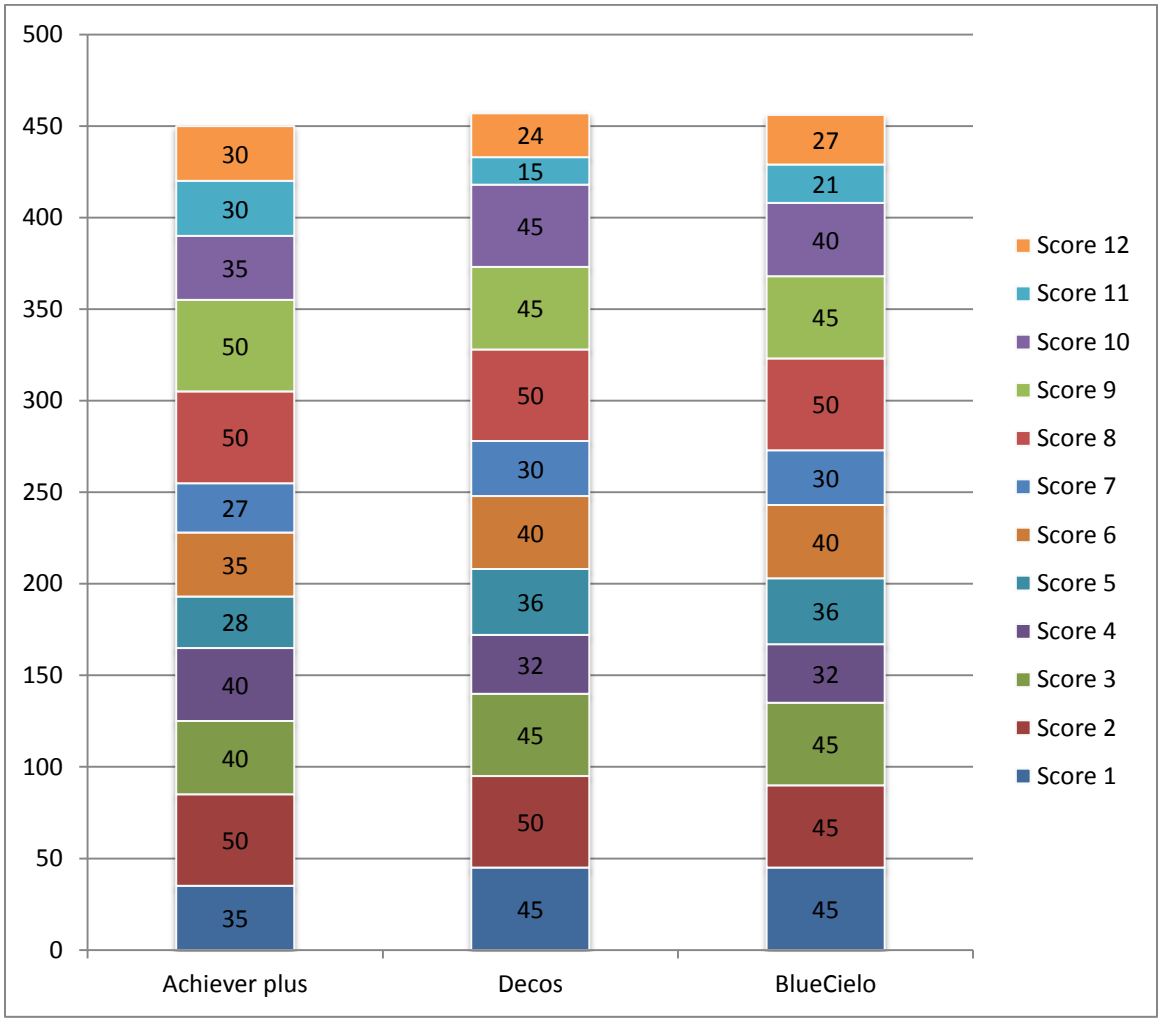


Figure 13: Solution Scores

It is interesting to see how with the weights applied, the results shift so drastically. Where once, Achiever Plus had seemed dominant and Decos the one lagging behind, we now see Decos taking full reign. We can clearly see now that there are only 2 dominant vendors and that the focus should be on Decos and BlueCielo as Achiever Plus is at minimal a full 6 points behind those two. It seems for Achiever Plus a higher weight was applied to its weakness and a lesser to its strength resulting in this drop to third place.

Looking at Decos and BlueCielo, we see an interesting battle going on. At first sight BlueCielo seems the better solution, but when weights are applied the strengths of Decos are shown. Which of these two vendors is the better one? Do we discard BlueCielo just because Decos scored higher even if by one point? Or do we choose BlueCielo because it has a higher rating thus having a better distribution of its strengths?

We will now look at the criteria were these two vendors have different scores. These criteria are:

- 2. Vendor qualifications.
- 10. Support services
- 11. initial costs
- 12. Ongoing costs

As can be seen these are not areas of differences in the functional requirements. Both these two vendors scored high on requirements met and are thus both very highly capable systems. Decos scored higher for criteria 2 and 10 both having higher weights thus being of more importance to Staatsolie. Both these vendors didn't score particularly high for criterion 11, but BlueCielo won that category and the ongoing costs. The costs for BlueCielo are thus lower than that of Decos and they provide the same high quality of functionality.

But from the start of this project, Staatsolie has put emphasis on quality over costs concerning this project. Decos does not score much lower than BlueCielo in these two categories, while still having better support services and better vendor qualifications. Because it was decided and also stated in the RFP that the vendor with the highest overall score would be selected, my selection and advice is Decos.

10.4 Summary

To analyze and rationalize the RFP responses that Staatsolie received back, a decision matrix was used, scoring each vendor solution based on a set of criteria provided by the project group. From this decision matrix we learned that the weights of these criteria had a big impact on the final score. Without the weights applied, Achiever Plus and BlueCielo had the highest scores. With the weights, it became clear that Achiever Plus would not be an option as now Decos had the highest score followed closely by BlueCielo. That BlueCielo scored high with and without the weights shows that its strengths are better distributed and probably has no very low ratings. Still, Decos was eventually advised by me, as it was stated beforehand that the vendor with the highest overall score would be selected.

11. Final Remarks

11.1 General conclusions

The final objective of this thesis is to meet the overall objectives and aims defined by the scope. This thesis was mainly focused on the implementation process of an EDMS at Staatsolie.

The aim of this thesis is to make an analysis of the business needs and processes of Staatsolie's T&I organization and the documents involved, and to select an EDMS tool that will support these needs. This EDMS should allow users to store, access and modify information quickly and easily, and thus aid in keeping to the T&I schedule. It should also thoroughly remove the problem of missing documents or documents not being created.

The problems, most departments of Staatsolie faced, prior to this project, were countless but could be summarized as problems with efficiency: in that it takes far too much time to find certain documents, Problems with knowledge sharing: due to the fact that no one exactly knows what documents are available, these documents are not being reused, instead being recreated from scratch, and problems with document flow: The process cycles of all sorts of documents are not enforced.

These same problems concerning documents are also present in the T&I organization. It can thus be concluded that Staatsolie has an inefficient way of managing its electronic documents, making it difficult to keep track of documents during their periodic T&I turnarounds.

Therefore I formulated the objective as follows:

"To have reliable, correct and the latest version of documents available and enable improvement in efficiencies and document processing time drastically."

To reach this objective, an efficient system should be implemented. This system should take the aspects into account as stated in [1.3].

Because an EDMS is such a complex system, not just any solution can be used. A closer look must be taken to comply with many laws, standards, guidelines and regulations. Also Staatsolie's mandated guidelines and standards must not be overlooked. Furthermore the needs of the users of the system should not be overlooked. All this was taken into account during this project.

Many companies all over the world use EDMS to standardize the way information is accessed and passed through the company. Research in this field has shown that an EDMS not only makes it easier for employees to find and access documents they want and in doing so, helping them perform better on the job, but an EDMS also saves time, simplifies the work, enforces standards and ensures accountability.

"IDC has estimated that the typical enterprise with 1,000 knowledge workers wastes $2.5 million to $3.5 million per year searching for nonexistent information, failing to find existing information, or recreating information that can't be found." (IDC: Feldman & Sherman, 2001)

BAE Systems conducted a study that discovered that 80% of employees waste an average of half an hour per day retrieving information, while 60% are spending an hour or more duplicating the work of others. (Kingsley Martin, 2002)

As can be seen from these sources, a lack of document management can cause a lot of money and time.

This thesis so far has been analyzing Staatsolie, and specifically the T&I organization, and how it currently works. We have seen that an EDMS is a proper solution for this organization, but that there is a need for one that best fits the needs of the T&I organization.

In this thesis I supplied a clear methodology for finding and implementing such EDMS. Using the methodology by Bielawsky and Boyle and adjusting it to fit the needs of companies today. The methodology I proposed has 5 phases: Analysis, Tool Evaluation & Selection, design, implementation and post-implementation. Before the start of this project a few meetings between my two supervisors were planned in, where it became apparent that one of my supervisors was pulling for a company-wide implementation and the other one was more concerned about the needs of the T&I organization. During these meetings, I outlined my plan of action or methodology.

The scope of my thesis project was established at this stage of the project and was the T&I organization. I outlined what the methodology would be that I would use during this project and advised them to let each department assign a group to follow this same plan to establish the requirements for the organization. My supervisor, head of the IT department at Staatsolie, used my plan of action and preliminary research to complete a business case, to get an approval for the whole project. Once this was received, everything rolled into motion.

In the analysis phase I made use of an actor questionnaire to start of my actor analysis. For companies like Staatsolie such a method is quite suitable to use in each department to get the needed user profiles for the eventual EDMS. This is because of the informal atmosphere in each department and their relatively small size. Such questionnaires then become ideal, because they provide quick information. The organizational profile and document profiles were acquired by research and interviews also done by me, and the T&I processes and business functions were identified using the ArchiMate modeling language. Another important method used during the Analysis was group collaborations. It is of great help to have a project group to help in acquiring the requirements of all the departments of Staatsolie. Each member of this group consisted of at least one key person of each department to represent it, and the job of each of these participants was to present their department's profiles and requirements. Weekly meetings were held with this project group to set up the software requirements specifications. This was done by going over the user profiles, organizational profiles and document profiles of all the departments. These software requirement specifications also took into account the laws, standards, guidelines and regulations with which Staatsolie needs to comply. Also Staatsolie's guidelines and standards for document control were taken into account.

Once this phase was completed the output was used to start off the next phase, Tool evaluation & selection or the tender phase. The methods used in this phase were all common practice at Staatsolie. My contributions during this phase, were my proposal of an evaluation group, that I had to school on what an EDMS is and what Staatsolie and specifically the T&I organization is looking for in such a system. I also set up the functional requirement specification in the RFP. Finally during this phase, I made my final recommendations on the EDMS to use.

The EDMS i recommend is Decos. Not only can Decos solve all the problems the previous T&I organizations faced, it is also reliable and used in a couple of companies and government organizations in Suriname, all who have no pressing complaints about it. Furthermore, Decos offers a lot of functionality that could be implemented and used in other departments at Staatsolie.

During the early stages of my project my scope was identified. Of the 5 phases in my methodology only the first 2 were in scope. I completed both theses phases during my project and advised on which EDMS to select. During my Analysis I acquired the organizational profiles, user profiles and document profiles that were used to set up the requirements and aid in the selection of the final EDMS. These profiles should also be used during the design phase.

11.2 Scientific Relevance

The relevance of this thesis and this project is that it has supplied Staatsolie with an improved process of acquiring new tools. It also provided them with deeper insights in their current document control problems by providing them with research and analysis of the T&I organization as it works now.

In this thesis an EDMS was proposed and selected. This EDMS was selected because it fulfilled the most of the functional requirements and criteria set by Staatsolie. Staatsolie was able to set these criteria and requirements by following the methodology proposed in this thesis.

This EDMS will improve the productivity of the T&I organization, and will assure proper document control. Referring to time, the EDMS proposed will reduce the time needed to find documents and improve the document workflow that is essential during the T&I as most important documents need signatures before being stored. In terms of costs, an EDMS can reduce costs by reducing the need of printed papers, of postage costs and document administration. The quality will also be improved because the latest information will be available and published, so there will be a minimal risk of working on old documents.

11.3 Future work

The scope of my project consisted of only the first two phases of my methodology. This project is therefore, far from over. While I have analyzed the T&I organization and the users and documents that will become part of the final EDMS system, Staatsolie personnel will still have to do a great deal more.

It should be noted that I have advice the use of Decos Document Management, and that Staatsolie needs to work closely with this vendor to first design and then implement this EDMS. The organizational profiles, user profiles and document profiles will be essential during the design phase and should be used to fill in the EDMS for the T&I.

All the employees of the refining operations department should be trained to use this system and the documents from the previous T&I's should be inserted. This will be during the implementation phase.

It has been indicated by many vendors and even the ones we used during this project, that it is very common for companies to come back to expand their EDMS solution to multiple departments or processes over time. This will probably also be the case at Staatsolie as it was apparent that the problems the T&I organization faced, were present in other departments.

If this project proves successful it will most certainly lead to greater support for a more significant investment later.

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Appendix A: Glossary Terms

AFI	As Found Inspection
CAR	Corrective Action Request
COLD	computer output to laser disk
CVI	Close Visual Inspection
CVS	Concurrent Versioning System
DCC	Document Control Center
DM	Document Management
DMS	Document Management System
DoD	Department of Defense
EDMS	Electronic Document Management System
ERMS	Electronic Records Management System
FCA	Final Closing Authority
HSE	Health Safety and Environment
ICT	Information and Communication Technologies
IT	Information Technology
MCC	Maintenance Control Center
OCR	Optical Character Recognition
RFI	Request For Information
RFP	Request For Proposal
RM	Records Management
SOX	Sarbanes-Oxley Act
T&I	Test and Inspection

Appendix B: Current Problems related to Document Management

Current problems/issues related to document management

Problems:

1. Documents are stored in multiple locations with multiple copies with the result that users can unknowingly get the wrong version.

EDMS Solution: An EDMS can solve this problem by taking advantage of current technologies where documents live in **only one place**, in **only one version**, and **only one source**, but are accessed simultaneously by many users. The user does not need to know where this document is stored; he only needs to know how to find it in the system.

2. Too much time is spent to search for a document.

EDMS Solution: Through the use of attributes or information about the documents, documents can be cataloged in a variety of ways. Sophisticated search engines for both attributes as well as full text indexing make document retrieval fast and easy. Here one might think of a Google type search engine without having to know where the document is located. This forms a type of transparency in the system. Because the user doesn't need to know where the document is, the system finds it for you.

3. A version of a document can overwrite important changes made by another co-worker. That work is now lost.

EDMS Solution: The system can track both major and minor changes made to a document. It will keep master copies of documents according to a set of predetermined rules. These rules are usually designed to ensure that any new edits are kept as minor changes or sub-versions of a document. This protects the integrity of the document assets.

4. A document is copied and edited, independently by multiple people. How can these multiple versions be reconciled?

EDMS Solution: Library services, which oversee the check-in and checkout of documents, are designed to prevent this situation from occurring. Documents are commonly locked from further access when one person has checked out a document for editing.

5. Getting a document reviewed, approved, and distributed back to the originators is not transparent. The process involves a number of people in different physical locations.

EDMS Solution: An EDMS can cover workflow, version control, online editing including comments and electronic delivery to streamline the process. Also with real time comment tracking many reviews can be executed in parallel instead of serial, cutting the time further. It can also eliminate the routing of

documents through email, giving only a notification email that a document is waiting for approval in the system, with a link given to that document

6. Documents created in different groups using different packages are difficult to share other than on paper.

EDMS Solution: Automated document conversion to a neutral format or use of multi-format viewers as part of the EDMS can make electronic information sharing a real possibility.

These are the most common user problems that Staatsolie needs to deal with on a daily basis. As is shown above, all these problems could in fact be solved, by implementing the right EDM system.

The benefits of EDMS

Besides all the problems Staatsolie has, that could be solved by an EDMS, there are also other benefits that will come along. This list is nowhere near complete in describing the great benefits of such a system:

1. The benefit of a Paperless distribution model. With the implementation of an EDMS the use of paper per month, can be lowered. Ask yourself the following questions: How much is spent on printing papers each month? How much on printer cartridges, binding equipment, etc.? How much time does it take to get a paper version of a document approved?

2. The ability to provide a business service. Primary among these benefits is the ability to provide immediate response to customer inquiries or to retrieve relevant documentation while directly servicing the customer. This directly enhances efforts to improve overall customer satisfaction. The time delays traditionally associated with document retrievals are virtually eliminated or at least significantly reduced.

3. Productivity improvements gained by utilizing document management systems include improved document search and retrieval, this is not only a reduction in the time it takes to search for a certain document, it also includes the time it would take to recreate a document if it was not found. If information in a usable form can be located quickly and easily, people in cross-functional teams can better share and collaborate; doing the things that add the most value, rather than simply shuffling electronic files back and forth.

4. Staatsolie, like other companies, must comply with the “Archief wet”. Document management provides a secure and stable environment where mandatory records can be stored for easy access by auditors or other regulators. These records cannot be altered, and any document access or action can be tracked through an audit history.

5. Another benefit is control over corporate knowledge contained within its documents. This is often best viewed as a cost avoidance measure. For example, what are the consequences if:

Documents are lost or destroyed? Outdated information is used for a decision or action? Inaccurate information is provided to costumers.

6. Furthermore, most EDM systems offer intranet options that would have as benefit, that it could eliminate the way general information is distributed throughout Staatsolie.

Appendix C: Request for Proposal

Statement of Purpose

We, Staatsolie Maatschappij Suriname N.V. have been camping with many problems concerning document management. These problems are evident at all departments of our company. Several user groups, such as the department of Engineering, Maintenance Control Center and Public Relations at Staatsolie, have requested ICT support for a solution to improve the management of electronic documents.

From this information a clear problem definition, including the many problems all departments seem to have concerning document management was made:

Efficiency: It takes a long time (if possible at all) to find a document in the present situation, especially for new employees.

Knowledge Sharing: It is not clear which documents have been created in the past. Because of this, new documents are regularly created from scratch, while these could have been based on existing documents. As a result of this a lot of time is wasted.

Document flow: The business process cycles (creation – verification – modification – approval – etc.) related to all sorts of documents, are currently not enforced through a system. Because of this, defined standards for these processes set in the guidelines for document control by Staatsolie, are not followed.

From this information, Staatsolie formulated their problem as follows:

Staatsolie has an inefficient way of managing its electronic documents, making it difficult to keep track of documents, share knowledge and follow the guidelines set for document control.

The solution for this situation is an EDMS. The goal of this RFP is to aid in the selection of an EDMS tool that will support these needs.

Scope of Work

The implementation of an EDMS will be done in 5 phases:

- Analysis
- Tool Evaluation & Selection
- Design
- Implementation
- Post-Implementation

The Analysis phase and Tool Evaluation & Selection phase will fall outside of the scope of the vendor. The design, implementation and post-implementation phase are to be completed by the vendor with the help of Staatsolie personnel.

Requirements for proposal preparation

In order to receive information related to your organization, services, products and related financials we have included a vendor questionnaire. The first part of this proposal is this questionnaire. This questionnaire consists of the following 2 sections:

- Vendor Profile
- Software Product Profile

Please respond to the questions of each section of the questionnaire as complete and direct as possible. You can also include documents to support your answers.

The RFP then goes on to ask for costumer references. A maximum of 4 references can be submitted. Please list current clients who are using your proposed system and who can be contacted for reference purposes. The references may be asked to allow select EDMS project team members the opportunity to visit their location(s).

The heart of this RFP is a detailed list of questions surrounding your system's functionality. Your response to these questions will help us determine to what extent there is a functional match between our requirements and your proposed solution.

Please indicate per requirement if and how it is supported by your system by placing a check-mark in the corresponding cell.

Evaluation and award process

The following are the criteria that will be used in evaluating the submitted reactions to the Request for Proposal. They are listed in order of importance.

- Ability to meet requirements as stated in the Requirement Specifications
- Vendor qualifications and financial stability
- Regulatory and compliance
- Implementation services including application training, conversion assistance, etc.
- Support services including maintenance, new releases, hot lines and responsiveness
- Installation ease, system adaptability to change and expandability
- Cost (initial and on-going)
- References

These Criteria will be scored in a decision matrix. The project group will give grades to the vendors based on how these criteria are met. This grade can range from a 0, criterion not met at all to a 10, criterion fully met. Each criterion has an importance level or weight, with 1 being not that important and 5 being a must. The more "high importance level" criteria met, the more chance a vendor has to be selected. The vendor with the overall highest score will be the one selected.

Schedule

You have exactly 21 days after receiving this request to submit this proposal. Failure to do so will disqualify you from making a bid.

Once this deadline is met, the project group at Staatsolie will evaluate each proposal. If additional information might be needed we will contact you. A final selection will be made within 21 days of the submittal deadline. At this point all vendors will receive an email. This could be a rejection letter or an award letter.

Vendor response requirements

VENDOR PROFILE	**Response**
1. When was the company founded?	
2. How many employees does the company currently have?	
• In sales and pre-sale technical support?	
• In post-sale technical support?	
• In consulting and implementation support?	
• In product development/engineering?	
• In administration?	
3. What were the total revenues for each of the last three years?	
4. List regional support, development, and sales office locations for the product.	
5. Do you maintain any partnerships/alliances for hardware, software, communications or support? If so with which companies and how long have you maintained these agreements?	
PRODUCT PROFILE	**Response**
1. What is the name of your application represented in this RFP?	
2. What is the software version represented in this RFP?	
3. When was the product released?	
4. How many clients have purchased, installed and are currently using your system?	
5. Provide details about the different installations:	
• Average number of geographical locations (sites)	

per customer	
• Average number of users per site	
6. Will there be any new version upgrades in the near future?	[Yes] / [No]
7. What is the frequency of updates to the software?	
8. Can you provide support for your proposed solution in Suriname?	
9. What is the average (mean) implementation duration and what is the range (i.e. 6-12 months)?	

1.	**Organization:**	
	Where Located:	
	Contact Person:	
	Contact's Title:	
	Contact's Phone Number:	
	Short system description (what installed, when, etc.):	
2.	**Organization:**	
	Where Located:	
	Contact Person:	
	Contact's Title:	
	Contact's Phone Number:	
	Short system description (what installed, when, etc.):	
3.	**Organization:**	
	Where Located:	
	Contact Person:	
	Contact's Title:	
	Contact's Phone Number:	
	Short system description (what installed, when, etc.):	
4.	**Organization:**	
	Where Located:	
	Contact Person:	
	Contact's Title:	
	Contact's Phone Number:	
	Short system description (what installed, when, etc.):	

#	Functionality	Description	Yes. Included in base packet	Yes, included as optional	Yes, as add-on application	Yes, in future updates	Yes, but customization required	No, it's not provided
Creation								
1.	Application compatibility	The system must provide a means to create and edit documents in Microsoft Office or any other type of Office application in use and insert it into the system.						
2.	Templates	The system must provide a means to store and use templates so that the final copy of a document will look the same electronically and on paper regardless of who created it.						
3.	Style-Types	The system must have a tool that provides style types to control document formatting.						
4.	Standard boilerplate texts	The system's tool for providing templates must also have an option of inserting boilerplate text such as headers and footers.						
5.	Form elements	The system must have a tool that allows a template to be constructed with basic form elements.						
6.	Forms	The system must allow a user to fill out a form and insert it into the system.						
7.	Digital media	The system must allow users to create digital media and store it into the system.						
Conversion								
8.	File types	The system must be able to convert between different types of files. Such as .doc, pdf, .xls, .dwg, jpg, gif, etc.						
9.	Scanned papers	The system should be able to convert scanned papers into editable document types.						
Management								
10.	Re-configuration	The system must allow administrators, in a controlled manner and without undue effort, to retrieve, display and re-configure						

		system parameters and choices made at configuration time.						
11.	Storage space	The system must monitor available storage space, and notify administrators when action is needed because available space is at a low level or because it needs other administrative attention.						
12	Back-ups	The system must include functionality to recreate the documents and metadata to a known status, using a combination of restored back-ups and audit trails.						
13.	System recovery	The system must provide recovery and rollback facilities in the case of system failure or update error, and must notify the administrators of the results.						
14.	User movement	The system must support the movement of users between organizational units.						
15.	User roles	The system must allow the definition of user roles, and must allow several users to be associated with each role.						
16.	Reporting facilities	The system must provide flexible reporting facilities for the administrators. They must include, at a minimum, the ability to report the following: • Number of files; • Transaction statistics for files, volumes and records; • Activity reports by user						
17.	Audit trail reports	The system must allow administrators to enquire on and produce reports on the audit trail. These reports must include, at a minimum, reporting based on files, users, time periods. And should be based on security categories, user groups or other metadata.						
18.	User restrictions	The system should allow administrators to restrict user's access to selected reports.						
19.	Security categories	The administrator must be able to change the security category of files.						
20.	File deletion	The administrator must be allowed to delete documents he did not create, however, in the event of such a deletion the system must record the deletion comprehensively in the audit trail, and must not allow deletion of documents that are part of another set of documents.						

21.	Meta-data	The administrator must be able to change any user-entered metadata element. Information about any such change must be stored in the audit trail.						
22.	Check-in	The system must be able to check-in any reviewed and approved document.						
23.	Checkout	The system must allow to checkout any document a user has authority to view.						
24.	Viewing	The system must allow viewing of a document by more than one person at a time.						
25.	Editing	The system must not allow simultaneous editing of a document by more than one person.						
Security								
26.	Access	The system must allow the administrator to limit access to documents, data and metadata to specified users or user groups						
27.	User profile attributes	The system must allow the administrator to attach to the user profile attributes, which determine the features, metadata, fields, documents or data to which the user has access. The attributes of the profile will: • Prohibit access to the system without an accepted authentication mechanism attributed to the user profile • Restrict user access to specific files or data • Restrict user access according to the user's security clearance • Restrict user access to particular features (example: read, update and/or delete specific metadata fields) • Allocate the user to a group or groups.							
28.	Control functions	The system must be able to provide the same control functions for roles as for users. This feature allows the administrators to manage and maintain a limited set of role access rights rather than a large number of individual users.						
29.	Setup and allocation	The system must allow only administrators to set up user profiles and allocate users to groups.						
30.	Security attributes	The system must allow changes to security attributes for groups or users to be made						

		only by administrators.						
31.	Restricted files	If a user performs a full text search, the system must never include in the search result list any document or data which the user does not have the right to access.						
32.	Logging of unauthorized activities and violations	If the system allows users to make unauthorized attempts to access files, it must log these violations and attempted violations in the audit trail.						
33.	Audit trail	The system must keep an unalterable audit trail capable of automatically capturing and storing information about: • All the actions that are taken upon a document or any data • The user initiating and/or carrying out the action • The data and time of the event This information must be available for inspection on request						
34.	Automatic tracking	Once the audit trail functionality has been activated, the system must track events without manual intervention, and store in the audit trail information about them.						
35.	System changes	The system must provide an audit trail for all changes made to the system.						
36.	Back-ups	The system must provide automated backup and recovery procedures that allow for regular backup of all documents, data, metadata and administrative attributes of the systems repository.						
37.	notifications	The system should be able to notify users whose updates may have been incompletely recovered, when they next use the system, that a potentially incomplete recovery has been executed.						
Searching and viewing								
38.	indexing	The system must be able to automatically index documents						
39.	Keyword searching	The system must support search by Author, editors, viewers, document type, document format, pre-defined keywords or by folder.						
40.	Searchable text	The system must allow some text contents to be searchable						
41.	Combination search	The system must allow the user to set up a single search request with combinations of metadata and/or document content						

42.	configurations	The system must allow administrators to configure and change the search fields						
43.	Searching methods	The system must provide searching tools that cover the following techniques: • Free text searching of combinations of metadata elements and content • Boolean searching of metadata elements						
44.	Display browsing	Where a graphical user interface is employed, the system must provide a browsing mechanism that provides graphical or other display browsing techniques.						
45.	Document search	The system must be able to search for and retrieve a complete list of documents, making out a specific report for a certain equipment at the plant.						
46.	Document name search	The system must be able to search for and retrieve a document by all implemented naming principles, including filename and file identifier						
47.		The system must display the total number of hits from a search on the user's screen and must allow the user to then display the search results or refine his search criteria and issue another request.						
48.	Selecting and opening	The system must allow documents listed in the search results of a user, to be selected then opened.						
49.	Metadata search	The system must allow metadata of any document to be searched.						
50.	Save queries	The system should allow users to save and re-use queries.						
51.	Narrow search	The system should allow users to narrow searches.						
52.	Unique identifier search	The system must allow users to retrieve documents directly by a unique identifier.						
53.	security	No system search or retrieval function must ever reveal to a user any information, which the access and security controls are intended to hide from that user.						
54.	Web access	The system should also be accessible by a web browser						
Workflow								

55.	Workflow steps	The system's workflow feature must provide workflows, which consist of a number of steps, each step being for example, movement of a document from one participant to another for action.						
56.	Infinite number of steps in workflow	The system should not practically limit the number of steps in each workflow						
57.	Alerts and Actions	The system's workflow must provide a function to alert a user participant that a document has been sent to the user for attention and specify the action required.						
58.	Email integration	The system must allow the use of email for a user to notify other users of documents requiring their attention. (This implies integration to an existing email system)						
59.	Pre-programming	The system's workflow feature must allow pre-programmed workflows to be defined and maintained by the administrator						
60.	security	The system's workflow feature must prevent pre-programmed workflows from being changed by users other than the administrator						
61.	management	The administrator should be able to designate the individual users are able to reassign tasks/actions in a workflow to a different user or group. (A user may wish to send a document to another user because the assigned user is on leave)						
62	Audit trail	The system's workflow feature must record all changes to pre-programmed workflows in the audit trail.						
64.	Progress reports	The system's workflow feature must record the progress of a document through a workflow so that users can determine the status of a document in the process.						
63.	Limitless workflows	The system must not practically limit the number of workflows, which can be defined.						
65.	Conditional flows	The system workflow feature should provide conditional flows depending on user input or system data.						
66.	interrupts	The system's workflow feature should allow users to interrupt a flow temporarily in order to be able to attend to other work.						
67.	Pause option	The system's workflow feature should be able to pause the workflow to await arrival						

		of related electronic documents. When the awaited item is received, the flow resumes automatically.						
System								
68.	Client-server solution	The solution offered is a client-server solution						
69.	ASP solution	The solution offered is a Application server provider solution						
70.	IBM OS, Windows server 2003	The system must support Microsoft Windows server 2003 or IBM OS as server operating system						
71.	Windows XP and higher	The system must support Microsoft Windows XP and higher as client operating system						
72.	Third party software Integration possibilities	The system should have integration possibilities with other Staatsolie applications, including DataStream (Staatsolie's workorder system), Microsoft Office and Lotus Notes.						
73.	Microsoft SQL, Oracle DB	The system must use either Microsoft SQL or Oracle DB as its database server						

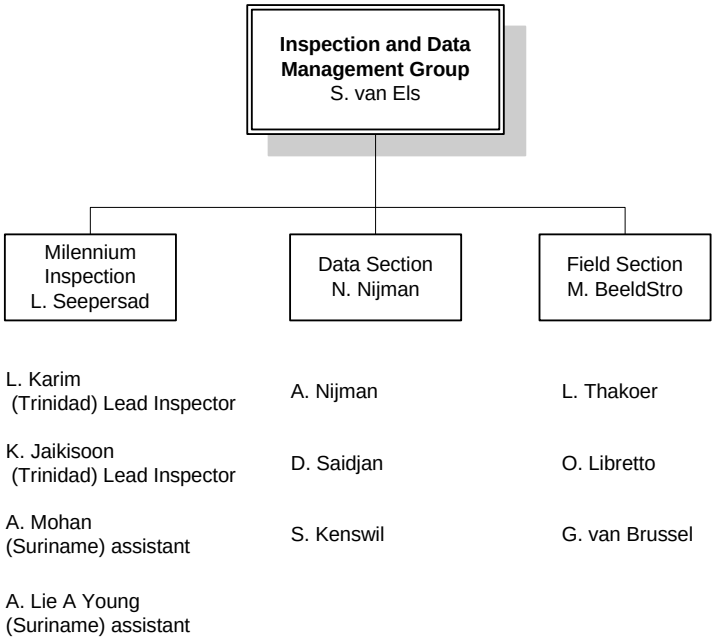
Appendix D: Test & Inspection 2008: Data Processing Group Evaluation

ORGANISATION

The Inspection and Data management group of the T&I 2008 consisted of:

- The Inspection supervisor
- An Inspection group, namely the Millenium inspection
- A data section
- A field section.

Below is a figure that maps out the organization of this group:



My experience with this group was an overall good one. We all worked very well together, getting the jobs done on time and working hard to achieving the group's goal. While doing this, a professional attitude was always present. Even so, that did not keep this group from making many jokes and talking about the funny events that had transpired, making the inspection office quite often a room of laughter in this building.

DOCUMENT FLOW

The inspection section was responsible for creating most of the documents. This included the following list of documents:

- AFI Reports
- CVI Reports
- Photo Captions documents
- Photos
- CAR documents
- Tube measurement AutoCad drawings
- UT measurement AutoCad drawings
- Heat Exchanger Test reports

The receiving of the workorder documents was de responsibility of Marlon Beeldstro. Who brought them in when received from MCC.

The data Section received all these documents first and was responsible for the management and distribution of these documents.

My experience with the document flow was in the beginning one of constant irritation. That is because the workorders never came in on time because the readiness for inspection of equipement on the field was very different then what was found on the T&I schedule.

Also the workorders needed to be filled out by the inspectors and that was mostly never done. In the defense of the inspectors, though, the workorders had many different jobs on them which they would do simultaneously while on the field. So the times for each job would be hard to report.

Furthermore the documents received from the inspection section were transported to the data section with the help of USB sticks which wouldn't be that frustrating if the computers in use didn't have the weirdest problems with recognizing these sticks. Upon receiving these documents, the data section held on to them until the jobs on the workorders where completed, at which time MCC could take a look at them.

Upon receival of the CAR documents, these had to be immediately emailed to the T&I Superintendent.

There were some positive points too. For instance, when asked for a certain document, the data section could always give an answer to where it was or if it was already made because of the logs that were kept.

MANAGEMENT OF DOCUMENTS

De management of the documents was all in hands of the data section. For this job, there was decided before hand, to make use of the SQLDesktop system. This system had many good points, but just as many bad points. Below I will list first the good points and then follow with the bad ones.

Pros:

1. Documents could be organized as we saw fit.

2. Documents could be organized in same way as a file cabinet. So it was easy to mimic the file cabinet we used for the physical documents.
3. It could support all the file formats we needed.
4. It allowed for the photos to be captioned.
5. It allowed photos to be placed in a photo album
6. It could handle photo sizes up to 2MB
7. The capacity of the server could handle all the data.

Cons:

1. Documents that needed to be in more places then one. Had to be uploaded multiple times in each place separately.
2. The search did not work very well.
3. The operation times were extremely slow. So much so that we first saved all the documents on the local pc first so to use those for printing instead of the ones filed away on the system.
4. Photo captions could only be of a certain size, otherwise not visible if printed.
5. Photos larger then 2MB could not be uploaded.
6. It's not very "lazy user" friendly. The simplest tasks needed so many clicks and so many procedures. For example, printing of 6 photos on one page needed first for the photo album to be converted to the "comic style" once converted needed to be saved to a location somewhere on the computer. Then from the computer it could be printed. All this wouldn't be so bad if the program didn't take hours to do this.
7. There is no option of restricting user rights. For example, letting MCC only see the documents that had been completed was not a possibility.

All in all it did a good job of filing away all the documents, but only because the personnel had the **patience** and the **will** to try and document everything correctly and well this T&I, because SQLDesktop is very aggravating in many ways.

LESSONS LEARNED

This T&I was a whole new experience to me. I had never been through something like this before, like most of the people in the Inspection and Data management group. I've seen what documents need to be documented and what they are needed for. Furthermore it gave me first hand insight on what exactly is needed here at Staatsolie to ensure good documentation during future T&I's. In a sense it

helped me fill out the requirements for my analysis on the document management system that I will be proposing for Staatsolie's T&I's.

RECOMMENDATIONS

As I have a background in ICT, my recommendations will all be based on automating the whole process.

I noted there was a lot of walking being done considering documents. All which is not at all necessary. The work orders needed to be picked up at MCC and brought here every morning. A recommendation here would be to make it available to the section in need of it. So they could print them out themselves.

Documents that needed signing. Needed to be brought around to all these people. Sometimes a tedious job, because the people could not be found due to all the activities going on at the plant. A recommendation here could be, emailing these documents around and working with electronic signatures. But this is something that would need to be accepted company wide.

Giving the inspectors access, for the time they are here, to the system in use for the document management. This will enable the inspectors to input their documents immediately, and would eliminate the use of USB sticks and the need for a data section.

Giving other personnel access to the log files on the system. So they can see what activities have been documented already and what still needs to be done.

Appendix E: Approval Plan of execution

Document : Plan of execution for the implementation of an Electronic

Document Management System

Authors : Lo A Njoe A. & Chandrikasingh D.

Version : version 1.2- draft

Date : 29 January 2009

DISTRIBUTION LIST:

Project Executive

I.E. Kortram - Director Finance

Project Team

Division - Department	**Name**
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Engineering & Maintenance - E&C	D. Kertotiko
HSEQ - Quality	R. Slijters
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Refining Operations	H. Lemmert

Project Reference Group

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Controlling	A. Moensi
Corporate Planning	A. Jagesar
Eng. & Maintenance	F. Rier
HSEQ	D. Mac Donald
Public Relations	W. Jungerman
Field Evaluation	S. Nandlal
Refining Operations	C. Hughes

Approval of attached document

Approval Director Finance

Project overview

Several user groups e.g. Engineering, Maintenance Control Center TLF, Public Relations, have requested ICT support for a solution to improve the management of electronic documents. Within the daily work most of the documentation is processed and stored electronic.

Currently documents are stored on separate data drives for each work location, and for teams we use restricted directories. Access is granted according to ICT logical access instructions and managed by authorized ICT personnel.

The document management solution must provide users a system to manage electronic documents. Main objective is to have reliable, correct and the latest version of documents available. Also electronic document review/routing for sharing and exchange must help to improve in-efficiencies and document processing time drastically.

Requirements

A. Business requirements:

Business areas have expressed their needs for improvement in electronic document management. A list of most common user problems is presented in attachment 1. This list is compiled in cooperation with representatives of other divisions.

To accommodate end users in managing electronic documents the market has nowadays advanced automated software systems as alternative application solution tools.

The implementation of such a solution tool company wide must help support the overall business in managing electronic documents.

The system should handle standard text contents, photos, pictures or images created by standard software in use within the business e.g. MS-office products, Acrobat, photo and video products, ascii text, etc.

B. User Requirements:

The system must fit the user list of functional requirements. Detail system and user requirements will be gathered and defined by the assigned project team.

Who, What and When

Who

Are the project Stakeholders?

- Sponsor : Director Finance
- Data/Process Owner : Manager Controlling Division
- System Owner : Manager ICT Division
- Project Management : ICT Superintendent Applications
- Customer : Business key users of documents

Will directly interact with the system?

Workflow routing/exchange of documents for review or approvals:

- Members of Directorate team
- Members of Division teams
- Members of Project teams

Data Entry:

- Assigned key persons

View documents:

- Project Reference Group

Will see what when they interact with the system?

- Authorized persons by username/password
- Access and privileges are granted on user groups and members

What

Information or assets go into and out of the system?

- Documentation listed on “List of working Documents”
- Documentation for Project groups
- Documentation related to company business

When

Do tasks get performed and when does information change?

- During / after document creation
- During document exchange and routing for review and approval

- At opening of the document

Does the system need to respond or act?

Alert functionality in case:

- Routing and review not processed as scheduled
- Disk space availability becomes an issue
- Document version control needs to be taken care of
- Audit trail on document use is required

Project scope & Deliverables

The scope of this project includes and excludes the following items:

In scope

The following major activities will be executed in this project:

- Identify current bottlenecks and specify user functional requirements for proper document life cycle. Workshop with key users to gather information on current problems/issues and specify a list of user functional requirements.
- Evaluation and proposal on package selection. Review short list of packages and perform product evaluation and advise preference.
- Prepare implementation of selected system. Advise on implementation rollout (transfer old documents vs. new documents), documentation conventions and rules, system use, functional setup.
- Training and rollout of the system.
- Detail time planning.

Out of scope

Electronic geographical documents which are viewed with specific software tools.

Above documents will be managed in other projects.

Deliverables

As product deliverables are expected:

- Detailed list of current problems/issues and user functional requirements for managing electronic documents
- Package evaluation and proposed preferred package selection
- Installed test environment and performed user acceptance test
- Detailed action plan and cost estimate for company wide implementation of the software system

Project estimated effort/cost/duration

Estimated effort hours

All needed project resources; skills and efforts will be extracted from in-house personnel. Resources must be fully dedicated and committed to spend time and effort on project activities. To achieve the objective to have the implementation finalized by the end of Q3 2009, estimate is initially set for 3 hours per week for the project team.

Estimated cost

The major costs are:

- Acquisition of a document control software system including licenses for company wide implementation.
- Possibly extra hardware
- External technical product consultancy support for installation, system configuration and training.

Cost for this project will be covered by the budget of ICT project NEI-0804 estimate US$ 110,000.00.

Estimated duration

Milestone	Date
Start of project	15 nov. 2008
Detailed system and user requirements	Mid Feb. 2009
Package evaluation and proposed preferred selection	1 April 2009
Installed test environment	1 May 2009
User acceptance test	15 June 2009
Start rollout production environment – pilot TLF	1 July 2009

Project resources

Project Team Members:

- ICT Division, Agnes Lo A Njoe - Project Management
- ICT Division, Benito Leeuwin – application administrator
- Controlling Div, Mala Chandrikasingh – AO specialist
- Engineering & Construction, David Kertotiko – key user technical area

- Refining Operations, Henk Lemmert – key user technical area
- E&P Data Management, Vikash Rambaran Mishre - key user technical area
- Quality, Richard Slijters – key user administrative are
- Public Relations, Kailish Bissesar – key user administrative area

Special Team Member:

- Angela Nijman – Student TUDelft

Reference Team Members:

- Managers of the team members.

Project assumptions

- Availability of personnel resources for a minimum of 3 hours a week
- Availability of other personnel for ad-hoc advice
- Availabilty of budget: It is assumed that enough budget should be made available to implement a company wide business solution.

Project approvals:

_____

Project Sponsor – Drs. I.E. Kortram Date

_____

Data/Process Owner - A.Moensi Date

_____

System Owner - A.Sleman Date

Appendix F: User Questionnaire

User Questionnaire

Dear respondent,

I'm currently studying Information Architecture at the Delft University of Technology in the Netherlands and doing my internship here at Staatsolie at the refinery. I am in my final year and writing my final thesis on Electronic Document Management Systems and how it will benefit the T&I turnaround. Part of this study is an actor analysis to find out who the users of the EDMS will be. By completing this questionnaire you will help me gain insight into the needs of these users and help me build the user profiles needed to obtain the requirements for an EDMS. This questionnaire is intended for all upper personnel participating in the T&I turnaround who have access to a personal computer during the T&I provided by Staatsolie. This survey consists of 18 questions and will take about 15 minutes to complete. Thanks in advance for your cooperation.

1. What is your job Title during the T&I?

_____

2. Please give a brief description of your job.

_____
_____
_____
_____

3. What are the major tasks you have to complete during the T&I turnaround? Please fill in the table. (If you have more tasks than rows given in the table, please write those at the back of this survey)

4. What are the obstacles involved that could prevent you from completing your job? Please fill in the table

5. What is the frequency in which you have to complete these tasks? Please check one in the table

6. What is the importance of these tasks and what are the consequences if not completed correctly? Please fill in the table

Task	Obstacles	Frequency	Importance	consequences
		○ Not frequent ○ Regularly ○ Very frequent	○ Not important ○ Important ○ Very important	
		○ Not frequent ○ Regularly ○ Very frequent	○ Not important ○ Important ○ Very important	
		○ Not frequent	○ Not important	

		○ Regularly ○ Very frequent	○ Important ○ Very important	
		○ Not frequent ○ Regularly ○ Very frequent	○ Not important ○ Important ○ Very important	
		○ Not frequent ○ Regularly ○ Very frequent	○ Not important ○ Important ○ Very important	
		○ Not frequent ○ Regularly ○ Very frequent	○ Not important ○ Important ○ Very important	

7. What is your computer experience? (Choose the one that best describes your situation)

- ○ No experience (I don't know what to do when a computer is turned on)
- ○ Basic (I can make use of my email account and basic knowledge of word processing programs, I can use an internet search engine to aid me in my daily work. I can use a CD and DVD on a computer)
- ○ Good (I make use of Datastream, email account, Microsoft Office suite, Autocad programs, the internet to aid me in my daily work, I can use a CD and DVD on a computer, I can make use of usb ports and cardreaders)
- ○ Expert (I build in house programs to aid me in analyzing my findings when out on the field. I know my way around the internet and have good knowledge of the systems in use at Staatsolie that are important for my tasks. I also know the hardware of my computer and how to use it.)

8. During the T&I do you use a computer on a daily basis?

- ○ Yes
- ○ No

9. What computer programs do you use to create documents? Please select one or more of the following options.

- ○ Microsoft Word
- ○ Microsoft Excel
- ○ Microsoft PowerPoint
- ○ AutoCad
- ○ OpenOffice
- ○ Other, namely _____

10. What are your expectations of an Electronic Document Management System (EDMS) for the T&I? Please select one or more of the following options.

- ○ No more lost documents
- ○ No more creating tedious documents the system will do that for you

- No time lost on searching for documents
- Easier to use then most systems in use at Staatsolie
- It will calculate data for me from previous entries
- Less walking around with papers that need to be signed
- Only one final version of documents that can't be edited without anyone knowing about it
- It will slow down the T&I schedule
- It will never be used by anyone during the T&I
- Other, namely ____
  ____
  ____

11. What documents and Information do you need for each task? (If you need more documents than rows given for each table, please write those at the back of this survey. If you don't need any documents to complete your tasks, please skip to question 14)

- Exactly what info in the documents is used?
- How is the document used?
- How important to the task is this document.
- How frequently is the document used?
- Where is the document located and how is it accessed.
- How helpful is the document (does it contain what you need).
- How long does it take to find what you're looking for?

Task 1

Document	Information in document	Importance	Frequency of use	Location	Helpfulness	time
		○ Not important ○ Important ○ Very important	○ Not frequent ○ Regularly ○ Very frequent		○ Not helpful ○ Helpful ○ Very helpful	
		○ Not important ○ Important ○ Very important	○ Not frequent ○ Regularly ○ Very frequent		○ Not helpful ○ Helpful ○ Very helpful	
		○ Not important ○ Important ○ Very important	○ Not frequent ○ Regularly ○ Very frequent		○ Not helpful ○ Helpful ○ Very helpful	
		○ Not important ○ Important ○ Very important	○ Not frequent ○ Regularly ○ Very frequent		○ Not helpful ○ Helpful ○ Very helpful	
		○ Not important	○ Not frequent		○ Not helpful ○ Helpful	

		○ Important ○ Very important	○ Regularly ○ Very frequent		○ Very helpful	
		○ Not important ○ Important ○ Very important	○ Not frequent ○ Regularly ○ Very frequent		○ Not helpful ○ Helpful ○ Very helpful	

Task 2

Document	Information in document	Importance	Frequency of use	Location	Helpfulness	time
		○ Not important ○ Important ○ Very important	○ Not frequent ○ Regularly ○ Very frequent		○ Not helpful ○ Helpful ○ Very helpful	
		○ Not important ○ Important ○ Very important	○ Not frequent ○ Regularly ○ Very frequent		○ Not helpful ○ Helpful ○ Very helpful	
		○ Not important ○ Important ○ Very important	○ Not frequent ○ Regularly ○ Very frequent		○ Not helpful ○ Helpful ○ Very helpful	
		○ Not important ○ Important ○ Very important	○ Not frequent ○ Regularly ○ Very frequent		○ Not helpful ○ Helpful ○ Very helpful	
		○ Not important ○ Important ○ Very important	○ Not frequent ○ Regularly ○ Very frequent		○ Not helpful ○ Helpful ○ Very helpful	
		○ Not important ○ Important ○ Very important	○ Not frequent ○ Regularly ○ Very frequent		○ Not helpful ○ Helpful ○ Very helpful	

Task 3

Document	Information in document	Importance	Frequency of use	Location	Helpfulness	time
		○ Not important ○ Important ○ Very	○ Not frequent ○ Regularly ○ Very		○ Not helpful ○ Helpful ○ Very helpful	

		important	frequent			
		○ Not important ○ Important ○ Very important	○ Not frequent ○ Regularly ○ Very frequent		○ Not helpful ○ Helpful ○ Very helpful	
		○ Not important ○ Important ○ Very important	○ Not frequent ○ Regularly ○ Very frequent		○ Not helpful ○ Helpful ○ Very helpful	
		○ Not important ○ Important ○ Very important	○ Not frequent ○ Regularly ○ Very frequent		○ Not helpful ○ Helpful ○ Very helpful	
		○ Not important ○ Important ○ Very important	○ Not frequent ○ Regularly ○ Very frequent		○ Not helpful ○ Helpful ○ Very helpful	
		○ Not important ○ Important ○ Very important	○ Not frequent ○ Regularly ○ Very frequent		○ Not helpful ○ Helpful ○ Very helpful	

Task 4

Document	Information in document	Importance	Frequency of use	Location	Helpfulness	time
		○ Not important ○ Important ○ Very important	○ Not frequent ○ Regularly ○ Very frequent		○ Not helpful ○ Helpful ○ Very helpful	
		○ Not important ○ Important ○ Very important	○ Not frequent ○ Regularly ○ Very frequent		○ Not helpful ○ Helpful ○ Very helpful	
		○ Not important ○ Important ○ Very important	○ Not frequent ○ Regularly ○ Very frequent		○ Not helpful ○ Helpful ○ Very helpful	
		○ Not important ○ Important ○ Very important	○ Not frequent ○ Regularly ○ Very frequent		○ Not helpful ○ Helpful ○ Very helpful	
		○ Not important ○ Important	○ Not frequent ○ Regularly		○ Not helpful ○ Helpful ○ Very	

		○ Very important	○ Very frequent		helpful	
		○ Not important ○ Important ○ Very important	○ Not frequent ○ Regularly ○ Very frequent		○ Not helpful ○ Helpful ○ Very helpful	

Task 5

Document	Information in document	Importance	Frequency of use	Location	Helpfulness	time
		○ Not important ○ Important ○ Very important	○ Not frequent ○ Regularly ○ Very frequent		○ Not helpful ○ Helpful ○ Very helpful	
		○ Not important ○ Important ○ Very important	○ Not frequent ○ Regularly ○ Very frequent		○ Not helpful ○ Helpful ○ Very helpful	
		○ Not important ○ Important ○ Very important	○ Not frequent ○ Regularly ○ Very frequent		○ Not helpful ○ Helpful ○ Very helpful	
		○ Not important ○ Important ○ Very important	○ Not frequent ○ Regularly ○ Very frequent		○ Not helpful ○ Helpful ○ Very helpful	
		○ Not important ○ Important ○ Very important	○ Not frequent ○ Regularly ○ Very frequent		○ Not helpful ○ Helpful ○ Very helpful	
		○ Not important ○ Important ○ Very important	○ Not frequent ○ Regularly ○ Very frequent		○ Not helpful ○ Helpful ○ Very helpful	

Task 6

Document	Information in document	Importance	Frequency of use	Location	Helpfulness	time
		○ Not important ○ Important ○ Very important	○ Not frequent ○ Regularly ○ Very frequent		○ Not helpful ○ Helpful ○ Very helpful	

		○ Not important ○ Important ○ Very important	○ Not frequent ○ Regularly ○ Very frequent		○ Not helpful ○ Helpful ○ Very helpful	
		○ Not important ○ Important ○ Very important	○ Not frequent ○ Regularly ○ Very frequent		○ Not helpful ○ Helpful ○ Very helpful	
		○ Not important ○ Important ○ Very important	○ Not frequent ○ Regularly ○ Very frequent		○ Not helpful ○ Helpful ○ Very helpful	
		○ Not important ○ Important ○ Very important	○ Not frequent ○ Regularly ○ Very frequent		○ Not helpful ○ Helpful ○ Very helpful	
		○ Not important ○ Important ○ Very important	○ Not frequent ○ Regularly ○ Very frequent		○ Not helpful ○ Helpful ○ Very helpful	

12. Are you satisfied with the time it takes to find a certain document? If no, what would be a suitable time in seconds?

- ○ Yes
- ○ No ____________

13. Are the documents you need always the latest and correct version?

- ○ Yes
- ○ No

14. What documents do you have to create for each of your tasks? (If you create more documents than rows given for each table, please write those at the back of this survey, if you don't create any documents, please skip to question 17)

- ○ Who will use these documents?
- ○ How frequently must you create these documents?
- ○ How important is this document?
- ○ Where do you store these documents?

Task 1

Document	Users	Frequency	Importance	location
		○ Not frequent	○ Not important	

		○ Regularly ○ Very frequent	○ Important ○ Very important	
		○ Not frequent ○ Regularly ○ Very frequent	○ Not important ○ Important ○ Very important	
		○ Not frequent ○ Regularly ○ Very frequent	○ Not important ○ Important ○ Very important	

Task 2

Document	Users	Frequency	Importance	location
		○ Not frequent ○ Regularly ○ Very frequent	○ Not important ○ Important ○ Very important	
		○ Not frequent ○ Regularly ○ Very frequent	○ Not important ○ Important ○ Very important	
		○ Not frequent ○ Regularly ○ Very frequent	○ Not important ○ Important ○ Very important	

Task 3

Document	Users	Frequency	Importance	location
		○ Not frequent ○ Regularly ○ Very frequent	○ Not important ○ Important ○ Very important	
		○ Not frequent ○ Regularly ○ Very frequent	○ Not important ○ Important ○ Very important	
		○ Not frequent ○ Regularly ○ Very frequent	○ Not important ○ Important ○ Very important	

Task 4

Document	Users	Frequency	Importance	location
		○ Not frequent ○ Regularly ○ Very frequent	○ Not important ○ Important ○ Very important	
		○ Not frequent	○ Not important	

		○ Regularly ○ Very frequent	○ Important ○ Very important	
		○ Not frequent ○ Regularly ○ Very frequent	○ Not important ○ Important ○ Very important	

Task 5

Document	Users	Frequency	Importance	location
		○ Not frequent ○ Regularly ○ Very frequent	○ Not important ○ Important ○ Very important	
		○ Not frequent ○ Regularly ○ Very frequent	○ Not important ○ Important ○ Very important	
		○ Not frequent ○ Regularly ○ Very frequent	○ Not important ○ Important ○ Very important	

Task 6

Document	Users	Frequency	Importance	location
		○ Not frequent ○ Regularly ○ Very frequent	○ Not important ○ Important ○ Very important	
		○ Not frequent ○ Regularly ○ Very frequent	○ Not important ○ Important ○ Very important	
		○ Not frequent ○ Regularly ○ Very frequent	○ Not important ○ Important ○ Very important	

15. How do the people who use these documents know where they are stored? Please select one or more of the following options.

- ○ You tell them
- ○ They have to find out themselves
- ○ They have to come and ask you
- ○ They never know, you just give them printed copies
- ○ They get notified by email
- ○ They never know, they receive a copy of the document by email

- Other, namely _____
  _____
  _____

16. Are users allowed to change copies of the document you created? If yes how will the users know which one to use? If no how do you keep them from changing the original document?

- Yes
  - The most current date on each copy is the one to use
  - The original one created by me is the one to use
  - A group discussion will determine the one to use
  - Other, namely_____
- No
  - Do not distribute copies, only original to be used
  - Make sure document can't be edited by making pdf of it
  - Tell them they can't change it
  - Other, namely_____

17. Do you think the use of an EDMS would make your job easier or less time consuming?

- Yes, because I always lose time searching for the documents I need
- Yes, because it takes too long for documents to be ready (for example: Documents that need multiple signatures)
- Yes, because I wouldn't have people constantly asking me for documents
- Yes, because_____
- No, because I don't use any documents
- No, because I can always find the documents I need
- No, because I'm more in the field then behind a computer so it would make my job more time consuming instead
- No, because_____

18. What information do you need but do not have access to?

_____
_____
_____
_____

Appendix G: Questionnaire Results

Job Title	Inspector	Inspector	Inspector	Assistant inspector	Assistant inspector	Electrical engineer	Electrical engineer	Electrical engineer	Mechanical engineer	Mechanical engineer	Jr. Mechanical engineer
Major tasks, frequency, importance? **NI: Not important** **I: Important** **VI: Very Important** **NF: Not Frequent** **R: Regularly** **VF: Very Frequent**	-Inspect equipment on plant. VI, VF -Report Findings VI, VF -Make CAR's VI, R	-Inspect equipment on plant VI, VF -report Findings. VI, VF -teach Assistants I, VF	-inspect Equipment On plant. VI, VF -report Findings. VI, VF -teach Assistants. I, VF	-help with Inspections I, VF -fill in Measure-Ments in Autocad Drawings VI, R -Take Pictures VI, VF	-help with Inspections VI, VF -fill in Measure-Ments in Autocad Drawings VI, R -Take Pictures VI, VF	-Maintenance repair of electrical equipment. VI,R -oversee Engineer-Ing personnel VI, VF	-Maintenance of electrical equipment. VI,R -Repair/ Renew work VI, R	-Maintenance of electrical equipment. VI,R -Repair/ Renew work VI, R	-Maintenance of equipment VI, R -Repair/ renew if cannot be fixed VI, R	-Maintenance of equipment VI, R -Repair/ renew if cannot be fixed VI, R	-Maintenance VI, R -Help with repairs I, R
Computer experience											
No experience											
Basic											
Good	X	X	X	X	X	X	X		X		X
Expert								X		X	
During the T&I do you use a computer on a daily basis?											
Yes	X	X	X	X	X	X	X	X	X	X	X
No											

Job Title	Inspector	Inspector	Inspector	Assistant inspector	Assistant inspector	Electrical engineer	Electrical engineer	Electrical engineer	Mechanical engineer	Mechanical engineer	Jr. Mechanical engineer
What computer programs do you use to create documents?											
Microsoft Word	X	X	X			X	X	X	X	X	X
Microsoft Excel				X	X	X	X	X	X	X	X
Microsoft PowerPoint						X	X	X	X	X	X
AutoCad				X	X	X	X	X	X	X	
OpenOffice											
Other						X	X	X	X	X	X
What are your expectations of an EDMS?											
No more lost documents	X	X	X	X	X	X	X	X	X	X	X
No more creating tedious documents				X			X			X	X
No time lost on searching for documents	X	X	X			X	X	X	X	X	X
Easier to use then most systems in use at Staatsolie							X	X	X	X	
It will calculate data for me from previous entries				X	X						
Less walking around with papers that need to be signed						X	X	X	X	X	X
Only one final version of documents that can't be edited without anyone knowing about it	X	X	X	X	X	X	X	X	X	X	X
It will slow down the T&I schedule						X			X		
It will never be used by anyone during the T&I						X					

Job Title	Inspector	Inspector	Inspector	Assistant inspector	Assistant inspector	Electrical engineer	Electrical engineer	Electrical engineer	Mechanical engineer	Mechanical engineer	Jr. Mechanical engineer
Other											
What documents do you need to complete tasks? *documents* *Importance: NI, I, VI* *Frequency: NF, R, VF* *Location* *Helpfulness: NH, H, VH* *Time in seconds or minutes: s, min*	-CAD drawings. VI, VF, H. Cabinet at Inspection center. 60-120 s. minutes -workorder VI, VF, NH. MCC -schedule I, VF, NH. Inspection center. 20-60 s.	-CAD drawings. VI, VF, H. Cabinet at Inspection center. 60-120 s. minutes -workorder VI, VF, NH. MCC -schedule I, VF, NH. Inspection center.	-CAD drawings. VI, VF, H. Cabinet at Inspection center. 60-120 s. minutes -workorder VI, VF, NH. MCC -schedule I, VF, NH. Inspection center.	-CAD drawings. VI, R, VH. Cabinet at inspection center.	-CAD drawings VI,R, VH. Cabinet at inspection center. 60-120 s	-CAD drawings. I, R, VH. Cabinet at Inspection center. 10-20 min. -work order. MCC. VI, R, VH -work permit. VI, R, NH MCC -Final T&I Report. VI, NF, VH At DCC	-CAD drawings. I, R, VH. Cabinet at Inspection center. 5 min -work order. MCC. VI, R, VH -work permit. VI, R, NH MCC -Final T&I Report. VI, NF, VH At DCC	-CAD drawings. I, R, VH. Cabinet at Inspection center. 25 min -work order. MCC. VI, R, VH -work permit. VI, R, VH MCC -Final T&I Report. VI, NF, VH At DCC	-CAD drawings. I, R, VH. Cabinet at Inspection center. 10-15 min -work order. MCC. VI, R, NH -work permit. VI, R, NH MCC -Final T&I Report. VI, NF, VH At DCC	-CAD drawings. I, R, VH. Cabinet at Inspection center. -work order. MCC. VI, R, VH -work permit. VI, R, NH MCC -Final T&I Report. VI, NF, VH At DCC	-CAD drawings. I, R, VH. Cabinet at Inspection center. 3-10 min -work order. MCC. VI, R, VH -work permit. VI, R, NH MCC -Final T&I Report. VI, NF, VH At DCC
Are you satisfied with the time it takes to find a certain document?											
Yes	X	X	X	X	X						
No						X	X	X	X	X	X
Are the documents you need always the latest and correct version?											
Yes			X		X	X	X			X	X
No	X	X		X				X	X		

Job Title	Inspector	Inspector	Inspector	Assistant inspector	Assistant inspector	Electrical engineer	Electrical engineer	Electrical engineer	Mechanical engineer	Mechanical engineer	Jr. Mechanical engineer
What documents do you have to create for your tasks? *Documents* *Frequency: NF, R, VF* *Importance: NI, I, VI* *Location*	-Photos -AFI - CVI -Heat exchanger test reports - Photo caption documents -CAR	-Photos -AFI - CVI -Heat exchanger test reports - Photo caption documents -CAR	-Photos -AFI - CVI -Heat exchanger test reports - Photo caption documents -CAR	-Photos -AutoCad drawings	-Photos -Cad drawings	-Report NF, I. Archived at DCC	-Report NF, I. at DCC	-Report NF, VI. at DCC	-Report NF, VI. at DCC	-Report NF, VI. at DCC	-Report NF, VI. at DCC
How do the people who use these documents know where they are stored?											
You tell them	X	X	X	X	X						
They have to find out themselves											
They have to come and ask you											
They never know, you just give them printed copies											
They get notified by email											
They never know, they receive a copy of the document by email											
Other	X	X	X								
Are users allowed to change copies of the document you created?											
Yes,the most current date on each copy is the one to use											

Job Title	Inspector	Inspector	Inspector	Assistant inspector	Assistant inspector	Electrical engineer	Electrical engineer	Electrical engineer	Mechanical engineer	Mechanical engineer	Jr. Mechanical engineer
Yes, the original one created by me is the one to use											
Yes, a group discussion will determine the one to use											
Yes, other...											
No, do not distribute copies, only original to be used											
No, make sure document can't be edited by making pdf of it	X	X	X	X	X						
No, tell them they can't change it											
No, other...											
Do you think the use of an EDMS would make your job easier or less time consuming?											
Yes, because I always lose time searching for the documents I need				X	X		X	X	X		
Yes, because it takes too long for documents to e ready											
Yes, because I wouldn't have people constantly asking me for documents											
Yes, other...	X	X	X								
No, because I don't use any documents											
No, because I can always find the documents I need						X				X	
No, because I'm more in the field then behind a computer so it would make my job more time consuming instead											X

Job Title	Inspector	Inspector	Inspector	Assistant inspector	Assistant inspector	Electrical engineer	Electrical engineer	Electrical engineer	Mechanical engineer	Mechanical engineer	Jr. Mechanical engineer
No, other...											
What information do you need but do not have access to?											

Job Title	Construction engineer	HSE superintentdent	T&I superintendent	Inspection supervisor	Data control supervisor	Document control supervissor	Data collector	Data collector	Refining operations smanager	Maintenance control supervisor	Maintenance control worker
Major tasks, frequency, importance? **NI: Not important** **I: Important** **VI: Very Important** **NF: Not Frequent** **R: Regularly** **VF: Very Frequent**	-Repair and renew VI, R -Construct on site when necessary I, NF	-provide safety permits -Inspect safety of equipment -Train crew for safety	-Oversee planning, scheduling and materials managemen t. I, F -Oversee Procurement I, F -Sign off on equipment to determine readiness of plant start up. VI, R -Write final report of the T&I. VI, NF	-Sign off on CAR documents VI, R -Sign off on equipment VI, R	-Check correctness of all documents. VI, VF -Check that the workorders are being signed. VI, VF -Send CAR to inspection supervisor. VI, R	-Make sure all documents comply with document control. VI, VF -Archive all documents that need to be archived. VI, R -Keep track of who checks in and checks out documents. VI, NF	-Insert documents into system. VI, VF	-Insert documents into system VI, VF	-Supervise plant shut down and start up. VI, NF -Close off on equipment. VI, F	-Provide work orders. VI, VF -provide work permits. VI, VF	-Collect work orders and permits. I, R
Computer experience											
No experience											
Basic						X					X
Good	X	X	X					X	X	X	
Expert				X	X		X				

Job Title	Construction engineer	HSE superintentdent	T&I superintendent	Inspection supervisor	Data control supervisor	Document control supervissor	Data collector	Data collector	Refining operations smanager	Maintenance control supervisor	Maintenance control worker
During the T&I do you use a computer on a daily basis?											
Yes	X	X	X	X	X	X	X	X	X	X	
No											X
What computer programs do you use to create documents?											
Microsoft Word	X	X	X	X	X		X	X	X	X	X
Microsoft Excel	X				X		X	X			
Microsoft PowerPoint	X										
AutoCad	X										
OpenOffice											
Other	X	X	X			X				X	X
What are your expectations of an EDMS?											
No more lost documents	X	X	X	X	X	X	X	X	X		
No more creating tedious documents				X							
No time lost on searching for documents	X		X	X	X	X	X	X	X	X	X
Easier to use then most systems in use at Staatsolie	X	X	X	X	X	X	X	X		X	X

Job Title	Construction engineer	HSE superintentdent	T&I superintendent	Inspection supervisor	Data control supervisor	Document control supervissor	Data collector	Data collector	Refining operations smanager	Maintenance control supervisor	Maintenance control worker
It will calculate data for me from previous entries	X										
Less walking around with papers that need to be signed	X		X	X	X	X	X	X	X		X
Only one final version of documents that can't be edited without anyone knowing about it	X	X	X	X	X	X	X	X	X	X	X
It will slow down the T&I schedule											
It will never be used by anyone during the T&I											
Other						X					
What documents do you need to complete tasks? *documents* *Importance: NI, I, VI* *Frequency: NF, R, VF* *Location* *Helpfulness: NH, H, VH* *Time in seconds or minutes: s, min*	-CAD drawings. I, R, VH. Cabinet at Inspection center. -work order. MCC. VI, R, NH -work permit. VI, R, NH MCC		-Photos -AFI - CVI -Heat exchanger test reports - Photo caption documents -workorders -CAR documents -Final closing authority All VI, VH	-Final closing authority VI, H, NF -CAR documents VI, H,R	-Photos -AFI - CVI -Heat exchanger test reports - Photo caption documents -CAR -CAD drawings -work orders	All T&I documents	-Photos -AFI - CVI -Heat exchanger test reports - Photo caption documents -CAR -CAD drawings	-Photos -AFI - CVI -Heat exchanger test reports - Photo caption documents -CAR -Cad drawings	-Final closing authority. R, VI, H	-Schedule VI, VF, VH -Safety permit -Corrective Action Request document VI, R, VH	-Schedule. VI, VF, VH -Work permit. -work orders

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Are you satisfied with the time it takes to find a certain document?											
Yes						X			X		
No	X		X	X	X		X	X		X	X
Are the documents you need always the latest and correct version?											
Yes	X		X			X			X		
No					X		X	X		X	X
What documents do you have to create for your tasks? *Documents* *Frequency: NF, R, VF* *Importance: NI, I, VI* *Location*	-Report NF, I. Stored at DCC	-Safety permits. R, VI -Safety report. NF, VI	-Final closing authority -Final T&I report. NF, VI. At DCC -Schedule NF, VI	-Final closing authority. R, VI					-Final closing authority. VI	-Work orders. VF, VI -Work permits. VF, VI. At MCC	
How do the people who use these documents know where they are stored?											
You tell them				X	X				X		
They have to find out themselves											

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They have to come and ask you				X	X		X				
They never know, you just give them printed copies											
They get notified by email				X	X				X		
They never know, they receive a copy of the document by email			X								
Other		X	X	X	X		X	X	X	X	X
Are users allowed to change copies of the document you created?											
Yes, the most current date on each copy is the one to use			X								
Yes, the original one created by me is the one to use			X								
Yes, a group discussion will determine the one to use											
Yes, other...											
No, do not distribute copies, only original to be used										X	X
No, make sure document can't be edited by making pdf of it				X							
No, tell them they can't change it											
No, other...		X									

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Do you think the use of an EDMS would make your job eassier or less time consuming?											
Yes, because I always lose time searching for the documents I need	X										
Yes, because it takes too long for documents to be ready				X					X	X	
Yes, because I wouldn't have people constantly asking me for documents					X	X	X				
Yes, other...			X					X			X
No, because I don't use any documents											
No, because I can always find the documents I need		X									
No, because I'm more in the field then behind a computer so it would make my job more time consuming instead											
No, other...											
What information do you need but do not have access to?											