Improving the project performance within Joulz Projects

A case study of the implementation of Eneco’s Project Approach

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Preface

This Master Thesis is performed to complete the master Systems, Engineering, Policy Analysis and Management of Delft University of Technology. The research is performed at the department project control of Joulz Projects.

I would like to thank all members of my graduation committee, Hans de Bruijn, Haiko van der Voort, Herman Mooi and Paul van Schijndel, for the pleasant cooperation. They provided me with useful critics and helpful ideas.

I would like to thank Joulz for providing the possibility to perform this research within their company. They gave me the opportunity to observe and learn about the practice of project management and they provided an enjoyable working environment.

Furthermore I would like all persons that participated in this research for being kind enough to answer my questions.

Finally, I would like to thank friends and family for the support during this research and the rest of my study.

Jan-Willem Westenbrink
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Summary
This summary discusses the research problem and the research approach, followed by the results, conclusions and recommendations.

Research problem & approach
Joulz is active in the design, construction and maintenance of energy infrastructure. The competition in this market is increasing due to market changes. Currently Joulz performs more than 95% of its projects for its main customer Stedin. The intention is to increase the number of projects for other customers. The mission statement of Joulz within this competitive market is to be leading in the design and construction of future-proof energy infrastructure. In order to fulfil this mission Joulz has defined two goals:

1. Increase the efficiency of the organization
2. Increase the customer-orientation of the organization

In order to reach these goals a project management method is implemented within Joulz Projects called Eneco’s Project Approach (EPA). This research focuses on improving the project management within Joulz Projects. The problem is analyzed through a case study. The main research question is:

_How does project management contribute to both the efficiency and customer-orientation of Joulz Projects and how can the efficiency and customer-orientation be increased?_

In this case study the requirements of efficiency and customer-orientation, the way projects used to be managed, the organizational characteristic and the design of EPA are studied. These analyses are compared to the actual use of project management in ten selected projects. Preceding the future projects of Joulz are indicated. This results in conclusions and recommendations on how to improve the efficiency and customer-orientation.

Research results
A distinction can be made between High Voltage and Grids & Connections projects. The way these projects are managed will be discussed below, followed by the performance on customer-orientation and efficiency and the interrelation between these goals.

High Voltage projects
For the management of High Voltage Projects certain elements of EPA are used. At the project start a project plan including a project organization is made and project controls are used to monitor progress. Other elements of EPA are not used: There is no a clear distinction between stages where the performance is evaluated and a decision is made about whether or not to continue to the next stage, projects are rarely evaluated and the use of risk analysis is limited.

Difficulties in these projects originate from the unclear and changing project objectives of the customer, management of changes during the project, communication within the project team and customer and the control on the project progress. Other problems are redundancy in the technical specifications, unfinished tasks within projects, postponement of activities by employees and problems with the required licenses.

Grids and Connections Projects
Projects of Grids & Connections have a very basic project organization. A project manager is supported by a planning engineer and only uses staff from other departments for very specific tasks; they do not form part of the project team. Most project tasks are performed by the project manager. EPA is currently not used in these projects. The use of project management elements is limited in these projects, a project plan is made and a basic planning and budget are used.

The difficulties in these projects originate from the cooperation with the multiple parties involved in the project. Cooperation is necessary to provide an integrated solution. Because multiple parties are
involved the number of interdependency increases, which leads to more plan and scope changes during the project.

**Project performance**
The performance on customer-orientation is good. In most projects the project objective and functional performance are met and the customer is satisfied with the project results. If the customer requires changes during the project these are easily communicated and carried through.
The performance on efficiency is not very good. Within most projects there are many plan and scope changes. The original project budget and schedule is often exceeded due to these changes. Extra costs caused by scope changes are generally accounted to the customer.

**Interrelation between customer-orientation and efficiency**
In projects where many scope changes occurred, the original project budget and schedule were exceeded. Flexibility required from a viewpoint of customer-orientation decreased the efficiency. Within these change decisions the customer had to make a trade off between the expected benefit of the scope changes and the decreased efficiency; the two goals are conflicting in these change decisions. Synergy was also identified. The customer satisfaction is strongly related to the time and costs, and therefore the efficiency, of a project. The goals can enforce each other, both positively and negatively. However, in projects where time is not the biggest priority, delay does not influence the customer satisfaction.

**Conclusions and recommendations**
There are two reasons for the underperformance regarding efficiency. The first reason is the attitude of the main customer, Stedin. Suggested changes within the projects and the additional consequences for the budget and schedule are almost always accepted. This attitude does not give much incentive to work more efficient and take the consequence of changes for the budget and schedule into account. However the focus on efficiency by Stedin is increasing and the goal of Joulz is to increase the number of projects performed for other customers. The expectation is that the focus on efficiency is generally stronger in projects performed for other customers than Stedin. Through these developments this cause for underperformance is diminished and the incentives to work more efficient are increased.

The second reason is the way projects are managed. For the high voltage projects change in the application of EPA can resolve part of the problems. The recommendations for change come down to stricter following the EPA method, increasing the involvement of the customer in the projects and improve the use of project management through project evaluation and knowledge sharing between project managers.

For the Grids & Connection projects EPA should not be used in all projects. Due to the lack of a project team and the low technical complexity of these projects the use of EPA is very bureaucratic. However, the project controls of EPA can be used to increase project control. Furthermore, in projects where Joulz has a coordinating role for the entire project using the EPA method is useful. In these projects it is also recommended to evaluate projects and increase the involvement of the customer.

**Customer-orientation and Efficiency**
In order to become leading in future-proof energy infrastructure EPA is a valuable method that can improve both the efficiency and customer-orientation of Joulz Projects. Currently the performance on efficiency is already not good and customer's focus on efficiency is even increasing. Therefore it is necessary to improve the project performance regarding efficiency. Now is the time to change the use of project management to be prepared for the expected increasing demand for efficiency of both Stedin and other customers.

This increased attention for efficiency will lead to more conflicts between customer-orientation and efficiency in change decisions. EPA can be useful in these change decisions by clarifying the impact on the entire project, change management and reducing the negative impact of these changes on the efficiency.
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Translation of terms

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<td><strong>Functions within Joulz</strong></td>
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<tr>
<td>Construction supervisor</td>
<td>Uitvoerder</td>
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<tr>
<td>Planner</td>
<td>Medewerker van de afdeling planning en voortgang</td>
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<td>Planning engineer</td>
<td>Werkvoorbereider</td>
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<td><strong>Project management &amp; Prince2</strong></td>
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<td>Business Case</td>
<td>Zakelijke rechtvaardiging</td>
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<td>Stage</td>
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<td>Work Package</td>
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1 - Introduction

The research is performed within the company Joulz, part of Eneco Holding. This chapter introduces the topic and the approach of the research. First an introduction into Eneco and Joulz is given, followed by the motive for the research and the problem on which the research focuses. This results in a research objective and research questions. Concluding, the research methods and the outline of the report are presented.

1.1 Changes

Eneco operates within the total energy chain, from production to supply. Eneco trades energy, manages the grid and designs and constructs energy infrastructure. The last couple of years the competition in the energy market is increasing due to regulatory changes which have led to liberalisation, privatisation and unbundling. This increasing competition forces Eneco to improve its performance continuously. In this changing energy market Eneco chooses a different strategy than its competitors to comply with the changing regulation.

Eneco chooses to have an independent infrastructure company (Joulz), that is responsible for the design, construction and maintenance of energy infrastructure. Due to this independence Joulz has to perform in a free market, where assignments are put to tender. Currently Joulz performs more than 95% of its projects for Stedin, responsible for the grid management and also part of Eneco Holding. In a free market, Stedin invites other parties to tender and Joulz can perform projects for many other parties. The current vision is that in a couple of years 50% of the projects will be performed for Stedin and the other 50% for external companies. The size of the energy infrastructure market in which Joulz can operate with its current expertise is about ten times as big as the current portfolio of Joulz. Therefore the free market forms a great challenge for Joulz. In order to survive in this competitive market it is very important for Joulz to deliver qualitative work at a competitive price.

Changes within Eneco Holding

Within Eneco Holding reorganization has taken place due to expected changes in European regulation. The new organization consists of three different companies; Eneco (energy supplier), Joulz (infrastructure) and Stedin (grid management) since the 1st of January 2009. The organization chart of the new organization is shown in figure 1:

![Figure 1: Organization chart of Eneco Holding N.V.](image)

The major change for Joulz is that the main client is no longer a different department of the same company, but an independent company that not automatically assigns its infrastructure assignments to Joulz.

The departments responsible before the 1st of January 2009 for the infrastructure and the grid management were Eneco Infra and Eneco Grid Management. These departments used to work together on projects, with both different tasks, but interchange of tasks and information were common practices. Both Infra and Grid Management communicated with the customer of Grid Management. The employees worked partly in the same building and had many informal relations. If Grid
Management demanded extra work in a project, it directly asked the employees of Infra to perform the work. How the bill was settled was discussed later on, most contracts were based on subsequent calculation. In the execution of projects, scope change, delays and extra costs compared to the original project plan often occurred. When the project was completed the reasons for the delay and extra costs were hard to point. There was little control on the project performance.

The relation between the two departments was not a normal customer – contractor relation, where the scope of the project is defined at the start, changes are discussed between the project manager of the customer and the project manager of the contractor and financial consequences are agreed upon before changes are carried through. Due to the new organization, where the responsibilities for the infrastructure and the grid management are assigned to independent companies, the relationship with Stedin has to become more businesslike.

In the new situation Joulz wants to be a preferred supplier for Stedin, but the way projects for Stedin are handled will be more businesslike, similar to the way projects are handled for other customers. Stedin will define the assignment, Joulz makes a quotation which includes the scope of the project, and if Stedin agrees upon this quotation they make the decision to carry out the assignment. Communication should flow through the project managers, and changes to the scope of the project have to be agreed between the customer and the contractor on management level, before the changes are carried through. This requires a different mind set of all employees. It can be quite hard to take a professional position toward people with whom you have close informal relations. The control on the project performance has to be increased.

Changes within Joulz

Within Joulz there are three different business units; Projects, Service Provider and CityTec. The unit Projects covers the projects concerning the High Voltage (HV), Middle Voltage (MV), Low Voltage (LV) and Gas (G) grids. The Service Provider covers the routine installations and maintenance jobs of the MV, LV and G grids. CityTec is involved in public lighting and traffic control installations. Part of the organization chart of Joulz, relevant for this research, is shown in figure 2:

![Organization chart of Joulz](image)

In the former organizational set-up the construction and maintenance of the energy infrastructure used to be performed by Eneco Infra. At Eneco Infra the projects were divided between two different departments, the department High Voltage and the department Grids & Connections. Due to the
organizational change these departments no longer exist. The projects that were performed by both departments are from now on executed by Joulz Projects

**Strategy of Joulz**
The mission statement of Joulz within this competitive market is to be leading in the design and construction of future-proof energy infrastructure. In order to reach this mission Joulz has defined two goals:

1. Increase the efficiency of the organization
2. Increase the customer-orientation of the organization

In order to reach these goals certain decisions are made. The first decision is to restructure the organization as mentioned above; all projects are performed by Joulz Projects from now on. The second decision is to implement project management within Joulz Projects based on the methodology called Eneco’s Project Approach (EPA).

These decisions have impact on the organization; employees are transferred between departments and new working methods are implemented to which the employees have to become accustomed. Furthermore, the increasing competition in the market in which Joulz is active requires a different mindset from the employees.

**1.2 Problem statement**
Joulz is currently not sufficiently equipped to serve both Stedin and external customers in an efficient and customer-oriented way. Problems arise in the making of quotations, the agreements on the project objectives and scope and the control of projects. When serving Stedin there is also lack of clarity about the different responsibilities of customer and contractor.

The mission is to become leading in future-proof energy infrastructure through accomplishing the two different goals; (1) increase the efficiency and (2) increase the customer-orientation.

Aside from this mission statement of Joulz the competition in the energy infrastructure market is also increasing. This increased competition could lead to a decrease of market share. This could occur if Stedin assigns many projects to other parties than Joulz, and Joulz does not obtain that much projects from external customers. In order to be competitive within this market Joulz has to improve the project performance.

**1.3 Research objective**
The goal of the implementation of project management is to increase the efficiency and customer-orientation of the organization. When implementing project management it could occur that certain changes influence the goals in a different way; it could even occur that the goals form a trade off or conflict with each other.

The goal of this research is to provide insight on how project management contributes to the efficiency and customer-orientation of Joulz Projects, how these goals are interrelated and identify possible changes in the execution of projects in order to increase the efficiency and customer-orientation of Joulz Projects.

Next to the recommendations for Joulz, this case study contributes to the understanding how project management in general contributes to the efficiency and customer-orientation of a project based business organization and how these two goals are interrelated by comparing theory to a real-life case.
1.4 Research questions

The problem statement and the research objective lead to the following research question:

*How does project management contribute to both the efficiency and customer-orientation of Joulz Projects and how can the efficiency and customer-orientation be increased?*

In order to answer this question, the different elements are studied through the following subquestions:

1. What are the requirements to project management for efficient and customer-oriented execution of projects according to theory?
2. How were projects managed before the implementation of project management?
3. How is project management used within Joulz Projects, and how does this relate to efficiency and customer-orientation?
4. How are employees trained in the use of project management within Joulz Projects?
5. What changes are possible to the use of project management within Joulz Projects to increase the efficiency and customer-orientation?

*Demarcation*

The research is restricted to the projects performed by Joulz Projects. This means that the efficiency and customer-orientation is only related to the execution of projects, and not to other aspects of the organization of Joulz Projects. The goal is not to give an overview of project management methods and tools; EPA and Prince2 form the starting point. Recommendations about the use of project management are made; the goal is not to redefine the work processes. For Joulz a precondition for the use of project management is that the organizational structure consists of different specialized departments. This structure is the current set-up of Joulz and this structure is chosen in order to retain a certain level of knowledge within the departments and stimulate transfer of knowledge between employees of the department itself.
1.5 Research Design

The research has the shape of a single-case study. The case studied is the implementation of a project management methodology within Joulz Projects. According to Yin (2003): “Case studies are the preferred strategy when how or why questions are being posed, when the investigator has little control over events and when the focus is on a contemporary phenomenon within some real-life context.”

Through this case study it becomes possible to answer the question how project management contributes to both the efficiency and customer-orientation of Joulz Projects and what improvements are possible in order to increase the efficiency and customer-orientation of Joulz Projects. This case-study is therefore exploratory; it explores how project management currently contributes to the efficiency and customer-orientation and what improvements are possible.

The disadvantage of a case study can be that insights gathered in a specific case are not applicable in general. But according to Yin (2003) case study can be used to expand theories. Through literature study insight is provided on how project management is related to the efficiency and customer-orientation of projects. This leads to a set of requirements for the efficient and customer-oriented execution of projects. This research uses these requirements in a real life case. The results can be used to expand the theory about the requirements for the efficient and customer-oriented execution of projects.

A single-case study has the disadvantage that the results can not be compared with another case, but it provides the possibility to study the case at hand in more depth. In this research this is accomplished by studying multiple sources of information.

In this case study the theoretic background of methods used within Joulz Project are studied, followed by the way projects used to be managed, the training of project management and the actual use of project management in ten selected projects. These different analysis are compared and future projects of Joulz are indicated. This results in conclusions and recommendations on how to improve the efficiency and customer-orientation.

The overview of the research is presented in figure 3. In the figure the chapters where the subjects are discussed are indicated.

Figure 3: Overview of research design

The different elements of the overview are discussed in more detail on the next page.
Theoretical background

Through literature study focused on the methods that are used by Eneco Infra and Joulz, the characteristics of these methods are explained. Furthermore, the relation between project management and efficiency and customer-orientation are discussed, which leads to a research framework for the different analyses.

Management of projects within Eneco Infra

For the analysis of the way the projects used to be managed within Eneco Infra, different sources of information are used:

1. Documentation of the work processes
2. Interviews with employees about the organization and the way projects used to be managed

Since the projects used to be performed by two different departments, this analysis is done for both departments and the differences between the departments are indicated.

The documentation of the work processes is studied through desk research. The interviews are unstructured interviews with employees from the two different units that together form Joulz Projects. These interviews focus on the way projects used to be managed, the way the organization was set up and managed, the culture of the organization and the differences between the two former departments.

In order to analyze the differences between the two departments, the 7-S framework developed by Peters and Waterman is used. This framework was developed for a holistic and systematic analysis of organisational aspects that are of key importance for the effectiveness and efficiency of an organisation (Kleijn and Rorink, 2005). The specific framework used is the framework of Maylor (2006), who has adjusted the 7-S framework for a project environment. The framework is presented in Appendix A.

Use of project management within Joulz Projects

The analysis of the use of project management consists of three different elements.

The first element is the study of the way project management is intended to be used. This is studied through analysing EPA using the EPA manual.

The second element consists of the use of project management in general. This is studied through participating in a discussion about the use of project management by Joulz during the training.

The third element is the analysis of ten selected projects that are recently completed or currently being executed by Joulz Projects. It is expected that the management of different types of projects differs; small projects with low complexity are handled in a different way than large, complex projects. In order to understand how project management contributes to both the efficiency and customer-orientation of the entire organization of Joulz Projects it is necessary to analyse the use of project management in different types of projects. The selection of the projects is discussed in chapter 4.

These projects are analyzed through interviews that question the project over the preceding period and study of the project documentation. The interviews are based on a interview protocol and are semi-structured. The interview protocol is based on the requirements derived from literature and the insights gathered through the analysis so far. The reason to choose for semi-structured interviews is that a certain structure is needed in order to compare the different projects but a structured approach would leave too little room for further questioning of remarkable project issues.

Training of employees

For the analysis of the training of employees, direct observation of the training and study of the training documents are used to research the training of project management.
After these analyses the outcomes are compared and the future projects of Joulz are identified, this leads to the conclusions and recommendations of this research.

Limitations of research methods used
The study of documents within the desk research has its limitations. The advantages are that they are stable and can be reviewed repeatedly. Disadvantages are possible problems in retrieving documents or even blocked access, and the possibility for biased selection or reporting of the documentation (Yin, 2003). The use of interviews also has limitations that are discussed according to Baarda and de Goede (2001). The advantage of using interviews is that information is gained not only about what people do, but also why they do it. Using interviews makes it possible to research motivation, thoughts and use of knowledge. In this research this is required in order to understand why people use a certain approach in a certain type of project. A disadvantage of interviews is the reliability of the information. People are not always aware of their behaviour or their motivation to act that way, the interviewer can be biased in the questioning and people tend to give socially acceptable answers.

1.6 Outline
This chapter formed the introduction of this research. Chapter 2 discusses the relevant theories used in this research. In chapter 3 the former management of projects within Eneco Infra is discussed, followed by the use of project management in Joulz Projects in chapter 4. Chapter 5 comments on the design and training of project management according to EPA. In chapter 6 the different analyses are compared, the results are explained and future projects are discussed. This leads to the conclusions and recommendations about the use of the project management by Joulz Projects, presented in chapter 7. The final chapter includes a reflection on this research to indicate the limitations of this research.

Outline of the report:
Chapter 1: Introduction  
Chapter 2: Theoretical background  
Chapter 3: Management of projects within Eneco Infra  
Chapter 4: Use of project management within Joulz Projects  
Chapter 5: Training of the employees  
Chapter 6: Comparison and improvements  
Chapter 7: Conclusions and recommendations  
Chapter 8: Reflection
2 - Theoretical background

In this chapter the theoretical background of the methods used within Joulz are explained. First the methods that are used by Joulz for the management of projects are discussed. Next the basic principles and characteristics of these methods are discussed according to theory and the methods are compared. Concluding a framework is presented that is used to analyse the performance of the project management within Joulz on efficiency and customer-orientation. This framework forms the theoretical basis of this research and provides an answer to the research question: What are the requirements to project management for efficient and customer-oriented execution of projects according to theory?

2.1. Methods used within Joulz

Within Joulz two different methods are used in order to increase project performance; process management and Eneco’s Project Approach (EPA). Process management is the basis for all business processes of Joulz, also for the management of projects. Throughout the entire company the processes are mapped in order to synchronize the work processes of the different regional offices. From the different offices the work processes have been compared and the best practices are used to map the work processes that are currently implemented company wide. Through registration of these work processes an ISO certification was obtained. The main criterion for the certification is that a high quality documentation of the processes and the quality assurance procedures is maintained (Becker et al., 2003). The main reason for Joulz to map all processes was to synchronize the work between the offices, obtain the ISO certification, improve the quality management and as starting point for improving the work processes. In §2.2 the characteristics of process management are discussed. Figure 4 shows an example of a process map. Next to the process maps a method for project management was developed by Joulz Projects: EPA. This method is developed to improve the control within the projects of Joulz Projects. The process map of project control complies with the procedures described in EPA, both methods thus prescribe how projects should be managed. The characteristics of project management are discussed in §2.3, EPA is elaborated on in §4.1. EPA is based on the project management method of Prince2, which is described in §2.3.1. Before the different methods are discussed, first is explained what is meant with a project.

What is a Project?

There are many different kinds of projects, from small personal projects, like planning a wedding to large professional projects with many actors involved such as the construction of the North-South metro line in Amsterdam. However all projects share the same characteristics. In this research the definition of a project according the Prince2 method defined by van Onna and Koning (2002) is used: “A project is a temporary organizational form which is needed to accomplish a pre-specified product or result within a specified amount of time, using a specified amount of assets.” Other definitions often include that a project is a unique endeavour that has not been performed before. Because of these characteristics of projects, you have to deal with uncertainties, risks and constraints in order to
accomplish a project. The type of project performed by Joulz can be typified as engineering projects; they have a clearly defined result and clearly defined methods and techniques to reach this result, therefore it is possible to move quickly into planning the work to be done and the emphasis will be on activity-based planning (Turner, 1999).

2.2 Process Management

Process Management is a widely used term. In this section first different types of process management are mentioned in order to make clear what type of process management is used by Joulz, and which types of process management are not applicable for this research.

2.2.1 Types of process management

Business Process Management

This type of process management focuses on the functional work processes of an organization. It is the management of the work processes that deliver value to the customer. The process within this type is defined as a series of actions that are interdependent and have a specific sequence (Wijnen et al., 1994). A process converts input into output, the series of actions lead to a product or service for a customer. A standard business process of Joulz is to perform the engineering in a project, with requirements as input and technical specifications and drawings of technical details as output.

Processes within Prince2

The processes of Prince2 describe the project management activities that have to be executed during the project. Every process has its own purpose, and the processes follow in general the different phases of a project. The different project phases are named stages within Prince2. Every Prince2 project passes through all processes, the extent of the process varies per project and depends on the size and the complexity of a project. The following processes are identified within Prince2:

- starting up a project
- initiating a project
- planning a project
- controlling a stage
- directing a project
- managing stage boundaries
- managing product delivery
- closing a project

For the different processes it is prescribed what the goal of the process is and what information and communication is required throughout the process. The project is managed through the execution of the different processes. The difference with the processes of business process management is that the variety in these processes is bigger; projects are unique and the way these processes are executed will therefore differ for every project, the extent of using the process can vary per project.

Process management of change processes

This type of process management focuses on how changes can be recognized and implemented. The focus lies on the management of the environment and context of changes rather than on substantive choices. Attention is paid to the different objectives and possible conflicting interests of the actors involved and the corresponding complexity of decision making (de Bruijn et al., 2002). In a project environment process management incorporates that surprises occur in projects, due to substantive uncertainty, conflicting interests or changes in the environment of the project. It tries to deal with the uncertainty and risks of projects through anticipation (Veeneman, 2004).

The process management within Joulz is the type referred to above as business process management. The characteristics of this type of project management are further explained below. Process management of change processes is not analyzed in this research. The processes of Prince2 form part of this research, since the project management methodology of Joulz is based on Prince2.
2.2.2 Business process management

As mentioned above business process management is the basis for all working processes within Joulz. In this section the theoretical background of this type of process management is explained.

The orientation towards processes suggests that the organization should be viewed as a system of processes that need to be mapped, improved and controlled in order to create value for the customers (Deming, 1988). Instead of optimizing the efficiency of independent departments, the entire process of the organization in which value is added for the customer should be optimized. The goal of process management is to increase efficiency, customer-orientation and flexibility and to lead to innovation through evolution of the processes (Hardjono and Bakker, 2001). Providing insight in the processes should lead to identification of inefficiencies and optimisation of the entire process of the organization, instead of optimisation of the work processes of functional departments.

Since most existing processes have grown within the customs of a company without relevant control, they are terribly inefficient. Process management can improve the performance through focussing on processes that generate value for the customers and question activities that don’t directly contribute to this added value (Garvin, 1998). In process management the final objective is reached through a fixed set of actions that need to be executed (Maas, 1999).

Process management is mostly used for repetitive tasks that need to take place in the same order to reach the final objective; you could say that the end product is the result of a number of routine actions. Therefore process management does not seem appropriate for the management of projects, since projects are unique endeavours. However a process could describe an activity that results from following routine actions, but has a unique outcome. For example, when designing energy infrastructure, the actions that need to be taken are fixed: design, construction and testing & putting into operation, however the activity itself can be unique; laying a gas grid in a specific neighbourhood or building a high voltage line between two power stations.

In practice process management is applied through mapping the processes, appointing process owners, establish a process measurement system and identify opportunities for improvement (Hellström and Eriksson, 2008). A common way of describing processes is the use of flow charts, where the activities, decision points and required documents are described. The documentation of processes serves four different goals (Bouwman et al., 2009):

1. provide insight in the processes itself and the way they are structured
2. as a basis for analysis and evaluation of the processes
3. securing and transferring the available knowledge
4. certification

As mentioned above the main reasons for Joulz to map all processes were to synchronize the work between the offices, obtain the ISO certification, improve the quality management and as starting point for improving the work processes.

A possible disadvantage of the approach is that certification of the processes with the corresponding auditing, leads to bureaucratization because employees are (partly) assessed on the extent in which they follow the prescribed processes; it becomes more important to follow the described processes than to complete the activity efficiently and effectively (Hardjono and Bakker, 2001). But since the ISO certification is a demand of several clients of Joulz it is very important to retain this certification.

For the control of processes a process measurement system should be established. This is often done through appointing performance indicators for the different steps in a process. These performance indicators are mostly related to the following aspects: time, costs and quality (Kars, 2006). A
disadvantage is that for some processes it is hard to indicate performance indicators due to the process characteristics (Bouwman, 2009).

2.3 Project management

As mentioned before a project management methodology (EPA) is implemented in Joulz Projects. In this section first the theoretical background of project management, then the Prince2 methodology on which EPA is based are explained. This section concludes with the goal of project management.

Project management focuses on the management of a project; a temporary organizational form which is needed to accomplish a pre-specified product or result within a specified amount of time, using a specified amount of assets (Onna and Koning, 2002). Project management consist of three elements: phasing, controlling and deciding (Janssen, 2006). Through phasing the work is divided into different tasks and a planning is made for the execution of these tasks. Control is needed to make sure that the actual work follows this plan. Decisions are necessary to determine the project plan and when there are differences between the actual work and the original plan. There are different phases identified in the life cycle of a project, the phases defined in EPA are:

- Starting up a project; define the project’s objectives and goals, what and why?
- Project design fase; design and plan, when and how will it be done by who?
- Execution fase(s); execute the work, take decisions, solve problems, measure and compare the progress to the design and planning
- Closing fase; finish the work and evaluate the results

In order to control this life cycle, Turner (1999) distinguishes five different functions that need to be managed within projects to deliver the project’s product: managing the scope, the project organization, the quality, the cost, and the time. The quality, cost and time form constraints for the project, managing the scope and the organization are the essential functions of project management. As Turner puts it: “without work there would be no project, and without the people, the work would not get done.”

The quality, cost and time for a project form the constraints of a project. These three are dependant on the scope of the work and the organization of the work. The three constraints always form a trade-off. You cannot increase one without decreasing one of the others constraints.

Another function of project management is risk management. Due to the uncertainty all projects are subject to risks. Since risk management is important for the control of all five functions, it is often not regarded as a unique function of project management (Janssen, 2006).

Project management offers different tools in order to manage the different functions. Table 1 gives an overview of tools per function, this overview just gives an indication of the tools available, not all PM tools are listed. Since risk analysis is an important tool for the control of all five different functions, it is added to the five functions defined by Turner.

Table 1: project management tools (adapted, Source: Turner, J.R., (1999))

<table>
<thead>
<tr>
<th>Tools</th>
<th>Scope</th>
<th>Organization</th>
<th>Quality</th>
<th>Cost</th>
<th>Time</th>
<th>Risk</th>
</tr>
</thead>
<tbody>
<tr>
<td>Work Breakdown</td>
<td>Work Breakdown Structure</td>
<td>Organizational breakdown</td>
<td>Quality assurance</td>
<td>Budget</td>
<td>Network planning</td>
<td>Risk analysis</td>
</tr>
<tr>
<td>Responsibility charts</td>
<td>Quality control</td>
<td>Earned value</td>
<td>Bar charts</td>
<td>Bar charts</td>
<td>Risk log</td>
<td></td>
</tr>
</tbody>
</table>

Through defining and designing the project with the use of these tools and monitoring the progress through reporting and reviewing, project management tries to control projects in a structured way.
Project management has developed over the years into a very successful management method, but of course there are also some drawbacks.

Projects are influenced by their environment and are subject to risk and uncertainty. Projects are performed in a dynamic environment. The solution of project management to these influences is to try to predict, measure and control these situations. However it is impossible to eliminate all risk and uncertainty, since there are always unexpected events that you cannot predict and information is not complete and unambiguous.

Another menace for project management is the fact that in every project multiple parties are involved. One of the key features of project management is to have a clearly specified objective for the project. But when there are multiple parties involved, it is likely that different parties have different objectives, which could even be conflicting. This can happen between different organizations working on the same project, but also within one organization between different departments. If there are many conflicting objectives, one can question the value of the clearly specified objective of the project. Furthermore the objectives of the different parties can be subject to changes over time due to changes in the environment, new information or new insights.

Project management has the tendency toward making a plan and stick to it. During the project, project management is less concerned with the question if the right things are done. The project management tools reinforce a focus on operational planning and control rather than strategic issues and uncertainty management (Atkinson et al, 2006). If unexpected events occur the project organization will become inflexible and cannot respond to these changes (Turner, 1999). The strong focus on the predetermined project plan could lead to unwanted project outcomes.

Project management is constantly under development in order to improve project performance and to overcome the drawbacks mentioned. Over the years these methodologies have developed from very rigid project management that mainly focussed on the control of scope, time, cost and quality to approaches where more attention is paid to the project’s environment and changes during the project. How this is done is explained in the next section, where the project management method Prince2 is explained. Prince2 is a widely used project management method and the project management method used by Joulz Projects (EPA) is based on Prince2.

2.3.1 Prince2

Eneco’s project approach (EPA) is based on the Prince2 methodology. Prince is developed by the British Office of Government Commerce in 1989, and in 1996 the improved version Prince2 was introduced. The name Prince stands for Projects In Controlled Environments. The core of Prince2 is a multi-stage project management process. The processes have been described in §2.2.1. Every Prince2 project passes through all processes, the extent of the process varies per project, depending on size and complexity of the project.

Another key element of Prince2 is the central position of the business case of a project and the constant evaluation of the project progress with the business case (van Onna and Koning, 2002). The business case describes the business motive for the project in terms of benefit; the right to exist for the project.

In the method eight components are defined that are used within the different processes. The components are:

- Plans
- Organization
- Controls
- Quality control

- Management of Risk
- Business case
- Configuration management
- Change control
Compared to the functions of project management listed in table 1, there are certain similarities. Plans and Controls are related to Scope, Time and Cost. Organization, Risk and Quality are similar. The addition of the components is the configuration management, business case and change control.

Configuration management is the control over the products produced during the project, the documents and deliverables. Change control deals with the changes in the project. Changes are very likely to occur in projects, within Prince2 all potential changes are dealt with as project issues. The project board needs to decide in the initiation phase where the authority for making changes in the project lies. The business case makes clear what the benefits of executing the project should be, during the execution of the project it is important to reflect to the business case; is the expected benefit of the project still feasible?

Compared to the functions of project management defined in table 1, the three elements (Business Case, Configuration management and Change control) pay more attention to the environment of the project and changes during the project.

A disadvantage often mentioned is that Prince2 is bureaucratic due to the many prescribed processes and components within these processes. However an important aspect of Prince2 is that the degree of use of the processes should vary per project. The use should be scaled to the appropriate level for the project at hand. An often occurring phenomenon with the use of Prince2 is that instead of scaling, certain components of the method are not used, this leads to PINO (Prince In Name Only).

Next to the processes and components defined in Prince2, it is possible to use other methods and techniques within Prince2 for the management of a project. The process approach of Joulz can be used within Prince2, and the method is designed is such a way that it meets the demands of the ISO certifications (Wijnen et al., 1994).

2.3.2 Goal of Project Management

The reason for Joulz to implement a project management methodology is to improve the efficiency and the customer-orientation of the organization. The goal of the methodology is to successfully complete projects. But what are the aspects that determine the success of a project? Traditionally a project was regarded as successful if the constraints of the budget, time and quality were met (Pinto, 1986). However these criteria only determine the internal and short term criteria for the effectiveness of a project. No attention is paid to the customer’s expectations and the long term goals of the organization (Boddy, 2002).

Shenhar et al. (1997) distinguish four different dimensions for the success of projects; meeting design goals, benefits to the customer, commercial success and future potential. These criteria both pay attention to the internal and external effectiveness of a project on both long an short term. The study from Lipovetski et al. (1997) shows that benefit to the customer and meeting design goals are the most important criteria for project success. The importance of the other two criteria, commercial success and future potential is almost negligible compared to these two.

Meeting the design goals can be regarded as project efficiency, since meeting the design goals means realizing the project plan within the time, budget and quality constraints. The term used in this research for the criterion of benefit to the customer is customer-orientation.

The main goal of project management is to successfully realise projects, and the most important criteria for project success are efficiency and customer-orientation. These criteria attune perfectly to the main goals of Joulz.

2.4 Differences between the process- and project management

The two management types described above have both in essence the same objectives, but try to reach these objectives in a different way. The main objectives of both types are to increase the efficiency and customer-orientation of the organization through a structured approach.

Process management standardizes the approach to deliver a specific product or service to the customer through describing the process from start to end. Through evaluation with the customer and
internal improvements, the processes are optimized in order to increase efficiency and customer-orientation. Process management is best applied to optimize routine activities where standard products or services have to be delivered.

Project management provides structure and tools for executing a project. This structure and tools prescribe the way projects should be managed, however there is room within this structure and tools to take into account the uniqueness of projects. The use of project management is adjusted for every project. Through defining a project plan, controlling progress and deciding on the project plan and deviations to the plan, efficiency and customer-orientation are optimized. The different focus of the two types is summed up in table 2.

Table 2: differences between process- and project management

<table>
<thead>
<tr>
<th>Process management</th>
<th>Project management</th>
</tr>
</thead>
<tbody>
<tr>
<td>Standardized approach to reach product or service (routine)</td>
<td>Adjusted approach for every project (novel)</td>
</tr>
<tr>
<td>Optimization of processes in order to improve performance</td>
<td>Planning, controlling and deciding in order to reach project success</td>
</tr>
</tbody>
</table>

2.5 Research framework

In the preceding paragraphs the methods that are used by Joulz have been described. Joulz implements project management to increase the project performance. This research focuses on the contribution of project management to the efficient and customer-oriented execution of projects. To be able to analyse this contribution it is necessary to define what the requirements of these goals are for the management of projects. These requirements are discussed in this paragraph.

Selection of requirements

Several studies have generated lists of requirements that determine project success. These lists vary in detail level and focus, and there is little agreement on these requirements (Lechler and Gemunden, 1997). In this research requirements are derived from literature and a selection is made from these requirements. The requirements selected are:

1. related to efficiency and customer-orientation
2. related to the type of projects performed within Joulz

As explained in §2.3.2 the most important factors of project success are customer-orientation and efficiency. There are other factors of project success identified, but these are not taken into account in this study.

Requirements of project success are dependant on the specific project at hand (Dvir et al. 1998). The requirements derived from literature are related to many types of projects such as engineering, product development, research and development, systems development or organisational change. The projects studied within Joulz Projects are engineering projects. The requirements selected apply to this type of projects, requirements that do not related to this type of project are not selected. For example Rubinstein et al. (1976) found that individual ‘project champions’ are important for the success of R&D projects. This requirement is not selected since it is not related to the projects performed by Joulz.

First the requirements resulting from the goal of customer-orientation, then the requirements resulting from efficiency are indicated. The next step is to identify where possible synergies or conflicts between the two goals can occur. This framework is used in the analysis of the different projects.

2.5.1 Requirements of customer-orientation

In the following table the requirements resulting from the goal of customer-orientation are presented and related to the functions of project management presented in table 1, these functions are Scope,
Organization, Cost, Time, Quality and Risk. As mentioned before, risk is related to all five different functions and thus also relates to all requirements; it will not be noted for every requirement separately. The requirements are discussed and justified on the next page.

Table 3: requirements of customer-orientation

<table>
<thead>
<tr>
<th>Requirement</th>
<th>Function of PM</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Meeting project objectives</td>
<td>Scope</td>
</tr>
<tr>
<td>2. Flexibility</td>
<td>Scope</td>
</tr>
<tr>
<td>3. Technical competency project management</td>
<td>Organization</td>
</tr>
<tr>
<td>4. Resource allocation – stimulation</td>
<td>Organization</td>
</tr>
<tr>
<td>5. Reach functional performance</td>
<td>Quality</td>
</tr>
<tr>
<td>6. Customer satisfaction</td>
<td>All</td>
</tr>
</tbody>
</table>

1. **Meeting project objectives**

A customer-orientation means doing the right things. The project objectives should represent the needs of the customer. Meeting the project objectives is therefore a demand of customer-orientation (Neal, 1995, Olsson, 2007, Shenhar et al., 1997).

2. **Flexibility**

Due to the dynamics caused by uncertainty and to maximize project success, original project plans and project goals will have to be changed (Dvir and Lechler, 2004). In other words not one project will be finished according to the original plan because of changing circumstances, and in order to maximize the project success, changes are required during the progress of the project to react to these changes. In order to be able to respond to changing customer requirements, flexibility within the project plan is needed (Turner and Keegan, 1999, Dvir and Lechler, 2004).

3. **Technical competency project management**

With the technical competency of project management is meant the availability, skills and knowledge of project management tools. Are proper project management tools available and do people know how and why to use them? The technical competency of project management is a requirement of both customer-orientation and efficiency (Hyväri, 2006, Dvir and Lechler, 2004, Müller and Turner, 2006).

4. **Resource allocation – stimulation**

From a customer’s perspective the people working on the project should be stimulated to think outside the project specifications and come up with innovative and creative solutions for the customer’s problem (Turner, 1999).

5. **Reach functional performance**

The end product should function in such a way that the performance is appropriate for solving the customer’s problem. If the specifications within the project objectives are not sufficient to solve the customer’s problem, a customer-orientation would make sure that the functional performance of the end product does solve the problem (Shenhar et al., 2001).

6. **Customer satisfaction**

Next to the demands mentioned above the customer satisfaction regarding the entire project is an important demand of customer-orientation. Even if the demands above are met, the customer could be unsatisfied, e.g. through bad communication with the project team (Neal 1995, Shenhar et al., 2001, Wateridge, 1995).
2.5.2 Requirements of efficiency

In the following table the demands resulting from the goal of efficiency are presented and related to the functions of project management. The requirements are discussed and justified on the next page.

Table 4: requirements of efficiency

<table>
<thead>
<tr>
<th>Requirements</th>
<th>Function of PM</th>
</tr>
</thead>
<tbody>
<tr>
<td>7. Minimize scope changes</td>
<td>Scope</td>
</tr>
<tr>
<td>8. Minimize plan changes</td>
<td>Organization</td>
</tr>
<tr>
<td>9. Technical competency project management</td>
<td>Organization</td>
</tr>
<tr>
<td>10. Resource allocation – optimization</td>
<td>Organization</td>
</tr>
<tr>
<td>11. Meet technical specification</td>
<td>Quality</td>
</tr>
<tr>
<td>12. Minimize cost</td>
<td>Cost</td>
</tr>
<tr>
<td>13. Minimize time</td>
<td>Time</td>
</tr>
</tbody>
</table>

7 & 8. Minimize scope and plan changes

Dvir and Lecher (2004) identify two types of changes; plan changes and goal changes. Plan changes have impact on the project plan, but do not affect the project goals or meeting the customer requirements. Plan changes are typical results of unexpected events in the environment (weather conditions, delays) or poor planning. The project manager has to adapt the project plan, but can hold on to the project scope. If changes require adapting the project scope they are called goal changes, these changes are typically a result of a conscious decision by the stakeholders. Goal changes always require a change in plans in order to meet the new requirement. In this research goal changes are called scope changes. In general scope changes decrease the efficiency of a project. Clear project objectives can help to minimize scope changes (Dvir and Lechler, 2004, Neal, 1995).

9. Technical competency project management

With the technical competency of project management is meant the availability, skills and knowledge of project management tools. Are proper project management tools available and do people know how and why to use them? The technical competency of project management is a requirement of both customer-orientation and efficiency (Hyväri, 2006, Dvir and Lechler, 2004, Müller and Turner, 2006).

10. Resource allocation – optimization

Resources within a project should be used as efficient as possible; they should be available when needed and every hour they work for the project should be accounted for (Turner, 1999).

11. Meet technical specification

In order to fulfill the project plan the technical specifications that are agreed upon between customer and contractor should be reached. A demand of efficiency is that the technical specifications as defined in the project plan are met. Shenhar et al. (2001) regard meeting technical specifications as a requirement of customer-orientation. Dvir and Lechler (2004) regard efficiency as meeting the initial project plan. Since the technical specifications form an important part of the project plan, this requirement is regarded as a requirement of efficiency. From a viewpoint of customer-orientation meeting the functional performance is regarded more important than meeting technical specifications. From a viewpoint of efficiency one should watch for doing more than clearly specified within the project plan, the criterion used to express this is ‘meet technical specifications’.

12 & 13. Minimize cost and time

From a viewpoint of efficiency the cost and time of a project should be minimized, the target is to keep the project within the planned budget and schedule (Shenhar et al., 2001, Phelan, 2005).
2.5.3 Synergy & Conflicts

It can be expected that in some cases the two goals will reinforce each other, but in other cases the two goals could form a trade off. It is known that in projects that are performed within time and budget the likeliness of a satisfied customer increases (Dvir and Lechler, 2004). If we look at the requirements derived from the two different goals, we see different requirements for the same functions of project management. Table 5 shows this comparison. On the next page this table is discussed.

Table 5: differences in requirements

<table>
<thead>
<tr>
<th>Function of PM</th>
<th>Customer-orientation</th>
<th>Efficiency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Scope</td>
<td>Flexibility</td>
<td>Minimize scope changes</td>
</tr>
<tr>
<td>Organization</td>
<td>Resource allocation – stimulate innovative and creative problem solving</td>
<td>Resource allocation – optimize use of resources</td>
</tr>
<tr>
<td>Quality</td>
<td>Meeting functional performance</td>
<td>Meeting (technical) specifications</td>
</tr>
<tr>
<td>Cost</td>
<td>Customer satisfaction</td>
<td>Minimize cost</td>
</tr>
<tr>
<td>Time</td>
<td>Customer satisfaction</td>
<td>Minimize time</td>
</tr>
</tbody>
</table>

The difference between the requirements is discussed below. Looking at the requirements for the same function one could expect conflict between the requirements. It should be noted that conflict can occur between these requirements; it will not always be the case. In the projects it is analysed how project issues are related to the requirements, and if there is synergy or conflict between the goals of efficiency and customer-orientation. Below the differences presented in Table 5 are explained.

*Flexibility vs. Minimize scope changes*

Scope changes can influence the project success. The possibility of scope changes (flexibility) is in general viewed as a blessing and a curse (Olsson, 2007). A blessing since they give room to adjust the project to changing requirements and new information, which can increase the customer satisfaction of a project. A curse since these changes can lead to creating uncertainty, delay, iterations and cost overrun, which decreases the efficiency of the project. This means that conflicts can arise between the goals of project efficiency and customer-orientation. Clear project objectives can reduce the need for scope changes (Dvir and Lechler, 2004).

*Resource stimulation vs. Resource optimization*

On the one hand you want the resource allocated to the project to be available only when required and to work as efficiently as possible. On the other hand you would like creative and innovative solutions. Creativity and innovative ideas are not stimulated in an environment where every minute has to be accounted for (Turner, 1999). Through discussions with colleagues and rethinking problems creativity and innovation is stimulated, but it decreases the efficiency.

Related to the organization, there is also a synergy identified a requirement of both goals is the technical competence of project management. The knowledge and availability of project management skills and tools increases both efficiency and customer-orientation.

*Meeting functional performance vs. Meeting (technical) specifications*

From a viewpoint of efficiency quality is delivered when the requirements of the project plan are met. From a viewpoint of customer-orientation quality means that the project objectives are reached; the customer’s problems is solved effectively. There can be a big difference between the two quality requirements due to the uncertainty at the start of the project.

*Customer satisfaction vs. Minimize time and costs*

Three requirements are related to time and costs are: minimize time, minimize cost and customer satisfaction. Both synergy and conflict can occur between these requirements. As mentioned before it turns out that if projects are performed within time and budget the likeliness of a satisfied customer
increases (Dvir and Lechler, 2004). On the other hand it can occur that it will take extra time or costs in order to fulfil the desires of the customer. A trade off can occur between the extra effort that needs to be performed and the added-value for the customer. Another possibility is that the customer is willing to increase the time or budget in order to full fill its needs.

2.5.4 Use of the requirements
As described in §1.5 the requirements are used to assess the contribution of project management to efficiency and customer-orientation. The requirements will be used within three different analyses: the management of projects within Eneco Infra, the use of project management within Joulz and the training of employees in project management.
3 – Management of projects within Eneco Infra

In this chapter the way projects were managed by Eneco Infra is presented. The projects that are currently performed within Joulz Projects used to be executed by two different departments of Eneco Infra, the unit High Voltage and the unit Grids & Connections. This chapter discusses the difference between the types of projects, the way projects were managed in both department and the differences in organization and management of the departments. This chapter provides an answer to the research question: How were projects managed before the implementation of project management?

It is expected that different types of projects need to be managed in a different way, and therefore require a specific application of project management. Furthermore differences in culture and habits within both departments are expected to influence the implementation of project management within these departments. These insights are therefore needed in order to understand in what way project management according to Eneco’s Project Approach differs from the management of projects by Eneco Infra.

As explained in the research design the 7-S model is used for this analysis. This method and the detailed outcomes are presented in Appendix A. The information is gathered through interviews. The list of interviews is presented in Appendix B. In this chapter the results are discussed.

3.1 High Voltage

Type of Projects

The High Voltage (HV) department is involved in the design, construction and maintenance of high voltage grids, from 25kV up to 150kV, and projects above 10MVA electric potential. The department handles around 70 projects per year, with 320 employees and has a turnover of around 150 Million Euro. Normal project budgets vary between € 250.000,- and € 20 million. Typical projects are the installation of high voltage cables and power stations. The work of the high voltage department consists of genuine projects; every assignment is unique and is custom-made according to the desires of the customer. The main customer of the HV department is Eneco Grid Management, which is part of the same company; Eneco. HV grids above 150kV are managed by the national grid manager TenneT and sometimes projects are performed for TenneT. Some large industrial companies also require HV cables or switchboxes for their systems. If projects are directly performed on the premises of such a company, the division HV can be directly involved without interference of the grid manager.

Management of projects

The High Voltage department consists of four different teams: (1) Project control, (2) Engineering, (3) Construction and maintenance and (4) Sales. Every team has a team leader. In the execution of projects the project support office is used for procurement, calculation, planning and financial control. For the different departments the processes in order to successfully complete a project are described in flow charts with corresponding explanations of the steps, according to the process management method described in §2.2.2.

The Sales team acquires the assignments and passed them through to project control, where a project manager is assigned to the project. The project manager forms the project team according to the required disciplines. In general all four teams are involved in the projects. The organization of the project team remains the same during the project life cycle. Based on the project description of the client a quotation is made for every project. This quotation includes the scope of the project, the required budget and a planning. If the customer agrees upon the quotation the project plan is worked out in more detail. This results in a complete project plan, which includes the specifications and detailed planning of the project. The resource planning is done by the team leaders, who get support from the planning department through overviews of the required resources for the different projects.

During the project the progress is controlled by the project manager, supported by financial control and planning. Every two weeks the progress is updated during the project team meetings. The project
Improving the project performance within Joulz Projects

manager communicates the progress to the customer with highlight reports, as frequently as requested. Internally regular meetings are planned with the team leader of the project control department to monitor the overall progress of the projects. In this meeting the scope, planning and financial aspects of the project are discussed.

Organisational characteristics
Eneco Infra is one of the few companies that can both design and construct high voltage energy infrastructure, and the strategy of the High Voltage department is based on providing integral high voltage solutions. The main strength of the high voltage department lies in the specialized knowledge about high voltage grids. Engineers with this knowledge are rare, and only few companies have this expertise. Most of the staff has an electro technical background.

The skills of the employees are developed through different educational courses for every department. Employees can subscribe for these courses. Project managers are trained in project management throughout their career. The assessment of employees is performed by their team leader; the project manager is not involved in the assessment of employees of his project team.

The culture of High Voltage can be described as informal. The team structure is evidently present, but there are many informal contacts between the different teams. Problems are discussed within the teams, and project issues between teams are discussed between employees of different teams. The commercial awareness of the department is not very high. Project control, financial control, procurement and sales are aware of the commercial implications of project progress. The other teams take priority in the quality of the work performed. The general attitude is that High Voltage projects are superior over the other infrastructure projects, due to technical complexity and size of the projects.

The main customer of the High Voltage department is Eneco Grid Management. Every department has informal contacts with Grid Management. This interdepartmental contractor-customer relation leads to a very informal relation where the differences in responsibilities of contractor and customer are not very clear. Examples of this confusion are that parts of the project description are performed by the customer, and scope changes in projects are not always discussed with the customer.

The project performance in the department is measured through the time and budget performance of the individual projects. If changes occur in a project that lead to an agreement with the customer for extra time or budget, a project is regarded within time and budget if the new agreement is met. These criteria are measured for the entire project; no distinction is made between different project phases or the different departments active in the project.

3.2 Grids & Connections
Type of projects
The department of Grids and Connections (G&C) is involved with the design and construction of middle voltage, low voltage and gas grids. Typical jobs are connecting neighbourhoods to the electricity and gas grids, connections between these grids and the high voltage and high pressure grids and installation of public lighting and ANWB-masts. If a job is too small it is regarded as a short cyclical assignment, and performed by another department. The budget per job varies between € 5000,- and € 1.500.000,-. A normal number of running jobs per person lies between 50 and 100.

The main customer is the grid manager. By experience the work is divided into standardized work packages with a fixed price agreed upon between the grid manager and G&C. An assignment consists of a combination of these standardized packages. Some jobs are performed for external customers. For these jobs the scope is defined through using the standard work packages and adjusting them where needed according to the customer's requirements. The jobs performed by the department can be typified as routine-like jobs, there are some complex jobs that can be typified as unique projects. These projects are currently executed within Joulz Projects, the routine jobs are performed by the Service Provider.
Management of projects

The Grids & Connection department consists of different teams that are assigned to a certain geographic region. These teams consist of construction supervisors, planning engineers and (Sr.) project coordinators. These teams are supported by other teams, such as the drawing office, the licences & land department and administration. For the different teams the processes in order to successfully complete a project are described in flow charts with corresponding explanations of the steps, according to the process management method described in §2.2.2.

A project is managed by one person; a planning engineer, a junior project coordinator or a senior project coordinator, depending on the size and complexity of the project. This person is responsible for the entire project; the design, the execution and the monitoring. Construction supervisors often assist within more complex projects, input of the supporting teams is only requested where needed.

The project plan consists of a combination of standardized packages. The project coordinator keeps track of the progress and the budget, and communicates with the customer. If changes are needed, in most cases the project coordinator takes a decision on these changes. The extra work is settled with the end-customer, the customer Grid Management. Only if changes have a huge impact the project coordinator will first discuss this with Grid Management.

The construction supervisors play an important role in the quality control since they supervise the work executed. This work is often outsourced to contractors. The construction supervisors reports to the project coordinator about the progress and peculiarities.

A real planning is not made for the projects. The work packages have certain runtimes, which form a basic planning. With the customer a certain starting time for the job is agreed. Another aspect is that most projects like connections for new housing development or a job related to maintenance of a railway depend for their planning on the planning of external parties; they have a certain time window where the job needs to be done.

A resource planning is not kept. Within a region there are two or three project coordinators assigned. Projects are divided on a regional basis, regardless of the occupation of the coordinators of that region.

Organizational characteristics

The projects performed are a combination of standardized packages with fixed prices. The strategy of Grids & Connections is aimed at optimization of these standardized activities. The prescribed processes are optimized with a focus on safety, efficiency and quality.

New employees follow a seven day course where the work processes and systems of Grids & Connections are trained. After the training they are assigned to small projects to apply these processes in practice. As mentioned above all project coordinators handle middle voltage, low voltage and gas grids, so they need to become competent in these three different fields. Since project coordinators perform the greatest part of the jobs themselves, they need to have enough technical knowledge. Most new employees have an electrical educational background, and their gas knowledge is small. Most gas projects are performed by experienced employees, and the gas knowledge of new employees is gradually increased.

The work style of Grids & Connections is task-focused, project coordinators handle many projects and they just start with the job without formulating an extensive project description or planning. There is little cooperation within projects, there is not a real project team, a project coordinator only asks for support where needed and does not delegate much tasks.

The main customer of the Grids & Connections department is Eneco Grid Management. This interdepartmental contractor-customer relation leads to an informal relation where the differences in responsibilities of contractor and customer are not very clear. Examples hereof are that scope changes are not always discussed with the customer, and the extra work performed is directly billed to the end-customer, the customer of the grid manager.

The performance of the project coordinators is monitored by their team leader, based on two sources of information. The first is the project performance on progress, costs and planning. The second is control on the administration of the project according to the processes. The main focus is on the
portfolio of projects, not on individual projects. Project coordinators have monthly targets over all their projects. The main focus lies on project runtime and costs. Since employees handle many projects it can occur that certain projects with low priority are put aside. The goal is to finish all projects within 180 days. Since the remuneration for the different activities is fixed it is important to control the costs and the allocation of work to the specific activities.

### 3.3 Differences with Joulz Projects

Joulz Projects consists of the entire High Voltage department, the projects from Grids and Connections are added to this new organization and certain employees are transferred to Joulz Projects. The standardized jobs of Grids and Connections are accommodated within the Service Provider. The setup of the organization is similar to the setup of High Voltage. The differences between the two former units and Joulz Projects are related to three topics: (1) scope of work, (2) market-orientation and (3) project management.

The first difference is related to the scope of work, Joulz Projects focuses on the entire energy-infrastructure, from low voltage up to high voltage electricity infrastructure and from low to high pressure gas installations. The strength is that Joulz can provide complete energy infrastructure solutions. The strategy of Joulz Projects is to become leading in future-proof energy infrastructure.

The second difference is related to the market-orientation. The goal of Joulz Projects is to increase the share of projects performed for other parties than Stedin, in five years this share should be half the portfolio. Furthermore the relation with Stedin has to become more businesslike. The responsibilities of customer and contractor and agreements on changes and on payments have to become more evident.

The third difference is the implementation of a project management method. Within the two former departments process management was used for the management of project. Within Joulz Project process management is still used, but Eneco’s Project Approach (EPA) forms an additional method for the management of projects. EPA is explained in chapter 4.

### 3.4 Summary

This paragraph summarizes the insights gathered through the analysis of the management of projects within Eneco Infra. These insights are needed in order to understand the different types of projects executed by Joulz Projects and the differences between EPA and the way these projects were managed previously. In table 6 the main differences between the two units and Joulz Projects are presented:

#### Table 6: differences between the units and Joulz Projects

<table>
<thead>
<tr>
<th></th>
<th>High Voltage</th>
<th>Grids &amp; Connections</th>
<th>Joulz Projects</th>
</tr>
</thead>
<tbody>
<tr>
<td>Expertise about high voltage energy infrastructure</td>
<td>Expertise about low &amp; middle voltage electricity and gas infra</td>
<td>Expertise about future-proof energy infrastructure</td>
<td></td>
</tr>
<tr>
<td>Project teams handle few large projects</td>
<td>Project coordinator handles many small projects</td>
<td>Project teams handle few large projects</td>
<td></td>
</tr>
<tr>
<td>Customized project approach based on prescribed processes</td>
<td>Project plan consists of standardized activities with fixed prices and duration time</td>
<td>Customized project approach based on EPA</td>
<td></td>
</tr>
<tr>
<td>Technical complexity high</td>
<td>Technical complexity low</td>
<td>Technical complexity low &amp; high</td>
<td></td>
</tr>
<tr>
<td>Informal communication within project team and with Stedin</td>
<td>Little cooperation in projects, informal communication with Stedin</td>
<td>Business-like contact with customers, both Stedin and external customers</td>
<td></td>
</tr>
<tr>
<td>95% of projects for Stedin 5% for external customers</td>
<td>95% of projects for Stedin 5% for external customers</td>
<td>50% of project for Stedin 50% for external customers</td>
<td></td>
</tr>
<tr>
<td>Focus on control of budget and schedule</td>
<td>Focus on project runtime and costs</td>
<td>Improvement of efficiency and customer-orientation</td>
<td></td>
</tr>
</tbody>
</table>

- 34 -
The main conclusion is that the work performed by Grids & Connections is more standardized through pre-determined work packages with known duration and fixed prices. Projects are not really performed in teams, the level of technological complexity is lower and the focus is on optimization of these standardized activities through focussing on project runtime and costs.

The work performed by High Voltage is fairly unique, for every project a project plan is made and a project team is set up, the level of technological complexity is higher, in most projects engineering is required and the performance is monitored per project separately, based on the budget and schedule. The work performed by Joulz Projects combines the types of projects from High Voltage and Grids & Connections. Next to the processes, EPA is used for project management. The goal is to perform more projects for external customers. The performance goal is to increase both the efficiency and customer-orientation within the execution of projects.
4 - Use of project management within Joulz Projects

This chapter presents the analysis of the use of project management within Joulz Projects. First the methodology used by Joulz Projects is explained in order to understand how the use of project management is intended. The use of project management is studied through ten selected projects and discussion with project managers. The selection of projects and the way the project have been analyzed are discussed, after which the results of the analyses are presented. Following the actual use is compared to the intentions of the method. At the end the insights gathered in this analysis are summarized.

This chapter gives insights in the way projects should be managed according to the project management method are how they are actually managed within Joulz Projects. It provides the answer to the research question: How is project management used within Joulz Projects, and how does this relate to efficiency and customer-orientation?

4.1 Eneco’s Project Approach

In this paragraph a short description of Eneco’s Project Approach (EPA) is given, a full description is available through the EPA documentation of Joulz. EPA is developed in Joulz projects by a team of four employees who were experienced in the use of Prince2 and the projects performed by the High Voltage department. Figure 6 presents the overview of EPA, this overview is explained in §4.1.1.

EPA Overview

Figure 5: EPA overview (source: EPA manual Joulz)
4.1.1 EPA’s elements

EPA is developed for Joulz Projects. The approach is based on the Prince2 methodology, and adapted to the work experience and environment of Joulz. This has resulted in a project approach with a fixed planning in stages. The origin of these fixed stages are the recurring activities in all projects of Joulz; since all products are related to construction of energy infrastructure you need design, realization and testing & putting into operation for all projects. Therefore every project passes through the stages Starting Up, Design, Execution and Closing. The execution stage always consists of four sub-stages: (1) basic engineering, (2) detail engineering, (3) realization, and (4) test and put into operation. For each stage the steps that have to be taken and the documents that have to be delivered are defined. For these documents standard templates are available. The overview of the different stages, steps and documents is presented in Figure 6 on the previous page.

The starting point of EPA is that it is a guiding principle for the management of projects, it is not a rigid step-by-step plan where all documents are obliged. For each project choices need to be made which documents are used from EPA. In order to support these choices a classification matrix has been set up to define the complexity of a project. By assessing a project according to defined criteria, a project gets one of the following classifications:

1. Project based task
2. Light project
3. Heavy project

For each classification the suggested products that should be used are indicated. The overview of use of products and the quantification of the criteria are presented in appendix C. The criteria are used to determine which of the three classifications is most appropriate for the project at hand are:

- Project budget
- Investment
- Project run time
- # Involved teams Joulz
- # Involved public parties
- # Involved suppliers
- Strategic importance
- Importance for Stedin
- Risk

4.1.2 EPA and Prince2

The big difference between EPA and Prince2 is the fixed sequence of activities in EPA compared to Prince2. The reason for this is that Prince2 is developed for all types of projects and EPA specifically for the design and construction of energy infrastructure. The set up of the different stages, the corresponding documents and the required communication seem useful for the successful realisation of the projects within Joulz Projects. The templates provided for the different documents are useful for the standardisation of communication and improvement of the efficiency.

4.1.3 EPA and process management

EPA and the processes can coexist within Joulz without too much trouble. The main reason is that Prince2 and EPA are composed of processes and therefore have many similarities with process management. The intention of process management is to guarantee a certain quality level through prescribing the steps that need to be followed. This is exactly what is done within EPA: the different steps and documents for the management of projects are prescribed. The difference is that EPA is more detailed than the process maps and that the rules of EPA (§4.1.5) leave room for adjusting the application of EPA. The different terms used in EPA are similar to the terms used in the process maps and all documents that are described in the processes are required in EPA as well. The result hereof is that if a project is well executed according to EPA it is also well executed according to the process maps. Therefore the use of EPA is in compliance with the requirements of the ISO certification.
As mentioned in §2.2.3 it is possible to use other methods and techniques within Prince2 for the management of a project. To use indicators related to the process maps would therefore not be contradictory to the proper use of EPA. EPA forms a valuable addition to the process management since it is better equipped for the control of projects.

### 4.1.4 Performance indicators

Since the implementation of project management the measurement of project performance has been under development. The indicators from the High Voltage department as described in §3.1 have been extended with information from the different departments of Joulz Projects. Currently the hours and costs estimated, consumed and still to come are indicated within the project for the different departments in the internal project evaluation. The plan for the near future is to include the costs per department, and to compare the subsequent calculation with the estimated calculation in order to improve the calculation of the different departments. All these reports are made for the entire project, and not divided into different project stages.

### 4.1.5 Golden rules of EPA

In order to properly use EPA, certain ‘golden rules’ have been set up to indicate the most important aspects in using the method. These rules are described in the EPA manual for employees. These rules are used in this research to compare the use of project management to the intentions of the method, this comparison can be found in §4.4. The rules are:

- Use common sense; only use EPA elements if they seem useful. The classification matrix can be used as a guiding principle in choosing elements, but exceptions from this matrix are allowed but should be well substantiated.
- Every project starts with a cost benefit analysis and ends with a deliver report and a lessons learned report. During the project the cost benefit analysis is updated during transitions between project stages.
- Every project has a steering group that at least consists of the customer.
- Before the actual work is executed the project objective and the product specifications are defined in the project plan.

Within this paragraph the basics of EPA have been explained. The next step is to analyse the way the methodology is used within the execution of project. The way this analysis is performed is explained in the following paragraph.

### 4.2 Research approach

In this paragraph the approach used to select and analyse the projects is discussed. First the selection of the projects and then the research methods used are explained.

#### 4.2.1 Project selection

As discussed in §1.5, the selection of cases is important for the validity of this case study research. In order to evaluate the use of project management within Joulz, the selected cases should give a good representation of the project portfolio of Joulz. The selection is based on pragmatic and content related criteria. The pragmatic selection of cases is done through consultation within Joulz; to analyse a project, cooperation from the employees is required and the project has to be in an advanced phase. In order to be able to analyse the contribution of project management to the efficiency and customer-orientation of a project, in the ideal situation a project would have been evaluated and completed. Since project management is recently implemented within Joulz and the projects have quite a long runtime there are little ideal projects. Therefore also projects that are still in the execution phase are analysed, projects before this phase are
not taken into account. This resulted in a list of possible projects for analysis, from this list a selection was made through content related criteria.

The first categorization in content is made through selecting projects that in the former situation would have been performed by the two different departments. Now both categories of projects are performed by Joulz Projects. The first category consists of complex projects of Grids & Connections (not the routine jobs that are performed by the Service Provider), the second category of projects of High Voltage. Within these two categories different pilot projects are selected.

The second categorization is made with the use of criteria set within EPA. EPA uses three different project classifications:
1. project based task
2. light project
3. heavy project

Both light and heavy projects are selected for the analysis. Project based tasks are not regarded as projects by Joulz and are therefore not analyzed.

The third categorization is made through considering the customer of Joulz. Due to the changing market circumstances Joulz has set the goal to obtain far more projects from other customer than Stedin in the future. In order to understand the different requirements to project management both projects for Stedin and for other parties are selected.

These selection categories are compared with the list of available projects and this has resulted in the following selection of projects.

Table 7: overview of selected projects

<table>
<thead>
<tr>
<th>Grids &amp; Connections projects</th>
<th>Categorization</th>
<th>Customer</th>
<th>Project phase</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diefdijk fase 1</td>
<td>Light project</td>
<td>Stedin</td>
<td>Completed</td>
</tr>
<tr>
<td>Stadsgebied Utrecht</td>
<td>Heavy project</td>
<td>Stedin</td>
<td>Execution</td>
</tr>
<tr>
<td>N&amp;A binnen Oostland I</td>
<td>Heavy project</td>
<td>Stedin</td>
<td>Completed</td>
</tr>
<tr>
<td>Centrumplan Nieuwegein</td>
<td>Heavy project</td>
<td>Stedin</td>
<td>Completed</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>High Voltage projects</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Oostland I</td>
<td>Heavy project</td>
<td>Stedin</td>
<td>Completed</td>
</tr>
<tr>
<td>Station Nieuwegein</td>
<td>Heavy project</td>
<td>Stedin</td>
<td>Execution</td>
</tr>
<tr>
<td>De Lier</td>
<td>Heavy project</td>
<td>Westland Energie</td>
<td>Execution</td>
</tr>
<tr>
<td>Electrabel Maasvlakte</td>
<td>Light project</td>
<td>Stedin</td>
<td>Execution</td>
</tr>
<tr>
<td>Koedood</td>
<td>Light project</td>
<td>Stedin</td>
<td>Execution</td>
</tr>
<tr>
<td>Goeree Overflakkee</td>
<td>Light project</td>
<td>Stedin</td>
<td>Completed</td>
</tr>
</tbody>
</table>

As shown in the table multiple light and heavy projects and a project for another customer than Stedin are analyzed. It is not possible to analyze both light and heavy projects for multiple categories of customers for both Grids & Connection and High Voltage projects due to availability. The reason is that 95% of the projects within Joulz are currently performed for Stedin and at the time of this study there is only one relevant project performed for another customer that is in execution. Currently there are ten projects selected for analysis which results in multiple projects for both departments. The number is limited to ten due to available time for this study. These ten projects, including the subprojects, represent around 20% of the projects performed by Joulz Projects per year.

4.2.2 Research methods

As described in §1.5 the projects are analyzed through different data sources. The project documentation is analyzed and semi-structured interviews with the project managers are held. For
these interviews an interview protocol has been formulated based on the requirements to project management (ch2) and the insights gathered from the former management of projects (ch3). The interview protocol is presented in Appendix D.

After interviewing all project managers, three projects were selected for further analysis. Within these projects the customer and employees from different departments were interviewed in order to include their point of view on the use of project management. Due to time required of employees and available time for this research this was not done for all projects. The selection was based on a quick-scan after the first interviews; projects that were further analysed are De Lier, Koedood and Goeree Overflakkee. The overview of interviewees per project is given in Appendix B.

Next to the project specific insights, general insights regarding the use of project management are gathered through participating in the training of project management. During the training the way project management was used in practice was discussed. The training is discussed in chapter 5, the field experiences of the project managers that was revealed during this training is included within the results presented in this chapter.

4.3 Results of project analysis

In this paragraph the results from the analysis of the ten projects and the insights gathered through the discussions with project managers are presented. The results are discussed using the research framework of §2.5. This is not done for every project separately. The specific project descriptions can be found in Appendix E. Table 8 gives an overview of the scores per project on the requirements of the research framework. The requirement technical competency of project management is not presented in the table, since the score on this requirement is too complex to present in this table. The last column in the table presents the scores on the requirements gathered through the discussions within the training of project management. The table is discussed on the next page.

Table 8: overview of results

<table>
<thead>
<tr>
<th>Requirements of customer-orientation</th>
<th>G&amp;C projects</th>
<th>High Voltage projects</th>
<th>Discussion</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. meeting project objectives</td>
<td>DD SU NAOL CN OL SN DL EM KD GO</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. flexibility</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Resource allocation - stimulation</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. reach functional performance</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. customer satisfaction</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6. Resource allocation - stimulation</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7. minimize scope changes</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8. minimize plan changes</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9. resource allocation - optimization</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10. meet technical specifications</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>11. minimize cost</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>12. minimize time</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Legend:

<table>
<thead>
<tr>
<th>Projects</th>
<th>Symbols</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>DD – Diefdijk</td>
<td>SN- Station Nieuwegein</td>
<td>+ Positive score</td>
</tr>
<tr>
<td>SU – Stadsgebied Utrecht</td>
<td>DL – De Lier</td>
<td>0 Neutral score</td>
</tr>
<tr>
<td>NAOL – N&amp;A binnen Oostland I</td>
<td>EM – Electrabel Maasvlakte</td>
<td>- Negative score</td>
</tr>
<tr>
<td>CN – Centrumplan Nieuwegein</td>
<td>KD – Koedood</td>
<td>Deviation from original plan accorded by client</td>
</tr>
<tr>
<td>OL – Oostland I</td>
<td>GO – Goeree Overflakkee</td>
<td>R Redundancy</td>
</tr>
</tbody>
</table>
The table on the previous page shows that the project objectives and functional performance are met within all projects and that the customer is satisfied about most projects. Scope and plan changes are very common, and the costs deviate from the original project plans, but stay within the adjusted budget. The duration of projects exceeds the project plan quite frequently. The results presented in this table are explained in more detail for all requirements in the following paragraphs.

4.3.1 Results related to the requirements of customer-orientation

In this section the insights from the analysis of the use of project management related to the requirements of customer-orientation as described in §2.5 are presented.

1. Meeting project objectives

In four completed projects the project objectives are met, within the five projects in execution it is expected that the project objectives will be met. One completed project did not meet the project objectives, but this was caused by a change of the objective by the customer. Within the project Centrumplan Nieuwegein the customer made the choice not to build a certain power station. The adjusted project objective is achieved.

2. Flexibility

In projects that had a certain amount of uncertainty caused by developments in the area of the project or by the cooperation with multiple parties, flexibility in the design proved important for the customer-orientation and contributed to the customer satisfaction. The projects where this flexibility proved important are Diefdijk, Centrumplan Nieuwegein, N&A binnen Oostland I, Oostland I and Electrabel Maasvlakte. Within these projects scope changes were required to meet the changing project objectives.

3 & 9. Technical competency project management

This requirement is not presented in table 8 because the score on this requirement is too complex to be represented within the table. This requirement is both important for customer-orientation and efficiency. Related to customer-orientation the use of project management tools turns out to be useful in most projects for communication with the customer and for the registration of agreements. Related to efficiency the use of project management tools helps for the control of the project. The project schedule and budget form the most important control mechanisms.

The results related to this requirement will be discussed for both goals within this section. The use of project management differs significantly between the projects that were previously performed by the High Voltage and the Grids & Connections departments. First the results are discussed separately for these two different types of projects, preceding the results applicable to both types of projects are discussed.

High Voltage projects

Use of project management

In the design phase of this type of projects the project organization is drawn up. The project organization consists of the project team with employees of different departments, subcontractors and often a project board. The project team has weekly meetings, the project board less frequently and only the project manager is present at these meetings.

The use of elements from EPA differs quite much between the different projects. The use of EPA is less extensive within light projects compared to heavy projects. Within all projects a project plan is drawn up, including a detailed planning and a budget. The plan is agreed upon by the client before the actual work starts. Project highlights and changes are communicated to the client using the available reports. Elements that are not used are stage plans and stage reports, if risk analysis is used it is only at the beginning of a project, projects are rarely evaluated and lessons learned are not registered. An
exception is Oostland I, this project was evaluated and lessons learned are identified, only stage plans were not used.

Planning and reporting
Within the High Voltage projects, project support is used to control the planning and the budget. The planning is set up and updated by a planner and the project costs are controlled by a financial controller. These control mechanisms form the input for the progress reports to the customer and the internal progress reports. Project managers monthly report the progress of all their projects to their manager.

These internal reports contain information about how much time and money is spent and how much time and money is still needed in order to complete different activities or purchase materials. However there are difficulties with measuring the progress of the projects when these control mechanisms are used. Next to inaccurate estimations about costs and duration of activities at the project start, it is also difficult to measure the actual progress during the project. Project manager and planners depend for the larger part on the information provided by the project employee. The project members report on how much time they have spent and how much time they still need to complete a task. What happens is that if a task requires six weeks, the first four weeks the signals coming from the department are that the work is on schedule, only at the end it becomes clear that the deadline will not be met. During this period the project manager has little insight in the actual progress.

The employees fill in the progress reports according to the planned schedule because they consider these reports as administrational nuisance and do not want the project manager to control the planning of their tasks.

Communication
Regarding the communication with the project organisation it occurred within project Koedood and Goeree Overflakkee that the project manager is not informed, or informed too late about certain project issues. In the discussion with project managers this problem was identified as a familiar problem within most project teams that include multiple departments.

Since the project manager is responsible for the communication with the customer, it is important that the PM is informed to a certain level of detail about the important aspects of the project. Because project managers have multiple projects (5–10), they have a limited span-of-control. It is impossible for them to be informed about all technical project details.

The engineer knows most about the technical details of the project. The result hereof is that a lot of communication flows through the engineer; with the customer in order to attune the specifications to the demands of the customer and with the construction department to resolve vagueness in drawings or unforeseen circumstances. Furthermore the limited available time of project managers leads to discussions with colleagues and the team leader about the project details. On one side these discussions contribute to the knowledge development within the department and the quality of the delivered work. On the other side these discussions within the department instead of the project team lead to miscommunication within the project team. The project manager is informed about necessary changes, but often the choice has already been made. Within these choices there is little attention for the project budget and schedule and implications of these decisions for the other tasks of the project. However the project manager holds the responsibility for the total project, and decisions made within the project should be made in consideration with the project manager. The idea that the project manager is the boss instead of the team leader in a project is insufficiently present within the departments.

Unfinished tasks
In the design phase technical drawings are made to be able to construct the work according to the design. After the work has been executed the drawings should be returned by the construction department to the engineering department with the changes that occurred in execution compared to
the design. Engineering should perform the revision of these drawings. However it occurs that the drawings are not returned, or returned when the project has already been closed down. Since the engineering department cannot account the hours needed for revision to the project, the revision is often not performed which causes troubles in future, since the drawings are not up to date. The control on project deliverables is apparently not sufficient.

**Procurement**

The procurement department is involved in the ordering of materials for projects. The energy infrastructure sector uses highly specialized equipment that is expensive and has long delivery times. Before materials can be ordered, the basic stage of engineering has to be completed. When it is clear what materials are required, procurement chooses a supplier and the project administration orders the materials. Problems occur with (1) late ordering, (2) the selection criteria for suppliers and (3) the monitoring of delivery.

1. It often occurs that the project administration takes quite a time to order the materials.
2. Sometimes it is more important for a project to have quick delivery times than the cheapest offer. Ideally project managers should provide the procurement department with the selection criteria for the project, and procurement should take these criteria into account. However procurement is mainly focussed on the price of the materials.
3. Another problem is that when the materials are ordered, nobody keeps track of the progress of the delivery. The communication between the project manager and procurement is very limited after the selection of materials; procurement is not further involved in the projects.

Since the importance of the materials for the progress of the project, it is necessary to get better grip on the delivery of the required materials. In general it is currently quite difficult to reach the procurement department, due to physical distance and little contact with this department in the daily work practice.

**Grids & Connection projects**

**Use of project management**

For the Grids & Connection projects the project organization is very basic. Most project tasks (except construction) are performed by the project manager himself, sometimes supported by a planning engineer. The project’s design, planning and budget are performed by the project manager. Other departments of Joulz are only used in the projects for small tasks and do not really participate in the project. Only in the construction phase multiple people are involved but this work is mostly subcontracted.

Within the projects Diefdijk, Centrumplan Nieuwegein and Stadsgebied Utrecht it occurred that multiple utility companies were involved in the project, for the customer it was important that the designs and construction of these different parties was integrated. In order to provide this integral solution, representatives of all parties involved meet weekly to discuss the project highlights, and the construction work is subcontracted to one party by all different utility companies. The overall project planning for all parties involved is made by this subcontractor.

The project management methods used varies, but EPA is not used in these projects. The project managers in the Utrecht office use Eneco’s Prince2 approach. At the Rotterdam and Delft offices no specific project management method is used.

For all projects a project plan is made. These plans consist of standard activities with a fixed price and with familiar duration times. Only a very rough project planning is constructed by the project manager himself. If risk analysis is used it is only at the beginning of a project. Project progress is measured using clear measures like numbers of connections (to houses) established, or amount of meters cable installed.

Issues within projects are communicated through highlight reports to the customer. However, in the Utrecht office the reports are sent to the customer, Stedin, but are not used. The customer is not really involved in the project and lets Joulz handle the communication with their client. Only occasionally
there is involvement from Stedin in these projects. The main reason why certain reports are not used in projects is because it is regarded as time consuming and not directly contributing to the project results. During the closing of the project, project evaluation is rare and lessons learned are not identified.

The problems with procurement are not identified in these projects, since the work is more standardized the materials used are more common and often these materials are in stock.

Within two projects (Stadsgebied Utrecht and Centrumplan Nieuwegein) it occurred that the coordination between the parties was outsourced to Joulz by the client of Stedin. Within these projects the project manager was responsible for the entire project and the activities of the other parties involved can be regarded as sub-projects within this project.

Planning and reporting
For the Grids & Connections projects project support is not used. A rough planning is made and the budget is controlled by the project manager. Both are for the larger part based on standard duration times and pre-determined costs for certain activities often performed in this type of projects. Within the projects analyzed a more detailed planning that integrated the activities of all different parties involved was made by the subcontractor.

The control of budget is performed by dividing the project into very small activities and billing every separate activity when completed. The progress is measured using clear measurements like the number of connections established, or the amount of meter cable installed. These measures give insight in the actual progress of the project.

Both types of projects
Business Case
The cost benefit analysis as described in the golden rules of EPA is often not used at all, and when it is used is only describes the expected profit and is not updated and used to assess whether the project should be continued. The general attitude is that projects have to be completed anyway, no matter what happens during the project. Stedin is obliged by law to connect parties to the grid when they require a connection. Other projects involve maintenance and enforcement of the grid and are necessary for the reliability of the grid. The profitability of these projects is not calculated and compared to the costs since the profitability is hard to determine.

Since the only benefit for Joulz of the projects is profit and the decision if the project is still worthwhile to continue lies at the customer, using a business case does not seem useful. By Joulz the profitability of a project is monitored in the progress reports.

Configuration management
In multiple meetings it occurred that the documents used by the customer and Joulz, or between different departments of Joulz differed. This means that the configuration management has flaws. Improvement of configuration management was an important lesson from the evaluation of the Oostland project.

Within Prince2 one of the components is configuration management. An explanation for the lack of configuration management in the use of project management could be that this component is not explicitly taken into account within EPA.

Closing a project
The project evaluation is minimal within Joulz. During the last project meeting a list is made of what work still has to be performed and the final costs are presented. In most projects no lessons learned are identified. If asked about customer satisfaction an often heard quote is: “They have paid the bill, so they are probably satisfied with the project’s result.” By Joulz there is often no check if the revision of the drawings has taken place, the actual costs are not compared with the quotation and the team work is often not evaluated. The reasons why this project evaluation is minimal is discussed in §6.1.
Licences
All infrastructure projects have impact on the environment. For the construction of cables, pipes and masts land is required. For all projects licences have to be attained before construction. For these licenses applications have to be submitted with municipalities and provinces. These are complex procedures with many uncertainties. Problems such as ground pollution, road, rails, waterways, dikes, private property and zoning plans all influence these licenses. One can imagine that many parties need to be considered before a license can be given out and that it takes a lot of time to attain the required licenses. The licenses form a great risk for the success of the projects because of three reasons:
1. unexpected events or discoveries during the execution of the work affect the value of the licence
2. mistakes are made within the authority that provides the license which causes delay or affects the value of the licence
3. the license affects the project plan

For the management of risk in the projects, managing the acquisition of the licenses is an important issue for the project manager.

4. Resource allocation (Stimulation)
From a viewpoint of customer-orientation enough time should be available for creative and innovative problem solving, this is influenced by the way the resources are allocated.
The different tasks for the different departments are determined in the project planning. The planning is constructed through consultation of the different project members. The resource allocation results from the planning of the different projects. The team leaders of the different departments are responsible for the resource allocation to the projects.
Project members have to account the hours worked for the different projects. The issues that are identified related to the resource allocation are mostly related to optimization of resources rather than the stimulation of innovative and creative solutions. Related to this requirement it is identified that the discussions in project meetings lead to better solutions and integration of different tasks, thus it is important for customer-orientation that these meetings are attended by the members of the project team, held regularly and that sufficient time is available.

5. Reach functional performance
In all completed projects the functional performance was met, and in the projects in execution no troubles with the functional performance are expected. Within project Koedood the possibility to study different options led to a more efficient solution to realize the functional performance as requested by the customer, which led to an increase of customer satisfaction.

6. Customer satisfaction
In eight projects the customer is satisfied, in two projects the customer is currently dissatisfied. The dissatisfaction in one case was caused by not meeting the technical specifications which led to plan changes in the project and a chance for delay (De Lier). In the other project delay is caused by applying for the required licenses too late (Station Nieuwegein). In projects where the customer is pleased with the project results it turned out that flexibility in design and time and cost efficient execution of projects played an important role in the customer satisfaction. Within the Grids & Connection projects the customer satisfaction was mainly influenced by providing an integrated solution in which multiple parties were involved and good cooperation between these parties.
4.3.2 Results related to the requirements of efficiency

In this section the insights from the analysis of the use of project management related to the requirements of customer-orientation as described in §2.5 are presented.

7. Minimize scope changes

In nine projects scope changes during the project are identified. Within the Oostland project (including N&A in Oostland) and Centrumplan Nieuwegein the scope changes were considerable and had a large impact on the project. In the other projects the scope changes consisted of a change or extension of a cable route, additional drawings or an increased electric potential. Within project De Lier, performed for another customer than Stedin, so far no scope changes have occurred.

Except for Centrumplan Nieuwegein, where a large part of the project was cancelled, the scope changes negatively influenced the project’s efficiency. The changes led to extra time and/or costs in the projects. However most scope changes are agreed upon by the customer, because they are considered necessary in order to reach the project objectives, therefore these changes do not harm the profitability of the project for Joulz.

There are three different reasons identified for the occurrence of scope changes:

1. Unclear project description. Stedin provides Joulz with a very short project description, which is accepted by Joulz and elaborated into detail. This is possible due to the long relation with the customer and the knowledge about its grid. The project plan drawn up by Joulz is discussed with and agreed upon with Stedin and the project start. However during the project it often occurs that the detailed plan drawn up by Joulz differs from the desires of Stedin, and scope changes are required.

2. Change initiated by the customer. During the project changes are required due to new insights or changing circumstances.

3. Unforeseen external circumstances. For example polluted soil, conflicts with other infrastructure, not obtaining access to certain territory or problems with licenses.

For the efficiency of the entire project it is important to manage the scope changes. The influence of the scope changes on other project elements, the planning and the budget have to be assessed, and the changes and consequences should be communicated and agreed upon with the customer.

Subsequently the project plan and specifications have to be adjusted to the scope changes by the project team and the changes have to be put through.

Change management

Within the analysed projects problems have been identified with the management of changes.

Previously it has been mentioned that problems occurred with the communication within High Voltage projects. It was identified that the project manager is not informed, or informed too late about certain project issues. These issues are discussed between team members of different departments or between a team member and the customer. Because most of these changes are small, they are experienced as not threatening for the success of the project by the project employees. Nevertheless small changes can have huge implications for the entire project, due to interdependency between project elements in specifications and planning. Therefore it is important to assess the influence of the changes on the entire project.

A general problem within Joulz is the phenomenon of scope creep; almost continuously small changes are made in the scope of a project, the combination of these changes leads to big changes in the project. For a project manager it is hard to control this scope creep, since he is not informed (in an early stage) it is often too late to interfere effectively.

In Grids & Connection projects there are also scope changes, but these changes are easier to manage since there is no project team and the work is more standardized. Due to this standardisation of work packages it is easier to assess the changes in cost and time caused by the changes.
8. Minimize plan changes
In all project analysed plan changes have occurred. The plan changes have three different causes:

1. Scope changes. Scope changes always lead to deviations from the original project plan and therefore require plan changes.
2. Unforeseen circumstances. Weather conditions, delay caused by late delivery of materials or lack of resources due to illness are examples of unforeseen circumstances that affect the project plan.
3. Quality of planning. The project plan is drawn up during the project start up, within this stage there are many uncertainties about the project and it is impossible to make a flawless plan.

The plan changes caused by scope changes are necessary, but the impact of these changes on the project efficiency can be optimized through change management. As discussed before the change management of Joulz needs improvement.

The impact of plan changes caused by unforeseen circumstances can be minimized through change management and risk management. In the projects analysed risk analysis is used within five projects, during the project the risk analyses are not updated (except Oostland I). In the other projects no risk analysis was performed.

Regarding the quality of planning it is identified that the importance of the project start up is underestimated by the project team. During the start up of the project, the different departments are asked how much time and budget is required to deliver the work as described in the project plan. The employees give an estimate but these estimates are not very accurate.

The issues mentioned above regarding the change management and the quality of planning are mainly related to the High Voltage projects. Since the Grids & Connections projects are not performed by a project team there are fewer communication problems. Furthermore the costs and the duration of the activities are better known, since the activities are less complex. Both causes lead to plan changes but these changes are easier to manage for Grids & Connection projects.

Influence on project efficiency
It has been explained that scope changes generally lead to a decrease in efficiency, because extra time and cost are required to carry through the required changes. Plan changes caused by these scope changes therefore also generally have a negative outcome for the project’s efficiency. Unforeseen circumstances and inaccuracy of planning could both positively and negatively influence the efficiency. However if pleasant surprises occur, this will not automatically lead to more efficient execution of projects, according to Parkinson’s law (Parkinson, 1958) project employees will use all time available in the schedule. Therefore the impact of unforeseen circumstances and inaccurate planning on project efficiency is generally negative. This also turned out to be the case in the projects analysed. However plan changes can be used intelligently in order to minimize the negative impact for the project’s efficiency. Within project De Lier plan changes caused by scope changes are carried through, and so far the project is still on schedule. Within other projects, reshuffling of activities decreased the negative impact of unforeseen circumstances and scope changes.

9. Technical competency project management
This requirement has been discussed in §4.3.1.

10. Meet technical specifications
In nine projects the technical specifications are met. This forms no surprise since these projects are performed for Stedin, and the technical specifications are defined by Joulz itself. Stedin provided the functional requirements which are translated by Joulz into technical specifications. These specifications are sent to Stedin for inspection but are rarely changed.
Within project De Lier, performed for Westland Energie there were problems with meeting the technical specifications, however this problem was not caused by Joulz. It should be noted that for the project performed for another customer than Stedin the technical specifications have been very clearly defined by the customer.

The quality level of the other projects is according to the Eneco standard, both familiar to Joulz and Stedin. However in some cases the technical specifications are redundant compared to the required functional performance. The technical specifications are drawn up by the engineering department. The redundancy of the technical specifications has three causes:

1. Safety. By over-engineering the engineering department is certain that the design meets the requirement, they cover themselves for mistakes.

2. Lack of information. As mentioned before, the project description provided by Stedin is not always clear. This description is translated into technical specifications by the engineering department. Often additional information is required, which is not provided or provided too late by Stedin. This leads to delay in the project, or it forces the engineering department to make choices in uncertainty. These choices often lead to redundancy in the technical specifications of the project. The engineers are rather safe than sorry.

3. Enthusiasm. It is of course more attractive to build a power station according to the latest technological possibilities than the cheapest possibility that is sufficient to meet the requirements. If there is slack in the budget, it will be used.

Regarding the goal of efficiency this redundancy is unwanted. It makes the project more expensive than is necessary to meet the project objective.

11. Resource allocation (optimization)

From a viewpoint of efficiency resources within a project should be used as efficient as possible; they should be available when needed and every hour they work for the project should be accounted for. This section discusses the resource allocation regarding the efficiency for both types of projects.

**High Voltage**

When a project is started, the project manager forms his project team. From different departments employees are selected in discussion with the team leaders. In the project planning the required hours for the different departments are determined, and communicated to the team leaders. The team leaders are responsible for the resource planning of their department. In theory this should lead to a proper distribution of work over the employees and available time to perform work for projects when required. In practice this is not the case. The project planning is updated every two weeks to the changes that have occurred. Changes in the planning naturally affect the required resources over time. As discussed before the insight in the real project progress is limited. Furthermore the resource planning is not updated as frequently as the planning. The team leaders get an overview of the planning of the project on a monthly basis.

It occurs in projects that the agreed products are delivered too late. Next to the difference between the available resources and the required resources, the priority attached to the projects also has an influence. The prioritization for the different projects by the employees is often not in compliance with the prioritization set by management. Personal relations with project managers and pressure from project managers often determine the priority that an employee sets for a project.

In three projects a lack of resources was encountered. Two of these projects had a low priority for Joulz which caused the lack of resources; they were working on projects with a higher priority. In the other case the high demand for resources with a certain qualification led to the lack of resources; people with those qualifications are scarce within Joulz.
Construction department

Within the construction department there is difficulty with resource allocation. Due to a lack of mechanics external people have to be hired and work is often performed under stress. Within the department a weekly meeting is held where the work for the different projects is attuned. There is quite a flexible attitude, and if necessary work is performed after hours or in weekends. The several deadlines for different project however mean that mechanics rush from one job to another, which is not the most efficient way of working. Another general problem identified in this department is that the drawings are often delivered too late by the engineering department, which puts extra stress on the work of the construction department.

Grids & Connections

The resource allocation for grids & connections projects is less complex, since there is no project team. The projects are divided to the project manager based on the geographical region of the project. In the projects studied no problems related to the resource allocation are identified. However due to the many projects performed per project manager the time available for the use of project management tools is limited. The allocation of resources for the construction was the responsibility of a subcontractor.

12. Minimize cost

Most projects overrun the original budget, but as mentioned at the requirement minimize scope changes, most changes are agreed upon by the customer, and therefore the budget is enlarged. These scope changes however lead to extra costs in all projects.
There are differences between the contracts of the projects. Four projects are based on subsequent calculation, the other projects are based on a fixed price. Three projects that are based on subsequent calculation are time critical projects.
The costs for the different activities of Grids & Connection projects are predetermined, prices for these standard activities are agreed upon between Stedin and Joulz.

13. Minimize time

Most projects take more time than originally planned, but as mentioned at the requirement plan changes, often the changes and the consequences for the planning are agreed upon by the customer.
There are two types of projects performed for Stedin, projects that are initiated by order of a customer and projects that are initiated by Stedin for the maintenance and enforcement of the grid. The projects initiated by Stedin itself often are not very time critical. This requirement is therefore not very important for this type of projects.
Projects for Stedin by order of a customer, and the projects performed for other parties than Stedin are more time critical and often have penalties if the deadline is not met. The requirement of minimizing time is important for these types of projects.

The insights gathered through the analysis of the use of project management have been explained regarding the requirements of both efficiency and customer-orientation and several problems are identified. These results will be used in chapter six to indicate possible improvements to increase efficiency and customer-orientation.
The next step is to identify how efficiency and customer-orientation are interrelated in the management of projects within Joulz. This is discussed in the following paragraph.
4.3.3 Synergy & Conflict

In the research framework possible conflicts between the goals of efficiency and customer-orientation are identified (§2.5). In this paragraph the interrelation between the two goals in the projects studied are discussed. In appendix E the full project analysis is presented and the interrelation per project between the two different goals is identified. This paragraph presents the results for all projects analyzed. This is done according to the possible interrelations between the two goals identified in §2.5. Table 9 shows the overview of the interrelation for all projects:

Table 9: interrelation within projects

<table>
<thead>
<tr>
<th>Interrelation</th>
<th>G&amp;C Projects</th>
<th>High Voltage projects</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>DD</td>
<td>SU</td>
</tr>
<tr>
<td>1. flexibility vs. scope changes</td>
<td>C</td>
<td>C</td>
</tr>
<tr>
<td>2. resource stimulation vs. resource optimization</td>
<td>S</td>
<td>S</td>
</tr>
<tr>
<td>3. meeting functional performance vs. tech spec</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. customer satisfaction vs. minimize cost</td>
<td>S</td>
<td>S</td>
</tr>
<tr>
<td>5. customer satisfaction vs. minimize time</td>
<td>S</td>
<td>S</td>
</tr>
</tbody>
</table>

Legend:
- DD – Diefdijk
- SU – Stadsgebied Utrecht
- NAOL – N&A binnen Oostland I
- CN – Centrumplan Nieuwegein
- OL – Oostland I
- EM – Electrabel Maasvlakte
- KD – Koedood
- GO – Goeree Overflakkee

The table shows that interrelation occurred within the projects analyzed, however not for all projects and all identified interrelations between the requirements. The N score (no conflict or synergy) is only presented where conflict or synergy can be expected because of the performance on the two goals. Both synergy and conflict between the goal of customer-orientation and efficiency is identified. Within the tables below the requirements of customer-orientation and efficiency for the five interrelations are presented. The results are discussed in detail for every interrelation separately.

1. Customer-orientation | Efficiency | Function of PM
Flexibility            | Minimize scope changes | Scope

Conflict:
Interrelation between the two goals regarding the project scope occurred in five different projects: Diefdijk, Centrumplan Nieuwegein, N&A binnen Oostland I, Oostland I and Electrabel Maasvlakte. Within these projects flexibility was required due to uncertainty caused by developments in the geographical area of the project or because multiple parties were involved. In these projects the customer requested for several scope changes during the project. Within all projects the customer agreed upon the scope changes and the consequences for the budget and schedule. The scope changes caused extra costs within all projects and extra time within two projects. For Joulz these changes did not directly affect the project’s efficiency, since the consequences are accepted by the customer. However these changes require adjustments within the resource planning that can affect the overall efficiency of Joulz, but this was not indicated in this analysis.
From a customer’s point of view a trade off has to be made between the benefit of the scope change and the consequences for the budget and schedule. The requested flexibility leads to a decrease in project efficiency. So for the customer the two goals are conflicting within these change decisions.

Interrelation between the two goals regarding the resource allocation was not identified in the projects studied. The assumption was made that conflict could occur between the time required for creative and innovative solutions for the customer’s problem and the time available in the project to solve these problems.

In certain projects a lack of resources was identified. However no resource problems occurred in the project design stage, which includes most possibilities for creative and innovative solutions. The analyses performed did not signal a lack of time available to come up with sound solutions to the customer’s problem.

Conflict:
Interrelation between the two goals regarding the quality occurred within project Goeree Overflakkee. In this project there was uncertainty about the required functional performance because of incomplete information provided by the customer. Joulz translated the required functional performance into technical specifications, thus this uncertainty forced the engineer to make choices. These choices were made on the ‘safe side’, it appeared that the technical specifications were redundant compared to the desired functional performance.

From a viewpoint of efficiency this redundancy is not wanted because of the extra costs. However this redundancy was required to meet the functional performance without obliging the customer to deliver detailed specifications at the project start. In order to meet the requirement of customer-orientation the efficiency of the project decreased; the two goals are conflicting.

This conflict is only identified within project Goeree Overflakkee, however in the discussions during the training, redundancy in the technical specifications was mentioned as a common phenomenon. The reasons for this redundancy have been previously mentioned when the requirement meeting technical specifications was discussed in §4.1.3.

Synergy:
Interrelation between the two goals regarding costs occurred in three different projects: Diefdijk, Stadgebied Utrecht and Centrumplan Nieuwegein. Within these projects multiple utility companies are involved. For the customer it is important to integrate the designs and the construction work of these different parties, since this is cost efficient and diminishes the inconvenience due to construction work in the project area. The integrated solution provided in these projects highly contributed to the customer satisfaction. The increased efficiency also increased the customer satisfaction; synergy occurred between the two goals.
Synergy:
Synergy between the two goals regarding time occurred in six different projects: Diefdijk, Stadgebied Utrecht, Centrumplan Nieuwegein, N&A binnen Oostland I, Oostland I and Station Nieuwegein. Within the projects Diefdijk, Stadgebied Utrecht and Centrumplan Nieuwegein, multiple utility companies are involved. For the customer it is important to integrate the designs and the construction work of these different parties, since this is cost efficient and diminishes the inconvenience due to construction work in the project area. The integrated solution provided in these projects highly contributed to the customer satisfaction. The increased efficiency also increased the customer satisfaction; synergy between the two goals occurred. Within the project Oostland I and N&A binnen Oostland time was very critical. There was a very strict deadline with penalties for not meeting the deadline. Finishing this project within its deadline highly contributed to the customer satisfaction; synergy between the two goals occurred. Within the project Station Nieuwegein a big delay has occurred due to a failure of Joulz and time was critical in this project. The customer is very dissatisfied with this delay. The decreased efficiency has also decreased the customer-orientation; synergy between the two goals occurred.

No conflict or synergy:
In three different projects where interrelation can be expected regarding time, no interrelation occurred. Within these projects delay has occurred caused by unforeseen circumstances, late delivery of materials or a lack of resources. Above we have seen that delay can lead to a dissatisfied customer, therefore interrelation between the two goals can be expected in these project. Within project Koedood and Goeree Overflakkee the customer is satisfied regardless of the delay, since time was not a priority for the customer in these projects. According to the project manager, the customer finds it understandable within project Electrabel Maasvlakte that Joulz did not take the breeding season of birds within the area into account, which caused the delay. Therefore the delay did not influence the customer satisfaction.

Importance of results
In this paragraph the interrelations that occurred in the projects have been discussed, but why is it important to understand this interrelation between the two goals? The goal of Joulz is to increase both the customer-orientation and efficiency of the project performance. Changes in the management of projects will affect the project performance. As shown above both synergy and conflict between the two goals can occur. The understanding of the interrelation between the two goals is an important input for the decisions about the changes in the use of project management in order to judge the effects of these changes on both goals.
4.4 Comparison with EPA

In this paragraph the use of project management is compared to the ‘golden rules’ of EPA in order to compare the actual use of EPA to the way it was intended.

The first rule of EPA is: Use common sense; only use EPA elements if they seem useful. This rule is followed: there is quite a difference in use of elements between light and heavy projects. The use within light project is less extensive, only elements that are regarded useful are used. However the application of this rule gives the project manager a lot of freedom, and it occurs that several elements are not used in the projects such as risk analysis, end stage reports and project evaluation. According to Prince2 the use of elements should be scaled to the appropriate extent for the project at hand. Within the use of EPA certain elements are skipped.

The second rule of EPA is that every project starts with a cost benefit analysis and ends with a deliver report and a lessons learned report. During the project the cost benefit analysis is updated during transitions between project stages. This rule is not followed at all. Only cost analyses are made in the projects and the projects are rarely evaluated.

The third and fourth rules are that every project has a steering group that at least consists of the customer. And before the actual work is executed the project objective and the product specifications are defined in the project plan. Both rules are followed. Before the actual work in the project starts, the project objectives and the product specifications are described in the project plan. The project plan is discussed with the client before the actual work starts, and a project organization is set up including a project board with a representative of the client. However it occurs that in the project plan there are still many uncertainties and because changes within the project are not always discussed with the project manager, he also cannot inform the project board about these changes.

4.5 Concluding remarks

In this paragraph the main conclusions of the analysis of the use of project management are presented.

Project types and their management

There are three different types of projects identified that are managed in a different way:

1. Grids & Connection projects
2. Light High Voltage projects
3. Heavy High Voltage projects

Projects of Grids & Connections have a very basic project organization. A project manager is supported by a planning engineer and only uses staff from other departments for very specific tasks; they don’t form part of the project team. Most project tasks are performed by the project manager. Difficulties within these projects lie in interdependency with other parties; often these projects involve combined work with other public utility companies. Providing an integrated solution is important for both the efficiency and customer-orientation of these projects.

Light and heavy projects both consist of a project organization with members of different departments that are part of the project team. The difference between light and heavy projects results from the size, budget and technical complexity of the project. Light projects are less complex and the use of project management is less extensive than in heavy projects.

Difficulties within these projects lie in the unclear and changing project objectives of the customer, management of changes, communication within the project team and the control on the project progress. The engineering and construction department are not very cost and time conscious; the
Use of project management within Joulz Projects

Quotation and time estimates at the project start up are not very accurate and decisions about project changes are strongly based on quality, less on time and budget.

Project performance
The performance on customer-orientation is good. In most projects the project objective and functional performance are met and the customer is satisfied with the project results. If the customer requires changes during the project these are easily communicated and carried through.

The performance on efficiency is not very good. Within most projects there are many plan and scope changes. The technical specifications occur to be redundant compared to the required functional performance in some projects, which decreases the efficiency. The original project budget is often exceeded due to the scope changes, but the extra costs are generally accounted to the customer. These scope changes also negatively influence the project schedule, but delay is also caused by a lack of resources, late delivery of materials and postponement of activities by project employees.

The statement of Dvir and Lechler (2004) - It is known that projects that are performed within time and budget the likeliness of a satisfied customer increases - is also true for this analysis. The customer satisfaction is strongly related to the time and costs, and therefore the efficiency, of a project. This relation was revealed in multiple projects. No conflict occurred between the two goals, but both goals can strongly enforce each other, both positively and negatively. However in projects where time is not the biggest priority, the delay does not influence the customer satisfaction.

In projects where many scope changes occurred, the original project budget and schedule were exceeded. Thus the flexibility provided decreased the project’s efficiency. Within these change decisions the customer had to make a trade off between the expected benefit of the scope changes and the decreased efficiency; the two goals are conflicting within these change decisions.

How does project management contribute to project success?
The analysis performed in this chapter gives insight in how project management contributes to the project success; the way project management is used for the requirements of customer-orientation and efficiency and the project performance on these two goals have been discussed. The outcomes of this analysis are compared to the organizational characteristics and the training of project management in chapter six. This comparison gives an explanation why certain issues occur and gives insight in the possibilities for improvement.
5 - Training of project management

Eneco’s Project Approach (EPA) is implemented through providing a manual of EPA and a training of project management. The design of EPA and the rules in the manual have been discussed in §4.1. This chapter discusses the training of project management to the employees of Joulz Projects. Understanding how the employees are trained in project management is important for the assessment of the use of project management.

In the previous chapter differences between the intended use of project management and the actual use in the projects have been identified. The roots of these differences could lie in the way the employees are trained. Therefore the topics discussed in the training and the focus of the training are analyzed. This chapter provides the answer to the research question: How are employees trained in the use of project management within Joulz Projects?

First the set-up of the training is discussed followed by the focus of the training. The chapter concludes with the relation between the training and the issues identified in the use of project management.

5.1 Set-up of the training

The training of project management within Joulz consists of two different elements: structural training and specific training. The structural training program consists of courses that can be attended by employees by subscribing for them. The direct supervisor of this employee has to approve these courses. These courses are in general performed by an external company.

There are several courses related to project management. Project managers can obtain official Prince2-certificates in multiple levels. It is stimulated that project managers develop themselves through following these courses.

Project management according to EPA is implemented through a specific training program. This training is performed by an external management consultancy firm, APPM. The training consists of a theoretical and a practical course. The theoretical course consists of training in project management through presentations and exercises of theory and tools. The practical course consists of counselling in projects and personal coaching for project managers.

The employees were divided into three different groups for the theoretical course. The training between these different groups differed. The different groups are:

1. Managers and team leaders
2. Project managers
3. Project employees (engineers, construction supervisors, planning engineers)

The training was only given to project managers of high voltage projects and not to project managers of Grids & Connections projects. The reason is that the training was given during the reorganization and it was not clear which project managers of grids & connections would be transferred to Joulz Projects.

The theoretical course for project managers is more intense than the course for the other groups. The training for project managers took three days, the other groups are trained in one day. The practical course is given to the project managers only, this course consists of personal coaching in projects. The differences related to content are discussed in the next paragraph.

Research approach

The training of project management within Joulz is analyzed through direct observation of the theoretical course with project managers and project employees and through studying the documentation of the training.
5.2 Focus of the training

In this paragraph the focus of the project management training is addressed. The goals of the training and on the differences in training for the different groups are explained.

The goal of the training for all different groups consists of five targets (APPM, 2008):

- make employees familiar with project management
- get the knowledge level of project management tools to a proper level
- increase the project management skills of individual employees
- make employees familiar with the use of EPA
- increase the result-orientation of Joulz Projects

All groups
Similar in the training for the different groups were the basic explanation of project management and the explanation about the different roles of the groups within projects. The basics of project management focused on controlling the scope, organization, quality, cost and time of a project. The role of the different groups was discussed through pointing possible problems that occur between the line- and project organization, and the different responsibilities in the project organization during different stages of projects.

Managers and team leaders
The training for managers and team leaders focused on the question how to coach project managers and project employees.

Project Managers
The training of project managers was more intense. The basics of project management was explained in more detail and project management tools were practiced through exercises and related to the field experience of the project managers. Risk management was added to the training. The importance of reporting in projects was addressed, both internally as the reporting to the customer. The role and responsibility of the project manager was explained, with a focus on decision making in projects. And the importance of stages within the projects and the transition between the stages was emphasized.

Project employees
For the project employees the specific focus was on their responsibility within the different stages of the project. It was made clear that the role of the different departments changes during the different stages of the project. Furthermore it was made clear that the transition between the stages should be regarded as a formal event where important project decisions are determined. The importance of assessing the budget and schedule implications of these decisions for their task next to the technical implications was pointed.

Another important issue discussed was the communication about project issues and changes. It was emphasized that the project manager carries the final responsibility for the execution of a project, and should therefore always be involved in important decisions.

Not trained
The training was about project management in general and did not focus on EPA. The rules of EPA have not been addressed in the training and no elements of EPA were used within the explanation and examples. The advantages of project management have been addressed but the reason why EPA is developed and implemented within Joulz was not made clear in the training. The training did not mention the significance of efficiency and customer-orientation in a free market and the differences if projects are performed for other customers. How project and process management relate to each other,
and what the similarities and differences between EPA and the process maps was also not explained in the training.

5.3 Relation with the use of project management

In chapter four the use of project management has been discussed. Several issues have been identified where problems occurred or where room is for improvements. In this section it is discussed which issues have and which issues have not been addressed in the training.

In chapter four it was mentioned that scope creep occurred in many projects. Many scope changes were carried through but the change management was not handled well; the planning and budget consequences were not taken into account and the project manager was not informed or informed too late about the changes. The general attitude was that during the entire project, changes can be made in the design or construction without too much trouble. These problems have been addressed in the training. The roles and responsibilities of the different groups and the importance of decision making about changes are made clear. The value of the stages and the transition between the stages are explained.

Other problems identified in chapter four are:

• unclear project definitions from the customer
• redundancy in technical specifications by over-engineering
• insufficient insight in real project progress

These problems have not been addressed in the training. The importance of clear project objectives and a project plan at the project start was discussed, but how to cooperate with the customer in order to resolve this problem was not mentioned. Within the exercises the problem of over-engineering was talked about, but no solutions to this problem were introduced. The importance of planning at the project start up and reporting about the progress has been addressed, but how to improve the insight in the actual progress within projects was not talked about.

In general the training was quite internally focused with much attention for the project organization, the different roles of the groups, decision making within projects and the control of projects. Less attention was paid to the different roles of the customer, contractor and project board. In relation to the goals of implementing project management the main focus was on efficiency, less attention was paid to customer-orientation.

Since the training was given during the time of this research, the usefulness of the training cannot be judged at this moment. What this chapter does make clear is what can and cannot be expected of the employees and what the possibilities for additional training are.
6 – Comparison and improvements
In this chapter a comparison is made between the different analyses done so far. The former management of projects within Eneco Infra, the organizational characteristics, the training of project management and the use of project management by Joulz Projects are compared to each other and to the goals set by Joulz. The issues that are identified are explained using the different analysis. Next the expected changes in the future projects of Joulz are discussed. The chapter ends with possible improvements to increase the customer-orientation and efficiency of Joulz Projects. This provides the answer for the research question: What changes are possible to the use of project management within Joulz Projects to increase the efficiency and customer-orientation?

6.1 Comparison & explanation
In this paragraph a comparison between the different analysis and an explanation of the insights are presented. It should be noted that the projects analyzed were already in execution or completed when the training took place. Therefore it cannot be judged if the training was sufficient to resolve the identified issues within future projects. What can be judged is if the topics discussed within the training correspond with the issues identified in the projects. First the High voltage and Grids & Connections projects are discussed, followed by the insights related to customer-orientation and efficiency.

6.1.1 High Voltage projects
Comparison
Eneco Infra divided the projects into different stages. A project plan, schedule and budget were made at the project start and projects were controlled through reporting and progress measuring. The relationship between the project members of the different departments and between the project members and the customer were quite informal.

Compared to the project management at Eneco Infra there are two differences in the use of project management at Joulz Projects. The first is that the elements used within project management are more standardized, the available EPA templates are used and the same progress reports are used for all projects. The second difference is that the focus on efficiency has increased; progress reports have become more detailed and are reported more frequently.

What has not changes is that important project management elements are not used. There is no a clear distinction between stages where the performance is evaluated and a decision is made about whether or not to continue to the next stage. Projects are rarely evaluated and the use of risk analysis is limited.

Explanation
Within the analysis of the use of project management several problems have been identified. The occurrence of these problems is explained by insights gathered within the different analysis. The problems identified are:

- unclear project definitions from the customer
- many scope changes and scope creep
- insufficient management of changes
- redundancy in technical specifications by over-engineering
- insufficient insight in real project progress
- unfinished task within closed projects
- Influence of licenses on project (delay or scope change)
- postponement of activities by project employees

Reasons for these problems are identified within the analysis done so far and are explained on the next page.
Informal culture
The company culture can be typified as informal, both within Joulz and between Joulz and Stedin. This informal culture affects the project management in various ways. Because of the informal culture and the long lasting relationship between Joulz and Stedin, project descriptions of Stedin are easily accepted and translated into detailed project plans by Joulz, even if the project definitions are unclear. These uncertainties in the project plan lead to many scope changes and redundancy within the technical specifications.

Changes are easily agreed upon between employees or between employees and the customer due to the informal contact. Little attention is paid to the consequences of the changes for the entire project within these decisions. It occurred that the project manager was not informed or informed too late about these changes. This way of communicating explains the insufficient management of changes and scope creep.

Another consequence of the informal culture is that there is little criticism between the members of the project team. If agreements are not met, people are scarcely addressed to their behaviour and work is postponed easily. Projects initiated by maintenance and extensions to the grid are often not time critical and postponing these project forms no real problem for Stedin. Due to the long lasting relationship with Stedin and the close relations this is known by the employees within Joulz. They also know that extra costs within projects normally do not cause difficulties if the necessity of the extra work is logically explained. Project evaluations are rarely performed because they are not considered very useful due to the informal and long lasting relation with Stedin. It is expected that Stedin will speak up if dissatisfied.

It should be noted that there are also advantages of this close relation with the customer. Because of the mutual trust there can be certain openness in agreements and it is not necessary to register every detail in a contract. The perception of quality of work does not differ very much since there is a certain ‘Eneco standard’ familiar to both customer and contractor. The direct contact between employees and the customer can be useful and even necessary to resolve problems within the project.

Reserved
The actions taken to collect missing information are quite reserved, the information is requested and no further action is taken until the client or the project manager takes action. A more proactive attitude of the employees could lead to reduced uncertainties and therefore to a better design. This reserved attitude also occurs with the revision of drawings. This is not done if not specifically requested, although this task was agreed upon and assigned to a certain employee within the project plan. Through risk analysis possible problems can be anticipated on, but this tool is rarely used.

Risk Averse
Another aspect that was revealed during the analysis of the projects was a risk averse mentality within Joulz. As mentioned before due to missing information from Stedin sometimes design choices have to be made by Joulz. The tendency within Joulz is to choose on the safe side and include redundancy in the design rather than making a decision that could turn out to be wrong.

Different perceptions of performance
The main goal within the engineering and construction department is to deliver a functioning product with a decent quality level. The project is regarded successful if the installation is working properly. The budget and time constraints of the project are not considered less important. Being assessed on the time and cost of a project is therefore contradicting with their perception of performance and unwanted. Employees find it hard to give estimations about how long certain tasks will take or what the costs will be. It gives a shared responsibility in the planning and budgeting of the project. Giving an estimation leads to a starting point for the assessment of performance.
The focus on quality is also shown within the reviewing of work between engineers. These reviews focus only on the quality aspects of the project, the estimated costs and durations of the different activities are not reviewed by colleagues.

Project evaluations are not regarded very useful since the project is considered finished if the installation is tested and working properly.

**Measuring of progress**

Within Joulz Projects the progress reports have become more detailed and frequent. This obliges the different project members to report on how much time they have spent and how much time they still need to complete a task. This way of reporting does not provide much insight in the actual progress due to the following reasons:

1. Only measuring time does not provide insight in what activities have taken place, what the employees are working on and what still has to be done.
2. The employees fill in the progress reports according to the planned schedule because they consider these reports as administrational nuisance.
3. The employees do not want to provide too much detailed insight because it provides input for the assessment on performance and interference of the project manager with their work planning.

This lack of insight applies mainly to the engineering department, the actual progress within the construction department is better controllable due to the type of work.

**6.1.2 Grids & Connections projects**

**Comparison**

EPA is not used within Grids & Connections projects since the employees did not attend the project management training or received an EPA manual. Projects are managed according to process management. All employees have been trained in the use of the different processes when they started working at Grids & Connections. In the Utrecht office this method is extended by the use of Eneco's Prince2 approach.

Compared to project management according to EPA there are similarities in the way projects are managed: at the project start a project plan is made that includes the project objective and the product specifications, the project plan is discussed with the client before the detailed design starts and a project board with a representative of the client is formed. Within this project board there are often multiple parties involved since the projects usually consist of combined work of different utility companies.

Differences are that no project organization is formed, no quotations are made and the use of controls within projects is limited. The project planning is less extensive and the budget control is performed through billing every small standardized task.

The difficulty in these projects is caused by the cooperation with the different parties, this cooperation is necessary to provide an integrated solution. Because multiple parties are involved the number of interdependency increases which leads to more plan and scope changes during the project. The involvement of Stedin in the projects is limited.

**Explanation**

The reason why EPA is not used in these projects is very straightforward: it has not been implemented yet. The reason why the use of project management tools for the project control is limited has several causes. First of all the different project elements have a certain level of standardization; the costs are pre-determined and the average duration time is known. Another reason is that within these projects the construction work is often outsourced to one contractor by all parties involved. An integrated and detailed project planning is made by this contractor.
Improving the project performance within Joulz Projects

The culture of the former Grids & Connections department can also be typified as informal. The informal relation with Stedin leads to little involvement of Stedin within these projects; they completely hand over the project to Joulz. The project managers directly contact the client of Stedin. The project highlights are reported to Stedin, but decisions are often taken without consulting Stedin.

### 6.1.3 Customer-orientation and Efficiency

#### Comparison

Within Eneco Infra and Eneco Netbeheer the focus on efficiency was not that strong. The quality of the infrastructure was regarded most important. Considering the non-competitive market this forms no surprise. From a viewpoint of Netbeheer a budget was available for the maintenance and extensions to the grid and the investments are done for quite a long period. There is a legal obligation to maintain the grid. From a viewpoint of Eneco Infra efficiency was not a key issue since extra costs and extra time for projects were easily accepted by Eneco Netbeheer. The customer was satisfied with the project results and the quality delivered was according to the Eneco standard, familiar to both Netbeheer and Infra and developed through a long lasting cooperation between these departments.

Compared to this non-competitive market Stedin can now outsource the projects to multiple parties; the competition for Joulz has increased. Within Joulz the free market leads to an increasing focus on efficiency and a stronger market-orientation. The goal of Joulz is to increase the number of projects for other clients than Stedin.

The involvement in projects from Stedin has increased and the control on efficiency by Stedin is intensified. Joulz currently has to make a quotation for all projects; projects are not automatically assigned to Joulz based on the pre-determined price agreements.

The training of project management was mainly focused on increasing the project’s efficiency. This focus matches the main problems encountered in the projects.

The performance on customer-orientation is good, Stedin is satisfied with the project results and quality of work and the project objectives are met. The performance on efficiency is not very good. Within most projects the original project budget and schedule are exceeded. In most cases the extra costs are accounted to Stedin and the overrun of schedule does not harm the customer satisfaction. Since project evaluations are rare the insight in the customer satisfaction is mainly based on the informal relation with the customer.

The customer satisfaction is strongly related to the time and costs, and therefore the efficiency of a project. Within projects where many scope changes occurred, the original project budget and schedule were exceeded because of these changes. The required flexibility decreased the project’s efficiency. The two goals are conflicting within these change decisions. As mentioned before the consequences for the schedule and budget of these changes are generally accepted by the customer. Since the customer satisfaction is strongly related to the project’s efficiency it is strange that this decreased efficiency does not lead to a dissatisfied customer.

#### Explanation

There are two different reasons why budget and schedule overruns caused by changes are accepted by Stedin. The first reason is uncertainty within projects which leads to unclear project definitions of Stedin since they do not know exactly what they want and keep changing their demands. The second reason holds when flexibility is required in projects. When a customer requires flexibility, he presumes changes will be necessary in order to meet the project objectives. In general these changes will have a negative effect on efficiency and this is more easily accepted if the customer requested flexibility in the project himself.

Reasons why projects are rarely evaluated are the type of projects performed and the informal relation with the customer. Engineering projects have in general well defined goals and well defined working methods (Turner, 1999a). Combined with the informal relation with Stedin this explains the lack of evaluating the customer satisfaction. If it is completely clear that the functional performance and the
project objective are met, and the client is well known and it is expected that the client will speak up if dissatisfied, it does not seem very useful to evaluate the project performance with the client. Another reason why projects are not evaluated is avoiding negative attention. Evaluation of projects points out mistakes and imperfections of the project team. If evaluations are not required, why would project teams be critical about their own performance? It is remarkable that the only project that was really evaluated was a successful project. Evaluating this project provided positive attention for the project manager and his team.

6.2 Future projects of Joulz Projects
In order to make recommendations about changes in the use of project management it is important to consider what the future projects of Joulz will be. This information is based on the opinion of the team leader of project management and representatives of two different customers of Joulz.

The mission of Joulz Projects is to increase the share of projects performed for other parties than Stedin, 50% of the projects should be performed for Stedin, 50% for other parties. Performing projects for other parties than Stedin will probably cause four different changes:
1. Efficiency will be crucial within projects performed for external customers; due to fixed price contracts that include penalties if agreements are not met, it will become more important to realize projects within budget and time.
2. Technological diversity will increase due to customer demands. Since the technical specifications are currently drawn up by Joulz, all components used are familiar to the employees. With specific technical specifications of the client it can occur that new components will be used in projects, which can increase the uncertainties in design.
3. More work will be performed on the premises of the customer itself, in stead of connecting the customer to the grid.
4. More projects will form a sub-project of a bigger project. Now most projects are completely assigned to Joulz, from start to end. Within future projects it can be expected that only the detail engineering, the study of the cable route or the construction is assigned to Joulz. This will require cooperation with the other parties involved in the project.

For Joulz it will become necessary to focus on efficiency and a flexible attitude to be able to deal with the uncertainties and to cooperate with the other parties involved in these projects. According to customer-orientation it will be important to meet the (new) specific demands of the customer and perform the projects efficiently.

For the projects performed for Stedin there are also certain changes that can be expected. Stedin will provide more detailed project descriptions, with (more detailed) technical specifications and will order the large components needed for the project itself in an early stage because of the long delivery time. The control on the progress of projects will increase, efficiency will become more important. In the past it often occurred that first a study was performed which resulted in an assignment, in the future the study and the assignment will probably be assigned to different parties. Another possible change is that Joulz will be hired as a consultant of Stedin when a project is executed by another company, Joulz could be a suitable consultant because of the knowledge of the Stedin network and the experience with executing these projects.

The interdependency between Joulz and Stedin will still be strong because of the shared knowledge about the former Eneco network, but the relation will become more businesslike. Contracts will be based on fixed prices rather than subsequent calculation and efficiency will become more important.
6.3 Possible improvements

In §6.1 problems with the project management and reasons of these problems have been explained. In §6.2 the expected changes for future projects are described. The insights of these paragraphs make clear that changes are required in the use of project management. These changes should increase the customer-orientation and efficiency of Joulz Project. Since the management of projects differs between High Voltage and Grids & Connections projects, the improvements are discussed for both types of projects separately.

6.3.1 High Voltage Projects

The analysis in §6.1.1 discussed and explained several problems regarding High Voltage projects. In order to deal with these problems there are several improvements possible. These improvements are discussed below.

Clarify project definition

One of the problems identified was an unclear project definition from the customer. Problems related to this uncertainty in customer’s demands are many scope changes in the projects, redundancy in the technical specifications and delay through postponement of activities.

This problem can be reduced in the start up stage of the project. Taking more time an increasing the involvement of the customer within this stage to clearly define the project objectives could increase both the customer-orientation and efficiency of the entire project. Through a more proactive attitude and by better indicating what information is requested in an early stage of the project this can be prevented. Through the long lasting relationship with Stedin and the knowledge about its grid, Joulz should be better capable than its competitors to ask the right questions and clarify the project definition. The cooperation with the customer in this stage should be increased. This applies especially to Stedin; they should be more involved and provide more input in the project definition.

It should be kept in mind that taking more time and a more proactive attitude to clarify the project definition can help, but if flexibility is required in a project or if the customer changes the requirements during the project due to changing circumstance the extra effort performed is not useful and can even decrease the project’s efficiency.

Formalize decisions

Many scope changes, scope creep and insufficient management of changes are identified as problems. Currently there is no a clear distinction between stages where the performance is evaluated and a decision is made about whether or not to continue to the next stage. Projects are rarely evaluated and the use of risk analysis is limited.

The different stages are more regarded as a description of the different steps that have to be followed, like the way the process maps are used. They are not viewed upon as stages that lead to a final product that forms the input for the next stage. The products of the different stages are easily adapted to changing circumstances during the following stage. This attitude towards the value of products resulting from stages should change; these products should be seen as the formalized outcome of this stage. Through planning official project meetings between the stages, where the previous stage is closed and the plan for the next stage is discussed, the value attached to the decisions made within a stage can increase.

The design of EPA includes the steps to formalize the decisions in the projects. According to EPA stages have to be evaluated and the project plan and the risk analysis have to be updated in the transition between the different stages. The basics of project management; phasing, controlling and deciding, are present in the design but not used in the management of projects. Joulz has to start using EPA the way it is designed and make clear distinction between stages, where formal project decisions are made.
In the design of EPA there are items that enforce the undisciplined use of elements. The rule ‘use common sense; only use EPA element if they seem useful’ leaves too much freedom to skip elements whenever project managers do not want to use the element. Furthermore the prescription of elements for light projects is optional for most of the elements. Only a project plan and a deliver report are required, during the project it is not necessary to evaluate and report project performance. At least a decision moment between the design and the construction stage should be required within light projects where the current project plan is updated and the performance is evaluated.

The formalization of decisions and making more distinction between stages can also lead to bureaucratization. Especially with light projects one should watch for too much time put into administration and meetings instead of working on actual project output.

Of course changes in the project plan can be required during the project. However these changes should be managed. Problems have been identified in the management of changes; the need for changes and decisions about changes were not communicated to the project manager and not enough attention was paid to the implications regarding time and costs of the changes. If a need for change occurs, it should be discussed by the project team and the implications for the budget and schedule have to be assessed. If the change is significant or has large implications for the project’s efficiency the change should be discussed between the customer and the project manager, and sometimes even the project board. Change management can limit the negative influence of changes for the project’s efficiency.

The positive elements of the close relation with the customer should be taken into account in the formalization of decisions. The informal culture with Stedin provides the possibility to be more flexible during the project since not all details are determined in a formal contract. The direct contact between employees and the customer can accelerate the decision making about changes. If decision making is formalized within all change decisions the efficiency could also be decreased, since more negotiation and administration is needed if changes are carried through.

**Extend progress measurement and justify delay**

A problem identified was insufficient insight in the actual progress due to three causes:

1. Only measuring time does not provide insight in what activities have taken place, what the employees are working on and what still has to be done.
2. The employees fill in the progress reports according to the planned schedule because they consider these reports as administrative nuisance.
3. The employees do not want to provide too much detailed insight because it provides input for the assessment on performance and interference of the project manager with their work planning.

The current measuring of progress is mainly based on time rather than products. This progress measurement can be extended by measuring what products have been delivered and what activities have been finished. This way the insight in the actual progress is extended and it diminishes the possibility to just fill in the report according to the schedule since the progress is more tangible. It does however lead to more administrative hassle for the employees and provides more detailed insight. To reduce the extra administrative burden for the engineering and construction department, the role of the planner in the project team can be extended. He can keep track of the progress of activities. Since a planner is involved in multiple projects, he can compare the times estimated and spent for certain tasks between projects and increase the quality of planning and the progress measurement. If the quality of planning and the insight in actual progress is improved this will also have a positive influence on the resource allocation since the required resources are better known.
Another problem is the postponement of activities by employees, deadlines are often not met. Not meeting these deadlines is hardly justified by the employees and it is not indicated beforehand that troubles with the schedule could occur. Currently there is hardly any consequence if a deadline is not met. There is little internal criticism and the schedule is rearranged according to the delay. This way of dealing with these postponements provides little incentives to meet a deadline. Employees should at least justify why the deadline is not met and what the cause of this delay is. A following step could be to attach consequences to not meeting the deadline if there is no valid justification for the delay. A possibility could be to give a project manager a vote in the personal assessment of employees, based on performance indicators with the project evaluation.

Improving the progress control by increasing the control on employees and increasing the assessment of performance in projects can also lead to unwanted side effects. In order to meet the deadlines and budget, employees can create slack in the estimated time and costs. Furthermore increased control on progress can lead to deliberate misleading the project manager through the progress reports in order to minimize interference of the project manager. If this occurs the actual progress is not improved and the insight in the actual progress diminishes. Furthermore increasing the quality of planning can improve the resource allocation, but it does not solve the lack of resources with certain specialized skills.

**Extend the review of engineers**

A problem identified is redundancy in the technical specifications compared to the functional performance. The clarification of the project definition mentioned above will help to decrease this problem. Another recommendation to solve this problem is to extend the review of engineers. Currently the technical specifications are reviewed as quality control by a colleague that is not involved in the project. In this review little attention is paid to time and cost estimates resulting from the activities described in the technical specifications. The review focuses on the consistency in technical specifications between the different parts of the project; it is not reviewed if the functional performance can be achieved more efficient. By including the estimates of time and costs in this review, possible redundancies within the technical specifications can be identified.

The extended review of the technical specifications by colleagues can help to reduce the redundancy within the technical specifications, but since the work of a reviewer will also be reviewed by colleagues, it is likely that this review will not be very critical, as mentioned before there is a minimal critical attitude between employees. Furthermore due to the different perception of performance the review of schedule and budget is regarded as unimportant by the engineers and considered as an increase of the administrational nuisance.

**6.3.2 Grids & Connections projects**

In the analysis in §6.1.2 several problems are discussed and explained. In order to deal with these problems there are several improvements possible. These improvements are discussed below.

EPA is currently not used in the Grids & Connections projects. Since the projects are not performed by a project team and the work consists of a combination of standardized elements it can be questioned if EPA is the right method to manage these projects. Using EPA could turn out to be very bureaucratic within these projects.

Difficulties in these projects are caused by the cooperation with the different parties involved. The customer is responsible for the integration of the projects performed by different parties. Therefore the way the entire project is managed is determined by the customer, it is more logical to adapt to the required way of working of the customer.

Within projects where Joulz is asked by the customer to coordinate the entire project, EPA is useful, but the project managers first have to be trained in the use of EPA. Compared to the current way these projects are coordinated, the use of EPA can improve the integration of the different sub-projects and
increase the control on budget and schedule. The project support office can be used to make a detailed planning for the entire project.

If Joulz is not responsible for the entire project, using EPA seems very bureaucratic since only a project manager and often a planning engineer are involved in the project. The performance on efficiency within these projects needs improvement. Elements of EPA can be useful to increase the project control. The projects should include a quotation based on the actual project activities. The templates provided by EPA can be used to formulate the project plan and the project reports. And to comply with the internal progress reporting of Joulz Projects the planning and budget controls should be adjusted.

Elements of EPA can help to improve the control of the projects, and within project where Joulz is asked to coordinate the project by order of the customer, EPA can be used as the method for the entire project. The project managers of Grids & Connections should therefore be introduced into EPA, but not be obliged to use the method. They should confirm to the way project progress is reported internally, this requires increased use of project controls.

6.3.3 Customer-orientation and efficiency

Part of the problems with the management of projects regarding efficiency is caused by the attitude of Stedin regarding the efficiency of the project. Suggested changes in the projects and the additional consequences for the budget and schedule are almost always accepted. Delay within project often does not influence the customer satisfaction because the time priority of projects that involve replacements of current infrastructure is low. This attitude does not give much incentive to work more efficient and take the consequence of changes for the budget and schedule into account.

It is shown that the focus on efficiency by Stedin is increasing, therefore this cause for certain problems is diminished and the incentives to work more efficient are increased. But there are also other areas for improvement identified, these will be discussed below.

Training

In the training of project management attention was paid to the current project management issues of Joulz, but an important question was not answered in the training or documentation of EPA; the reason why EPA is implemented was not properly addressed. The reason given in the documentation is a standardization of project management, clearness about the expected deliverables and the possibility to check how project management is executed. The main goals of implementing EPA, efficiency and customer-orientation, are not accentuated within the training or documentation of EPA. Project managers apply EPA because they have to or they find certain elements helpful, not in order to increase efficiency or customer-orientation. Several project management tools are exemplified, but how these tools relate to efficiency or customer-orientation is not indicated.

Joulz Projects has to perform in a competitive market. Joulz wants to increase the number of projects performed for other customers and the focus on efficiency within Stedin is increasing. It should be specifically made clear to the employees why EPA will be important related to these changes in the market.

Furthermore it should be made clear what the advantages of the method are for the employees. This can increase the willingness to confirm to the method. For employees the advantages are that uncertainty in projects is reduced and projects are better coordinated. This should lead to a decrease of ad hoc demands with high time pressure, which leaves more time for innovative and creative problem solving within projects.

The rules that provide guidance in the use of project management are described in the EPA manual. There are two problems with these rules. The first problem is that the rules are not implemented within Joulz. Within the training no attention has been paid to these rules. The second problem is that the rules currently do not comply with the goals of EPA. Within High Voltage projects the rule of ‘use
common sense' leaves too much freedom to the project manager and it turns out that many elements of EPA are skipped. Adjusting this rule to ‘apply scaling’ will require the project manager to use all elements and still leave room to adjust the extent in which the elements are used. Within the prescription of elements per project type at least a decision moment between the design and the construction stage should be required within light projects where the current project plan is updated and the performance is evaluated.

Furthermore the use of a business case in the projects is not useful as mentioned before; therefore this rule should be removed from the golden rules.

When the rules are adjusted they should be communicated to the project managers and become well known, since they provide guidance on how to use EPA within the projects.

**Risk management**

An important risk identified in most projects is requiring the necessary licenses. The project managers possess most knowledge about these licenses and the procedures to obtain them. This knowledge is bound to geographic areas since the licenses and procedures differ between the municipalities and provinces. Knowledge sharing between project managers can help to resolve problems occurring with licenses. This could be done through creating a database with important information per region, such as contact information, required documents and average time it takes to require certain licenses, or through regular meetings between project managers where experiences are shared.

The drawback of this recommendation is that it takes time and effort to share, archive and update the information which could decrease the efficiency of Joulz if the benefits do not outweigh this extra time and effort.

**Evaluation**

Projects are currently seldom evaluated. Project evaluation is a crucial part of project management and Joulz should start evaluating projects for the following reasons:

1. To improve project management in future and learn from mistakes. The lessons learned within these evaluations can be used to improve the performance of Joulz Projects. Within similar types of projects the lessons learned from a previous project can be studied at the start of a project. Regular meetings between the project managers where the lessons learned are presented and discussed can lead to improvement of the project management skills and project performance.

2. To determine the customer satisfaction. The current perception of customer-satisfaction in projects is based on the informal contact between customer and client. When the share of projects performed for other clients increases and the relation with Stedin becomes more businesslike the informal relation will diminish. Other methods will be needed to become aware of the customer satisfaction, evaluating the projects’ results with the client will become more important.

3. To improve project plans. Comparing the actual project costs to the quotation will give better insight in the real costs and costs of changes, this can lead to better project plans and quotations. In a competing market this can be a competitive advantage.

4. To control project completion. Through evaluation unfinished tasks within project are revealed and can be finished before the project is closed down.

In order to evaluate completed projects the success criteria for the project should be well defined. The importance of efficiency and customer-orientation can differ per project. Within projects where the technical specifications are described in detail by the client or projects that are a sub-project of bigger project, efficiency will probably be the most important success criterion. Within large, complex projects with high-tech solutions and many uncertainties customer-orientation (meeting functional performance) will probably be more important than efficiency. Since the variety of projects and clients is expected to increase, it will become more important to clearly define the success criteria in the start up phase of the project.
**Interrelation between the two goals**

Synergy occurred between the requirements of minimizing cost and time and customer satisfaction. As mentioned before the focus on efficiency is increasing. Since customer satisfaction is strongly related to the time and costs of the project, the importance of completing projects within budget and schedule will also increase from a viewpoint of customer-orientation.

Conflict occurred between the requirements flexibility and the minimization of scope changes in two situations:

- Flexibility was required because of uncertainty caused by developments in the project area or involvement of multiple parties.
- There was uncertainty about the required functional performance

Flexibility is important from a viewpoint of customer-orientation and due to the uniqueness of projects there will always be a certain amount of flexibility required. Considering the future projects of Joulz it is expected that the focus on efficiency will increase. Because of this increased efficiency the requirement of minimize scope changes will become more important and the conflicts with the required flexibility are expected to increase.

Within these conflicts EPA can help in making the trade off decision between the two goals. If EPA is used as intended the success criteria for the project are made clear at the project start and the consequences of the changes for the entire project are made comprehensible through updating the project plan and structured communication with the project team, the customer and the project board. The use of change management should decrease the negative effects of changes on the project’s efficiency.

Considering the changes in the market the variety in types of projects and customers will increase. The importance of efficiency and customer-orientation will therefore also vary more between projects. To make the trade off in these change decision it is recommended to clearly specify the success criteria for the project in the start up stage.

**Increase both efficiency and customer-orientation**

It has been made clear that EPA can increase the project’s efficiency and decrease the negative effects of flexibility on the project’s efficiency. This contributes to the customer-orientation since customer satisfaction is closely related to the cost and time of a project. Furthermore using EPA can also directly increase the customer-orientation. Through increasing the involvement of the customer in the project, by consulting the customer between stage transitions and better organizing projects to create time for creative and innovative problem solving, the customer-orientation is increased. Project evaluations will help to improve the customer-orientation.
7 – Conclusions and recommendations

The goal of Joulz for the implementation of project management was to increase the efficiency and customer-orientation of its organization in order to be able to be leading in the design and construction of future-proof energy infrastructure in a competing market. This chapter discusses the main conclusions and recommendations of this research.

The implementation of project management is evaluated in this research through the following question:
• How does project management contribute to both the efficiency and customer-orientation of Joulz Projects and how can the efficiency and customer-orientation be increased?

In order to answer this question first the performance on efficiency and customer-orientation has been determined. The performance on customer-orientation is good, in most projects the customer is satisfied with the project results and quality of work and the project objectives are met. The performance on efficiency is not very good. In most projects the original project budget and schedule are exceeded. In most cases the extra costs are accounted to the customer and the overrun of schedule does not harm the customer satisfaction. There are two main reasons identified for the underperformance on efficiency.

The first reason is the attitude of the main customer, Stedin, towards the goal of efficiency. Suggested changes in projects and the additional consequences for the budget and schedule are almost always accepted. Delay within projects often does not influence the customer satisfaction, because the time priority of replacement projects is low. This attitude does not give much incentive to work more efficient. However, the focus on efficiency by Stedin is increasing and the goal of Joulz is to increase the number of projects performed for other customers. The expectation is the focus on efficiency is generally stronger in projects performed for other customers than Stedin. Through these developments this cause for the underperformance on efficiency is diminished and the incentives to work more efficient are increased.

The second reason for underperformance on efficiency is the way projects are managed. The problems that occur vary for the high voltage and the grids & connections projects. In the following section the use of project management and recommendations to increase the performance are discussed for High Voltage and Grids & Connections projects separately.

High Voltage projects
Considering the difficulties identified within these projects, EPA can contribute to increase the performance of High Voltage projects, but EPA is not used the way it should be. Currently only the elements of EPA are used that resemble the way projects were managed according to the work processes before the implementation of project management. Essential project management elements are not used. There is no a clear distinction between stages where the project performance is evaluated and the project plan is updated and a decision is made about whether or not to continue to the next stage. Projects are rarely evaluated and the use of risk analysis is limited. The reason why these elements of EPA are not used is partly explained by the culture and habits within the organization, such as the informal culture, little criticism between employees, lack of costs and time consciousness, a risk averse attitude and different perception of performance. These elements are, however, present in the design of EPA and can help to improve the efficiency and customer-orientation of Joulz Projects. Therefore, it is recommended to change the use of project management in the following ways:
• Stricter follow the design of EPA, especially during stage transitions.
• Change the rules of EPA
• Increase the involvement of the customer within the project
• Evaluate projects
• Share knowledge and lessons learned between project managers

Grids & Connections projects
For Grids & Connection projects EPA is currently not used since it has not been implemented for these projects. EPA should not be used within all Grids & Connections projects because the projects are not performed by a project team and the work consists of a combination of standardized elements. Using EPA could turn out to be very bureaucratic within these projects. However, in certain projects EPA can be used and in the other projects some elements of EPA can be useful.

Difficulties in these projects are caused by the cooperation with the different parties involved. The customer is responsible for the integration of the projects performed by different parties. In projects where Joulz is asked by the customer to coordinate the entire project, EPA should be used to manage the entire project.

If Joulz is not responsible for the entire project it is more logical to adapt to the required way of working of the customer, but elements of EPA can be used to increase the efficiency and customer-orientation. The control mechanisms of EPA should be used to increase project control, and the templates provided by EPA should be used to formulate the project plan and the project reports.

Considering the projects of Grids & Connections it is recommended to:
• Train the project managers of Grids & Connections project in EPA, but not oblige them to use the method within all projects
• Adjust the way these projects are internally reported. This requires increased use of project controls within the projects
• Increase the involvement of the customer in the projects
• Evaluate projects
• Share knowledge and lessons learned between project managers

Become leading in future-proof energy infrastructure
The goal of Joulz for the implementation of project management was to increase the efficiency and customer-orientation of its organization in order to become leading in future-proof energy infrastructure. The focus on efficiency will increase in the future projects of Joulz because of changing customers demands; the focus on efficiency of Stedin is increasing and in projects for other customers the focus on efficiency is strong. This increased attention for efficiency will lead to more conflicts between customer-orientation and efficiency. EPA can help to better deal with these conflicts. Through improving change management and defining the project success criteria at the project start the trade off between the two goals can be better decided upon.

Since customer satisfaction is strongly related to the time and costs of the project, the importance of completing projects within budget and schedule will also increase from a viewpoint of customer-orientation.

EPA is a valuable method that can improve both the efficiency and customer-orientation of Joulz Projects. However, the use of EPA should be changed as recommended above and it should not be used within all Grids & Connections projects.

To accomplish the correct use of EPA it is recommended to clarify to the employees what the goal of implementing EPA is and why this will become more important in the future. If people don’t know why they are using the method the likeliness of incorrect use is higher and the acceptance of the method will be lower. Furthermore the ‘golden rules’ of EPA have to be adjusted to comply with the goals of EPA.

Now is the time to change the use of project management to be prepared for the expected increasing focus on efficiency of both Stedin and other customers.
8 – Reflection

In this chapter the research performed is reflected on in order to clarify its limitations and to put it into the right context. First the research methods used and the research design are discussed followed by the research results.

Research Methods & Design

Study of documents

The access and availability of project documentation formed no problem; all project documentation archived within Joulz Projects was available for this research. To prevent biased selection or reporting of the documents the analysis per project was reviewed by the project managers. Difficult to distract from the project documentation was the performance on efficiency. The distinction between the extra costs or time due to changes required by the customer and extra costs or time through other causes is not clear at all. If a project is performed within the (adjusted) budget or schedule is hard to judge. Joulz does not have a uniform way of judging the performance of the projects. The information about the cause of extra costs or time had to be gathered through interviews.

Interviews

In projects where multiple team members and the client are interviewed, differences between the interpretation of customer-orientation and efficiency and the causes of problems in projects are identified. In most projects only the project manager has been interviewed. Therefore the results of these interviews can be biased. The reasons not to interview multiple project members for all projects are the burden of interviews on the employees since interviews are very time consuming and the available time for this research.

The different perceptions of employees with different roles within the projects has been taken into account through interviewing multiple team members within three projects and by attending the training for both project managers and project employees.

Project selection

In this research ten projects are selected for analysis. For the validity of this research it is important that these ten projects resemble the project portfolio of Joulz. Three different criteria determined what projects had to be present:

1. Project type: High Voltage and Grids & Connections
2. Project classification: Light projects and Heavy projects
3. Customer: Projects for Stedin and for other customers

The first and the third criteria are easy to judge. From Grids & Connections four different project and from High Voltage six projects have been analyzed. Only one project performed for another customer than Stedin was analyzed. This does resemble the small share of project performed for other customers, however the insights gathered about the use of project management for other customers than Stedin is limited. Through studying the future projects of Joulz the differences in projects for other customers than Stedin have been made clear in order to clarify the different requirements to project management for this type of projects.

Six heavy and four light projects have been analyzed. If this resembles the project portfolio is harder to judge. This classification is not used by Joulz within the project documentation; therefore no numbers are available about the share of heavy and light projects. The only possible comparison is based on project budget, but this does not resemble the other eight criteria that determine the project classification.
To judge whether the selected projects resemble the project portfolio, expert opinions are used. The team leaders of project control in the Rotterdam and Utrecht office and one project manager are used as experts.

**Single case study**

The implementation of a project management methodology is only analyzed within Joulz Project. Therefore no comparison can be made with other situations where a project management methodology is implemented. It would be interesting to compared the problems identified within Joulz Project to another company that also implements project management in order to be able to deal with increasing market competition.

**Research Results**

**Time of research**

Regarding the research results it should be noted that the time the research is performed influences the results.

First of all the research is performed during the organisational change from Eneco Infra to Joulz and the implementation of EPA. The project performance is measured only for the current projects. The ideal situation would be to first assess the efficiency and customer-orientation within Eneco Infra, then study the implementation of EPA, followed by the assessment of the performance of projects performed according to EPA.

In order to see if EPA really did make a change to the project performance within Joulz it is recommended to perform a similar research again within a few years.

The second problem related to the time of the research is the assessment of the customer satisfaction. This requirement is hard to assess because of three reasons:

1. project evaluations are rare
2. five projects studied are in the execution stage
3. customer satisfaction is best assessed over a longer period

Because project evaluations are rare, the insight in customer satisfaction is limited. Through interviewing the customer the best insight in the customer satisfaction is gained, however this is not done in all projects because of the reasons mentioned before. The score on customer satisfaction is based on the information provided by the project manager.

Five of the projects studied are in the execution stage and have not been finished yet. Without a completed product it is only possible to assess the customer satisfaction so far.

When the project is completed the customer satisfaction is based on the project’s process and the interpretation how the end products fulfils the project objectives and functional performance. However this performance is only revealed during the actual use of the product. The customer satisfaction after two years of using the product can vary from the moment when the project is evaluated. Therefore the customer satisfaction is best assessed over a longer period. Within this research it was not possible to do so. However due to the long lasting relationship with Stedin, and the interviews with employees of Stedin, insight is gained in the general customer satisfaction about the projects performed by Joulz Projects.

**Culture and attitude**

In this research certain more fundamental issues within Joulz have been identified, such as the informal culture, risk averse attitude etc. The changes suggested for project management can help to reduce the impact of these issues on the project success.
If these issues should be changed from a viewpoint of the total organization and how this can be done is not analyzed within this research since the focus of this research was on project management. Further research is required to study these issues in more depth.

Changes to project management more complex
The suggested changes to project management are quite generally formulated. The way these changes can best be implemented is more complex and will vary per project. This requires intelligent implementation of these changes by the project managers. It will take time to learn how these changes are best applied.

Qualitative data
The assessment of performance is based on qualitative data. It will be difficult to use this research as a starting point of the current performance to assess the changes in performance in the future. As mentioned above the project performance on efficiency is currently hard to determine from the project documentation. The customer satisfaction is in fact not registered at all. If Joulz wants to assess the change in project performance over time it is necessary to establish a certain level of standardization in the reporting about project performance. In order to easily compare the future performance to the current performance it will be necessary to judge the current performance using quantitative data as well. The way the performance within Joulz is measured needs further attention. Further research could focus on the question: How should project performance be measured and documented to be able to judge the changes in project performance over time?
Literature


Appendix A – 7-S Framework applied to Eneco Infra

Introduction
In order to analyze the differences between the old units High Voltage and Grids & Connections, the 7-S framework developed by Peters and Waterman is used. This framework was developed for a holistic and systematic analysis of organisational aspects that are of key importance for the effectiveness and efficiency of an organisation (Klein and Rorink, 2005). This framework adjusted for a project environment by Maylor (2006) is presented in the table below:

Table 10: 7-S framework (source: Maylor, 1996)

<table>
<thead>
<tr>
<th>Element</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strategy</td>
<td>The high-level requirements of the project and the means to achieve them</td>
</tr>
<tr>
<td>Structure</td>
<td>The organisational arrangements that will be used to carry out the project</td>
</tr>
<tr>
<td>Systems</td>
<td>The methods for work to be designed, monitored and controlled</td>
</tr>
<tr>
<td>Staff</td>
<td>The selection, recruitment, management and leadership of those working on the project</td>
</tr>
<tr>
<td>Skills</td>
<td>The managerial and technical tools available to the project manager and the staff</td>
</tr>
<tr>
<td>Style/Culture</td>
<td>The underlying way of working and inter-relating within the work team or organisation</td>
</tr>
<tr>
<td>Stakeholders</td>
<td>Individuals and groups who have interest in the project process and outcome</td>
</tr>
</tbody>
</table>

As described in the introduction Joulz Projects executes all work of the former unit High Voltage and only the projects from Grids and Connections. The other activities of Grids & Connections are accommodated within the Service Provider. All employees of High Voltage and a selection of employees of Grids and Connections work within Joulz Projects. The description presented in this chapter is the situation before the foundation of Joulz Projects. The information is gathered through interviews. The list of interviews is presented in Appendix B.

High Voltage
Introduction
The work of the High Voltage (HV) department is involved in the design, construction and maintenance of high voltage grids, from 25kV up to 150kV, and projects above 10MVA electric potential. If switchboxes are present in a project HV is always involved, even if the work involves lower voltage. This has to do with the jurisdiction given to HV by the grid manager to work in their switchboxes. The department handles around 70 projects per year, with 320 employees and has a turnover of around 150 Million Euro. Normal project budgets vary between € 250,000,- and € 20 million.

Strategy
The strategy of the High Voltage department is based on providing integral high voltage solutions since Eneco Infra is one of the few companies that can both design and construct high voltage energy infrastructure. In future around 50% of the assignments should come from other parties than Stedin.

Structure
The structure of the High Voltage department is quite the same as the current structure of the project department. There are four different teams: (1) Project control, (2) Engineering, (3) Realization and (4) Sales. Every team has a team leader. In the execution of projects the project support office is used for procurement, calculation, planning and financial control.
Assignments go through sales to project control, where a project manager is assigned to the project. The project manager forms the project team according to the required disciplines. In general all four teams are involved in projects, and the support office is used for all tasks mentioned above. The organization of the project team remains the same during the project life cycle.

**Systems**

The work of the high voltage department consists of genuine projects; every assignment is unique and is custom-made according to the desires of the customer. A quotation is made for every project based on the customer specifications of the project; the scope of the project is discussed with the customer. For the different departments the processes in order to successfully complete a project are described in flow charts with corresponding explanations of the steps. The quality of work is the responsibility of the different team leaders, the project manager is responsible for the project progress and performance. The project manager gets support from financial control and planning. The planning is made at the project start and is adapted throughout the project on a two weekly base. The scope of the project is defined through a project plan, which includes a planning, a list of requirements and a budget.

Regular meetings are planned with the team leader of the project control department to monitor the overall progress of the projects. In this meeting the scope, planning and financial aspects of the project are discussed.

SAP is used as an information database for project control and used by all different departments. Parts of the entry of data into SAP is performed by an employee of the project support.

**Staff**

Most of the staff has an electro technical background. The educational level varies from MBO to WO level. The engineering department has very specialized knowledge about the high voltage grids. The project managers are trained in project management throughout their career. The assessment of employees is performed by their team leader, the project manager is not involved in the assessment of employees of his project team. The resource planning is done by the team leaders, who get support from planning through overviews of the required resources for the different projects.

**Skills**

The skills of the employees are developed through different educational courses for every department. Employees can subscribe for these courses. Project managers are trained in project management. The main strength of the high voltage department lies in the specialized knowledge about high voltage grids. Engineers with this knowledge are rare, and not many companies have this type of knowledge. Another specific skill lies in the work performed in the switchboxes of the grid manager.

**Style / Culture**

The culture within HV can be described as informal. The team structure is evidently present, but there are many informal contacts between the different teams. Problems are discussed within the teams, and project issues between teams are discussed between employees of different teams. Another specific characteristic is that every department has informal contacts with the main customer, the grid manager (current Stedin). The commercial awareness of the department is not very high. Project control, financial control, procurement and sales are aware of the commercial implications of project progress. The other teams take priority in the quality of the work performed. The general attitude is that HV projects are superior over the other infrastructure projects, due to technical complexity and size of the projects.

**Stakeholders**

The main customer of the HV department is the grid manager, which is part of the same company; Eneco. This interdepartmental contractor-customer relation leads to a very informal relation where the
differences in responsibilities of contractor and customer are not very clear. Examples of this confusion are that parts of the project description are performed by the customer, and scope changes in projects are not always discussed with the customer.
HV grids above 150kV are managed by the national grid manager TenneT, sometimes projects are performed for TenneT.
Some large industrial companies also require HV cables or switchboxes for their systems. If projects are directly performed on the premises of such a company, the division HV can be directly involved without interference of the grid manager.
HV also contract work out to other companies. When projects involve MV and LV parts, the department of Grids & Connections can be involved. But also external companies are hired for location studies, engineering or construction.

**Key Performance Indicators**
The work processes within the department are mapped according to process management as described in § 2.2.1. This approach prescribes the use of performance indicators in order to control the process. Within the unit High Voltage the performance indicators related to the process map have been developed, but are not implemented.
In order to measure the performance, indicators related to the time and budget aspects of the projects were used. The performance of High Voltage in 2008 was:

<table>
<thead>
<tr>
<th># of projects</th>
<th>within time</th>
<th>within budget</th>
<th>within time and budget</th>
</tr>
</thead>
<tbody>
<tr>
<td>66</td>
<td>67%</td>
<td>79%</td>
<td>52%</td>
</tr>
</tbody>
</table>

If changes occur in a project that lead to an agreement with the customer for extra time or budget, a project is regarded within time and budget if the new agreement is met. These criteria are measured for the entire project; no distinction is made between different project phases or different departments within the project.

**Grids & Connections**

*Introduction*
The department of Grids and Connections (G&C) is involved with the design and construction of middle voltage, low voltage and gas grids. Jobs that vary from connecting neighbourhoods to construction of distribution grids up to 10kV, and gas projects from G4 low pressure up to 8 bar. Other jobs involve public lighting and ANWB-masts. Most of the work can be typified as routine jobs. If a job is too small it is regarded as a short cyclical assignment, and performed by another department. The budget per job varies between €5000,- and €1.500.000,-.

*Strategy*
The strategy of G&C is aimed at optimization of current activities; improvement of the current procedures with a focus on safety, efficiency and quality. In future around 40% of the assignments should come from other parties than Stedin.

*Structure*
The G&C department consists of different teams that are assigned to a certain region. Within this team there are construction supervisors, planning engineers and (Sr.) project coordinators. These teams are supported by other teams, such as the drawing office, the licences & land department and administration.
A job is managed by one person who requests support where needed for the job. This person is a planning engineer, a junior project coordinator or a senior project coordinator, depending on the size and complexity of the project. This person is responsible for the entire project; the design, the
execution and the monitoring. A normal number of running jobs per person lies between 50 and 100 jobs.

**Systems**
The jobs performed within the department are routine-like jobs. Through experience the work is divided in many different standard packages, all with a certain code (DVO). Since the main customer is the grid manager, most jobs consist of specific descriptions of the required packages. For these packages standard tariffs have been agreed upon. For the execution of the job the processes are described in flow charts with corresponding explanations of the steps.

When a project is performed for an external customer, a quotation is made based on these work packages. Where the work packages don’t apply to a certain job, a calculation for the required work is made.

The construction supervisors plays an important role in the quality control since they supervise the work executed. This work is often outsourced to contractors. The construction supervisors reports to the project coordinator about the progress and peculiarities.

The project coordinator keeps track of the progress and the budget, and communicates with the customers if variations of the project plan are required. SAP is used as an information database for project control. The project coordinator has to perform many transactions within this system, and needs to be competent with this system. The budget and a basic planning are kept within SAP.

A real planning is not made for the different jobs. The work packages have certain runtimes, which form a basic planning. With the customer a certain starting time for the job is agreed. Another aspect is that most projects like connections for new housing development or a job related to maintenance of a railway depend for their planning on the planning of external parties; they have a certain time window where the job needs to be done.

The scope of a project is determined through the work packages. However if changes are needed, the project coordinator takes a decision on these changes. The extra work is settled with the end-customer, the customer of the grid manager. If the changes have a huge impact the project coordinator will discuss this with the customer.

The performance of the project coordinators is monitored by their team leader, based on two sources of information. The first is the project performance on progress, costs and planning. The second is control on the administration of the project according to the processes. The main focus is on the portfolio of projects, not on individual projects. The key performance indicators for the project coordinators are based on monthly targets over all their projects, the indicators are mentioned under the headline performance indicators below.

**Staff**
Most of the staff has an electro technical or a gas background. The educational level varies from MBO to HBO level. Since project coordinators perform the greatest part of the jobs themselves, they need to have enough technical knowledge. All project coordinators handle MV, LV and G grids, so they need to be competent in these three different fields. The assessment of employees is performed by their team leader.

A resource planning is not kept. Within a region there are two or three project coordinators assigned. Projects are divided on a regional basis, regardless of the occupation of the coordinators of that region.

**Skills**
New employees follow a seven day course where the work processes and systems of G&C are trained. After that they assigned to small projects to practice. As mentioned above all project coordinators handle MV, LV and G grids, so they need to be some competent in these three different fields. Most new employees have an electrical educational background, and their gas knowledge is small. Most gas
projects are performed by experienced employees, and the gas knowledge of new employees is gradually increased.

**Style / Culture**
The work style within G&C is task-focused, project coordinators handle many projects and they just start with the job without formulating an extensive project description or planning. There is little cooperation within projects, there is not a real project team, a project coordinator only asks for support where needed and does not delegate much tasks. Due to the commercialization the awareness of the importance of the project performance and turnover has increased. The relationship with Stedin is becoming more businesslike regarding to costs and payment but the contact is still informal.

**Stakeholders**
The main customer of the G&C department is the grid manager Stedin, which is part of the same company; Eneco. This interdepartmental contractor-customer relation leads to an informal relation where the differences in responsibilities of contractor and customer are not very clear. Examples hereof are that scope changes are not always discussed with the customer, and the extra work performed is directly billed to the end-customer, the customer of the grid manager.

Some jobs are performed for external customers. These jobs are a combination of the work packages and improvisation in order to meet the customer's requirements.

In large jobs, construction work is contracted out, mainly to regular contractors with which fixed price agreements have been made.

**Key Performance Indicators**
The work processes within the department are mapped according to process management as described in § 2.2.1. This approach prescribes the use of performance indicators in order to control the process. For the different activities within the process map performance indicators should be set up and monitored. Within the department of Grids & Connections nine performance indicators are used to measure project performance. These indicators are:

- Contractor chosen (y/n)
- Work contractor planned (y/n)
- Realization of work (%)
- Total costs (€)
- Cost allocated to activity (%)
- Project run time (<180 days)
- Start date (compared to plan)
- End date (compared to plan)
- Budget overrun (%)

The main focus lies on project runtime and costs. Since employees handle many projects it can occur that certain projects with low priority are put aside. The goal is to finish all projects within 180 days. Since the remuneration for the different activities is fixed it is important to control the costs and the allocation of work to the specific activities.
Appendix B – Overview of Interviews

In this appendix the overview of interviews within this research is given. The interview reports are not included in this report, but are available (in Dutch). In order to obtain these reports please contact the author.

Table 12: overview of unstructured interviews

<table>
<thead>
<tr>
<th>Name</th>
<th>Function</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Albert Labigar</td>
<td>Former PC G&amp;C, currently PM Joulz Projects</td>
<td>15-12-2008</td>
</tr>
<tr>
<td>Martin Korteschiel</td>
<td>Former PC G&amp;C, currently PM Joulz Projects</td>
<td>17-12-2008</td>
</tr>
<tr>
<td>Berry Heeren</td>
<td>Developer of best practices from different offices</td>
<td>17-12-2008</td>
</tr>
<tr>
<td>Peter van der Veen</td>
<td>Former PC G&amp;C, currently PM Joulz Projects</td>
<td>17-12-2008</td>
</tr>
<tr>
<td>Taco van Berkel</td>
<td>Consultant APPM – implementation of PM Joulz</td>
<td>05-01-2009</td>
</tr>
<tr>
<td>Erik Blokland</td>
<td>Former PC G&amp;C, currently PM Joulz Projects</td>
<td>06-01-2009</td>
</tr>
<tr>
<td>Mikel Hufkens</td>
<td>PM Joulz Projects</td>
<td>12-01-2009</td>
</tr>
<tr>
<td>Dick Ouwerkerk</td>
<td>Teamleader project management Utrecht</td>
<td>21-01-2009</td>
</tr>
<tr>
<td>Vincent Hassfeld</td>
<td>PM Joulz Projects</td>
<td>29-01-2009</td>
</tr>
<tr>
<td>Zoran Jeremic</td>
<td>PC G&amp;C</td>
<td>02-02-2009</td>
</tr>
<tr>
<td>Maikel Zuidmeer</td>
<td>Teamleader G&amp;C</td>
<td>02-03-2009</td>
</tr>
<tr>
<td>Ben van Duin</td>
<td>Financial controller</td>
<td>07-04-2009</td>
</tr>
</tbody>
</table>

PC = project coördinator | PM = project manager | G&C = Grids and Connections

Table 13: overview of semi-structured interviews

<table>
<thead>
<tr>
<th>Project</th>
<th>Name</th>
<th>Function</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diefdijk</td>
<td>Martin Korteschiel</td>
<td>Project manager</td>
<td>06-04-2009</td>
</tr>
<tr>
<td>Stadsgebied Utrecht</td>
<td>Arnold Verheul</td>
<td>Project manager</td>
<td>23-03-2009</td>
</tr>
<tr>
<td>N&amp;A binnen Oostland I</td>
<td>Karel Moody</td>
<td>Project manager</td>
<td>10-04-2009</td>
</tr>
<tr>
<td></td>
<td>Arjan Blom</td>
<td>Project coordinator</td>
<td>10-04-2009</td>
</tr>
<tr>
<td>Centrumplan Nieuwegein</td>
<td>Peter de Graaf</td>
<td>Project manager</td>
<td>23-03-2009</td>
</tr>
<tr>
<td>Oostland I</td>
<td>Vincent Hassfeld</td>
<td>Project manager</td>
<td>26-03-2009</td>
</tr>
<tr>
<td>Station Nieuwegein</td>
<td>Peter Huijgen</td>
<td>Project manager</td>
<td>01-04-2009</td>
</tr>
<tr>
<td>De Lier</td>
<td>Peter van der Veen</td>
<td>Project manager</td>
<td>03-04-2009</td>
</tr>
<tr>
<td></td>
<td>Gurkan Albayrak</td>
<td>Engineer</td>
<td>04-05-2009</td>
</tr>
<tr>
<td></td>
<td>Leo Holstein</td>
<td>Constructor</td>
<td>24-04-2009</td>
</tr>
<tr>
<td></td>
<td>Roland Kardos</td>
<td>Client</td>
<td>29-04-2009</td>
</tr>
<tr>
<td>Electrabel</td>
<td>Albert Labigar</td>
<td>Project manager</td>
<td>26-03-2009</td>
</tr>
<tr>
<td>Koedood</td>
<td>Ruud Machielsen</td>
<td>Project manager</td>
<td>24-03-2009</td>
</tr>
<tr>
<td></td>
<td>Wim van Belzen</td>
<td>Client</td>
<td>29-04-2009</td>
</tr>
<tr>
<td></td>
<td>Ed Verzijden</td>
<td>Client</td>
<td>29-04-2009</td>
</tr>
<tr>
<td>Goeree Overflakkee</td>
<td>Marcel de Bruijn</td>
<td>Project manager</td>
<td>30-03-2009</td>
</tr>
<tr>
<td></td>
<td>John Zegwaard</td>
<td>Engineer</td>
<td>21-04-2009</td>
</tr>
<tr>
<td></td>
<td>Frank van Leeuwen</td>
<td>Constructor</td>
<td>04-05-2009</td>
</tr>
</tbody>
</table>
Appendix C – EPA project classification

The table below contains the criteria for the EPA classification of project within Joulz.

Table 14: EPA classification criteria

<table>
<thead>
<tr>
<th>Criteria</th>
<th>PB task</th>
<th>Light project</th>
<th>Heavy project</th>
</tr>
</thead>
<tbody>
<tr>
<td>Project budget</td>
<td>&lt; 50K</td>
<td>50K – 1 mil.</td>
<td>&gt; 1 mil.</td>
</tr>
<tr>
<td>Investment (€)</td>
<td>&lt; 50K</td>
<td>50K – 150K</td>
<td>&gt; 150K</td>
</tr>
<tr>
<td>Project run time</td>
<td>&lt; 6 months</td>
<td>6 months &lt;&gt; 1 year</td>
<td>&gt; 1 year</td>
</tr>
<tr>
<td>Involved Joulz teams</td>
<td>1-3</td>
<td>4-8</td>
<td>&gt; 8</td>
</tr>
<tr>
<td>Involved public parties</td>
<td>0-1</td>
<td>1-3</td>
<td>&gt; 3</td>
</tr>
<tr>
<td>Involved suppliers</td>
<td>0-2</td>
<td>3-6</td>
<td>&gt; 6</td>
</tr>
<tr>
<td>Strategic relevance for Joulz</td>
<td>-</td>
<td>Operational/tactical</td>
<td>Strategic</td>
</tr>
<tr>
<td>Importance for Stedin</td>
<td>6-5</td>
<td>4-3-2</td>
<td>1</td>
</tr>
<tr>
<td>Risk</td>
<td>-</td>
<td>+</td>
<td>+++</td>
</tr>
</tbody>
</table>

In order to judge if the classification used within EPA is appropriate for dividing the projects in different types, the criteria used within Joulz to determine the classification are compared to criteria for typology of projects provided by Maylor (2006) and Müller (2006). The criteria set by Joulz quite represent the criteria derived from literature. However the technical complexity of a project is not taken into account (only risk). Within the analysis of pilot projects the technical complexity will be added in order to analyse its importance to the management of projects.

For the different project the use of components and products of EPA is prescribed. The overview of the use is given in the following table:

Table 15: use of EPA documents

<table>
<thead>
<tr>
<th>EPA Document</th>
<th>PB Task</th>
<th>Light project</th>
<th>Heavy project</th>
</tr>
</thead>
<tbody>
<tr>
<td>Project proposal</td>
<td>Max 1 A4</td>
<td>Max 2 A4</td>
<td>+</td>
</tr>
<tr>
<td>Risk analysis and log</td>
<td>-</td>
<td>Optional</td>
<td>+</td>
</tr>
<tr>
<td>PID</td>
<td>Use project proposal</td>
<td>Use project proposal</td>
<td>+</td>
</tr>
<tr>
<td>Project plan</td>
<td>-</td>
<td>Optional</td>
<td>+</td>
</tr>
<tr>
<td>Cost calculation</td>
<td>Use project proposal</td>
<td>Use project proposal</td>
<td>+</td>
</tr>
<tr>
<td>Product descriptions</td>
<td>Use project proposal</td>
<td>Use project proposal</td>
<td>+</td>
</tr>
<tr>
<td>Communication plan</td>
<td>Use project proposal</td>
<td>Use project proposal</td>
<td>+</td>
</tr>
<tr>
<td>Project Organization</td>
<td>Use project proposal</td>
<td>Use project proposal</td>
<td>+</td>
</tr>
<tr>
<td>Issue log</td>
<td>-</td>
<td>Optional</td>
<td>+</td>
</tr>
<tr>
<td>Next Phase plan</td>
<td>-</td>
<td>Optional</td>
<td>+</td>
</tr>
<tr>
<td>Issue Form</td>
<td>-</td>
<td>Optional</td>
<td>+</td>
</tr>
<tr>
<td>Lessons learned log</td>
<td>-</td>
<td>-</td>
<td>+</td>
</tr>
<tr>
<td>Work packages</td>
<td>-</td>
<td>-</td>
<td>+</td>
</tr>
<tr>
<td>Progress reports</td>
<td>-</td>
<td>Optional</td>
<td>+</td>
</tr>
<tr>
<td>Headline reports</td>
<td>-</td>
<td>Optional</td>
<td>+</td>
</tr>
<tr>
<td>Exception reports</td>
<td>-</td>
<td>Optional</td>
<td>+</td>
</tr>
<tr>
<td>Phase plan</td>
<td>-</td>
<td>Optional</td>
<td>+</td>
</tr>
<tr>
<td>End phase report</td>
<td>-</td>
<td>-</td>
<td>+</td>
</tr>
<tr>
<td>End project report</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>Lessons learned report</td>
<td>-</td>
<td>-</td>
<td>+</td>
</tr>
<tr>
<td>Deliver report</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
</tbody>
</table>

Symbols: - = not required | + = required
Appendix D - Interview protocol project analysis

Project naam:
Startdatum:
Einddatum:
Project fase:
Projectbudget:

Project plan
- Wat houdt het project in en waar liggen de moeilijkheden binnen dit project?
  o Technisch, overlegstructuur, vergunningen, overig?
- Welke specifieke kennis en vaardigheden zijn vereist en hoe is hierin voorzien?
  o Welke afdelingen zijn bij het project betrokken?
  o Welke andere partijen zijn bij het project betrokken?
- Welke contractvorm is op dit project van toepassing en hoe wordt het project opgeleverd?
- Wat is bijzonder aan dit project in vergelijking met andere projecten?
- Waar ligt de nadruk binnen dit project, op klanttevredenheid of efficiëntie?
- Wat is de belangrijkste criterium binnen het project? (tijd, geld, kwaliteit)
- Is er een business case opgesteld, wat zijn de doelstellingen en zijn deze realistisch?
- Zijn er spanningen opgetreden tussen de realisatie van het project binnen de
gestelde randvoorwaarden (tijd, geld, kwaliteit) en de wensen van de klant?

Prestatie
- Hoe zijn de prestaties van het project tot dusver?
  o Tijd, geld kwaliteit
  o Is de klant tevreden over de tot nu toe opgeleverde producten en het verloop?
- Is het projectdoel bereikt, zo ja, binnen de gestelde randvoorwaarden (tijd, geld, kwaliteit)?
  Indien nee: wat is daarvan de oorzaak en hoe beïnvloed dit de klanttevredenheid?
- Hoe is het project geëvalueerd?
  o Wat waren de grootste leerpunten?

Resources
- Is er voldoende capaciteit beschikbaar gesteld vanuit de verschillende afdelingen en hoe
  verloopt de afstemming met de teamleiders?
  o Zijn er conflicten opgetreden met een van de teams?
  o Is de rol van de projectleider duidelijk voor alle projectmedewerkers?
- Kloppen de begrote uren met de besteedde uren en uren nog te gaan?

Ontwerp en uitvoering
- Zijn er innovatieve/creatieve oplossingen gebruikt binnen het project?
- Neigt het product meer naar de minimale vereisten of is er sprake van overvloedigheid in het
  ontwerp of in de uitvoering van het project, en hoe beïnvloedt dit de klanttevredenheid?
- Hoe draagt de projectmethodiek (Epa) bij aan het managen van het project?
- Op welke wijze wordt de voortgang en budget van het project gerapporteerd?
- Welke andere systemen worden gebruikt voor het beheersen van het project?
- Vormen de rapportages aanleiding voor het ingrijpen in de planning of de doelstelling?

Veranderingen & Risico’s
- Is er een risicoanalyse uitgevoerd?
  o Hoe is er omgegaan met de risico’s die zich hebben voorgedaan?
  o Hoe hebben de risico’s het project beïnvloed en wat voor gevolgen heeft dit voor de
    klanttevredenheid en de efficiëntie?
- Zijn er tussentijdse veranderingen nodig geweest in het project?
  o Wat was de oorzaak van deze veranderingen?
  o Van welke partij/ontwikkeling kwam de noodzaak voor de verandering?
  o Hoe hebben de veranderingen het project beïnvloed en wat voor gevolgen heeft dit
    voor de klanttevredenheid en de efficiëntie?
Project details:

EPA classification

<table>
<thead>
<tr>
<th>Project Naam</th>
<th>Project Code</th>
<th>Klant</th>
<th>Project budget</th>
<th>Investering</th>
<th>Doorlooptijd</th>
<th>Betrokken Joulz teams</th>
<th>Betrokken publieke partijen</th>
<th>Betrokken leveranciers</th>
<th>Strategisch belang voor Joulz</th>
<th>Strategisch belang voor Stedin</th>
<th>Risico</th>
<th>Technische complexiteit</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Criteria | PB task | Light project | Heavy project
---|---|---|---
Project budget | < 50K | 50K – 1 mil. | > 1 mil.
Investment (€) | < 50K | 50K – 150K | > 150K
Project run time | < 6 months | 6 months < > 1 year | > 1 year
Involved Joulz teams | 1-3 | 4-8 | > 8
Involved public parties | 0-1 | 1-3 | > 3
Involved suppliers | 0-2 | 3-6 | > 6
Strategic relevance for Joulz | Operational/tactical | | Strategic
Importance for Stedin | 6-5 | 4-3-2 | 1
Risk | + | | +++

Checklist is project N&A complex?:

<table>
<thead>
<tr>
<th>Project Naam</th>
<th>Klant</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Complex project | Y / N | (1x Y = Y)
Gebruik EPA documenten

**Huidige fase project: Opstart / Projectontwerp / Uitvoering / Afsluitfase**

<table>
<thead>
<tr>
<th>EPA Documenten</th>
<th>Gebruikt?</th>
<th>Opmerkingen</th>
</tr>
</thead>
<tbody>
<tr>
<td>Projectvoorstel</td>
<td>J/N</td>
<td></td>
</tr>
<tr>
<td>Risicologboek</td>
<td>J/N</td>
<td></td>
</tr>
<tr>
<td>PID</td>
<td>J/N</td>
<td></td>
</tr>
<tr>
<td>Projectplan</td>
<td>J/N</td>
<td></td>
</tr>
<tr>
<td>Kostencalculatie</td>
<td>J/N</td>
<td></td>
</tr>
<tr>
<td>Productbeschrijvingen</td>
<td>J/N</td>
<td></td>
</tr>
<tr>
<td>Communicatieplan</td>
<td>J/N</td>
<td></td>
</tr>
<tr>
<td>Projectorganisatie</td>
<td>J/N</td>
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<tr>
<td>Issuelogboek</td>
<td>J/N</td>
<td></td>
</tr>
<tr>
<td>Faseplan eerstvolgende fase</td>
<td>J/N</td>
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<tr>
<td>Issueformulier</td>
<td>J/N</td>
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<tr>
<td>Leerpunten Logboek</td>
<td>J/N</td>
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<tr>
<td>Werkpakketten</td>
<td>J/N</td>
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<tr>
<td>Voortgangsrapport</td>
<td>J/N</td>
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<tr>
<td>Hoofdpuntenrapport</td>
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<td></td>
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<tr>
<td>Afwijkingsrapport</td>
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<td>Faseplan</td>
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<td>Einde fase rapport</td>
<td>J/N</td>
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<tr>
<td>Einde project rapport</td>
<td>J/N</td>
<td></td>
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<tr>
<td>Leerpunten rapport</td>
<td>J/N</td>
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<tr>
<td>Opleverrapport</td>
<td>J/N</td>
<td></td>
</tr>
</tbody>
</table>
Appendix E – Detailed project analyses

E-1 Diefdijk fase 1 – January 2006 till March 2007 – budget €850,000,- Interviewee: project manager

Introduction
The project objective is to replace electricity cables due to an enforcing of the Diefdijk over a length of four kilometres by order of Eneco Netbeheer for the Municipality of Vianen. The project requires coordination with several other public utility companies like KPN and Oasen. According to budget, time and organization the project is regarded a light project. The project is based on subsequent calculation and is currently completed.

Project Performance
The most important aspect for this project is to deliver an integrated solution for the municipality; the cable routes and planning of work of the different parties should be coordinated. In order to do so the project board consisted of a representative of all parties involved. The project exceeded the original budget of € 583,000,- due to changes in the project scope required by the client. The delivered work was according to the quality required by the client. The project had a delay of six months due to the scope changes and problems with the acquisition of terrain, holidays and changes in route which required plan changes, but the most important reason was the lack of time pressure within the other parties involved. The budget and time overrun did not influence the customer satisfaction. For the client the time pressure within this project was low, and the extra costs were caused by extra demands from the client. The table below shows the relation between these issues and the requirements to project management:

<table>
<thead>
<tr>
<th>Requirement</th>
<th>Influence on project management goals</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flexibility</td>
<td>Increased customer-orientation by implementing all required changes</td>
</tr>
<tr>
<td>Minimize scope changes</td>
<td>Decrease of efficiency through delay and extra costs of extra work</td>
</tr>
<tr>
<td>Minimize plan changes</td>
<td>Decrease of efficiency through delay and extra costs</td>
</tr>
</tbody>
</table>

The many scope changes and the budget and time overrun did not negatively influence the customer satisfaction. The reason is that the scope changes (and corresponding extra costs) were initiated by the customer, and the time pressure for this project was low. However from the customers’ point of view the flexibility decreased the project efficiency, and a trade off between the changes and the extra time and cost need to be made.

The customer satisfaction is influences by providing an integrated solution. Since this leads to cost advantage for the customer and the total period of construction work is reduced, synergy between the two goals occurs. The table below shows the interrelation between the two goals:

<table>
<thead>
<tr>
<th>Function of PM</th>
<th>Customer-orientation</th>
<th>Efficiency</th>
<th>Relation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Scope</td>
<td>Flexibility</td>
<td>Minimize scope changes</td>
<td>Conflict</td>
</tr>
<tr>
<td>Cost</td>
<td>Customer satisfaction</td>
<td>Minimize cost</td>
<td>Synergy</td>
</tr>
<tr>
<td>Time</td>
<td>Customer satisfaction</td>
<td>Minimize time</td>
<td>Synergy</td>
</tr>
</tbody>
</table>

Use of Project Management
This project was not managed according to EPA or Prince2. There have been several project management tools used within this project. A project plan was made, with a cost calculation and a time schedule. During the project there were regular meetings where the progress and issues were discussed. The budget was controlled through dividing the work into small tasks (houses connected) and by billing these tasks directly when finished. At the end the project has been evaluated and lessons learned have been identified. The customer was satisfied with the project result. Important lessons were that if multiple parties are expected to work closely together, the project plan should be drawn up with input of all parties involved and the pre-engineering should be done at an early stage to minimize future changes within the following project stages.
E-2 Stadsgebied Utrecht – January 2008 till 2020 – budget € 1,8 million
Interviewee: project manager

Introduction
The project objective is reinforcing the grid for the future, divert existing cable and gas routes and integrate other activities within this project by order of Stedin for the Municipality of Utrecht. Since this area is under development, changing of plans is probable and coordination is necessary with multiple other parties that are constructing pipes, cables and sewers within the area. Between these different parties Joulz has a coordinating role. According to budget, time and organization the project is regarded a heavy project. The project is based on a fixed price and is currently in construction.

Project Performance
The most important aspect for this project is to deliver an integrated solution for the municipality; the cable routes and planning of work of the different parties should be coordinated. Since the project is performed within the busy centre of Utrecht it is important that all work is done at once, and as quickly as possible. Another important issue is that all gas work has a strict deadline due to weather circumstances. Within this project Joulz has a coordinating role and the construction of the work for all parties involved is outsourced to one contractor.

The municipality is so far very pleased with the performance. The integrated solution leads to the desired quality. The project is on schedule, and considering the scope changes within budget. The scope changes consist of extra work outside the technical specifications. This is agreed between Stedin and Joulz in order to prevent the need for big work within the centre of Utrecht in the future. Polluted soil has caused the work to be stopped for a while. This risk had been foreseen, but no agreements were made between the parties how to deal with the risk. The risk has led to extra cost and delay, but the deadline was not threatened. The extra costs were divided between all parties, and were accounted to Stedin. The table below shows the relation between these issues and the requirements to project management:

<table>
<thead>
<tr>
<th>Requirement</th>
<th>Influence on project management goals</th>
</tr>
</thead>
<tbody>
<tr>
<td>Minimize scope changes</td>
<td>Decreased efficiency through costs of extra work</td>
</tr>
<tr>
<td>Meet technical specification</td>
<td>Redundancy to be prepared for future changes</td>
</tr>
</tbody>
</table>

The customer satisfaction is influences by providing an integrated solution. Since this leads to cost advantage for the customer and the total period of construction work is reduced, synergy between the two goals occurs. The relation is shown in the table below:

<table>
<thead>
<tr>
<th>Function of PM</th>
<th>Customer-orientation</th>
<th>Efficiency</th>
<th>Relation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cost</td>
<td>Customer satisfaction</td>
<td>Minimize cost</td>
<td>Synergy</td>
</tr>
<tr>
<td>Time</td>
<td>Customer satisfaction</td>
<td>Minimize time</td>
<td>Synergy</td>
</tr>
</tbody>
</table>

Use of Project Management
The project has not been performed according to the elements of EPA, but was performed using the Prince2 method of Eneco. Phase plans and phase reports are not used, lessons learnt are not identified. An integrated planning for the project including the work for all different parties was made by the contractor. There is a weekly meeting with the project board, existing of a representative of all the different parties involved, where the progress and the issues of the project are discussed. The planning of the contractor forms the main input for these meetings. An important tool for the control of the project is to break down the work into very small tasks, perform these tasks and bill them directly when finished.
Interviewees: project manager, project coordinator

Introduction
The goal of the Oostland I project is to facilitate the return delivery of electricity from combined heat and power generation installations (WKK) of 78 horticulturists. In order to do so 500km of cable had to be constructed and six power stations had to be (re)build. This subproject focuses on the connections from the substations to the horticulturists. Considering the size, the budget and the importance for both Stedin and Joulz this project is regarded a heavy project, although the technical complexity is low. The contract was based on subsequent calculation. The project has been completed.

Project Performance
The project is evaluated as a success. The strict deadline for connecting the horticulturists was met according to the required quality levels and on schedule. Within the Oostland project the scope was significantly increased during the project by the customer. Therefore the initial budget was also exceeded. The extra work was however also completed within the strict deadline for the project. There have been some plan changes within the cable routes due to the availability of terrain. During the building holiday there has been a lack of resources for the construction. The table below shows the relation between these issues and the requirements to project management:

<table>
<thead>
<tr>
<th>Requirement</th>
<th>Influence on project management goals</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flexibility</td>
<td>Increased customer-orientation by implementing all required changes</td>
</tr>
<tr>
<td>Minimize scope changes</td>
<td>Decreased efficiency through costs of extra work</td>
</tr>
<tr>
<td>Minimize plan changes</td>
<td>Decreased efficiency through costs of extra work</td>
</tr>
<tr>
<td>Resource allocation – Optimization</td>
<td>Lack of resources during construction</td>
</tr>
</tbody>
</table>

The scope changes did not lead to a decrease of customer satisfaction, since the scope changes (and corresponding extra costs) were initiated by the customer. However from the customers’ point of view the flexibility decreased the project efficiency, and a trade off between the changes and the extra time and cost need to be made.

The time pressure for this project was very high, and the completion of the project within the deadline has increased the customer satisfaction. The table below shows the interrelation between the two goals:

<table>
<thead>
<tr>
<th>Function of PM</th>
<th>Customer-orientation</th>
<th>Efficiency</th>
<th>Relation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Scope</td>
<td>Flexibility</td>
<td>Minimize scope changes</td>
<td>Conflict</td>
</tr>
<tr>
<td>Time</td>
<td>Customer satisfaction</td>
<td>Minimize time</td>
<td>Synergy</td>
</tr>
</tbody>
</table>

Use of project management
For the management of the project a project plan has been set up, progress reports formed the input for the regular project meetings and a deliver report has been made. The budget was controlled through billing directly when a connection had been realised. The progress reports and meetings helped for the efficient realisation of the project. For the customer-orientation the communication with the horticulturists was very important. Visits to the farms were made, and updates were given in order to inform them. One month before the connection would be realized the growers received a final date for the work to be completed.
**Introduction**

The project objective is to build a new distribution net for Gas, Electricity and Water and a new power station by order of Stedin for the Municipality of Nieuwegein. Since this area is under development, changing of plans is probable and coordination is necessary with multiple other parties that are constructing pipes and cables within the area. Between these different parties Joulz has a coordinating role. According to budget, time and organization the project is regarded a heavy project. The project is based on a fixed price and is currently finished.

**Project Performance**

The project objective has changed during the project. The customer decided not to build the new power station, due to uncertainty in the building development within the area.

The most important aspect for this project is to deliver an integrated solution for the municipality; the cable routes and planning of work of the different parties should be coordinated. Joulz has a coordinating role between the parties and the construction of the work is outsourced to one contractor by all parties involved.

The municipality is so far pleased with the performance. The integrated solution leads to the desired quality. The project exceeded the original budget and schedule, due to scope changes during the project. An important scope change was the change of the cable route because of a lack of space. This has led to extra time and costs, but the change and the consequences were agreed upon by the client.

The table below shows the relation between these issues and the requirements to project management:

<table>
<thead>
<tr>
<th>Requirement</th>
<th>Influence on project management goals</th>
</tr>
</thead>
<tbody>
<tr>
<td>Meet project objectives</td>
<td>No influence on customer-orientation, decision for plan change was made by customer</td>
</tr>
<tr>
<td>Minimize scope changes</td>
<td>Decrease of efficiency through extra time and costs of extra work</td>
</tr>
</tbody>
</table>

The customer satisfaction is influences by providing an integrated solution. Since this leads to cost advantage for the customer and the total period of construction work is reduced, synergy between the two goals occurs. The relation is shown in the table below:

<table>
<thead>
<tr>
<th>Function of PM</th>
<th>Customer-orientation</th>
<th>Efficiency</th>
<th>Relation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cost</td>
<td>Customer satisfaction</td>
<td>Minimize cost</td>
<td>Synergy</td>
</tr>
<tr>
<td>Time</td>
<td>Customer satisfaction</td>
<td>Minimize time</td>
<td>Synergy</td>
</tr>
</tbody>
</table>

**Use of Project Management**

The project has not been performed according to the elements of EPA, but was performed using the Prince2 method of Eneco. Phase plans and phase reports are not used, lessons learnt are not identified. An integrated planning for the project including the work for all different parties was made by the contractor. The use of the reports was useful for the control of the project and for the documentation, but not for communication to Stedin. The reports were not read. However the reports were used within the weekly meetings with the project board, which existed of a representative of all the different parties involved.
Interviewee: project manager

Introduction
The goal of the Oostland I project is to facilitate the return delivery of electricity from combined heat and power generation installations (WKK) of 78 horticulturists. In order to do so 500km of cable had to be constructed and six power stations had to be (re)build. The project was very complex due to the size, the strict deadline, the organizational and technical complexity, political significance of the project and building development within the project area. The project is classified as a heavy project with the highest priority for both Joulz and Stedin. The contract was based on subsequent calculation. The project is currently being finished.

Project Performance
The project is evaluated as a success. The strict deadline for connecting the horticulturists was met according to the required quality levels. The budget of 42 million has been expanded to 54 million through scope changes. The scope changes are agreed upon by the customer. However there are displeased parties within the project. The end users wanted to be connected way faster than the deadline set by Stedin, because of the high savings of a WKK installation. Because of the high priority of the project all available resources could be put into action for this project. However there was still a lack of resources because some activities within the project required specific qualifications that are scarce. For other projects there was a lack of resources because of the high stress on resources from Oostland. Because of the complexity of the project flexibility was very important in order to meet the project objectives. There have been multiple plan changes due to the scope changes, changing circumstances and unexpected obstacles. The table below shows the relation between these issues and the requirements to project management:

<table>
<thead>
<tr>
<th>Requirement</th>
<th>Influence on project management goals</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flexibility</td>
<td>Increased customer-orientation by implementing all required changes</td>
</tr>
<tr>
<td>Minimize scope changes</td>
<td>Decreased efficiency through costs of extra work</td>
</tr>
<tr>
<td>Minimize plan changes</td>
<td>Decreased efficiency through costs of extra work</td>
</tr>
<tr>
<td>Resource allocation - Optimization</td>
<td>Lack of resources did not influence goals for this project, but delay was caused for other projects</td>
</tr>
</tbody>
</table>

The flexibility within the project has led to many scope and plan changes. These scope changes did not lead to a decrease of customer satisfaction, since the scope changes (and corresponding extra costs) were initiated by the customer. However from the customers’ point of view the flexibility decreased the project efficiency, and a trade off between the changes and the extra time and cost need to be made.

The main focus of the project was time related and the changes did not threaten the deadline. The plan changes were necessary to meet the project objectives within time. The completion of the project within the deadline has increased the customer satisfaction. The relations between the two goals is shown in the table below:

<table>
<thead>
<tr>
<th>Function of PM</th>
<th>Customer-orientation</th>
<th>Efficiency</th>
<th>Relation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Scope</td>
<td>Flexibility</td>
<td>Minimize scope changes</td>
<td>Conflict</td>
</tr>
<tr>
<td>Cost</td>
<td>Customer satisfaction</td>
<td>Minimize cost</td>
<td>No conflict</td>
</tr>
<tr>
<td>Time</td>
<td>Customer satisfaction</td>
<td>Minimize time</td>
<td>Synergy</td>
</tr>
</tbody>
</table>
Use of Project Management

For the management of the project most elements of EPA that are required within a heavy project are used. An issue log, phase plans and phase reports are not used. Phases are not used since it would be very time consuming to report all changes due to the many plan changes. The elements that are used are very helpful for the control and communication of the project. All plan changes are well documented and communicated through the reports. The project has been evaluated and lessons learnt have been identified. The most important lesson was that the configuration management needs improvement.
**Introduction**

The project goal is to install an extra transformer by order of Stedin. The difficulty lies in the changing wishes of the client and the unclear project proposal. According to budget, time and organization the project is regarded a heavy project. The focus within the project lies on time, the old transformer needs to be replaced in order to prevent failure. The contract is based upon subsequent calculation. The project is currently under construction.

**Project Performance**

The project is currently performed according to the required quality level and within budget. But there has been a major delay of eight months on a scheduled duration of nine months. This is caused by not applying for the necessary permits on time. This changed the project plan significantly. The table below shows the relation between these issues and the requirements to project management:

<table>
<thead>
<tr>
<th>Requirement</th>
<th>Influence on efficiency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Minimize plan changes</td>
<td>Decreased efficiency (delay) because of problems with licenses</td>
</tr>
</tbody>
</table>

The customer is very dissatisfied with this delay since time was crucial in this project. The decreased efficiency influences the customer satisfaction within this project. The table below shows the interrelation between the two goals:

<table>
<thead>
<tr>
<th>Function of PM</th>
<th>Customer-orientation</th>
<th>Efficiency</th>
<th>Relation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Time</td>
<td>Customer satisfaction</td>
<td>Minimize time</td>
<td>Synergy</td>
</tr>
</tbody>
</table>

**Use of Project Management**

The elements of EPA used within the project are the project plan, headline- progress- and exception reports. In the beginning of the project a risk analysis was made, but this analysis has not been used since. The planning has been made by the contractor. There is a monthly meeting with the project team and a monthly meeting with the project board. The use of project management helps for the control of the project, not for the communication since the client does not use the provided reports.
E-7 De Lier – January 2009 – April 2010 – budget € 1.8 million
Interviewees: project manager, client, engineer, constructor

Introduction
The project objective is to build and connect a power station by order of Westland Energy. The technical complexity of this project is low. According to budget, time and organization the project is regarded a heavy project. The contract is based on a fixed price. The project is currently under construction. Special to this project is that it is performed for another client than Stedin. Therefore the main focus lies on customer satisfaction in order to obtain future projects from this client. Another remarkable aspect is that the project is performed within a consortium with one other party, Areva.

Project performance
The project is currently performed within budget and on time. The technical specifications for the project are very clearly defined by the client, the main focus lies on efficient execution of the desired work. However there are some difficulties within this project. The main reason for these difficulties is the collaboration within the consortium. Because of the interdependency of the technical systems it takes a lot of communication to attune the different tasks performed by the two companies.
Since the installation delivered by Areva did not meet the specifications, a new installation is currently built by Areva. This means that the work for Joulz has almost come to a standstill, they have to wait for the new technical drawings. The short time span for this work will but high pressure on the resources within Joulz and there is quite a chance for delay.
The client is not pleased by this situation, especially since the specifications have been clearly defined by the client. So far this issue has not led to any delay, but it required plan changes, tasks that can be performed at the moment (based on experience with building this type of stations) are performed earlier than planned to win time. Apart from the problems, there have been some changes in the construction work of the project so far suggested by Joulz in order to work more efficient.
The table below shows the relation between these issues and the requirements to project management:

<table>
<thead>
<tr>
<th>Requirement</th>
<th>Influence on project management goals</th>
</tr>
</thead>
<tbody>
<tr>
<td>Customer satisfaction</td>
<td>Customer is dissatisfied because technical specifications are not met</td>
</tr>
<tr>
<td>Meet technical specification</td>
<td>Decreased efficiency because technical specifications are not met, work has to be redone</td>
</tr>
<tr>
<td>Minimize plan changes</td>
<td>Plan changes are necessary to keep the project on schedule</td>
</tr>
<tr>
<td></td>
<td>Plan changes in construction increased the efficiency</td>
</tr>
</tbody>
</table>

Use of project management
For the management of the project most elements of EPA that are required within a heavy project are used. Phase plans and phase reports are not used. The biggest problem within this project is the communication due to the many parties involved. In order to control the communication every three weeks a project meeting is planned. The reports form the input for these meetings. The planning and budget are well communicated. There is more vagueness in the technical details due to uncertainty.
All plan changes are well documented and communicated through the reports. Risk of late delivering of drawings was identified, but no control measures were formulated.
E-8 Electrabel Maasvlakte – November 2008 till October 2009 – budget € 1.3 million
Interviewee: project manager

Introduction
The project objective is to realize a new connection from a power station to a client of Stedin with a length of 3.7 km by order of Stedin. Keeping within the budget of the project is the main focus. The technical complexity of this project is low. According to budget, time and organization the project is regarded a light project. The contract is based on a fixed price. The project is currently in execution.

Project Performance
The project is currently within budget and performed according to the quality standards required. There is a four month delay within the project, the estimated duration was eleven months of which five months have passed. The delay has two causes: uncertainties in the developments within the area of the project and the breeding season of birds within the area. The uncertainties in the development have led to multiple scope and plan changes. Joulz has taken up a flexible position to these changes and has changed the project plan according to the desires of the customer. These changes have led to some extra costs and time for changing the plans (re-drawing). The main delay however is caused by breeding birds within the area. This has resulted in not being able to execute work in certain areas of the cable route. This incident was not foreseen by Joulz, and was indicated by Stedin’s client. The result is a big delay. However the customer is not dissatisfied because not foreseeing this incident is understandable. The table below shows the relation between these issues and the requirements to project management:

<table>
<thead>
<tr>
<th>Requirement</th>
<th>Influence on project management goals</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flexibility</td>
<td>Increased customer-orientation through flexible attitude</td>
</tr>
<tr>
<td>Minimize scope changes</td>
<td>Decreased efficiency through costs of extra work</td>
</tr>
<tr>
<td>Minimize plan changes</td>
<td>Decreased efficiency (delay &amp; costs) because of extra work and changes</td>
</tr>
</tbody>
</table>

The scope changes did not lead to a decrease of customer satisfaction, since the scope changes (and corresponding extra costs) were initiated by the customer. However from the customers’ point of view the flexibility decreased the project efficiency, and a trade off between the changes and the extra time and cost need to be made.

The delay caused by the breeding season did not lead to a dissatisfied customer, because the delay was caused by an unforeseen circumstance that is understandable to oversee. The table below shows the interrelation between the two goals:

<table>
<thead>
<tr>
<th>Function of PM</th>
<th>Customer-orientation</th>
<th>Efficiency</th>
<th>Relation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Scope</td>
<td>Flexibility</td>
<td>Minimize scope changes</td>
<td>Conflict</td>
</tr>
<tr>
<td>Time</td>
<td>Customer satisfaction</td>
<td>Minimize time</td>
<td>No conflict</td>
</tr>
</tbody>
</table>

Use of Project Management
For the management of the project most elements of EPA that are required within a light project up to the execution phase were used. No phase plans have been made and there was no use of progress reports, only headline reports. A risk analysis has been made, the uncertainties in the area had been unforeseen, the breeding season was unforeseen. There were no measurements for controlling the risk of uncertainties within the area identified. The risk log was not updated during the project, the risks were mentioned within the headline reports.

The headline- and deviation reports and issue forms are very useful for the control and communication of the project, both internally and to the client.
Introduction
The project objective is to transfer a connection from one power station to another station in order to reduce the load on the station, the client is Stedin. The technical complexity of this project is low, according to budget, time and organization the project is regarded a light project. The contract is based on a fixed price. The project is currently in execution.

Project performance
The project started with a study of two different options. Joulz suggested a new solution for this connection different from the two options provided by Stedin. This solution was much cheaper and could be realized quicker, the project plan and budget are based on the new solution.

The project is realized according to the quality standards required, the budget is overrun through scope changes but the changes and the corresponding extra costs are agreed upon by the customer. The project is currently three weeks behind schedule. The estimated project duration was ten months of which seven months have passed. The customer is satisfied with the projects results so far.

The delay is caused through a lack of resources within the execution phase. Due to the low priority of the project within Joulz the agreements with the construction department are not met. Another problem with the construction department lies in the communication. The department wanted to change the project plan in order to work more efficient, but did not communicate this with the project manager. The project manager accidentally found out about the intended change, and discussed it with the client. The change was not accorded by the client and the original project plan was kept. Plan changes did occur because of an obstacle in the planned route and a component not being delivered in time, which both led to delay.

The table below shows the relation between these issues and the requirements to project management:

<table>
<thead>
<tr>
<th>Requirement</th>
<th>Influence on project management goals</th>
</tr>
</thead>
<tbody>
<tr>
<td>Minimize scope changes</td>
<td>Decreased efficiency through costs of extra work</td>
</tr>
<tr>
<td>Minimize plan changes</td>
<td>Decreased efficiency (delay) through changes</td>
</tr>
<tr>
<td>Resource allocation - Optimization execution phase</td>
<td>Negative influence on efficiency (delay) through lack of resources</td>
</tr>
</tbody>
</table>

Although the project is delayed and the budget is overrun the customer is still satisfied. The main reason is the new solution provided by Joulz that made the project cheaper and shorter that originally calculated by Stedin. One could say that the overall efficiency of the project has significantly increased for Stedin and has enforced the customer satisfaction. However since this solution was identified within a study assignment, and the project objective of that study can be seen as identifying the best solution for the problem, this is not regarded as a positive synergy between customer-orientation and efficiency of the project. The table below shows the interrelation between the two goals:

<table>
<thead>
<tr>
<th>Function of PM</th>
<th>Customer-orientation</th>
<th>Efficiency</th>
<th>Relation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cost</td>
<td>Customer satisfaction</td>
<td>Minimize Cost</td>
<td>No conflict or synergy</td>
</tr>
<tr>
<td>Time</td>
<td>Customer satisfaction</td>
<td>Minimize time</td>
<td>No conflict or synergy</td>
</tr>
</tbody>
</table>

Use of Project Management
For the management of the project the elements of EPA that are required within a light project were used. There were no phase plans, risk log, issue log, issue reports and lessons learned report. The changes within the project are well communicated to the client through the progress-, exception- and headline reports. The use of project management has increased the control of the project. Although the project plan was well communicated within the team there was a lack of resources.
Introduction

The project objective is to adapt the security system of two substations by order of Stedin. The technical complexity of this project is low. According to budget, time and organization the project is regarded a light project. The contract was partly based on a fixed price, partly on basis of subsequent calculation. The project has been completed.

Project performance

The project is performed within budget with a delay of two months on a planned duration of nine months. The quality of the product is according to Eneco standard, however due to uncertainty certain choices within the project are made that are on the ‘safe side’, this is caused by a lack of information provided by the client. The client is satisfied with the project’s performance. There has been an accident within the project which was not communicated properly to the project manager.

The delay within the project had three causes: delay in the assembly of a security system at the supplier, missing drawings of the station and a lack of resources due to the priority of the project. To deal with these issues plan changes were required. The table below shows the relation between these issues and the requirements to project management:

<table>
<thead>
<tr>
<th>Requirement</th>
<th>Influence on efficiency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Minimize plan changes</td>
<td>Decreased efficiency (delay) through changes</td>
</tr>
<tr>
<td>Resource allocation - Optimization execution phase</td>
<td>Negative influence (delay) through lack of resources</td>
</tr>
<tr>
<td>Minimize time</td>
<td>Negative influence (delay) through late delivery by supplier</td>
</tr>
</tbody>
</table>

The decreased efficiency of the project nevertheless did not negatively influence the customer satisfaction. The reason for this is the low priority of the project for the client. The delay of the project did not cause real trouble for Stedin. The possible conflict between customer-orientation and efficiency related to the time did not occur, but the delay did certainly not enforce the customer satisfaction.

The technical specifications are redundant compared to the desired functional performance. The reason is a lack of information about the exact demands of the client. The table below shows the interrelation between the two goals:

<table>
<thead>
<tr>
<th>Function of PM</th>
<th>Customer-orientation</th>
<th>Efficiency</th>
<th>Relation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Time</td>
<td>Customer satisfaction</td>
<td>Minimize time</td>
<td>No conflict or synergy</td>
</tr>
<tr>
<td>Quality</td>
<td>Functional performance</td>
<td>Technical specifications</td>
<td>Safe choice in tech specs to meet functional performance because of uncertainty</td>
</tr>
</tbody>
</table>

Use of Project Management

For the management of the project the elements of EPA that are required within a light project were used. There were no phase plans, risk log, issue log and lessons learned report. The changes within the project were communicated through headline reports. Technical decisions were discussed between the engineer and the client, or the engineer and the constructor. The PM was informed about the changes these decisions implied for the project. The planning was constantly updated when changes occurred and communicated to the client. Project management has contributed to the control and internal and external communication of the project. The accident within the project was not properly communicated to the project manager.