

MASTER

Determining contract management professionalism within Rijkswaterstaat

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**Determining contract management
professionalism within
Rijkswaterstaat**

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in partial fulfilment of the requirements for the degree of

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Preface

This report describes a project that I have executed at Rijkswaterstaat. This project represents the final part of my study Industrial Engineering and Management Sciences at Eindhoven University of Technology. As a graduate student in Innovation Management, during this project I have analyzed the professionalism of the contract management function of Rijkswaterstaat in order to improve this function in the future.

I would like to thank several people that helped me throughout this master thesis project. First of all, I would like to thank Arjan van Weele, my primary university supervisor, for all his support, input and useful feedback during my entire project. We had regular meetings which helped me to overcome the challenges I experienced during my project. Furthermore, I would like to thank Isabelle Reymen, my secondary university supervisor, for her critical view on the project and her useful feedback.

At Rijkswaterstaat, I would like to thank Jacinta Lechner, who gave me the opportunity to conduct my master thesis project at Rijkswaterstaat. Next to that, I would like to thank her and Fred Rodewijk as company supervisors for the time and effort they invested in my project. Furthermore, I would like to thank all employees of Rijkswaterstaat who have contributed to my thesis project, especially the members of the contract management masterclass. In addition, many thanks to Coen Wilms and Kees Berends (Shell), Erik Kruizenga (Ballast Nedam), and Paul van der Wilden (Fluor), who provided me with input information for the contract management benchmark.

Finally, I would like to thank my family and friends who have supported me during my entire study and especially during this master thesis project.

Joep Hotterbeekx

June 26, 2013

Management Summary

A good infrastructure is essential for the economic prosperity and development of a country. Due to increasing complexity in the design and the involvement of many stakeholders, it is a challenge for both the client and contractor to deliver infrastructure projects successfully. In the literature, many studies have shown that large infrastructure projects often suffer from cost overruns, time delays, and/or quality problems. Dutch infrastructure projects such as the 'HSL-Zuid', the 'Noord-Zuid lijn', the 'Betuwelijn' and the 'A73/Roertunnel', were multiple times in the news because of their large cost overruns or exceeded planning. The literature identifies many possible causes for time delays and cost overruns. Taking these causes into account, it can be concluded that many of these causes can be influenced, directly or indirectly, by the project team. Therefore, professional project management, including contract management, should increase the likelihood of delivering infrastructure projects within the scope. Rijkswaterstaat encounters also problems with delivering their infrastructure projects within time, budget, and quality standards. Within a project team of Rijkswaterstaat, the contract manager is responsible for all the market aspects and has a direct link with contractors. In the last years, Rijkswaterstaat uses innovative contract types, which gives the contractor more freedom and responsibility and binds Rijkswaterstaat longer to these contractor(s). Therefore, contract management plays an important role within a project team of Rijkswaterstaat.

Problem statement

At this moment, is it not known what the current state of contract management professionalism is within Rijkswaterstaat. This is also complicated by the fact that there are differences between contract managers. There are contract managers which are managing the project strongly on the contract, but also contract managers which are more focused on the relationships with contractors. Furthermore, the IPM (integral project management) model is not always implemented very strictly, which can lead to unclear tasks and responsibilities between team members. For example, there are projects where the project manager is performing some contract management activities. The problem statement is described as follows:

It is unclear what the contract management professionalism is within large infrastructure projects of Rijkswaterstaat.

The main objective of this research is therefore to find a way to determine the professionalism or quality of contract management, and to apply this method for contract management within Rijkswaterstaat.

Research methodology

To determine the contract management professionalism, two models/frameworks are developed. First, a contract management maturity model (CMMM) was composed. This model is used to create a contract management benchmark between companies. It provides a general view of the maturity of the contract management function on a company-level. Second, a diagnostic framework is developed in order to determine the quality of contract management activities and aspects in a project life-cycle. The CMMM is more about the presence of procedures and mechanisms, and the implementation of contract management processes, while the diagnostic framework is more focused on the use of these procedures and mechanisms and the quality of contract management activities in

projects. Therefore, the analysis of the contract management function of Rijkswaterstaat is divided into two phases; the inter-organizational analysis and the intra-organizational analysis.

Inter-organizational contract management analysis

The inter-organizational contract management analysis compares the contract management function of Rijkswaterstaat with three other companies; Shell, Fluor, and Ballast Nedam. The role of contract managers can be organized in different ways. In some companies, contract managers have a more overseeing and supportive role, while in other companies, contract managers are full-time part of the project team. These differences in the organization of contract management do not say something about the maturity of contract management. So, to say something about the professionalism of contract management, it is not sufficient to look only at the role of the contract manager. More important is the fact that all important contract management activities (strategic/tactical/and operational) are performed sufficiently in a company or project team.

The contract management maturity model is used to score the different contract management functions. The results are shown in Table I.

Table I: contract management maturity model scores (scale 1 to 5)

Category	RWS	Shell	Fluor	Ballast Nedam
Planning and Governance	3,4	4,3	4,1	3,8
Resources	3,1	3,9	4,6	4,8
Document and information management	3,3	3,8	4,3	3,8
Relationship management	2,8	4,0	3,8	3,7
Performance management	3,2	3,9	4,0	4,1
Payment and Incentives	3,8	4,0	4,6	4,6
Risk management	3,3	3,6	4,6	4,6
Contract development	3,7	4,1	4,2	4,8
Market aspects	2,8	4,2	4,3	4,1
<i>Average</i>	3,2	4,0	4,3	4,2
Maturity Level	3	4	4	4

In the basis, the contract management function of Rijkswaterstaat looks sufficient, but in most areas improvements are possible. Rijkswaterstaat recognizes the importance of contract management by making it one of the project team roles. Considering the project size, complexity and the number of stakeholders of Rijkswaterstaat projects, contract managers are better placed in the project team close to the contractor. For companies with more and smaller contracts, contract management could be also placed in the line organization. If Rijkswaterstaat is compared with the other three companies, the contract management function seems less mature than Shell, Fluor, and Ballast Nedam at this moment. Rijkswaterstaat has a contract management maturity level 3 (Structured), while the other three companies have a maturity level 4 (Integrated).

Intra-organizational contract management analysis

This analysis uses a self-developed diagnostic framework in order to determine the contract management professionalism within projects. This framework consists of 87 statements, divided over 8 categories. For each contract management aspect, the respondent is asked about the relative

importance of this aspect, but also about the performance of this aspect in practice. Table II shows the results of the diagnostic framework for 25 projects of Rijkswaterstaat.

Table II: Diagnostic framework results (scale 1 to 7)

Categories	Importance	Practice
1.0 Project objectives	5,87	5,49
2.0 CM structure and organization	5,92	5,44
3.0 Pre-contractual phase (preparation time until the start of the public tender)	6,08	5,73
4.0 Contractual & negotiation phase (public tender until contract closure)	6,25	5,98
5.0 Post-contractual phase (realization until delivery)	6,33	5,91
6.0 CM methods and procedures	5,80	5,51
7.0 CM information and communication	6,16	5,87
8.0 Performance-indicators (KPI's)	6,13	5,55
Average	6,07	5,69

The average practice score for the contract management activities is 5,69. Therefore, it can be concluded that the overall performance of contract management activities is quite high, according to the contract managers themselves. Furthermore, this analysis showed that the quality of contract management activities in small infrastructure projects of Rijkswaterstaat is scored higher than in large infrastructure project. This could be due to the fact that large projects are normally exposed to a higher degree of complexity and more stakeholders than small projects.

Conclusion and recommendations

The results of the two analyses are combined in the following recommendations. There are no specific areas or categories where the contract management quality is significantly lower. To improve the contract management professionalism, the overall performance level has to be increased. Rijkswaterstaat should pay more attention towards evaluation of contract management processes and capturing key data and lessons learned. Furthermore, it is essential to guarantee and control the quality of contract management activities during a project in a sufficient way. In addition, it is important to provide proper training and support for contract managers. In this way, a continuous learning cycle will be established which improves the contract management function and makes this function more consistent and uniform in the future.

For Rijkswaterstaat, this research generated some useful implications. First of all, the diagnostic framework could be used as an evaluation tool for the contract management function. At this moment, there is a general evaluation after each project, but no specific evaluation of the performance of contract management. During this evaluation, learning points and best practices can be identified. This evaluation could also take place when the project is halfway. In this way, insights should be generated about strong and weak contract management activities. These weak contract management activities should get more attention in the remaining of the project.

The diagnostic framework can also serve as a contract management tool for monitoring the contract management quality after certain amounts of time. In this way, the progress of contract management performance can be followed.

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1. Introduction

Large infrastructure projects, like the construction or maintenance of roads, bridges, and tunnels, are essential for the economic prosperity and development of a country (Antoniou et al., 2012). Due to increasing complexity in the design and the involvement of many stakeholders, it is a challenge for both the client and contractor to deliver these projects successfully (Doloi, 2009). In the literature, many studies have shown that large infrastructure projects often suffer from cost overruns, time delays, and/or quality problems (Crespin-Mazet & Portier, 2010; Meng, 2012; Odeh & Battaineh, 2002). Dutch infrastructure projects such as the 'HSL-Zuid', the 'Noord-Zuid lijn', the 'Betuwelijn' and the 'A73/Roertunnel' were multiple times in the news because of their large cost overruns or exceeded planning. Canterelli et al. (2012) investigated 70 large scale infrastructure projects in the Netherlands over the last 30 years. In 55% of the projects, the actual costs are larger compared to the estimated costs. The average cost overrun was 16,5%, but there were some extreme cases with cost overruns higher than 160%. It was remarkable that the performance of these projects did not improve over the last 30 years (Canterelli et al. 2012).

According to Odeh & Battaineh (2002), important causes of cost overruns and time delays in infrastructure projects are:

- Clients related factors include finance and payments of completed work, owner interference, slow decision making and unrealistic contract duration imposed by the owners.
- Contractor related factors include site management, improper planning, inadequate contractor experience, mistakes during construction, improper construction methods and delays caused by subcontractors.
- Consultant related factors include contract management, preparation and approval of drawings, quality assurance/control, and long waiting time for approval of test and inspections.
- Material factors include quality and shortage.
- Labour and equipment factors include labour supply, labour productivity, and equipment availability and failure.
- Contract factors include variations in orders and mistakes and discrepancies in contract documents.
- Contractual relationships factors include major disputes and negotiations during construction, in appropriate organizations structure linking all parties involved in the project, and lack of communication between these parties.
- External factors include weather conditions, changes in regulations, problems with neighbours and site conditions

Taking these causes of time delays and cost overruns of construction projects into account, it can be concluded that many of these causes can be influenced, directly or indirectly, by the project team. Although there are a lot of other variables which can influence the project result, this research will focus on the project team, and particularly on the role of contract management. Infrastructure projects are taking place in a complex environment with a large number of stakeholders. So, it is not possible for a project team to explain all the variance in the time delays and cost overruns, but professional project management should increase the likelihood of delivering construction projects successfully.

Before turning to the problem description and research questions, it is needed to introduce the company Rijkswaterstaat. Thereafter, this chapter will discuss the problem statement and the research questions. Furthermore, the research methodology that is used to answer the research questions is described. At last, the structure of this report is provided in the thesis outline.

1.1 Company description: Rijkswaterstaat

Rijkswaterstaat is the executive division of the Dutch Ministry of Infrastructure and the Environment. On behalf of the Minister and State Secretary, Rijkswaterstaat is responsible for the design, construction, management and maintenance of the main infrastructure facilities in the Netherlands. Rijkswaterstaat operates to ensure the Dutch inhabitants have dry feet, sufficient and clean water, a smooth and safe flow of transport on the national highways and the main waterways, and reliable and useful information. Rijkswaterstaat has around 8,800 employees, divided over 10 regional departments, 5 specialized departments, 35 water and road districts, 1 project department, and 1 process organization, with an annual budget of 5,1 billion euro in 2012¹. The organogram of Rijkswaterstaat is shown in Appendix A.

The infrastructure facilities of Rijkswaterstaat can be divided into three national networks. These are main water systems, main highways networks, and main waterways networks².

- Main water systems: Dry feet, sufficient clean water and reliable and useful information. That is the essence of integrated water management as laid down in the new Management and Development Plan for National Waters. As the largest water manager in the Netherlands, Rijkswaterstaat is leading the way. All measures are planned around the users, environmental values and the landscape, in close cooperation with water boards and other managers.
- Main highways networks (5.695 km): The high rate of mobility in the Netherlands puts high demands on the quality and availability of the main highway network. About 3 million car drivers join the Dutch traffic daily. Summed up, they are responsible for 165 million driven kilometres a day. A challenge for Rijkswaterstaat, as being the Dutch infrastructure manager, to guide the traffic as fluently and safe as possible. Rijkswaterstaat is responsible to maintain a safe and sustainable infrastructure. Thereby they cooperate with the public and related organizations as (semi-)governments and other partners.
- Main waterways networks (1,686 km): Smooth and safe transport by water and reliable and useful information. Those are Rijkswaterstaat's aims on the main waterway network. The Netherlands has one of the busiest waterway networks in the world. Goods transport and storage are important economic drivers and recreational sailing is growing. So there is every reason to actively manage, maintain and develop the waterways with partners. Management and maintenance, construction, and traffic management are the three pillars of Rijkswaterstaat's operations on the main waterways. Management and maintenance has the highest priority. The waterways must always be passable and safe, and journey times by water must be reliable.

¹http://www.rijkswaterstaat.nl/en/about_us/

² <http://www.rijkswaterstaat.nl/en/>

The organization of Rijkswaterstaat has changed during the last decades. At this moment, this organizational change is still in progress, demonstrated by a reorganization in April 2013. Because of the Dutch society, who wants a smaller governmental system which costs less money, Rijkswaterstaat must become a smaller organization which is more efficient than before. This is a huge challenge, because there are still large and complex projects that have to be carried out. Therefore, Rijkswaterstaat seeks collaboration with the market and other stakeholders. If the market can perform tasks at the same level, or even better, activities are outsourced to the market. This approach calls for a different focus for the project organization. Rijkswaterstaat becomes more director of their projects, and does not design and build these construction projects by themselves anymore. With innovative contract types, constructors and designers get more freedom to perform the projects by their own discretion. This encourages the market to develop innovative and affordable solutions which can be implemented in a more effective way.

1.2 Problem statement and research questions

This chapter will discuss the problem statement and the research questions. The problem statement builds further on the introduction. The research questions are designed in order to structure the analysis.

1.2.1 Problem statement

The introduction section showed that project teams of large infrastructure projects have a big influence on the results of these projects, even when they have outsourced the construction to a contractor. Since many projects in the Netherlands, including projects of Rijkswaterstaat, have problems with delivering projects within time, cost, and quality standards, it is questionable if all project teams work most efficiently. A few years ago, Rijkswaterstaat introduced the IPM (integral project management) model to improve the structure and uniformity of their project teams. This IPM model consists of five different roles, which have to work intensively together to finish the project successfully. The contract manager, which is one of these five roles, is becoming more and more important these days. This is due to the use of innovative contract types, which gives the contractor more freedom and responsibility and binds Rijkswaterstaat longer to these contractor(s). The contract manager of Rijkswaterstaat is involved in the preparation phase of a project (i.e. procurement strategy, tendering, contract negotiation), but also in the realization phase (i.e. monitoring the contractor's activities, prevent or solve conflicts). Contract management is becoming a core competency critical to an organization's competitive advantage (Cohen & Eimicke, 2008). Therefore, contract management plays an essential part in delivering infrastructure projects successfully.

At this moment, it is not known what the current state of contract management professionalism is within Rijkswaterstaat. This is also complicated by the fact that there are differences between contract managers. There are contract managers which are managing the project strongly on the contract, but also contract managers which are more focused on the relationships with contractors. Furthermore, the IPM model is not always implemented very strictly, which can lead to unclear tasks and responsibilities between team members. For example, there are projects where the project manager is performing some contract management activities. The problem statement is described as follows:

It is unclear what the contract management professionalism is within large infrastructure projects of Rijkswaterstaat.

The main objective of this research is therefore to find a way to determine the professionalism or quality of contract management, and to apply this method for contract management within Rijkswaterstaat. Nowadays, there is no proper method for assessing the professionalism of contract management within projects. Other firms are also interested in methods to analyse their contract management function. This research tries to fill this gap by developing a framework.

1.2.2 Research questions

The problem statement is translated into research questions in order to structure the research. Answering these questions is the primary objective of this master thesis. The following research questions are drawn:

Research question 1:

How is contract management within Rijkswaterstaat structured and organized?

Before the contract management function of Rijkswaterstaat can be analysed, it is first needed to understand what contract management is, and how the contract management function is organized within Rijkswaterstaat.

Research question 2:

How can contract management professionalism be determined?

This research has to develop a method or framework which can be used to determine the contract management professionalism of a company.

Research question 3:

What is the professionalism of the contract management function within Rijkswaterstaat and how can this function be improved in the future?

After developing a method or framework for determining contract management professionalism, it must be applied for Rijkswaterstaat. This should give insights about the current state of contract management professionalism within Rijkswaterstaat and how this function could be improved in the future.

The next section will explain the research methodology which is used to answer these research questions.

1.3 Research methodology

This section will discuss the research methodology that is used to find answers for these research questions.

First of all, an extended literature review was conducted. The objective of this literature review was to explore the state of current research in the area of contract management in the construction industry. This resulted in a preliminary research framework, which included all important aspects of professional contract management. Next to the literature study, contract management within Rijkswaterstaat was explored. Figure 1.1 shows that two main methods were used to explore this

function. Internal interviews with contract managers and RWS documents were used to describe the role of contract management within Rijkswaterstaat.

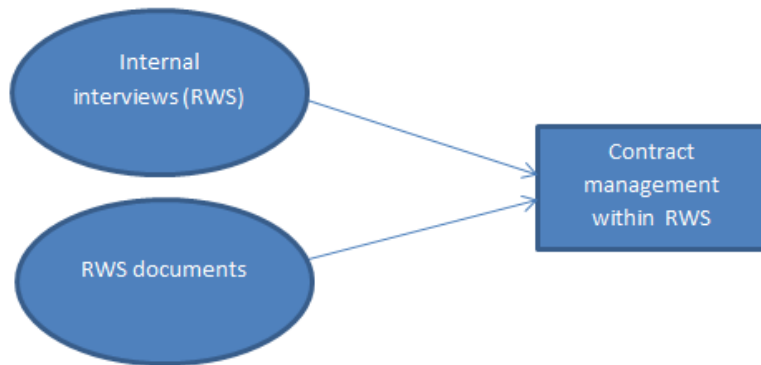


Figure 1.1: Research methodology which is used to describe the contract management function of Rijkswaterstaat

To determine the contract management professionalism, two models/frameworks are developed. First, a contract management maturity model (CMMM) was composed. This model is useful to create a contract management benchmark between other companies. It provides a general view of the maturity of the contract management function on a company-level. Furthermore, a diagnostic framework is developed in order to determine the quality of contract management activities and aspects in a project life-cycle. It was not possible to combine these two models. The CMMM is more about the presence of procedures and mechanisms, and the implementation of contract management processes, while the diagnostic framework is more focused on the use of these procedures and mechanisms and the quality of contract management activities in projects. Therefore, the CMMM is not applicable for individual projects. Because there are two models/frameworks which are going to be used to determine the contract management professionalism, the analysis of the contract management function of Rijkswaterstaat is divided into two phases; the inter-organizational analysis and the intra-organizational analysis. The first is focused on differences and similarities between companies, the second is focused on the professionalism within projects of Rijkswaterstaat.

In the inter-organizational contract management analysis, contract management of Rijkswaterstaat will be compared with three other companies. The methodology that is used for the inter-organizational contract management analysis is shown in Figure 1.2. This analysis is both quantitative and qualitative. External interviews were conducted to understand and describe the role of contract management in the different companies (qualitative). Furthermore, the contract management maturity model is used to score the contract management functions of each company (quantitative). The literature review and some additional contract management documents were used to design the CMMM. A detailed description and the development process are described later in this report.

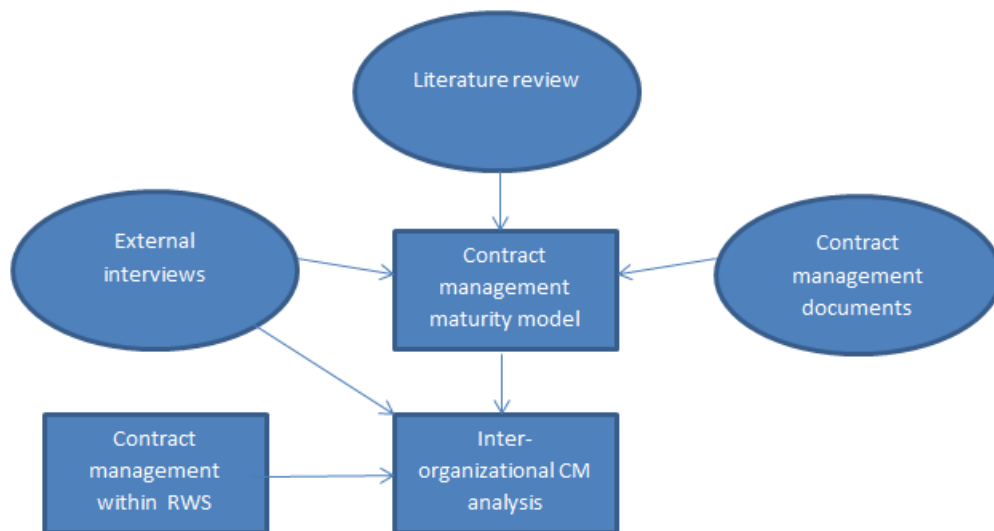


Figure 1.2: Research methodology which is used to perform the inter-organizational contract management analysis

The intra-organizational contract management analysis is only quantitative. To assess the professionalism/quality of contract management within projects of Rijkswaterstaat, a diagnostic framework is developed. Different sources were used to gain contract management knowledge (see Figure 1.3). Again, the literature review served as basis for this framework. Furthermore, knowledge obtained by attending two conferences and information within documents was used to identify important contract management aspects and activities. Also for this diagnostic framework, a detailed description and the development process are described later in this report.

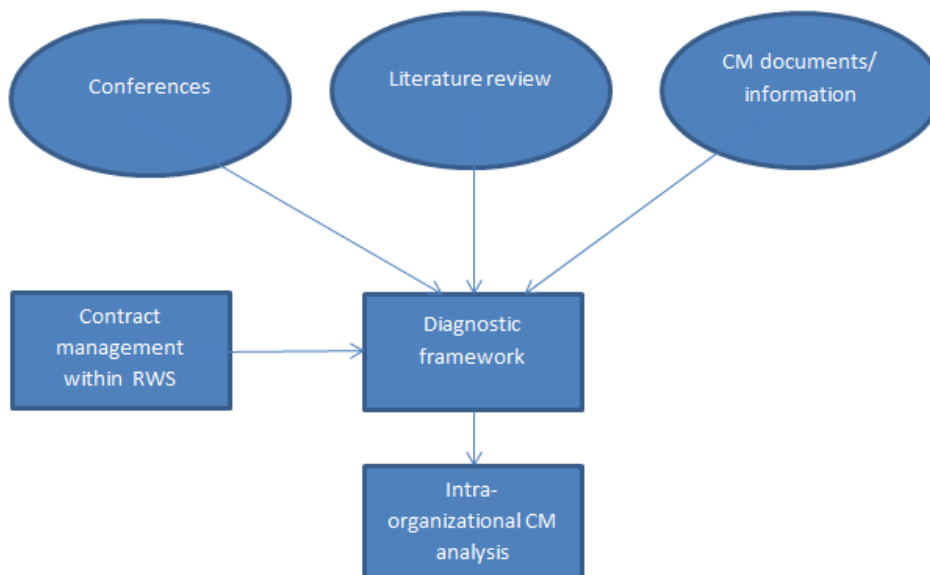


Figure 1.3: Research methodology which is used to perform the intra-organizational contract management analysis

1.4 Thesis outline

Figure 1.4 shows the outline of this master thesis report. First, a section of the complete literature review is provided in Chapter 2. This information gives the reader the necessary theoretical background of contract management. Before this report turns to the analysis, Chapter 3 gives an overview of the current contract management function of Rijkswaterstaat. Chapter 4 describes the inter-organizational contract management analysis, in which the contract management function of Rijkswaterstaat is compared to three other companies. To compare the companies, the contract management maturity model is used. These outcomes provide a general view of the maturity of the contract management functions on a company-level. Chapter 5 describes the intra-organizational contract management analysis. In this chapter, the diagnostic framework is used to determine contract management quality in single projects. Conclusion and recommendation are given in Chapter 6, together with limitations, implications and further research directions.

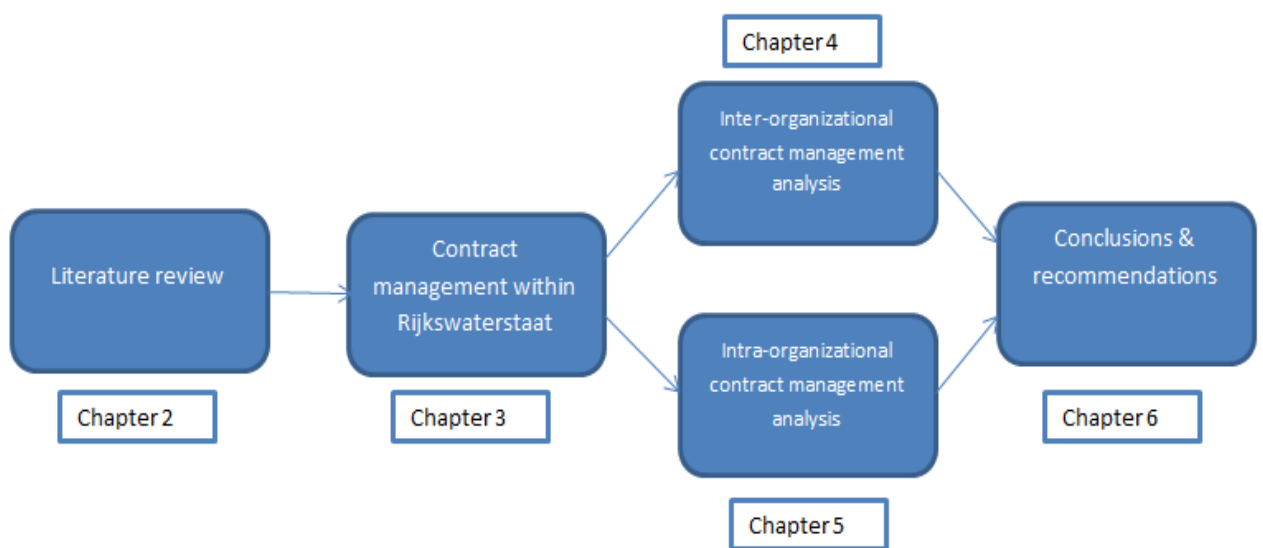


Figure 1.4: Thesis outline

2. Literature Review

As preparation for this master thesis project, an extended literature review was conducted to explore the current state of research in the area of contract management in the construction industry. The objective of this literature review was to find important aspects of effective contract management, which have to be included in a diagnostic framework for determining the degree of contract management professionalism. This chapter is a section of the complete literature review, and provides a necessary theoretical background of contract management, which is needed to understand this master thesis project. For the complete literature review, the reader is referred to Hotterbeekx (2012).

First, the concept of contract management will be defined. Thereafter, four contract management perspectives are described. Furthermore, skills and capabilities of professional contract managers are addressed. In the discussion section, the contract management literature is used to generate a preliminary research framework. This research framework consists of all important contract management aspects and stakeholders, and will serve as bases for the development of the contract management maturity model and the diagnostic framework. The conclusion summarizes this chapter.

2.1 Contract management

Contract management can be defined as the processes undertaken to maintain the integrity of the contract, and ensure that the roles and responsibilities contractually demarcated are fully understood and carried out to the contracted standard (Grimsey & Lewis, 2004). Another definition of contract management is the process that ensures that all parties to a contract fully meet their obligations, in order to satisfy the operational objectives of the contract and the strategic business goals of the customer (Van Weele & Van der Puil, 2013). Contract managers are involved at an early stage of project development to define what contract types to use, given the background and technical complexity of the project. During the execution of the project, they support their internal project manager by monitoring the contractors' activities against what has been stated in the contract (Van Weele & Van der Puil, 2013).

Traditionally, the major problem between contract parties is how to overcome conflicting interests. In construction projects, there are often differences in motives and goals between clients and contractors. The contractor aims at achieving the best profit margin while public authorities as clients, focus on low cost, desired quality and agreement to original schedule (Antoniou et al., 2012; Van Weele & Van der Puil, 2013). In any project, the client's goal can best be achieved by selecting the contract type that will most effectively motivate the contractor to the desired end (Zaghloul & Hartman, 2003). The client should choose a contract type that develops an appropriate cooperative relationship between themselves and their contractors, and provides incentives to motivate the contractors to achieve their objectives (Turner, 2004). However, in a client–contractor relationship at least, a common aim of clients appears to be to avoid risk as far as possible by allocating as many risks as it can to the contractor. One of the objectives of the contract is to serve as a framework between the parties to establish which one has assumed which risk. When a risk is shifted to the contractor and the contractor has no means by which to control the occurrence or outcome of the risk, the contractor must either insure against it or add a contingency to the bid price (Zaghloul & Hartman, 2003). The contract needs to recognize the risks and provide safeguards to protect the contractor. The contract should be designed to encourage the client and contractor to act rationally

together to achieve common objectives, and the best outcome for both within the expected risk (Turner, 2004).

Not only does the contract strategy need to provide incentives and safeguards to deal with risks in advance, it needs also to be flexible enough to deal with unforeseen circumstances. To maintain a climate of mutual cooperation, the contract needs to be flexible to deal with these circumstances through mutual agreement and cooperation, not through one party making use of them to make gains over the other. The contract needs to provide a flexible, farsighted structure that: (1) allows adaptations through mutual agreement; (2) provides a communication structure to identify project progress and problems as they arise so they can be dealt with in a cooperative fashion; (3) continues to provide an incentive for the contractor to deliver the client's objectives; and (4) without either party feeling the need to resort to the law (which automatically is a lose–lose scenario – the 'winning' party just losing less than the other)(Turner, 2004).

Contracting is not a turn-key operation. In other words, it is not as simple as setting up a contract and lean backwards. Once a contract is in place and a contractor is providing a service, the work of contract managers is ready to begin. A working relationship must be developed between the client and the contractor. Poor communication can result in poorly defined tasks and misunderstanding of what has been agreed, and can lead to unacceptable performance. It can also result in conflict between client and contractor when projects fail. Management must set the tone for a cooperative and productive relationship. Frequent formal and informal meetings, clear milestones, and mutual respect are fundamental requirements for effective inter-organizational relations. Another important issue is that there could be a lack of knowledge and expertise at the client, because of the more complex projects these days (Cohen & Eimicke, 2008). Many of these issues are also addressed by Van Weele & Van der Puil (2013). According to them, common problems with the role of contract management within a construction project are: misalignment of objectives between client and contractor; lacking knowledge and expertise at employer; active involvement of engineering and other consultants; inefficient decision making; frequent scope and planning changes; misunderstanding of what has been agreed; payment problems; and local political pressure. Given the many problems that may interfere in a successful project completion, they recommend that for larger projects, companies must differentiate between project management and contract management (Van Weele & Van der Puil, 2013).

2.2 Perspectives of contract management

Construction contracts are usually agreed between two parties, i.e. the client and the contractor. However, in complex projects other parties can be involved in the main contract negotiations too. This is the case where the client negotiates a contract with a consortium of specialist contractors. These specialist contractors may use different legal entities to engage in the relationship with their prospective employer. Legal entities can range from the creation of special purpose companies to joint ventures and alliances. A joint venture is a contractual agreement joining together two or more parties for the purpose of executing a particular project or business undertaking. These joint ventures could have the form of a consortium or an alliance. Differences are that the client is not part of a consortium, as well of the alliance. A consortium usually is seen as a group of companies that undertake an enterprise or an activity, which the individual members could not achieve alone. In both a consortium and an alliance all parties share the risks and rewards of the projects (Van Weele & Van der Puil, 2013).

Contracts may be perceived from different perspectives. Van Weele & Van der Puil (2013) introduced the following four perspectives (see Figure 2.1):

- *Dyadic perspective*: Contract parties are limited to the employer and the contractor. This perspective applies when parties allocate all risks among themselves and when parties think that all problems related to their agreements need to be solved by themselves.
- *Supply-chain perspective*: In this perspective, contract parties are aware that the completion of the work will depend to a fair detail on the contribution of subcontractors and suppliers down-stream the supply-chain. This perspective usually emerges in projects where major supplies (such as steel piles, pile sheets, prefabricated concrete elements) or specific supplier capacity and expertise (design, special molds for concrete elements, telemetry) represents bottlenecks in the project planning.
- *Value-chain perspective*: When adopting this perspective, the contractor, subcontractors and suppliers are aware that they have one common interest: to jointly serve the current and future interest of the employer. All of these parties are aware that they may influence the project result and that they are mutually interdependent. Therefore, parties will engage in close collaboration and information exchange. The value chain perspective usually results in gain and risk sharing agreements, based upon the actual project outcome.
- *Network perspective*: This perspective builds on the previous ones and recognizes that no company can act all alone. All these contract parties are aware of the interdependencies which may exist in the relationships of other companies that belong to the same industry. This becomes clear in tenders, where a contractor wants to involve a specific subcontractor early and therefore wants exclusivity from him. Subcontractors are reluctant in providing this exclusivity, because at that moment, it is not known which contractor wins the bid. Obviously, such behaviour impedes longer-term and close relationships between partners in the construction industry. Adopting a network perspective recognizes the interdependencies that may exist among different stages in the construction industry's value chain (Van Weele & Van der Puil, 2013).

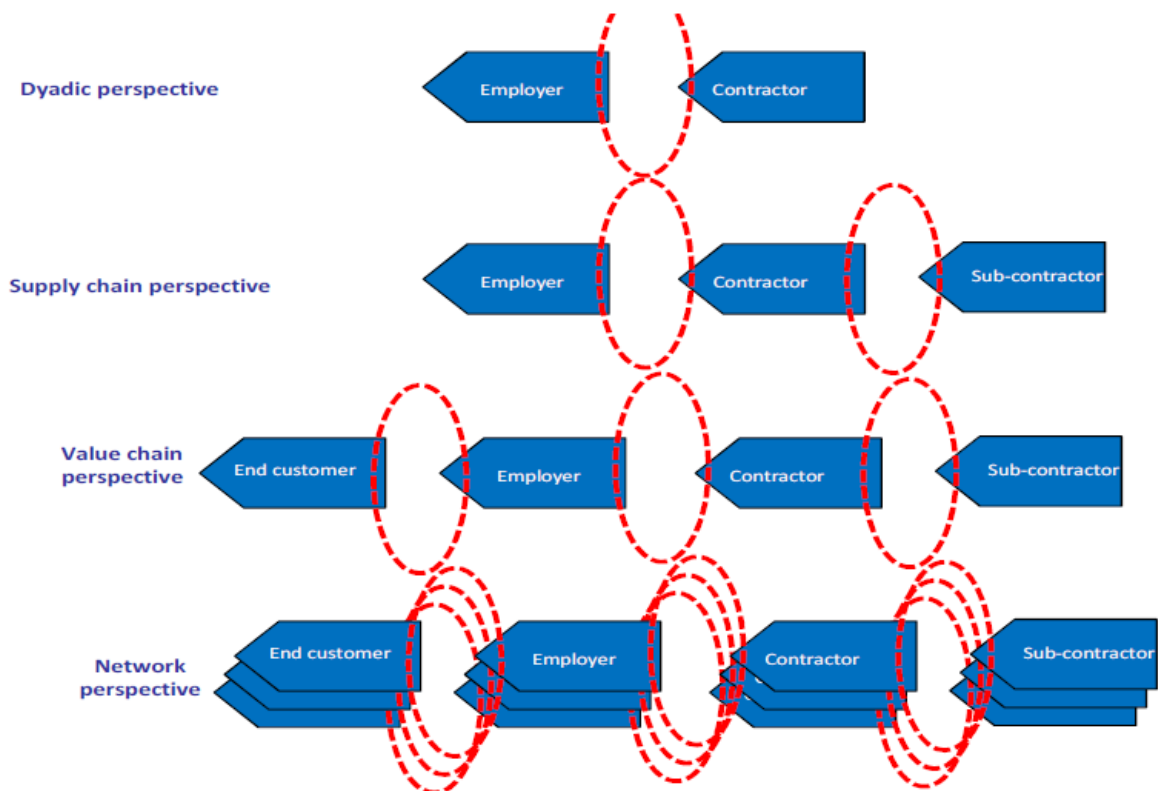


Figure 2.1: Different perspectives on contractual relationships (Source: Van Weele & Van der Puij, 2013)

Knowledge of these four perspectives on contract management is important when designing a contract or when discussing a conflict between parties. The next section discusses skills and capabilities of a professional contract manager.

2.3 Skills and capabilities

Contract management has all the conceptual elements of internal management. It requires strategic planning, leadership, human resource management, financial investment, financial allocation and control, work process analysis improvement, and performance measurement. It also requires that government managers ensure that contractors adhere to many of the same ethical standards that government officials follow. Finally, government contract management requires reporting and control that facilitates contractor accountability to the authority of laws enacted by elected officials (Cohen & Eimicke, 2008).

The fundamental tools of a contract manager include strategic planning, human resource management, information and performance management, financial management, political and media relations, and leadership. The innovation tools include re-engineering, quality management, benchmarking, team management, and contracting. A contract manager must have the skills to address the following issues (Cohen & Eimicke, 2008):

- *What is the work?* In this case, the contract manager must know what he/she doesn't know and be able to tap into technical expertise about the issue being contracted.

- *What skills do we need to perform these tasks, and where do we find those skills?* Once the contract manager understands the work that must be performed, the next step is to find the organizations with the experience and skills to do that work. It also requires experience at understanding the disciplines and skills that are required to perform tasks.
- *How do we ensure that the work is done effectively but at the lowest possible price?* This is the capacity to monitor and evaluate the work. It requires understanding of program evaluation method and results, but also skills at establish informal communication with contractor staff members and customers. Are the outputs being produced the correct ones? Is the organization really producing those outputs in the best possible way? Are the mistakes being made and is the waste that is produced within acceptable parameters? Communication and networking skills are required here, along with skill at quantitative measures and program evaluation. The ability to conduct or at least understand cost-effectiveness analysis is also critical here, as are bargaining and negotiation skills.
- *How do we know the work has been completed?* In addition to factors related to price and informal communication, the effective contract manager must have the capacity to develop, maintain, and utilize a set of performance measures that track contractor performance. These indicators must be linked to incentives, and they must be audited to assure accuracy. To ensure that the contract describes the work that needs to be done, provides incentives to stimulate the work, and tracks its accomplishments, the contract's provisions must be well crafted and enforceable. While the contract manager does not need to be capable of developing contract language, he or she must be able to work with and manage lawyers who develop RFPs and contract terms.
- *How do we know that the outcomes we've produced are the correct ones?* This requires that the contract manager be able to measure outcomes and judge their usefulness. The measurement of outcomes is difficult, and assessing an outcome is inherently subjective (Cohen & Eimicke, 2008).

Today, project and contract management are equal to stakeholder management. As projects have become more multidisciplinary and integrated, the focus in project management shifted from a technical orientation to a stakeholder orientation. Rather than engaging in technical discussions, most of the time of a contract manager goes into aligning communications with stakeholders. If relationships in the construction value chain are not properly managed, these may give rise to all kinds of disputes and conflicts, and even legal claims, which could have been prevented. A good contract can never replace a bad client-contractor relationship (Van Weele & Van der Puil, 2012).

2.4 Discussion: preliminary research framework

In this chapter the most important aspects of effective contract management, which follows from the literature review, are described in a preliminary research framework. This framework, shown schematically in Figure 2.2, will serve as a basis for the development of the diagnostic framework for determining the degree of contract management professionalism. As described before, contract management needs all the conceptual elements of internal management. It requires strategic

planning, leadership, human resource management, financial investment, financial allocation and control, work process analysis improvement, and performance measurement.

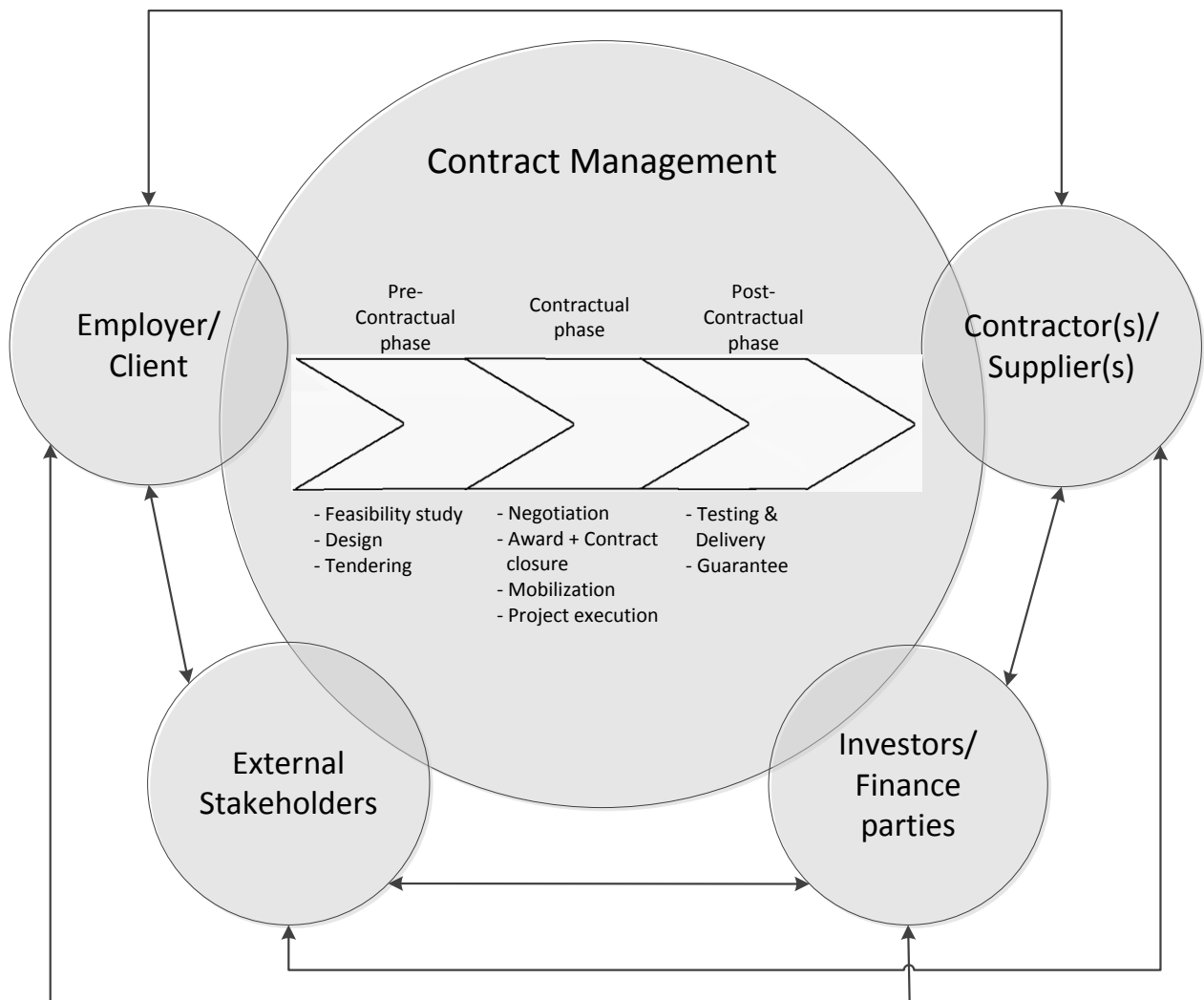


Figure 2.2: Preliminary research framework

First, there are some factors which first have to be present to support effective contract management. This begins with the structure or governance of the specific firm. The contract management team must have the required responsibilities and freedom to perform their activities. It is also crucial that the top management layer recognizes the need for contract management and is supportive towards it. The second remark is that there have to be proper resources available for contract management. This includes contract management team members, but also employees from other disciplines, like the project manager and technical managers. The contract management team should ideally include people involved throughout the business case, bidding and evaluation processes, as they are well versed on the contract and have had the opportunity to establish working relationships with the key contractor/supplier personnel. Proper administration is also an important aspect of contract management. Large construction projects call for many documents and contracts. Many people are using these documents, and along the project lifecycle, additions are made.

Document and information management systems/mechanisms provide easy access for employees to all contract documentation.

To deliver infrastructure projects successfully, some contract management aspects are important. First of all, relationship management is essential. Figure 2.2 shows that contract management has to maintain many direct relationships with stakeholders. As projects have become more multidisciplinary and integrated, the focus in project management shifted from a technical orientation to a stakeholder orientation. Rather than engaging in technical discussions, most of the time of a contract manager goes into aligning communications with stakeholders. If relationships in the construction value chain are not properly managed, these may give rise to all kinds of disputes and conflicts, and even legal claims, which could have been prevented. The contract management team is initiated by the employer to control and oversee the construction project and to represent his own interests. Relationships of contract management are not only limited to the employer/client and (sub)contractors, but also other stakeholders like investors and local government institutions. For example, it could be that local governmental institutions have specific requirements or wishes for parts of the construction facility, which has to be communicated to the other parties. Normally, the local governmental institution has to pay for these changes in the initial design, and therefore they have also a link to the finance parties. These other stakeholders have also relationships with each other, but contract management is at the center of all interactions. This literature review showed that positive relations and trust between different parties in the construction process are contributive to the project result. Furthermore, it is important that the contract manager is involved at an early stage of project development to define (together with the purchasing department) what contract types to use, given the background and technical complexity of the project. It is crucial that the contract manager is involved so early, because the contract management team has specific contractor/supplier information, and could use these early steps to build a solid relationship based on trust with the contractor/supplier. To conclude, the effective contract manager plays also a role in the supplier selection process. It is here where also negotiation skills are needed. But, the challenge for the effective contract manager is less about finding potential suppliers of goods and services and more about developing systems to ensure that contractors deliver the best possible goods and services at the lowest possible price.

Risk management is another aspect which should be mentioned here. It is important to define the possible risks, and to assess the likelihood and the impact of these risks. The contract management team has to communicate these risks with the employer and the contractor(s) in order to make clear who is responsible in different scenarios and how to minimize or overcome the most threatening risks. It has to be noticed that there are different risks during different construction project phases, so this risk identification and assessment activity has to be performed on a regular basis. To identify every known risk, it is important that all parties speak openly about possible shortcomings. Not only does the contract strategy need to provide incentives and safeguards to deal with risks in advance, it needs also to be flexible enough to deal with unforeseen circumstances. To maintain a climate of mutual cooperation, the contract needs to be flexible to deal with these circumstances through mutual agreement and cooperation, not through one party making use of them to make gains over the other. So, proper communication is again important here. Poor communication can result in poorly defined tasks and misunderstanding of what has been agreed, and can lead to unacceptable performance. It can also result in conflict between government and contractor when projects fail. Contract management must set the tone for a cooperative and productive relationship. Frequent

formal and informal meetings, clear milestones, and mutual respect are fundamental requirements for effective inter-organizational relations. This is very important because the length of the contract period and the complexity of the projects make it impossible to secure all scenarios and circumstances that could arise contractually. Contracts must be seen as more 'relational' rather than 'transactional'.

Furthermore, because more responsibilities and activities (i.e. design or maintenance) are shifted towards the contractor these days, the role of the contract management team is evolving. Performance management has become one of the most important aspects of effective contract management. During the realization of the project, the contract management team supports their internal project manager by monitoring the contractors' activities against what has been contractually. This implies that contract managers must also need a basic technical background, and clear and timely assistance (performance data) from the technical team. When the performance of the contractor is sufficient, the contract management team can give orders to pay the contractor. Therefore, contract management must also deal with payments and finance activities. When the contractor is behind schedule, or the quality is below contract standards, the contract management team can decide to postpone payments or to deduct parts of the total sum. The contract manager must identify effective incentives and penalties to ensure that the contractor achieves the desired outcomes.

2.5 Conclusion

After reading this chapter, it must be clear what the concept of contract management implies. The concept of contract management and four contract management perspectives were introduced. Furthermore, contract management skills and capabilities were discussed. The preliminary research framework is the first step in the development of the contract management maturity model and the diagnostic framework for determining contract management professionalism within projects. The next chapter explains the role of the contract management function within Rijkswaterstaat.

3. Contract Management within Rijkswaterstaat

Before the contract management function of Rijkswaterstaat can be compared, it is needed to understand the role and organization of this contract management function within Rijkswaterstaat. This research focuses on contract management within the GPO department (in Dutch: “Grote Projecten en Onderhoud”) of Rijkswaterstaat. This department takes care of improving their networks where this is needed, but also maintenance of their networks is an important part. This is done by realizing large construction projects and maintenance projects. The information in this chapter is based on internal interviews with contract managers and information extracted from RWS documents. A list of interviewees is attached in Appendix B, and the questions which serve as guidance for the interviews can be found in Appendix C.

First, the IPM model is described and explained, which is the basis for project teams within Rijkswaterstaat. This part includes also a description of the contract manager’s role and the other IPM roles. Furthermore, contract management resources within Rijkswaterstaat are discussed. In addition, the most important procedures and mechanisms which are related to contract management are mentioned. Finally, the conclusion summarizes the most important aspects of contract management within Rijkswaterstaat.

3.1 The IPM-Model

Within Rijkswaterstaat, the IPM (Integral Project Management) model³ is developed and implemented for managing all infrastructure projects. The objective of this IPM model is to increase the efficiency of the production processes within the construction sector of RWS (construction and maintenance) by means of more uniformity and standardization in control & management, organization, and staffing of projects. This uniformity and standardization is necessary for:

- A controlled management of projects
- A unified and professional approach of acting towards the market
- An efficient deployment and exchange of employees across departments and services

To achieve these objectives, it is important that uniformity is realized in the organization of the projects. In the past, different initiatives have led to the introduction of this IPM model. Projects within Rijkswaterstaat calls for cooperation between different disciplines. The different (sub) products must be properly aligned, resulted in one integral project result. Therefore, the IPM could be seen as a cooperation model, wherein it is important to seek balance between process control on the one hand, and quality on the other hand. The IPM model is schematically shown in Figure 3.1.

Within this model, the input from all project team members is relevant in order to achieve the desired project results. Nevertheless, a project organization can distinguish between different specific process roles, with a specific contribution for achieving the desired project result and own responsibility. Different disciplines within a project organization which are included in the IPM model are project control, management of environment (stakeholders), technical management, and contract management. The roles, corresponding to these disciplines, are shown in Figure 3.2. Each role leads a team within the project.

³ Rijkswaterstaat: Rolprofielen IPM (1-7-2008)

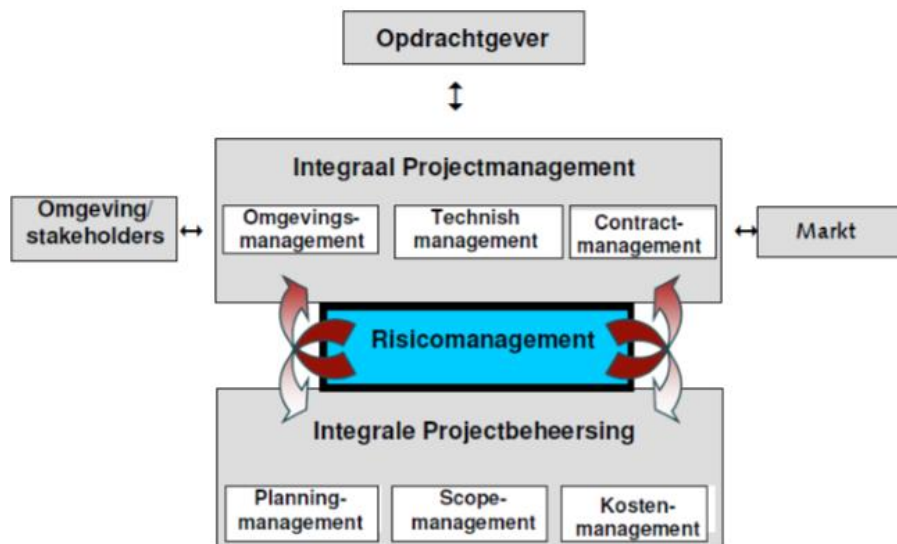


Figure 3.1: IPM model (Source: Rijkswaterstaat: Rolprofielen IPM)



Figure 3.2: Project team roles (Source: Rijkswaterstaat: Rolprofielen IPM)

Dependent on the specific nature and size of the project, the project organization can be complemented with employees who can contribute to the project result using their specific expertise, like procurement specialists.

3.1.1 The contract manager

Contract management can be considered in the broad sense and in the narrow sense. In the broad sense, the contract manager is also involved in the contract preparation process (i.e. selection of contract type, tendering process). In the narrow sense, contract managers are only involved after contract closure.

Contract management within Rijkswaterstaat can be considered as contract management in the broad sense. Contract managers are responsible for managing the entire process from determining the purchasing needs, the preparation of the procurement plan, the preparation of the contract, the public tender, to the management and monitoring of the contract within the scope of time, budget, quality and risks. The contract manager is responsible for the contacts between the market parties, and coordinates the communication between client and contractor. Before Rijkswaterstaat closes a contract with a contractor, it must guarantee that the risks are going to be controlled sufficiently.

These agreements are translated into preconditions which are included in the contract. Contract management must translate the needs from the client and the environment into the best possible option of market utilization and at the same time risks mitigation.

Thus, the contract manager plays not only a role after a contract is closed, but is also important in the preparation phase (i.e. procurement plan and strategy, contract type, selection of contractors). After the contract closure, he monitors the progress and performance of the contractor based on tests and frequent meetings with the contractor. When the operations of the contractor are not in line with the rights and obligations of the contract, the contract manager has to intervene. Furthermore, in case of changed circumstances or unexpected events during a project, the contract manager must find solutions together with all involved market parties and stakeholders. In all of the contract management activities, close cooperation with other project team roles is required. However, external relationships are also important, because the contract manager is the role within the IPM team which has direct relationships with the market. The tasks and responsibilities of the contract manager are listed below.

Tasks:

- The contract manager organizes and leads the procurement team and the contract management team.
- The contract manager takes care of the evaluation and testing of the contractual agreements.
- The contract manager is, on behalf of the client, the contact point for the contractor.
- The contract manager takes care of the preparation for the procurement plan and the procurement strategy.
- The contract manager sets up an assessment/testing plan, based on the risk portfolio.
- The contract manager must execute system tests, process tests, and product tests.
- The contract manager makes sure that risk-based tests are decided, executed, and if needed are followed-up.
- The contract manager considers the findings/results, in response to the tests, and communicates these results with the tester and the contractor.
- The contract manager is in charge of bonuses, discounts and penalties.
- The contract manager is assisted with expertise by other core project team roles when testing diverse contracts under his responsibility.
- The contract manager must come up with risks within his discipline, and he must actualize and control these risks.

Responsibilities:

- The contract manager is responsible for the exploration, preparation, draft, public tender, award and realization of the contract.
- The contract manager is responsible for the market orientation, market exploration, and market consultation according to the internal guidelines.
- The contract manager is responsible for controlling the realization activities based on the agreements of the scope, time, budget, quality and risks.
- The contract manager is responsible for the realization in agreement with the contract scope.

- The contract manager is responsible for contract-technical related products, like market scan, procurement plan and testing plan.

3.1.2. Other project roles

This research focuses on the role of the contract manager. For good understanding, it is also needed to know something about the other IPM roles. The roles are strongly related with each other and cooperation is needed to achieve results. Therefore, the other IPM roles are introduced here in short. For a detailed description of the other roles, the reader is referred to Appendix D. The relationships and dependencies between the project roles are described in Appendix E.

Project manager

The Project manager is responsible for the realization of the project within the predefined conditions. This role is held liable by the internal client for the project result. The project manager leads the project team and manages the overlap between roles. Another task is the stimulation of the team process and strengthen the teamwork. The project manager has an intermediary role between the internal client, the line organization and the project organization.

Manager project control

The manager project control (*in Dutch: 'manager projectbeheersing'*) ensures project control over the aspects scope, time, budget, risks, information, documentation and reporting. Careful project management means that for every moment in time, the state of the quality, costs, time, and scope of the project has to be clear. Steering is based on risk management. The manager project control and the risk manager, which is not one of the five IPM roles, are responsible for the processes regarding risks (i.e. risk meetings). Controlling these risks falls under the responsibility of the environment manager, technical manager, and contract manager.

Environment manager

The environment manager (*in Dutch: 'omgevingsmanager'*) takes care of the managerial and social embeddedness of the project. This role intermediates between the (project) organization and the stakeholders in the project environment. Public networking is essential for this role. The environment manager tries to seek understanding in the environment and to establish an effective cooperation with stakeholders. This role must also identify issues from the environment which can have an influence on the quality of the project.

Technical manager

The technical manager (*in Dutch: 'technisch manager'*) is responsible for the technical quality and safety in all phases of the project. This role is focused on realizing the desired technical result for the client. Furthermore, the technical manager translate the scope of the project into technical requirements and specifications for the market. He also contributes in technical aspects for the different tests (system, process, and product) in direction of the market parties in the realization phase. It is obvious that this role must have close cooperation with the environment manager and the contract manager. Risk management plays an important role too.

All of the IPM roles manage the 'going concern' within their own discipline, identifying opportunities and risks for the projects and take initiative on this. They are responsible for the execution of the

project for their work processes and the therefore necessary cooperation with other roles. This IPM model is within RWS the basis for all infrastructure projects, both in the preparation phase and the realization phase. Per each specific project, the project manager and the internal client determine the optimal implementation. Deviations of the IPM model should be included in the project plan explicitly.

Now the role and the organization of contract management within Rijkswaterstaat is clear, the next section describes the contract management resources.

3.2 Resources

Rijkswaterstaat has about 40 contract managers within the GPO department. They are housed in the procurement and contract management department. Contract managers within Rijkswaterstaat have different backgrounds. There are contract managers with more focus on the pre-contractual phases, but also contract managers which focuses on the realization phase. Besides, there are contract managers which are managing the project strongly on the contract, but also contract managers which are more focused on the relationship with contractors. The literature review indicates that continuity of contract management involvement is very important. The exchange of a contract manager within a project team is not recommended. On the other hand, contract managers within different project phases have to use different competencies. Within the first phases, the role is more focused on developing procurement strategies, selecting contractors, and closing the contract. In the execution phase, the focus is on controlling the realization process of the contractor. So, it is not necessarily needed that the same person performs the role of contract manager in all phases of an infrastructural project. It is important that the contract management function plays also a continuous role in the procurement and contracting process, and not only after the contract is closed. Within Rijkswaterstaat, there are often different contract managers responsible for different project phases.

Contract managers within Rijkswaterstaat must have a lot of experience in construction projects. It takes time to gain experience, because these large infrastructure projects normally last more than 5 years. Furthermore, relationships/communicative skills, negotiation skills, leadership skills, and an anticipating and forward-looking attitude are required. At this moment, it is a challenge for Rijkswaterstaat to find competent contract managers for all projects. Some contract managers are transformed from other IPM roles, but also external contract managers are hired.

Previously, the composition of the IPM team was merely based on the availability of employees who represents different IPM roles. Recently, a composition mechanism is developed which can be used to find matching IPM roles within a project team. Rijkswaterstaat uses colors to describe the characters of employees. This helps also in composing a constructive IPM team. Furthermore, it is important to take the specific project environment in mind when selecting a contract manager. Different contract types, higher complexity, and the nature of a project call for other types of contract managers.

Knowledge sharing is an important way of increasing the performance of contract managers. This is not always easy to accomplish, because normally the contract managers are placed physically at the project site. To stimulate knowledge sharing, Rijkswaterstaat has different programs initiated. At this moment, there is a masterclass contract management. Within this masterclass, different topics regarding the role of contract management are discussed within a group of 20 contract managers. In addition, Rijkswaterstaat has also an expert group and a knowledge group, consisting of contract

managers. These groups play an important role in identifying best-practices, and setting up and/or evaluating guidelines or processes.

3.3 Procedures and mechanisms

Rijkswaterstaat has a whole range of procedures in order to standardize their operations. This section will explain the most important ones in relation to contract management.

- *‘Werkwijzer aanleg’⁴*: This document includes procedures and guidelines, lessons learned, and best practices for the entire construction process of infrastructural projects. The objectives of this document are continuous quality improvement of project management and more uniformity in construction projects. The ‘werkwijzer aanleg’ is intended for all employees in construction projects, both in the line organization and the project organization.
- *IPM model*: This model, described in section 3.1, differentiates five roles, for which all tasks and responsibilities are stated in a report. This model serves as basis for project teams. It must be clear before the project start which role is responsible for which activities. Also the relationships and dependencies between the IPM roles are described.
- *Gate review/KAD*: During a project, there are a couple of gate reviews which have to be passed. These gates must control the quality, risks and lessons learned in different phases of the project. Figure 3.3 shows these different gates. Next to the gate review, there is a KAD (“kwaliteit aanbestedingsdossier”) test. The aim of this test is to increase the quality of the public tender. The gate reviews are focused more broadly on project management and risks in different phases of a project, while the KAD is purely focused on the tendering process and the contract.

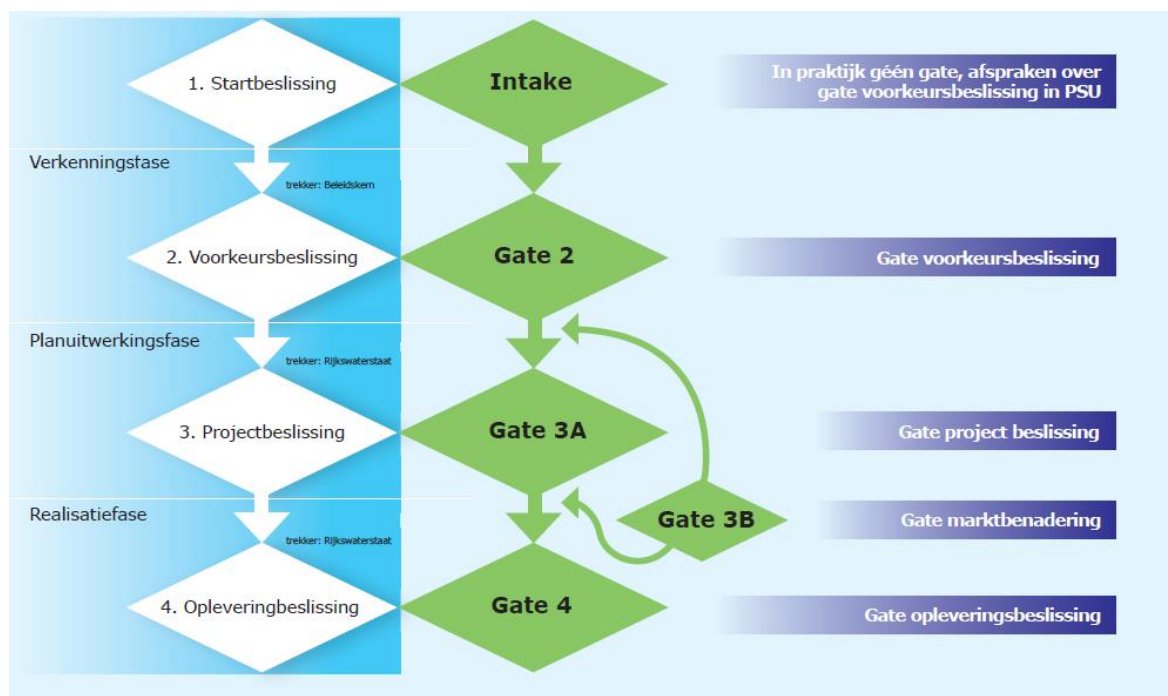


Figure 3.3: Gate reviews (Source: Presentation Masterclass Contract management 24-04-2013)

⁴ Rijkswaterstaat: Werkwijzer Aanleg Deel 1: Sturing en Beheer (December 2011)

- “*Systeemgerichte contractbeheersing*”⁵ (SCB): Rijkswaterstaat moves the responsibility for the realization as much as possible to the contractor(s). SCB implies that the contractor controls his own performance level and must prove to Rijkswaterstaat that he meets the requirements. In this way, Rijkswaterstaat can act as a coordinating company, and keeps control from a distance. To check if the contractor adheres to the contractual obligations, Rijkswaterstaat performs risk-based system tests, process tests, and product tests on the contractor operations. The results say something about the functioning of the contractors project management and quality management. Based on these outcomes, the risk profile for Rijkswaterstaat is updated. This process has a lifecycle of 8 weeks and is repeated until the project is finished. Figure 3.4 shows SCB schematically.

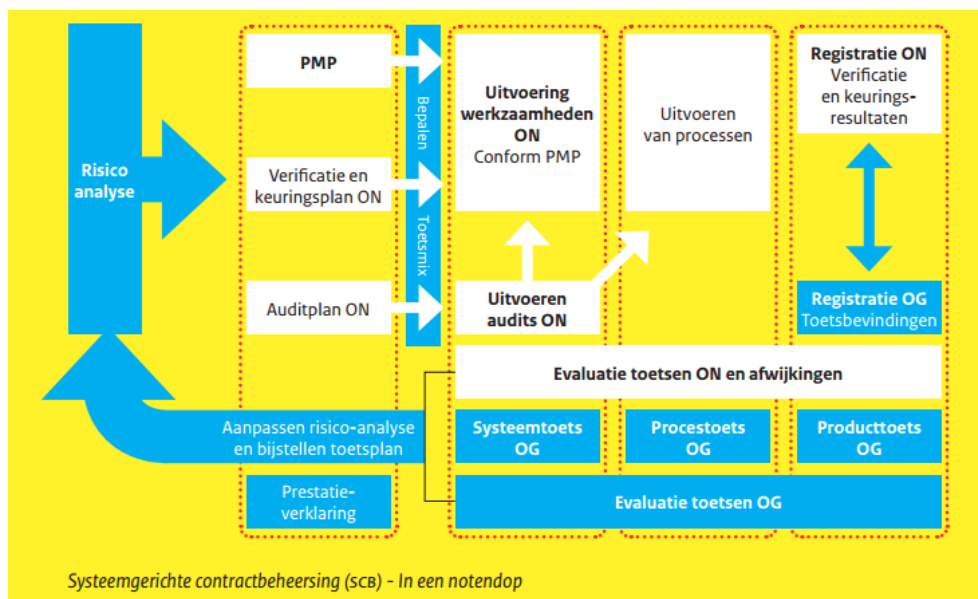


Figure 3.4: “Systeemgerichte contractbeheersing (SCB)”

- **Contracts buffet:** Rijkswaterstaat makes use of standard contracts (sections), developed by internal specialists. In this way, not every contract has to be drawn from scratch. This results in more standardized contracts which is also beneficial for contractors.

Finally, Rijkswaterstaat uses a document management system, called Hummingbird, which helps to archive documents in a structured way. Furthermore, they use some tools (VTW tool, URSCB tool) to standardize operations. Further elaboration of these tools is not necessary for this research.

3.4 Conclusion

Contract management within Rijkswaterstaat has an important role. Contract managers are one of the five IPM-roles in a project team. They are responsible for controlling the entire process of contract preparation, public tendering and project execution. So, the contract managers play also an important role before the contracts are closed. After the contract closure, the contract manager will monitor the rights and obligations of the contract, and must intervene when this is needed. This chapter further discussed contract management resources within Rijkswaterstaat, and the most important procedures and mechanisms which are related to contract management. The next chapter will compare the contract management function of Rijkswaterstaat with three other companies.

⁵ http://www.rijkswaterstaat.nl/images/SCB%20anno%202011_tcm174-333026.pdf

4. Inter-organizational Contract Management Analysis

Before the contract management professionalism within projects of Rijkswaterstaat is considered, the contract management function of Rijkswaterstaat will be compared with three other companies. This chapter focuses on a contract management benchmark between Rijkswaterstaat and the companies Shell, Fluor, and Ballast Nedam. The first part of this chapter describes the contract management function of these three large companies. In addition, a contract management maturity model (CMMM) is composed to score the contract management function of each company. A detailed description and the results of this CMMM are given in the second part of this chapter. Together with the description of the contract management function of Rijkswaterstaat in the previous chapter, it is possible to discuss the differences and similarities between the companies in the discussion section. Finally, the conclusion summarizes the most important insights.

4.1 Contract management within other companies

This section explores the contract management functions of Shell, Fluor, and Ballast Nedam. The information is obtained through informal interviews. As described before, a list of interviewees can be found in Appendix B. The agenda for these interviews is attached in Appendix F. Four categories are used to describe the contract management function; (1) the role of contract management, (2) structure and organization, (3) resources, and (4) procedures and mechanisms.

4.1.1 Shell

Shell is a multinational oil and gas company headquartered in The Hague, Netherlands. The company is active in every area of the oil and gas industry, including exploration and production, refining, distribution and marketing, petrochemicals, power generation and trading. It is the biggest company in the world in terms of revenue. It has operations in over 90 countries, produces around 3.1 million barrels of oil equivalent per day and has 44,000 service stations worldwide.⁶ Because of the different activities and the size of the company, good contract management is essential. This section will describe the contract management function of Shell, using 4 categories; the role of contract management, structure and organization, resources, procedures and mechanisms.

The role of contract management

Within Shell there are various parties involved in contract management, both in the business and in Contracting and Procurement (CP). Every business has their own contracting & procurement department, like for example projects (+/- 400 employees). This department focuses on strategy developing for projects in the areas of contracting & procurement, like outsourcing, but also the development of standards (best practices, model contracts, tools etc.). In addition, other activities of this department are governance and assurance of contract management. A central small group of some 10 employees, called Contracting Discipline team, is ensuring that all processes and standards regarding contracts are clear across Shell and across the globe. They check if the employees who manage contracts have the right competences, provide contract management training and own the contracting process across Shell. The contract holder (project leader) is responsible for (daily) contract management, and the procurement department (contract engineer) guarantees the quality of these activities. The contract holder is involved in the pre-award phase, but mainly active during the post-award phase of the contract.

⁶ <http://www.shell.nl/>

Structure and organization

As described before, within Shell there are various parties involved in contract management; the contracting & procurement departments in the various businesses, like in projects, and the central contracting discipline team. A remark here is that Shell doesn't use the terminology of contract managers, but mostly contract specialists or contract engineers. The daily contract management activities are performed by the contract management team. Shell is focusing on the biggest contracts, independent whether they are in Upstream, Downstream businesses or in Projects. The reason why Shell is not only interested in contract management for projects, is the fact that they spend approximately the same amount of projects capital investment (30 billion US dollars) on run & maintain (35 billion US dollars). All contracts are segmented as either operational, tactical or strategic. Most contracts are operational contracts. Shell aims at allocating most resources to the strategic and tactical contracts, and in standardizing the operational contracts. To give an idea, for operational contracts it is not surprising when someone manages 50 contracts, for strategic contracts this may well be just three. Thus, the segmentation of contracts helps Shell to prioritize the contracts. The cost of contract management activities are indirectly allocated to the business.

Resources

The ideal profile for a contract manager (either holder or engineer, Shell don't use the term contract manager) within Shell is someone with a lot of experience, good commercial and negotiation skills, and relationship and leadership skills. It is not needed for a contract manager to have a lot of legal knowledge. When there are claims, the contract manager must involve a lawyer. When the competence of the contract specialists at Shell is not sufficient, training is provided. It is sometimes difficult to allocate employees (contract managers) to projects as a typical project in Shell lasts 8 years (3 years preparation, 5 years execution). It can be imagined that it takes many years for employees to have experience with all of the project phases. Besides, the location of these projects is not always deemed attractive (Alaska, Russia, at sea etc.).

Procedures and mechanisms

Shell has developed a 'wiki' including best practices about contract management and have also a contract management system (SciQuest), where all information about Shells' contracts can be found. Besides this contract management system, Shell uses model contracts (standardized contracts) which can be used for the procurement of common materials or services, like consultancy. When someone deviates from a model contract, the approval of the Legal department is required. This is not the case when using model contracts. They have also a system to create these model contracts (Model contracts library).

Frequently, the CP projects department audits the performance of contract management in the field (at projects). The competences of contract managers are audited objectively every year. When the quality is not sufficient, training and support is provided.

For large and/or complex projects, there are Value Assurance Reviews (VARs) at every stage-gate. These VARs are reported out to a contract board. This board consists of people from CP projects, project management, Finance, Project engineering, and Legal. This contract board is the last step before going to the market. It is crucial for Shell that the contract board takes the right decision. An

incentive for the project team to involve the CP projects department is the fact that the CP project department must give advice to the contract board.

In Shell there are three lines of defense for contract management: (1) daily supervision by line manager, (2) functional audits (CP projects/contracting discipline), and (3) independent internal audit of contracts.

4.1.2 Fluor

Fluor is one of the biggest companies of the world in the field of engineering, procurement, construction, maintenance en project management. Fluor executes many of the world's most successful and challenging projects. Clients of Fluor can be found in the oil, gas, chemical and petrochemical industries, but also in telecommunication and infrastructural projects⁷. For Fluor, the contract management function will also be described using the 4 categories.

The role of contract management

Fluor's contract managers support the full scope of pre-award and post-award contracting activities. The contract manager must ensure that all stakeholders adhere to the contractual agreements. When this is not possible anymore due to circumstances, he must find a solution in consultation with all stakeholders. The project manager and the contract manager are essential in successful project management. Managing the contract is a crucial activity in managing the project. Contract management within Fluor aims to prevent contract changes. In addition, a contract manager monitors the progress and performance during meetings. He is the link between various stakeholders and has to canalize/organize the communication between these stakeholders; he has to monitor the invoices with project controls, obtain the right verifications and validations for delivered work, and ensure the right checks and balances. This is only possible when the contract manager has detailed knowledge of and affinity with the project. To summarize, essential aspects of managing contracts within Fluor are the following:

- Clear project specifications including costs
- Clear project execution plan including continuous risk management process
- Clear change management process
- Clear internal and external communication procedures
- Solving conflicts: before the actual start of the project, stakeholders must discuss how to solve or overcome conflicts

The contract manager has a supportive role towards the project leader/director, but has own responsibility in strictly following procedures and guidelines.

Structure and organization

For every project performed by Fluor, they appoint one project director and one contract manager. Other Important project team members are the engineering manager, the business services manager (budget and schedule) and the construction manager. In a central office location contract managers are part of the department Operations. Fluor attaches importance to the fact that the project

⁷ <http://www.fluor.com>

director and contract manager are internal employees. The contract manager is involved early in the process starting at the tender phase. The team which is responsible for acquisition in the tender phase, is normally also the team which will lead the execution after the award. In this way, problems with knowledge transfer are minimized and there is continuity in the contract management function in the different project phases. The project team itself has to make budget available for contract management resources.

Resources

Within Fluor contract managers normally have a history in project controls/cost estimation or project engineering, it is not needed for a contract manager to have extensive legal knowledge as this can be acquired from the in-house legal department. Experience is an important requirement, together with a pro-active attitude. A contract manager must look at the overall picture.

Fluor operates a web-based system, called Knowledge Online, in which all Fluor employees can share knowledge and experiences. Every business domain, including contract management, has its own Knowledge Managers and Global Excellence Leaders.

Procedures and mechanisms

Fluor's proven project execution processes and systems offer a full spectrum of integrated business management tools, from design to commissioning, using real-time portals and dashboards. The most important ones are the Operating System Requirements (OSR) and the Operating System Implementation Plans (OSIP). These are worldwide procedures and rules ('practices'), which are mandatory for all Fluor activities. Furthermore, contract managers are to use a web-based global Contract Management system. Finally, Fluor also makes use of standard model contracts. So, for commonly used services or products, the contracts are standardized. Any deviation on a subset of clauses in such standard contract format is to be specifically approved by the Fluor legal department.

The contract management activities are tested by periodic (international) audits. Besides, every contract, before signing, must be approved by the Legal department. Furthermore, for all projects there are regularly risk review sessions in which also the performance and the progress of contract management will be evaluated.

4.1.3 Ballast Nedam

Ballast Nedam has a leading position in construction and infrastructure. The company operates mainly in the Netherlands on integrated and other projects for companies, public authorities and housing consumers, in the fields of mobility, housing, employment, leisure and energy. Ballast Nedam operates internationally in various areas of expertise. Ballast Nedam supplies project, process and contract management in the development, implementation and management phases. The company also provides specialized know-how and skills, and semi-finished and finished products. Ballast Nedam achieved a turnover of over 1.4 billion euros in 2010, merely realized in the Netherlands. On average, there were approximately 4,000 employees working in our various business units this year⁸. For Ballast Nedam, the contract management function will also be described using the 4 categories.

⁸ <http://www.ballast-nedam.nl>

The role of contract management

A contract manager within Ballast Nedam (BN) has a different scope. In this company, contract managers represent being a contract specialist and advisor. Contract management within BN has not final responsibility, because contract management has an advisory role. The responsibility for contract issues is still part of the project team. The role of a contract manager within BN consists of two main activities. The first is monitoring and securing the rights and obligations based on the contract. The second activity is the handling of contract changes and claims. In many companies, the emphasis of CM is moving towards contract changes and claims, but professional contract management can also be only properly monitoring of the contract. Professional contract management aims at minimizing the amount of claims (optimal is no claims). Furthermore, another task of contract management is to keep track of missed opportunities. In large projects, the specifications can change, or the contractor has to perform additional activities. Contract management must try to charge the employer for these additional activities. In this situation, a good documentation is essential, otherwise after a while it is unclear which activities were performed by whom. Within BN, they make a distinction between operation, tactical, and strategic contract management activities. Operational activities are the activities which have to be performed or executed in the upcoming weeks, the daily contract administration. Tactical activities are activities with a horizon of 6 months. Strategic activities have a horizon of 1 year or longer. Senior contract managers are mostly deployed on tactical and strategic contract management. At this moment, the contract administration is performed by project team members. As a last remark, contract management within BN only manages the contracts regarding the projects. Other contracts, like ICT contract for instance, are managed by the ICT department themselves.

Structure and organization

Contract management within Ballast Nedam is housed in the Legal department. So, this means that there is one integral department for contract managers, lawyers and insurance managers. The contract managers can be deployed in all clusters of Ballast Nedam, like INFRA or BOUW. The Legal department serves as a staff department for project leaders. The decision to put all contract managers within the legal department is mainly based on the historical aspects and growth of the company. This integral department is very suitable for sharing knowledge and experiences between contract managers. Most of the contract managers within other companies have a lot of experiences, but they don't have a platform to share this knowledge. First, some project leaders of BN were skeptic towards the use of contract managers. They did not know the value of contract management, because these contractual issues are always handled by themselves. Only when there were problems, they turned to contract managers. At this moment, contract management within BN has not only a reactive focus anymore (solving problems/conflicts), but participates pro-active in project management. This is not the case in all clusters of BN. The board of directors is very enthusiastic about contract managers, but the use of contract management is not obligated for project leaders. Therefore, Legal department must convince some of the project leaders of the added value of CM. The costs of the use of contract management are allocated to the projects themselves, so the project leaders have to make a budget for the use of contract management. This is another reason why it takes time before contract management is company-wide accepted and used.

Resources

For Ballast Nedam, technical background and competences are the most important aspects for contract managers. Legal components can be more easily acquired afterwards. Because of the integral contract management department (Legal), contract managers are continuously developing legal knowledge through direct contact with lawyers. In addition, there is a strong believe that the best contract managers are the ones that are trained and educated by BN self. The optimal profile for the job of contract management is an employee with at least 7 year of experience in the field. The advantage of this approach is that these self-educated contract managers are familiar with the internal organization of BN, but they possess also knowledge about the field and problems and complexity which is involved in large projects. The role of BN within this education program, is mostly focused on the legal aspects. Because the new contract managers most have at least 7 years of experience, they are already technically grounded. According to BN, the quality of these self-educated contract managers is generally speaking higher than recruiting others.

Within the 18 contract managers of BN, there are still differences. There are contract managers who are more focused on relationships, but also contract managers who are sticking very strictly to the contract. Other contract managers are very competent in contract changes or claims. This variety ensures that BN can deploy the right contract managers for different situations. To stimulate internal knowledge sharing, the Legal department initiates frequently an internal training session (90 minutes) for contract managers. This training is obligated for junior contract managers and lawyers, but voluntary for senior contract managers. The subjects of these sessions range from experiences, lessons learned, to negotiation skills training. This will lead to a common practice. Contract managers with a lot of experience, like project leaders of previous projects, are deployed to bigger and more complex projects, while junior contract managers start with easier cases.

Procedures and mechanisms

Ballast Nedam uses a document management system (SharePoint) to share and store the contract documents. Furthermore, there are no other specific contract management systems.

At this moment, there is no manual or handbook for contract management within Ballast Nedam. From 2013, the head of contract management is planning to combine all the contract management information and experiences in handbooks and procedures. In this way, contract management will always make part of the process when complex or large contracts are considered. There are already procedures for contract management in place. In the case of big tenders, the purchasing department must request advice from the Legal department. In this way, no important tender will keep out the sight of contract management. This procedure, together with others like contractual kick-off and contract transfer, are not described on paper yet.

A couple of years ago, Ballast Nedam developed a handbook for contract administration for contractors (“contractbeheer voor aannemers”). This handbook consists of information, tools and checklists about daily contract management activities for projects. This is needed, because it is not obligated for project leaders to make use of contract managers. In other words, there are contract management activities which are performed by project team members. With this handbook, the quality of the operational contract management activities is secured. In addition, this information is educated by senior contract managers. This is an important aspect of contract management within

BN. Because there are only 18 contract managers, it is obvious that not all contract management activities can be performed by these employees. So, the daily contract administration will be performed by the project teams, which are trained by senior contract managers. In addition, BN makes use of many standard contracts. These standard contracts can be used by purchasers and project members without the approval of the Legal department. Within the Legal department, there are also sample models, which are adapted for the specific demand and project.

Finally, Ballast Nedam makes use of so-called RASCI matrices. A RASCI-matrix shows for different activities the role of a department. Different roles in this matrix are responsible (R), accountable (A), support (S), consulted (C), and informed (I). Ballast Nedam is very positive about this tool. The advantage is that at the beginning of a project, all stakeholders can meet and discuss about the different roles for which activities. In this way, it is very clear for every department what will be expected from each other. The quality of contract management activities is checked through contractual audits and KAM audits. In addition, Ballast Nedam has an internal assessment system, in which feedback about contract management from directors and project leaders is included.

4.2 The contract management maturity model (company-level)

To compare the contract management functions of the four companies in a quantitative way, a contract management maturity model (CMMM) is composed. First, this section gives a description of the model and the development process of this model. Thereafter, the results of the CMMM are shown for the four companies.

4.2.1 Description

Maturity models have been designed to assess the maturity (i.e. competency, capability, level of sophistication) of a selected domain based on a more or less comprehensive set of criteria. The most popular way of evaluating maturity is a five-point Likert scale with '5' representing the highest level of maturity. These models are used as an evaluative and comparative basis for improvement and in order to derive an informed approach for increasing the capability of a specific area within an organization (De Bruin et al., 2005). In this research, such a maturity model is composed to rank the maturity of contract management within Rijkswaterstaat and the other three companies.

The entire contract management maturity model is attached in Appendix G. This maturity model consists of 9 categories with corresponding statements about contract management. These categories are introduced below, together with a description.

- **Planning and governance:** This category is focused on preparing for contract management and providing oversight.
- **Resources:** This category is focused on ensuring that the right people are in place to carry out the contract management activities.
- **Documents and information management:** This category is focused on managing the physical contract.
- **Relationship management:** This category is about developing strong internal and external relationships that facilitate delivery.
- **Performance management:** This category is focused on ensuring that the service is provided in line with the contract.

- **Payment and incentives:** This category is about ensuring that payments are made to the supplier in line with the contract and that appropriate incentive mechanisms are in place and well managed.
- **Risk management:** This category is about understanding and managing contractual and supplier risk
- **Contract development:** This category is focused on effective handling of changes to the contract
- **Market aspects:** This category is about managing the wider market issues that have an impact on the contract, but lie beyond the supplier.

For every statement, the respondents must provide a score from 1 (poor) to 5 (excellent). These scores are related to a maturity level for contract management.

1 = poor	Level 1: Ad-Hoc The lowest level of contract management process maturity is the “Ad-Hoc” level. At this level, there are no contract management controls or processes in place, or if they are present, they are very poorly managed. Organizations that exhibit an “Ad-Hoc” maturity capability do not have organizational wide established basic contract management processes.
2 = below average	Level 2: Basic The second maturity level in the CMMM is “Basic.” This level implies that there are some controls or processes in place, but ineffective. An organization at this level has some basic contract management processes and standards established within the organization, but these are not required on all contracts.
3 = average	Level 3: Structured The third maturity level in the CMMM is “Structured.” An organization with a “Structured” maturity rating has reasonable controls or processes in place, but major improvements are required in most areas. At this maturity level formal documentation has been developed for its contract management processes and standards, some of which may be automated.
4 = good	Level 4: Integrated The fourth maturity level in the CMMM is “Integrated.” Organizations at this maturity level have good contract management controls and processes in place. Management understands its role in the procurement management process, and contract management processes are integrated with other organizational core processes. However, some areas could be improved substantially.
5 = excellent	Level 5: Optimized The highest level of contract management maturity that an organization can be rated using the CMMM is, “Optimized.” An organization operating with a contract management process at the “Optimized” level evaluates the contract management processes periodically using efficiency and effectiveness metrics. Very good controls and processes are in place and continuous improvement is sought to meet evolving best practices.

This contract management maturity model is merely focused on the stage where a contract has been signed and the service is up and running. It does not cover the tendering/contract award stage or some of the specific issues that arise when a contract expires or is terminated.

The results of this contract management maturity model can help a company to get insights about the maturity of their current contract management function, which is an indication of contract management professionalism. It is also useful for creating a benchmark with other companies. However, this model cannot be applied to determine contract management professionalism within a project lifecycle. This CMMM examines the contract management function at a higher level. To determine contract management professionalism within projects, a diagnostic framework is developed later in this research.

4.2.2 Development process

This section will describe the development process of the contract management maturity model. As described in the Research Methodology, a couple of sources were used to compose this CMMM.

First, the search engine Google was used to explore the Web for contract management assessment models or comparable documents. This resulted in the following relevant documents:

1) Good practice contract management framework⁹, by National Audit Office, December 2008

This framework is a good practice guide for managing a broad range of contracts. It is particularly relevant for contracts where services are delivered over a long period of time (five years plus) where customers need to ensure that service levels and value for money are maintained over the duration of the contract. The framework consists of 11 categories with corresponding statements about contract management activities.

2) Contract management self-assessment¹⁰, by National Treasury, August 2010

This self-assessment is designed to assist institutions to determine the current status quo with regard to contract management practices in the context of enterprise wide contract management.

3) Contract management maturity model, by dr. René Rendon¹¹;

The content of this document was not very useful for the CMMM, because it was focused on the contract management processes until the contract closure. It was developed for determining contract management maturity within the US Army. However, names and definitions of the contract management maturity levels were also applicable for this model.

The contract management aspects in document 1 and 2 were quite similar. This information served as basis for the contract management maturity model, and had also many similarities with the important contract management aspects found in the literature. To check for the completeness of the model, the prototype of the model is discussed during the three interviews with Shell, Fluor, and Ballast Nedam. Based on these interviews, the model was slightly adapted into a final version. This final model was ready for use.

⁹ <http://www.nao.org.uk/report/good-practice-contract-management-framework-2-2/>

¹⁰ <http://oag.treasury.gov.za/Publications/16.%20Contract%20Management/Self-Assessment/Contract%20Management%20Self%20Assessment%20-%20Ver%201.pdf>

¹¹ Model obtained by e-mail contact with dr. René Rendon

4.2.3 Data collection

For the data collection of the contract management maturity model, this research made use of a Microsoft Word document. In this document, the respondent could score all statement from 1 (poor) to 5 (excellent). The CMMM was sent to the different respondents by e-mail.

For Shell, Fluor, and Ballast Nedam, the contract management maturity model was completed by the same person who was interviewed. So, for these companies, only one completed model was obtained. For Rijkswaterstaat, the CMMM was sent to 9 contract managers. This resulted in 6 completed models. These 6 results were combined into one final score for Rijkswaterstaat (the score which was mentioned the most was chosen as the final score for a statement). The results of the contract management maturity model will be discussed next.

4.2.4 Results

This section will describe the results of the contract management maturity model for the four companies. First, the maturity score for Rijkswaterstaat is described. Thereafter, the maturity level scores for Shell, Fluor and Ballast Nedam are shown. Because Rijkswaterstaat is the main company in this master thesis, these results are described more extensively. The results per category for each company are shown in Table 4.1. The detailed scores for each statement can be found in Appendix G.

Table 4.1: Contract management maturity model results per category (scale 1 to 5)

Category	RWS	Shell	Fluor	Ballast Nedam
Planning and Governance	3,4	4,3	4,1	3,8
Resources	3,1	3,9	4,6	4,8
Document and information management	3,3	3,8	4,3	3,8
Relationship management	2,8	4,0	3,8	3,7
Performance management	3,2	3,9	4,0	4,1
Payment and Incentives	3,8	4,0	4,6	4,6
Risk management	3,3	3,6	4,6	4,6
Contract development	3,7	4,1	4,2	4,8
Market aspects	2,8	4,2	4,3	4,1
<i>Average</i>	3,2	4,0	4,3	4,2
Maturity Level	3	4	4	4

Rijkswaterstaat

The results of the contract management maturity model of Rijkswaterstaat are schematically shown in Figure 4.1. Overall, the contract management maturity model score for Rijkswaterstaat is 3,2. So, it can be concluded that Rijkswaterstaat has a maturity level 3: “Structured”. As described before, an organization with a “Structured” maturity rating has reasonable controls or processes in place, but major improvements are required in most areas.

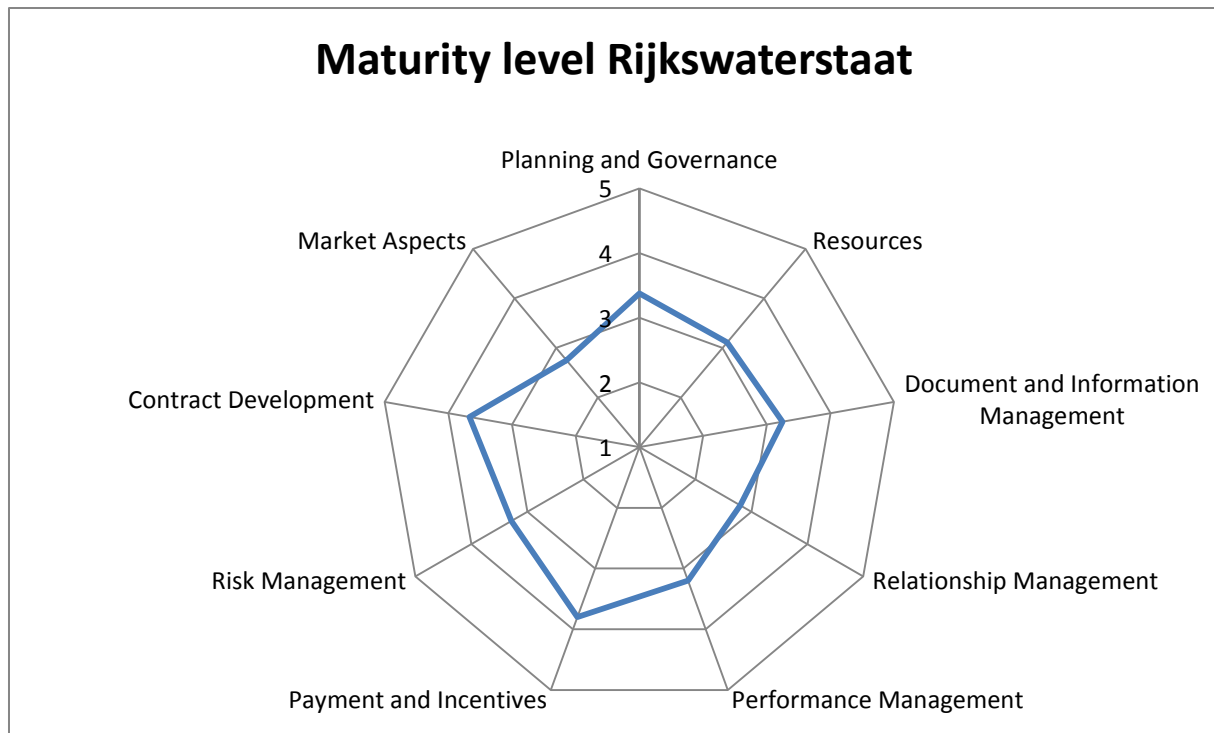


Figure 4.1: Contract management maturity model score for Rijkswaterstaat

The categories which scored the best are Payment and Incentives (3,8) and contract development (3,7). For these two categories, Rijkswaterstaat has almost maturity level 4. The categories which have the lowest scores are Relationship management (2,8) and Market aspects (2,8).

The following statements are scored the lowest (score 2 = below average):

- Regular assessment and evaluation takes place to ensure the quality of contract management activities.
- Knowledge management is embedded, capturing key data and lessons from contract management process and experience both within the organisation and more widely
- Contract managers have accurate job descriptions, roles are positioned at an appropriate level and salary, and there is a career path for contract management staff.
- Problem resolution processes are well defined and used, and are designed to ensure minor problems do not escalate and cause relationship issues; a 'blame culture' is avoided (for example, through the use of a 'relationships charter' or similar document).
- Relationships between stakeholders are evaluated after project realization in order to create a learning cycle
- If there are contracts which would benefit from a strategic relationship with the supplier, buyer or other stakeholders, processes are in place for stakeholder development and relationship management with a view to deliver benefits to all parties.
- The general market (outside of current suppliers, buyers and other stakeholders) is monitored for market trends and compared to performance of current stakeholders
- For key suppliers and/or buyers, the contract manager monitors the financial health, performance, tax compliance and contract performance.

- Market intelligence is used to maintain an understanding of the market and of alternative suppliers (to inform benchmarking, contingency planning and re-competition strategies).
- There is on-going evaluation of emerging technologies and practices, and identification of opportunities from both immediate and parallel market sectors.

Many of the statements above are focused on evaluating contract management processes and capturing key data and lessons learned. To increase the maturity level of the contract management function of Rijkswaterstaat, these activities have to be improved definitely. As a last remark, it has to be noticed that Rijkswaterstaat is a government institution. This implies that it is not very easy to establish long-term relationships with contractors, because Rijkswaterstaat is not allowed to use past performance of contractors to select them. Every company must have equal chances to win the public tender. This could be a reason for the low scores for Relationship management and Market aspects.

Shell

The results of the contract management maturity model of Shell are also shown in Figure 4.2. The average contract management maturity model score for Shell is 4,0. So, it can be concluded that Shell has a maturity level 4: “Integrated”. Organizations at this maturity level have good contract management controls and processes in place. Management understands its role in the procurement management process, and contract management processes are integrated with other organizational core processes. However, some areas could be improved substantially.

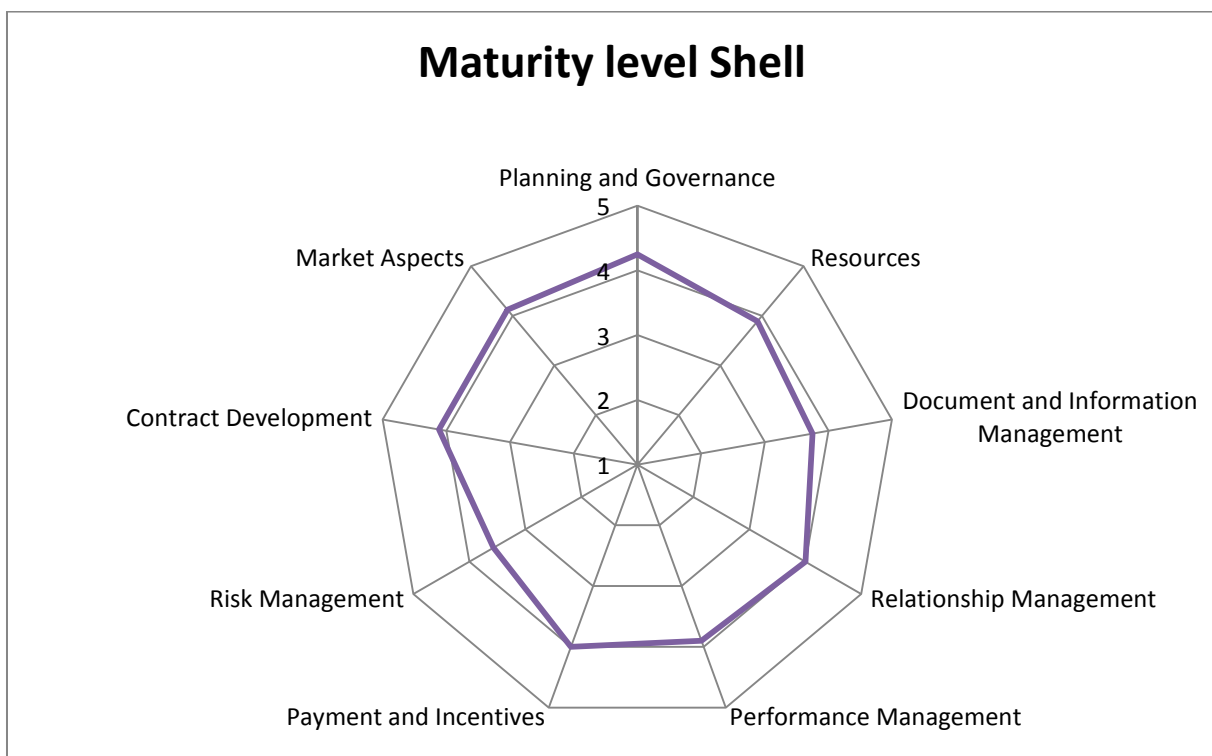


Figure 4.2: Contract management maturity model score for Shell

The category for Shell which scored the best is Planning and Governance (4,3). Risk management has the lowest score (3,6). To improve the maturity level, Shell should pay more attention to continuous improvement of their processes.

Fluor

The results of the contract management maturity model of Fluor are shown in Figure 4.3. Overall, the contract management maturity model score for Fluor is 4,3. Therefore, it can be concluded that Fluor has a maturity level 4: “Integrated”. As described before, organizations at this maturity level have good contract management controls and processes in place. Management understands its role in the procurement management process, and contract management processes are integrated with other organizational core processes. However, some areas could be improved substantially.

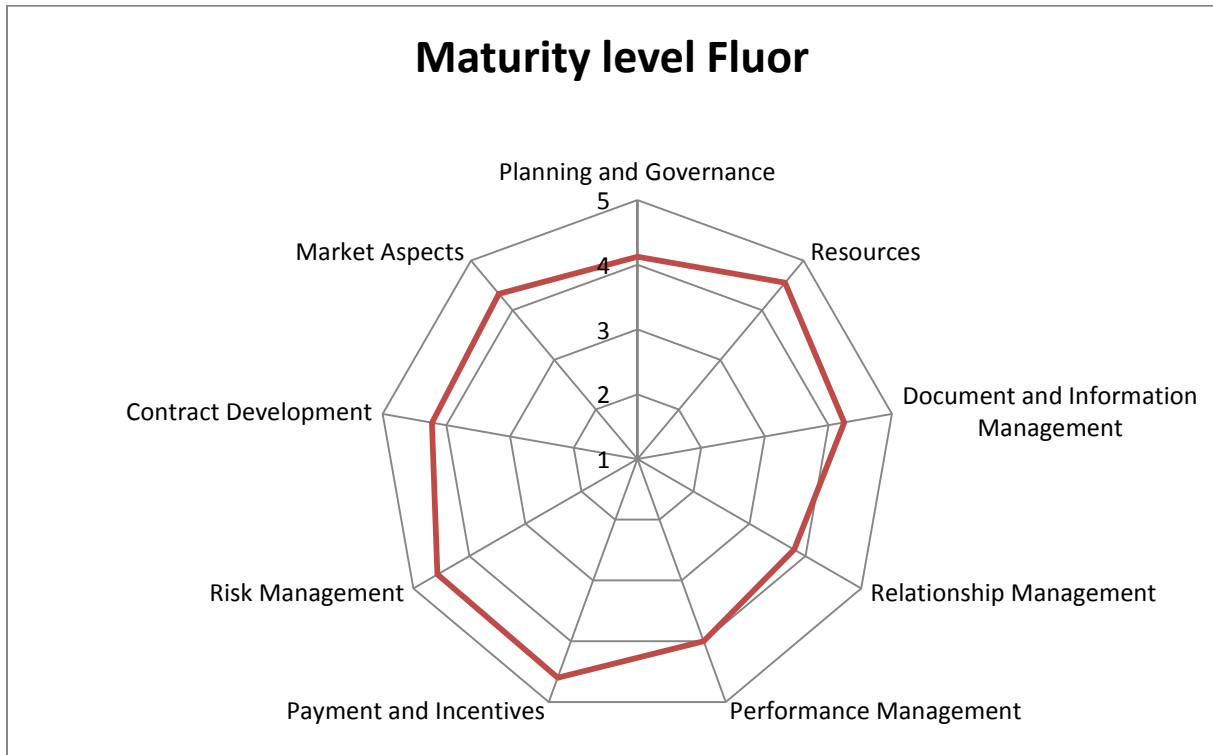


Figure 4.3: Contract management maturity model score for Fluor

The highest results for Fluor are Risk management, Payment and incentives, and Resources (4,6). Relationship management scored the lowest (3,8). Fluor has established very good contract management processes already, but to improve the contract management function, more attention should be paid to continuous evaluation and learning of these processes.

Ballast Nedam

The results of the contract management maturity model of Ballast Nedam are in Figure 4.4. The average contract management maturity model score for Ballast Nedam is 4,2. So, it can be concluded that Shell has a maturity level 4: “Integrated”. In accordance with Shell and Fluor, Ballast Nedam has also good contract management controls and processes in place already. Management understands its role in the procurement management process, and contract management processes are integrated with other organizational core processes. However, there are still some areas which could be improved substantially.

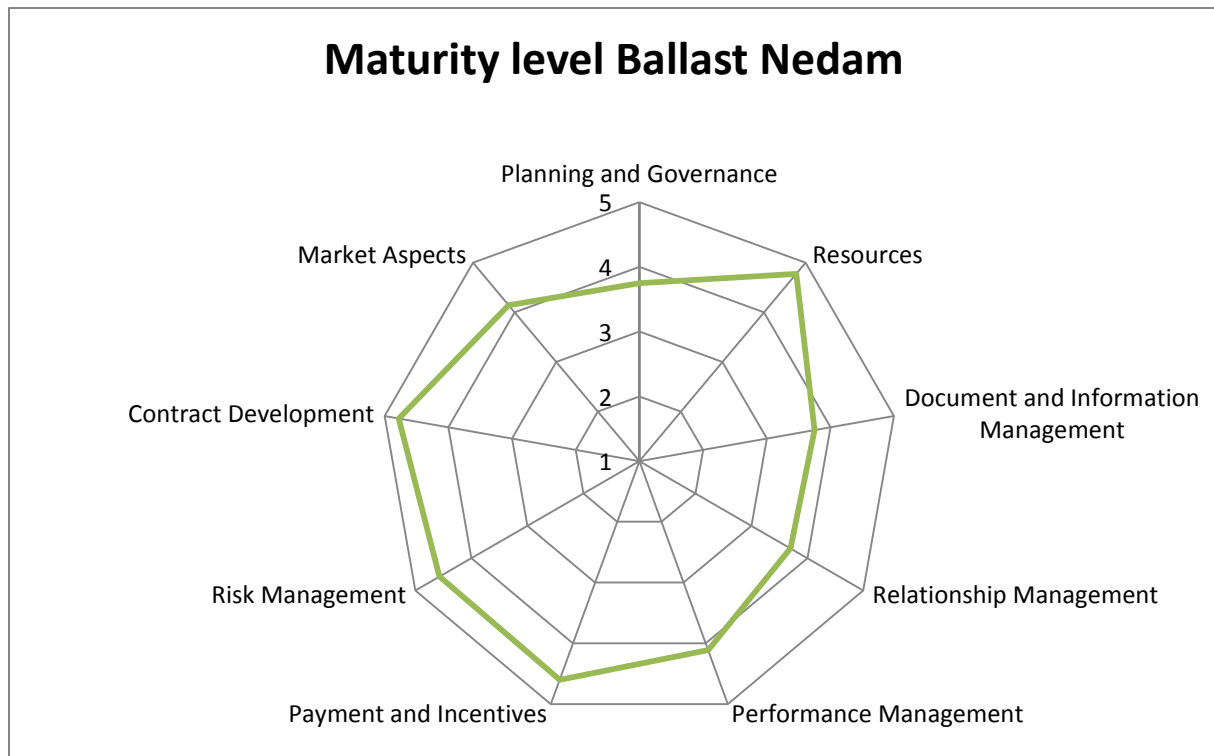


Figure 4.4: Contract management maturity model score for Ballast Nedam

Resources and Contract development have by far the best score (4,8). These categories scored almost the maximum score of 5. The lowest score is for Relationship management (3,7).

4.3 Discussion

Table 4.2 shows the most important characteristics of the contract management functions of the four companies that are discussed. It can be noticed immediately that there are a lot of differences between these companies, but there are also some similarities. This section will discuss these differences and similarities.

First, there are differences between the roles for contract managers. Within Shell and Ballast Nedam, the contract manager function has a more overseeing and supporting role, and plays not always a role in the project team. The daily contract management activities are performed by the project team, and the contract managers have to assure a certain level of quality of these activities. This can be achieved by providing training, but also with establishing handbooks and procedures. Contract engineers/specialists within Shell are more involved in the tactical and strategic contract management activities. This is due to the fact that Shell has to manage a lot of contracts, even in upstream and downstream business.

Contract management within Ballast Nedam has no final responsibility for project result. Contract managers don't participate in the entire project, but can be used by the project team when this is required (i.e. claims or disputes). As a remark, the project team of Ballast Nedam has to allocate budget for contract management resources. This is one of the reasons that contract management is not accepted in the entire organization yet.

Table 4.2: Contract management comparison

	Rijkswaterstaat	Shell	Fluor	Ballast Nedam
The role of contract management	<ul style="list-style-type: none"> - Responsible for the entire purchasing/contracting process, and for the contract management activities in the execution phase. - The CM is the link between client and supplier. <p>Main activities:</p> <ul style="list-style-type: none"> • monitoring the rights and obligations of the contract • checking if the progress of the constructor is in line with the scope of the contract. • mitigate (contract) risks • overcome/solve problems & conflicts 	<ul style="list-style-type: none"> - Developing contract strategy (standard model contracts). - Involved in tactical and strategic contract management activities. - Governance & assurance of operational contract management: <ul style="list-style-type: none"> • support & training • testing & guarantee CM quality - Ensuring processes & standards regarding contracts are clear. 	<ul style="list-style-type: none"> - The contract manager has a supportive role towards the project leader/director, but has own responsibility in strictly following procedures and guidelines. - Main CM activities: <ul style="list-style-type: none"> • provide clear project specifications • solve conflicts • verification and validation 	<p>Advisory and supportive role to project teams. Contract managers have no final responsibility for project result.</p> <p>Main activities of contract management:</p> <ul style="list-style-type: none"> • support & training • monitoring the rights and obligations of the contract. • handling of contract changes and claims • keep track of missed opportunities
Structure and organization	<ul style="list-style-type: none"> - Contract manager are housed in the department Procurement and contract management (after reorganization) - The CM is member of the project (IPM) team. -- Together with the project manager is the CM one of the most important roles in the project team. - Involved from pre-contractual to post-contractual phase (continuity). 	<ul style="list-style-type: none"> - Shell does not use the role contract manager, but contract specialist or contract engineer. - The contract holder (project leader) is responsibility for (daily) contract management, the procurement department (contract engineer) guarantees the quality of these activities. - The contract holder is involved in the pre-award phase, but mainly active during the post-award phase of the contract. 	<ul style="list-style-type: none"> - Contract managers are housed in the department Operations. - Every project has one or more contract managers, which are part of Business Services. - The contract manager is not only involved in the execution phase, but he plays also a role in the tender phase (continuity). 	<ul style="list-style-type: none"> - Contract managers are located in the Legal department, which is a staff department for project teams. - Operational CM activities are mostly performed by the project team. - Project teams are not obligated to make use of contract managers. The CM is not involved in the entire project, only when this is required. - The project teams have to make budget available for contract management resources.
Contract managers profile	<ul style="list-style-type: none"> - Experience - Relationship/communication skills, - Negotiation skills, - Leadership skills, - Anticipating and forward-looking attitude 	<ul style="list-style-type: none"> - Experience - Commercial & negotiation skills - Relationship management - Leadership skills - No legal knowledge required 	<ul style="list-style-type: none"> - Internal employees - Experience is important - Pro-active attitude - No legal knowledge required 	<ul style="list-style-type: none"> - 7 years of experience in the field (technical background and competences) - Self-educated employees
Procedures and mechanisms	<ul style="list-style-type: none"> - Werkwijzer aanleg - IPM model - Gate review/Kad - Systeemgerichte contractbeheersing - Contractenbuffet 	<ul style="list-style-type: none"> - Best practices 'wifi' - Contract management system - Model contracts (library) - Contract management audits - Stage-gates (VARs) - Audits 	<ul style="list-style-type: none"> - Web-based knowledge sharing system - Contract management system - Operating System Requirements - Operating System Implementation Plans - Standard contracts - Audits 	<ul style="list-style-type: none"> - No handbook for CM - 'contractbeheer voor aannemers' for daily contract management activities - RASCI-matrix - Document management system - Audits
Maturity level	Level 3: Structured	Level 4: Integrated	Level 4: Integrated	Level 4: Integrated

On the other hand, the contract manager within Fluor and Rijkswaterstaat plays an important role in the project team. Within these companies, the contract manager is the link between the client and the contractor. Within Fluor, the contract managers have a supportive role towards the business services director and the project leader. The contract manager within Rijkswaterstaat is actually one of the five project team roles, and is responsible for the entire procurement/tendering process, as well as the contract management activities in the realization phase. Rijkswaterstaat manages very large and complex projects in different project situation, which calls for full-time contract management. In comparison with Shell for instance, Rijkswaterstaat has fewer contracts to manage. Shell has also small contracts, which are not very complex. These contracts don't need continuous contract managers attention. In all of the companies, the contract managers are involved in larger procurement/tendering processes. But, only Rijkswaterstaat and Fluor have continuity of contract management involvement in their project team.

The place in the organization also differs per company. Within Ballast Nedam, the contract managers are housed in the Legal department. Shell don't use the term contract manager, but has different functions which are performing contract management activities, like contract engineers or specialists. The roles that perform the more strategic contract management activities within Shell are housed in the Contracting & procurement projects department and in the Contracting discipline team. Within Fluor, contract managers are placed in the department Operations. In the past, contract managers of Rijkswaterstaat were housed in the department Project management, but after the reorganization in April 2013, they are housed in the contracting and procurement department.

When considering the ideal contract managers profile, it can be concluded that experience is very important in all companies and that it is important for a contract manager to be familiar with the internal organization. Furthermore, competences which are needed for a contract manager are leadership skills, commercial and negotiation skills and a pro-active attitude. Relationship management, risk management and performance management are other important aspects. There is no legal knowledge required for contract managers within Rijkswaterstaat, Shell and Fluor. In contrast, a contract manager within Ballast Nedam must have necessary legal knowledge.

Furthermore, all companies have contract management procedures and mechanisms in place. It is difficult to compare these procedures, because every company is different. It is important to ensure the quality of contract management activities, for instance by performing audits. Within a project team of Rijkswaterstaat, the manager projectcontrol (in Dutch: "manager projectbeheersing") must ensure the quality of the project team activities. There is no individual check or evaluation for the contract manager performance at the end of the project, only a general evaluation session.

If the contract management maturity level is considered, Rijkswaterstaat seems to be slightly behind the other companies. Shell, Fluor and Ballast Nedam have maturity level 4 (Integrated), while Rijkswaterstaat has maturity level 3 (structured). However, it has to be noticed that the contract management maturity model is more focused on commercial companies. As described before, Rijkswaterstaat is a government institution, which implies that it is not very easy to establish long-term relationships with contractors, because Rijkswaterstaat is not allowed to use past performance of contractors to select them. Every company must have equal chances to win the public tender.

4.4 Conclusion

The role of contract managers can be organized in different ways. In some companies, contract managers have a more overseeing and supportive role, while in other companies, contract managers are full-time part of the project team. These differences in the organization of contract management do not say something about the maturity of contract management. So, to say something about the professionalism of contract management, it is not sufficient to look only at the role of the contract manager. More important is the fact that all important contract management activities (strategic/tactical/and operational) are performed sufficiently in a company or project team. Therefore, the diagnostic framework must not focus explicitly on the role of the contract manager, but on all important contract management activities and aspect within Rijkswaterstaat.

In the basis, the contract management function of Rijkswaterstaat looks good, but in most areas improvements are possible. Rijkswaterstaat recognizes the importance of contract management by making it one of the project team roles. Considering the project size, complexity and the number of stakeholders of Rijkswaterstaat projects, contract managers are better placed in the project team close to the contractor. For companies with more and smaller contracts, contract management could be also placed in the line organization. If Rijkswaterstaat is compared with the other three companies, the contract management function seems less mature than Shell, Fluor, and Ballast Nedam at this moment. However, it has to be noticed that Rijkswaterstaat is a government institution. Commercial companies have more freedom in selecting contractors and building long-term relationships.

To improve the contract management function, Rijkswaterstaat should pay more attention towards evaluation of contract management processes and capturing key data and lessons learned. The diagnostic framework, introduced in Chapter 5, is useful as an evaluation tool for evaluating contract management. At this moment, there is a general project evaluation after completion of a project, but there is no specific evaluation per project role. In this way, data can be obtained about strong and weak contract management processes and activities. Within this evaluation, best practices and lessons learned can be indicated. However, it is not only important to capture this data and derive these best practices. This information has to be used and communicated actively in order to improve contract management, by creating standards or procedures for example. In addition, it is important to provide proper training and support for contract managers on these weak aspects. Maybe it is an option to set up a small department or group which has the primary task to guarantee and ensure the quality of contract management within projects. Within Shell and Ballast Nedam, similar entities are in place for guaranteeing and ensuring the quality of contract management. Within Rijkswaterstaat, such a group could lead the evaluation of contract management, could develop standards and procedures, and could provide training and support. In this way, a continuous learning cycle will be established which improves the contract management function in the future.

5. Intra-organizational Contract Management Analysis

To conclude something about the professionalism and quality of the contract management function of Rijkswaterstaat, it is not sufficient to look only at the general picture. For instance, Rijkswaterstaat can have established guidelines and procedures for contract management, but it is not known to what extent these guidelines and procedures are followed or respected during a specific project. As described before, the intra-organizational contract management analysis uses a self-developed diagnostic framework to assess the contract management activities/aspects within a project life-cycle. This chapter will first describe the diagnostic framework and the corresponding development process. Thereafter, the results will be presented. At the end, some conclusions are drawn.

5.1 The diagnostic framework (project-level)

This section gives a description of the self-developed diagnostic framework for determining contract management professionalism within projects of Rijkswaterstaat. In addition, the development process of this framework is explained.

5.1.1 Description

The diagnostic framework is developed to generate insights about the contract management professionalism within projects of Rijkswaterstaat. This framework, schematically shown in Figure 5.1, consists of 87 contract management aspects or activities spread among 8 categories. These categories are identified to structure the framework. Two of these categories are more general and not only specific for the contract management function, respectively the project objectives (start of a project) and the performance indicators (end of the project). The project lifecycle is divided into three phases; the pre-contractual phase, the contractual phase, and the post-contractual phase. The pre-contractual phase is the preparation time until the start of the public tender. The contractual phase starts with the public tender and last until the contract closure. The post-contractual phase starts after the contract closure, so this includes the realization until the final delivery of the infrastructure. Furthermore, there are three other categories, which are important in all phases of a project. These categories are structure and governance, methods and procedures, and information and communication. The 87 contract management statements of the diagnostic framework are presented later in this report together with the results.

For every contract management aspect/activity, the respondent is requested to answer the following questions:

- 1) To what extent is the activity or aspect important? (score from 1 to 7)*
- 2) To what extent is the activity or aspect performed sufficiently in your project? (score from 1 to 7)*
- 3) Room for explanation. Why is it not sufficient? What could be improved?*

With these questions, different information can be generated. First, information about crucial contract management activities can be obtained. What are important activities/aspects of contract management within Rijkswaterstaat, and are there differences between projects. Furthermore, this framework gives insights which contract management activities/aspects are performed in a sufficient way, or not. It is also possible to combine the outcomes of the questions 1 and 2. For instance, there can be checked if all important activities are also performed sufficiently, or which activities must be improved. So, if a contract management activity has a score 6 for importance, it is recommended

that the activity is also performed with a score 6 or higher. At last, question 3 could generate information why specific activities are not performed sufficiently.

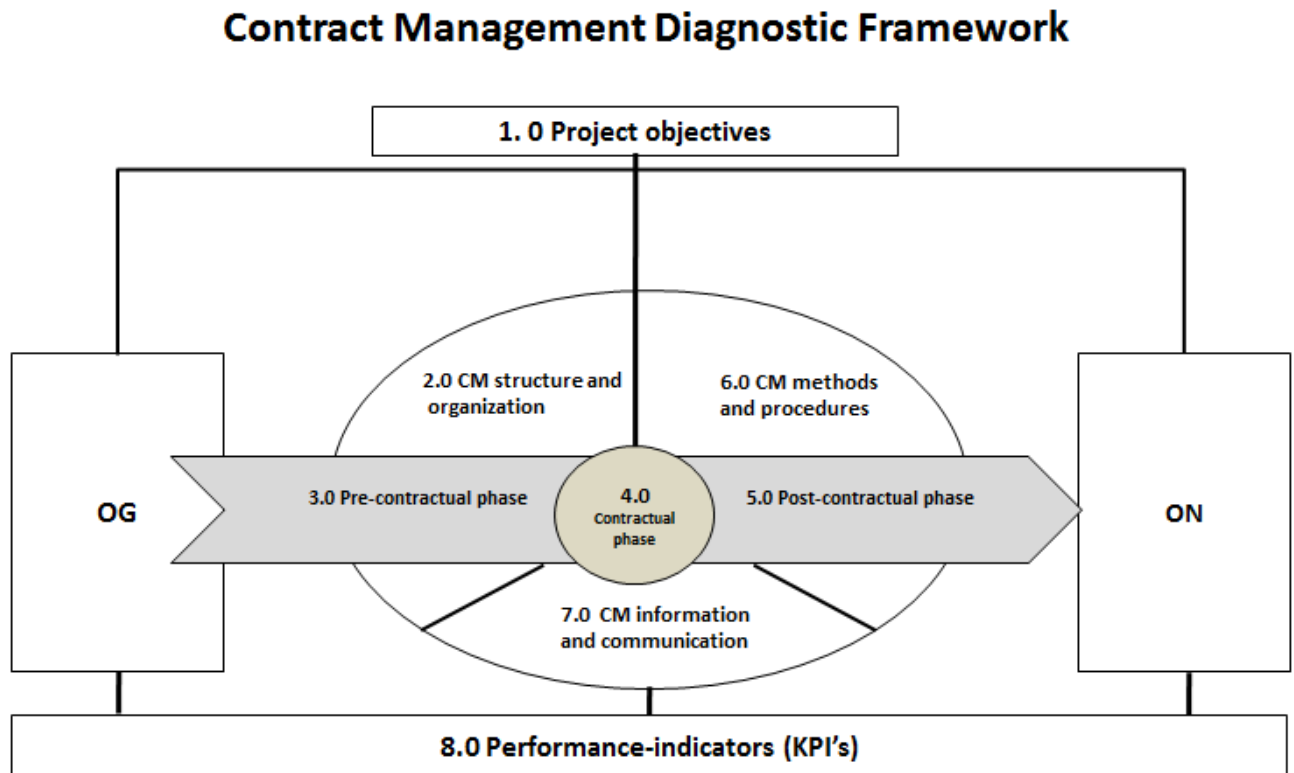


Figure 5.1: Schematic representation of the contract management diagnostic framework

5.1.2 Development process

It was needed to create a diagnostic tool for determining the quality of contract management within projects of Rijkswaterstaat, because the contract management maturity model only provided a general view of the contract management function. The CMMM considers the contract management function at a higher level, and is not applicable at specific projects. This diagnostic framework, in contrast to the CMMM, also includes the structure, organization and procedures of Rijkswaterstaat.

Elaborating on the preliminary research framework, the first idea was to define important contract management activities and aspects per project phase, and to ask contract managers about the relative importance of these activities and their performance on these activities in practice. These contract management activities and aspects were identified using different sources; two contract management conferences¹², general contract management documents¹³, and RWS documentation¹⁴. So, the framework consists of a combination of theoretical contract management activities and aspects (which activities should a contract manager perform), but also specific RWS tasks and responsibilities (which activities must a RWS contract manager perform). Later in the development process, it was chosen to add extra categories, because some elements play a role in all project phases. Also the project objectives and the performance indicators categories were included. This resulted in a concept version of the framework.

¹² Nationale contract management conferentie/kringbijeenkomst NEVI zuid

¹³ The two documents which were used for the development of the CMMM

¹⁴ Rijkswaterstaat: Rolprofielen IPM (1-7-2008)

This concept version of the framework was sent to 5 contract managers in advance to check the completeness of the model. It was also sent to one of the founders of the IPM model. Based on their feedback, the framework was adjusted. Furthermore, the completion of the framework was observed with one contract manager, to see if everything was clear. After these steps, the concept version was upgraded to a final version of the diagnostic framework which was ready for distribution.

5.2 Data collection

For the data collection of the diagnostic framework, this research made use of a Microsoft Excel document. Within this Excel document, three sheets were included:

- Sheet 1: An explanation about the diagnostic framework and completion instructions
- Sheet 2: A short questionnaire to obtain some project information
- Sheet 3: The statements of the diagnostic framework with the three questions

The information of sheet 1 is attached in Appendix H. The short questionnaire for obtaining project information is included in Appendix I. The 87 statements of the diagnostic framework (sheet 3) are presented together with the results.

The final version of the diagnostic framework document was sent to 44 contract managers by e-mail. In the two weeks after, two reminder mails were sent to the respondents. Furthermore, the completion of the diagnostic framework was also promoted during a masterclass meeting, which was attended by 20 contract managers.

This resulted in 25 completed diagnostic frameworks, which is a response of 57%. Among these results, a whole variety of RWS projects are present. There are differences in project size, project duration, complexity, contract type, budget etc. So, it seems to be that these projects are a good sample of average infrastructure projects of Rijkswaterstaat. The project characteristics are attached in Appendix J.

5.3 Results

As described before in the diagnostic framework description, the 87 statements were scored on the relative importance and the performance in practice. Table 5.1 shows the diagnostic framework results per category. As can be seen in this table, the average practice score is 5,69. This means that all contract management activities or aspect are performing with an average quality of 5,69 (with a minimum of 1 and a maximum of 7). Therefore, it can be concluded that the overall performance of contract management activities is quite high, according to the contract managers themselves.

If the category scores are taking into account, it can be seen that almost every category scores above the 5,5. Within the three project phases categories, the contract management activities are performing the best overall. Furthermore, the category CM information and communication has also a good result in practice. Structure and organization and methods and procedures scored a little lower. However, the importance score is higher in every category, so the performance of the contract management activities could still be improved.

Table 5.1: Diagnostic framework results per category (scale 1 to 7)

Categories	Importance	Practice
1.0 Project objectives	5,87	5,49
2.0 CM structure and organization	5,92	5,44
3.0 Pre-contractual phase (preparation time until the start of the public tender)	6,08	5,73
4.0 Contractual & negotiation phase (public tender until contract closure)	6,25	5,98
5.0 Post-contractual phase (realization until delivery)	6,33	5,91
6.0 CM methods and procedures	5,80	5,51
7.0 CM information and communication	6,16	5,87
8.0 Performance-indicators (KPI's)	6,13	5,55
Average	6,07	5,69

There are marginal differences between the categories. Because the category scores are not lying far from each other, it is maybe useful to consider the individual statements within each category. Detailed diagnostic framework results per statement are attached in Appendix K. This table shows the average score for importance and practice, but also the variance. The variance is a measure of how far a set of numbers is spread out. This means that when a statement has high variance, the scores for this particular contract management activity are very different. A small variance means that the scores are very close to each other. Detailed scores for each statement per project can be found in Appendix L.

Next, the highest and lowest importance scores are described. Thereafter, the highest and lowest scores for contract management activities in practice are shown. It is also possible to consider the combination of scores for importance and practice. In general, contract management activities which are very important should also be covered sufficiently in practice. In addition, the project sample made it possible to compare the scores between large infrastructure projects and small infrastructure projects of Rijkswaterstaat.

5.3.1. Importance

This section will discuss the degree of importance for the individual contract management activities. In Table 5.2 and 5.3, the top 10 statements with the highest and lowest average for the importance score are shown.

Table 5.2: Top 10 highest importance scores

Top 10 highest importance		Average	Variance
8.8	Inspections from the Auditdienst Rijk (ADR) has not led to determination of unauthorized payments	6,64	0,23
5.12	There is monitoring on a legitimate invoices and payments	6,57	0,24
4.1	The procurement team is well led in this phase of the project	6,53	0,25
4.4	There is sufficient legal knowledge available to draft the contract (contract structures, contract conditions,...)	6,53	0,25
5.13	It is clear who is in charge of bonuses, discounts, and penalties (according to the contract)	6,52	0,25
5.14	The administrative process around contract changes, and extending or ending the contract after realization is well managed	6,52	0,25
5.6	Based on this testing plan, system tests, process tests, and product tests are performed in a sufficient way	6,50	0,35
7.1	When collaboration starts between project team and contractor(s), there is a project start-up organized	6,50	0,43
8.3	The result of the project will provide the intended functionality	6,50	0,58
3.13	The award criteria and the selection criteria are designed clearly (SMART)	6,47	0,35

If a look is taken at these important contract management aspects, it is notable that most of the aspects are elements of category 4 (Contractual & negotiation phase) and 5 (Post-contractual phase). It seems to be very important that all choices and activities are justified and well-documented. Furthermore, good contract management leadership is also essential. It has to be clear who is in charge of contract management aspects. At last, a project start-up is a key activity in order to establish a good relationship with contractors.

Table 5.3: Top 10 lowest importance scores

Top 10 lowest importance		Average	Variance
2.7	The substitution of an IPM role proceeds in a sufficient way and is defined	5,73	1,83
3.6	There is taken care of performing value tests (in Dutch: 'meerwaardetoetsen) in a sufficient way	5,69	1,46
1.4	After project realization, it is evaluated whether the project objectives are achieved or not	5,55	2,35
1.3	During the project it is evaluated if the project objectives are still feasible	5,43	2,25
5.15	The contract is regularly reviewed to check whether the contract still meets the needs of the end costumer	5,40	2,14
8.9	There are no VTW's owing to shortcomings of the contract	5,27	2,20
2.3	Deviations of the IPM model are clearly defined in the project plan	5,11	4,32
6.8	In case of dealing with request for contract changes, the VTW tool is used in a proper way	5,11	4,21
6.7	During the project, there is made use of the URSCB-tool in a proper way	4,88	3,52
7.4	The 'Bouw Informatie Model' (BIM) is used in a proper way	4,83	3,81

According to the results, contract management activities related to reviewing and evaluating are less important. Furthermore, sticking to procedures and the proper usage of tools seems also less

essential. It has to be noticed that many of the low importance contract management activities has a high variance score. This means that the scores for these activities are very divers.

5.3.2. Practice

This section will discuss the degree of performance for the individual contract management activities in specific projects of Rijkswaterstaat. In Table 5.4 and Table 5.5, the top 10 statements with the highest and lowest average for the practice score are shown.

Table 5.4: Top 10 highest practice scores

Top 10 highest practice		Average	Variance
5.12	There is monitored on a legitimate invoices and payments	6,71	0,21
7.1	When collaboration starts between project team and contractor(s), there is a project start-up organized	6,56	0,69
7.7	The results of the tests are weighted and communicated to the tester and the contractor sufficiently	6,53	0,35
4.6	The process from drafting the contract to contract closure is fully transparent	6,45	0,43
8.8	Inspections from the Auditdienst Rijk (ADR) has not led to determination of unauthorized payments	6,44	0,50
4.4	There is sufficient legal knowledge available to draft the contract (contract structures, contract conditions,...)	6,38	0,54
7.5	There is (periodic) reported about the contract state and developments to the client and contractor	6,38	0,61
4.12	It is clear in which way the payments are going to take place, including bonuses, discounts, and penalties	6,36	0,66
5.13	It is clear who is in charge of bonuses, discounts, and penalties (according to the contract)	6,35	0,82
2.1	The IPM model is used as basis for the composition of the project team	6,32	1,26

It is good to see that many contract management activities which scored high for importance, also have a high score for the performance of these activities in practice. Furthermore, it is important that it is clear how processes are going to take place after the contract is signed.

Table 5.5: top 10 lowest practice scores

Top 10 lowest practice		Average	Variance
3.8	Contracts which are needed in this phase of the project (e.g. hiring engineers) are managed sufficiently	5,21	1,45
6.3	The KAd test is passed positively and the feedback is discussed with the client	5,14	3,84
4.8	The contract clearly describes how the performance of the contractor is tested in the realization phase	5,07	2,78
2.8	The quality of contract management activities is guaranteed and controlled sufficiently	5,05	1,50
1.3	During the project it is evaluated if the project objectives are still feasible	4,91	2,26
2.3	Deviations of the IPM model are clearly defined in the project plan	4,72	4,87
2.7	The substitution of an IPM role proceeds in a sufficient way and is defined	4,57	1,96
7.4	The 'Bouw Informatie Model' (BIM) is used in a proper way	4,40	6,24
5.15	The contract is regularly reviewed to check whether the contract still meets the needs of the end customer	4,33	3,42
8.9	There are no VTW's owing to shortcomings of the contract	3,81	3,15

Considering the lowest average scores for contract management activities in practice, it can also be concluded that many activities which scored low on importance, have also a low score in practice. Guaranteeing and controlling the quality of contract management activities is an important aspect when improving the contract management professionalism. When there is a contract management evaluation during a project, strong and weak activities could be indicated. These activities should have more attention in the remainder of the project. Furthermore, deviations of the IPM model, and substitutions between IPM roles, are not always defined clearly. This could result in unclear tasks and responsibilities between project roles.

5.3.3. Importance vs. practice

After discussing the results of importance and practice separately, these two results can also be combined. Contract management activities which are very important should also be performed sufficiently in real infrastructure projects. So, contract management activities with a score 6 on importance, should be also covered in practice with a 6 or higher. To identify contract management activities which are not performed in line with the importance of that activity, the score for practice can be subtracted by the importance score. In this way, the negative values represent contract management activities which are performed below the required level. Table 5.6, shows the contract management activities which are performed the most below the importance level.

Table 5.6: Lowest practice scores in comparison with the relative importance

8.9	There are no VTW's owing to shortcomings of the contract
2.7	The substitution of an IPM role proceeds in a sufficient way and is defined
5.15	The contract is regularly reviewed to check whether the contract still meets the needs of the end customer
6.3	The KAd test is passed positively and the feedback is discussed with the client
8.10	The project members are satisfied when looking back at the project
4.8	The contract clearly describes how the performance of the contractor is tested in the realization phase
5.2	The contract management team members are performing their tasks properly
2.5	The contract management team (contract team after contract closure) has/had a good composition (in terms of size and skills)
2.8	The quality of contract management activities is guaranteed and controlled sufficiently
8.7	The project objectives are achieved (or are going to be achieved)

It is notable that guaranteeing and controlling of contract management quality is not performed very well in practice. This is also indicated by the fact that the contract management team performs their tasks not always sufficiently, and the low score for the composition of the contract management team. If more attention is paid to these aspects, the likelihood that project objectives will be achieved and that project members are satisfied with the project should be increased. Furthermore, many VTW's (request for contract modifications) are owing to shortcomings of the contract. This is not always avoidable, because of the complex environment and many stakeholders which are involved in projects of Rijkswaterstaat. However, more information has to be obtained about the different reasons for these VTW's, in order to decrease the VTW's in the future.

5.3.4. Project size

Together with the collection of diagnostic framework results, also corresponding project information was obtained. This makes it possible to analyze the results of the diagnostic framework considering differences in project characteristics. Here, it is chosen to make a comparison between large and small infrastructure project of the GPO department of Rijkswaterstaat. Projects with a budget below 100 million are considered small, while project above 100 million are labeled large. This resulted in 14 large projects and 10 relatively small projects. In general, the large projects are also exposed to a higher degree of complexity and number of stakeholders during the project. Table 5.7 shows the diagnostic framework results for large and small projects.

Table 5.7: Diagnostic framework results for large and small projects

Categories	Large	Small
1.0 Project objectives	5,83	5,31
2.0 CM structure and organization	5,33	5,66
3.0 Pre-contractual phase (preparation time until the start of the public tender)	5,64	5,96
4.0 Contractual & negotiation phase (public tender until contract closure)	5,79	6,29
5.0 Post-contractual phase (realization until delivery)	5,64	6,30
6.0 CM methods and procedures	5,29	6,02
7.0 CM information and communication	5,72	5,91
8.0 Performance-indicators (KPI's)	5,76	5,08
<i>Average</i>	5,62	5,83

After looking at the table, it can be concluded that the contract management activities within relatively small infrastructure projects are performed better. This result could be expected, because large projects are normally exposed to a higher degree of complexity and more stakeholders. Only the categories 'project objectives' and 'performance-indicators' are scored higher by the large projects. Probably, these projects have to pay more attention to these categories, because of the increased complexity in these projects. Rijkswaterstaat is already allocating senior contract managers to large and complex projects, which is recommended.

Other project comparisons, between different contract types for example, are not possible because the current data is not suitable for this.

5.4 Conclusion

This chapter described the intra-organizational contract management analysis. To determine the contract management professionalism within projects of Rijkswaterstaat, a self-developed diagnostic framework was used. This framework consisted of 87 contract management aspects and activities divided among 8 categories. For every contract management aspect, the respondent provided a score from 1 to 7 for the relative importance and the performance of this aspect in practice.

The average practice score for the contract management activities was 5,69. Therefore, it can be concluded that the overall performance of contract management activities is quite high. However, this result is only based on the view of contract managers themselves. This research does not include the contract management assessment by other roles. Furthermore, there were marginal differences between the 8 categories. This suggests that there are no contract management areas which are performed significantly lower than the average level. In other words, there are no contract management activities which are performed below average in all projects.

If there is a look taken at the average scores for the individual statements, it is notable that guaranteeing and controlling of contract management quality is not performed very well in practice. This is also indicated by the fact that the contract management team performs their tasks not always sufficiently, and by a low score for the composition of the contract management team. This is in line with the outcomes of the inter-organizational contract management analysis. To improve the contract management professionalism, the overall performance level has to be increased. This could be realized by evaluating contract management activities and to share best practices and lessons learned. More attention has to be paid to guaranteeing and controlling the quality of contract management activities during a project. When there is a contract management evaluation during a project, strong and weak activities could be indicated. These activities should get more attention in the remainder of the project. The diagnostic framework could serve as guidance during this evaluation.

At last, this analysis showed that the quality of contract management activities in small infrastructure projects of Rijkswaterstaat scored higher than in large infrastructure project. This could be due to the fact that large projects are normally exposed to a higher degree of complexity and more stakeholders than small projects. Therefore, it is important to put more contract management effort on these larger projects and to allocate experienced contract managers to these projects.

6. Conclusion and Recommendations

This chapter describes the conclusions and recommendations, implications, limitations, and further research directions of this master thesis research. At last, further directions for achieving contract management maturity are addressed.

6.1 Conclusion and recommendations

Many large infrastructure projects often suffer from cost overruns, time delays, and/or quality problems. It is a challenge for both the client and contractor to deliver these projects successfully. Rijkswaterstaat encounters also problems with delivering their infrastructure project within time, budget, and quality standards. Professional project management, including contract management, should increase the likelihood of delivering infrastructure within the scope. Contract management plays an important role within a project team of Rijkswaterstaat. The contract manager is responsible for all the market aspects. In the last years, Rijkswaterstaat uses innovative contract types, which gives the contractor more freedom and responsibility and binds Rijkswaterstaat longer to these contractor(s). Despite of the implementation of the IPM model, there are still differences in the way contract managers are working. For example, there are contract managers which are managing the project strongly on the contract, but also contract managers which are more focused on the relationships with contractors. In addition, there are project managers which are performing contract management activities. In this way, it is not known what the overall contract management professionalism is within Rijkswaterstaat. This research tried to find an answer for this problem by developing a method for determining contract management professionalism.

To determine the professionalism of contract management within Rijkswaterstaat, two analyses were performed. The inter-organizational contract management analysis compared the contract management function of Rijkswaterstaat with three other companies. In the basis, the contract management function of Rijkswaterstaat looks good, but in most areas improvements are possible. In addition, a contract management maturity model was composed to score the contract management functions. If Rijkswaterstaat is compared with the other three companies, the contract management function seems less mature than Shell, Fluor, and Ballast Nedam at this moment. Rijkswaterstaat has a contract management maturity level 3 (Structured), while the other three companies have a maturity level 4 (Integrated).

Second, a diagnostic framework is developed in order to determine the quality of contract management activities and aspects in a project life-cycle. This framework consists of 87 statements about contract management activities and aspects divided over 8 categories. The average practice score for the contract management activities was 5,69. Therefore, it can be concluded that the overall performance of contract management activities is quite high, according to the contract managers themselves. This research does not include the contract management assessment by other roles. There are no specific areas or categories where the contract management quality is significantly lower. It seems to be that different contract management activities are performed insufficiently in projects of Rijkswaterstaat.

The results of the two analyses are combined in the following recommendations. To improve the contract management professionalism, the overall performance level has to be increased. Therefore, Rijkswaterstaat should pay more attention towards evaluation of contract management processes and capturing key data and lessons learned. At this moment, there is a general project evaluation

after completion of a project, but there is no specific evaluation per project role. The results of the diagnostic framework indicated that there were no contract management aspects which were performed structurally below average. Therefore, it is important to evaluate individual cases.

Furthermore, it is essential to guarantee and control the quality of contract management activities during a project in a sufficient way. At this moment, there is hardly any control on contract managers after the contract is closed. In addition, it is important to provide proper training and support for contract managers. When it seems to be a contract manager is performing an activity insufficiently or in a wrong way, it is needed to intervene. In this way, a continuous learning cycle will be established which improves the contract management function and makes this function more consistent and uniform in the future. Later in this chapter, further directions will be given about how these recommendations can be realized.

6.2 Implications

For Rijkswaterstaat, this research generated some useful implications. First of all, the diagnostic framework could be used as an evaluation tool for the contract management function. At this moment, there is a general evaluation after each project, but no specific evaluation of the performance of contract management. The diagnostic framework which is developed in this research could be used to evaluate the contract management performance with the IPM roles by discussing all the statements of the framework. During this evaluation, learning points and best practices can be identified. Weak contract management aspects could be part of the next contract management masterclass for example. This evaluation could also take place when the project is halfway. In this way, insights could be generated about strong and weak contract management activities. These weak contract management activities should get more attention in the remaining of the project.

Another implication for Rijkswaterstaat is to use the diagnostic framework for determining the contract management professionalism again after a certain period of time. The overall performance at this moment is measured during this research. After a while, the same measurement could indicate whether the contract management professionalism is increased or not, and which activities/aspects are increased or not. So, the diagnostic framework can serve as a contract management monitoring tool.

These two implications could be combined. When Rijkswaterstaat choses to evaluate all projects with this diagnostic framework, the scores can be saved automatically. In this way, data about the contract management professionalism is generated after each finished project. With finished projects, it is possible to consider the project outcomes in terms of time, budget and quality. After a while, the scores of the diagnostic framework could be matched with the outcomes of corresponding projects. When there is a relation between the contract management professionalism of a project and the project outcomes, the added value of contract management is proven.

This diagnostic framework is also useful for determining contract management professionalism in other (construction) companies. However, the current contract management activities must be slightly adapted for the specific firm. In this version of the diagnostic framework, there are specific Rijkswaterstaat procedures and mechanisms included. Therefore, the structure and the general contract management activities can be used for determining contract management professionalism in projects of other companies. At last, the contract management maturity model can be used to create a contract management benchmark between different companies.

6.3 Limitations

Just like every research, this research has also some limitations. These limitations have to be taken into account when considering the results of this research.

To begin with, the contract management maturity model and the diagnostic framework are self-assessment models. This means that these models are completed by contract managers themselves. In this research, the contract managers are the roles who have the detailed knowledge and information about contract management within Rijkswaterstaat. It is obvious that this group is used first to determine contract management professionalism. Self-assessment methods or tools have some disadvantages. First, self-assessment tools are difficult to validate. The fact that they produce a measurement or evaluation result does not mean that it is accurate or meaningful. Interpretation must be done with careful attention to the validity of the tools and how they were used. The respondents, involved in the self-assessment, can distort the results a number of ways. They may deliberately provide false or misleading information to promote their own interests. Furthermore, they can provide inaccurate data due to their own biases, faulty memories, or flawed perceptions. To improve the reliability of the results, the contract management professionalism should be assessed from different angles/roles. Within this research, this was not possible due to the restricted time for this master thesis project.

Another limitation of this research considers the completeness of the contract management maturity model and the diagnostic framework. To prevent missing aspects, the CMMM is discussed during the external interviews with Shell, Fluor and, Ballast Nedam. These interviews indicated some missing aspects, which were added to the final version. The diagnostic framework is checked for completeness by six contract managers of Rijkswaterstaat. Based on their feedback, the diagnostic framework was adapted with missing aspects. Despite these efforts, it is still possible that there are some contract management aspects which are not included in one of the two models.

The data of the diagnostic framework was collected using a Microsoft Excel document. Feedback from the respondents indicated that the completion of the framework was a time-consuming activity. To complete the model in a concentrated way, it took between 45 and 60 minutes. It could be that some respondents completed the diagnostic framework faster and less concentrated, because of a lack of time. Furthermore, some respondents found the design of the framework inconvenient and not user-friendly. These aspects could have an influence on the reliability of the results.

The last limitation considers the sample size of the analyzed projects. As described before, 25 completed diagnostic frameworks were collected (57%). Taking the project characteristics into account, it seems to be a good cross section of Rijkswaterstaat projects within the GPO department. Despite of the good response, some data within completed diagnostic framework results were missing. This was due to the fact that many contract managers were not involved in the entire project life-cycle. Within Rijkswaterstaat, there are exchanges of IPM roles during a project. Therefore, contract managers don't have always the knowledge to complete the entire diagnostic framework. In addition, this research describes the contract management professionalism at this moment. Many of these 25 projects are not finished yet, which also resulted in missing data.

6.4 Further research directions

This research developed a first version of a tool for determining contract management professionalism. Before the diagnostic framework can be applied at different companies, it has to be tested at more companies in order to create a standard version of the diagnostic framework. These tests could also indicate missing aspects of the framework, which makes the framework more complete. In addition, it has to be noticed that there were marginal differences between the 8 categories of the diagnostic framework. In this research, the scale 1 to 7 was used. To stimulate more differentiated results, it is maybe useful to tests the framework with other scales, like 1:6:10 for example. In this way, more useful results could be generated.

At this moment, the diagnostic framework is only completed by contract managers. Therefore, the determination of contract management professionalism is entirely based on the view of contract managers themselves. To get a total view of the professionalism of contract management within Rijkswaterstaat, the relevant contract management aspects should also be scored by other project roles, the contractor(s), and maybe by other stakeholders. Probably, these persons don't have enough knowledge about all contract management aspects. Adapted frameworks could be developed for these different roles. When there is contract management data collected from different angles, the reliability of the results is much higher. Furthermore, this creates insights about which role has knowledge about different contract management activities, and which role does not.

As described before, the contract managers who completed the diagnostic framework indicated that the completion via the Excel document was a little inconvenient and not user-friendly. When there is chosen to use the diagnostic framework on a regular basis, it is a good idea to design a web-based version of the diagnostic framework which make the completion easier en more convenient. In this way, the results can be stored automatically too. If there is more data available of completed infrastructure projects, relationships between project characteristics, project outcomes, and the professionalism of contract management could be examined.

6.5 Further directions for contract management maturity

This research resulted in a first view of the professionalism of the contract management function of Rijkswaterstaat. Contract management within Rijkswaterstaat is structured, but processes and activities have to be improved in order to increase the contract management performance. The contract management function of Rijkswaterstaat is still not mature. This section describes the next steps which have to be taken in order to become more mature in contract management.

As described before, Rijkswaterstaat should pay more attention towards evaluation of contract management processes and capturing key data and lessons learned. Furthermore, it is essential to guarantee and control the quality of contract management activities during a project in a sufficient way. In addition, it is important to provide proper training and support for contract managers. Now, the question is how this can be implemented.

One option could be to set up a small department or group which has the primary task to guarantee and ensure the quality of contract management within projects. Such a group already exists in other companies, like Shell. This group could lead the evaluation of contract managers during a project and after completion of a project. The diagnostic framework can serve as guidance during these evaluations. However, this model has to be developed further. This new group could improve this

diagnostic framework in relation with researchers. It is recommended that the members of this group are familiar with contract management processes within Rijkswaterstaat. During the evaluation, they can indicate best practices and lessons learned. With this key data, this new group could develop standards and procedures in cooperation with contract managers. In addition, for weak areas of contract managers, proper training and support could be provided. For instance, these procedures and weak contract management areas could be part of a next masterclass. In this way, the contract management function will become more consistent and uniform in the future.

Furthermore, this group could monitor the overall contract management professionalism over time. During this research, the contract management professionalism for Rijkswaterstaat is determined. After a certain period, the same research could be repeated in order to see the development of the contract management function. It could be examined whether the contract management activities which scored low this research, are improved over time or not.

To conclude, it is not only sufficient to evaluate contract management within projects using the diagnostic framework. The obtained information has to be used actively in order to improve the contract management function in the future. There has to be an entity, this new group for example, which oversees and coordinates this evaluation and improvement process.

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Appendix A: Organogram Rijkswaterstaat



Appendix B: List of interviewees

Name	Company	Function
Jacinta Lechner	Rijkswaterstaat	Team leader contract managers
Fred Rodewijk	Rijkswaterstaat	Contract manager
Roemer den Ruijter	Rijkswaterstaat	Contract manager
Marjolijn Lubbert	Rijkswaterstaat	Contract manager
Aede van der Weij	Rijkswaterstaat	Contract manager
Bas Maas	Rijkswaterstaat	Contract manager
Freek Wermer	Rijkswaterstaat	Senior Advisor Project management
Coen Wilms	Shell	Group Procurement Contracting Discipline Manager
Kees Berends	Shell	General Manager CP projects
Paul van der Wilden	Fluor	Director Infrasppeed
Erik Kruizenga	Ballast Nedam	Head of Contract management

Appendix C: Questionnaire for internal interviews

1. Waar staat contract management binnen RWS voor? (wat zijn de belangrijkste taken en verantwoordelijkheden)
2. Hoe ziet de fasering van een standaard project eruit, en welke rol speelt de contract manager in elke fase? (Wat zijn de belangrijkste activiteiten van een contract manager binnen RWS, operationeel vs. tactisch/strategisch)
3. Wat is je mening over het IPM model? (Werkt dit goed?/Volg je dit model strikt?/Hoe zit dit bij andere rolhouders? Wat kan/moet er beter?) (Hoe zit het met overlap tussen activiteiten van verschillende rolhouders?)
4. Wordt de waarde van contract management binnen RWS genoeg gewaardeerd? (Heb je genoeg bevoegdheden om je taken/verantwoordelijkheden op een juiste manier uit te voeren?)
5. Wat is het ideale profiel voor een contract manager? (specifiek voor RWS, of algemeen toepasbaar)
6. Wat zijn de grootste problemen/onduidelijkheden die je tegenkomt als contract manager binnen RWS?
7. Op welke aspecten verschilt contract management binnen projecten van RWS?
8. Hebben deze verschillen invloed op het projectresultaat? (Is het beter om CM binnen elk project op dezelfde manier aan te pakken, of vraagt ieder project voor een andere aanpak) Verschil tussen grote/kleine, of complexe/eenvoudige projecten, contracttypes, projecttype
9. Waaraan kun je zien of er in een RWS project goed contract management bedreven wordt? (Wat is professioneel contract management)
10. Waaraan kun je zien dat contract management steken heeft laten vallen?
11. Welke procedures zijn er voor contract management binnen RWS? (Worden deze goed nageleefd in de praktijk?)
12. Is er een leerprogramma voor contract managers? (Is er een platform waar kennis en ervaringen kunnen worden uitgewisseld?)

Appendix D: Detailed description of the other IPM roles

Projectmanager

De projectmanager is primair verantwoordelijk voor het bereiken van het projectresultaat binnen de vooraf gestelde randvoorwaarden ten aanzien van tijd en geld. Hij wordt hierop aangesproken door de interne opdrachtgever binnen RWS. De projectmanager stuurt het projectteam, bewaakt de onderlinge raakvlakken binnen het team en zorgt voor het samenbindend leiderschap dat de spelers tot een team bindt en het teamgevoel versterkt.

De projectmanager is de spin in het web, de natuurlijke sparringpartner en het intermediair tussen opdrachtgever, lijn en project. De projectmanager onderhoudt ook de contacten binnen V&W-intern voor zover dat voor zijn project van belang is en in overleg met de opdrachtgever. Bestuurlijke contacten worden onderhouden door of onder regie van het betreffende DirectieTeam.

Taken

- De projectmanager organiseert en geeft leiding aan de/het projectorganisatie/team
- De projectmanager draagt zorg voor de totstandkoming en uitvoering van de projectopdracht conform het projectplan
- De projectmanager keurt beslisdocumenten goed, wanneer dit binnen zijn bevoegdheid ligt
- De projectmanager zorgt voor het met elkaar bereiken van het projectresultaat binnen de gestelde eisen tijd, geld, kwaliteit op basis van de door de manager projectbeheersing aangeleverde stukken
- De projectmanager draagt in overleg met de lijn zorg voor de juiste personele invulling (De verantwoordelijkheid voor capabele en deskundige medewerkers ligt bij de lijn)
- De projectmanager heeft een antenne voor veranderingen en is initiator tot besluitvorming over scopewijzigingen.
- De projectmanager heeft nadrukkelijk oog voor binding binnen het team en het versterken van het teamgevoel
- De projectmanager onderhoudt contact met de opdrachtgever
- De projectmanager onderhoudt de contacten over het project intern Verkeer en Waterstaat, waar nodig in overleg en afstemming met de opdrachtgever
- Bestuurlijk overleg vindt plaats door het DT van de verantwoordelijk regionale dienst, of door de projectmanager onder regie van het DT
- De projectmanager draagt risico's aan betreffende zijn vakgebied en actualiseert deze regelmatig

Verantwoordelijkheden

- De projectmanager is verantwoordelijk voor opzet en organisatie van het project
- De projectmanager is sturend en toetsend voor opzet en organisatie van het projectmanagement
- De projectmanager is verantwoordelijk bij aanvang voor het vaststellen van een goedgekeurde SMART projectopdracht voor de projectorganisatie

- De projectmanager is verantwoordelijk voor het realiseren van de projectopdracht conform (SMART) afspraken, welke als input dienen voor het projectplan
- De projectmanager is verantwoordelijk voor het tijdig, juist en volledig opleveren, overdragen en evalueren van het totale project
- De projectmanager is eindverantwoordelijk voor een tijdige, juiste en betrouwbare rapportage van het project naar o.a. opdrachtgever
- De projectmanager is eindverantwoordelijk voor overeenstemming met belanghebbenden/stakeholders (marktpartijen en politiek/maatschappelijk)
- De projectmanager is eindverantwoordelijk voor de risico's binnen het project
- De projectmanager is eindverantwoordelijk voor de interne kwaliteit binnen het project

Manager projectbeheersing

Integrale sturing op risico's ten aanzien van tijd, geld, kwaliteit en scope is de primaire voorwaarde voor succesvolle integrale projectbeheersing. Afwijkingen in tijd, geld of kwaliteit worden veroorzaakt door risico's die optreden: Niet-geplande gebeurtenissen of onbeheerste processen. De effecten van opgetreden afwijkingen in kwaliteit zullen doorgaans zijn op te heffen ten koste van tijd en geld. Door gedurende het project te bepalen welke risico's de grootste effecten op planning en kosten hebben, kan met beheersmaatregelen actief gestuurd worden op beperking van ongewenste effecten.

Zorgvuldig projectmanagement betekent voor de projectmanagers inzicht in de stand van zaken op het gebied van kwaliteit, geld, tijd en scope op ieder moment in het project. Van iedere activiteit moet aan te tonen zijn wat het heeft opgeleverd, wat het heeft gekost en hoe lang het heeft geduurd. Integrale projectbeheersing zorgt voor de controle van tijd, geld en kwaliteit (techniek) gedurende de life cycle. Sturing is gebaseerd op risicomanagement. De manager projectbeheersing en daarmee ook de risicomanager is de manager van de processen omtrent risico's; de verantwoordelijkheid voor de beheersing van de risico's behorende bij omgevings- technisch- en contractmanagement ligt bij de desbetreffende rolhouders.

Risico's worden gekoppeld aan activiteiten. Integrale Projectbeheersing is daarom opgebouwd uit:

- scopemanagement, de beheersing van de scope inclusief de wijzigingen van het project;
- financieel management, de beheersing op uitgaven en inkomsten alsmede opbrengsten en kosten in heden, verleden en toekomst;
- kostenmanagement, de beheersing d.m.v. kentallen en diverse vormen van ramingen;
- planningsmanagement, de beheersing van het aspect tijd gedurende de life cycle van een systeem, als ook de MIT/SNIP mijlpalen;
- risicomanagement, de identificatie en beheersing van de risico's van een project, over de aspecten kwaliteit, geld en tijd heen;
- kwaliteitsmanagement, de beheersing van de kwaliteit binnen het project;
- informatiemanagement, het juist en tijdig aanleveren van betrouwbare informatie voor de managementcyclus;

- documentbeheersing, het toegankelijk en traceerbaar vastleggen van documenten.

Aan de hand van de resultaten van deze managementprocessen worden de activiteiten binnen een project verantwoord. Integraal project management handelt op basis van de informatie die geleverd wordt door integrale projectbeheersing. Een belangrijk aspect hierin is ook het principe dat de check op deze beheers aspecten apart wordt geïdentificeerd en geen integraal onderdeel is van de werkzaamheden van de acterende partij. Op deze manier is op ieder moment onafhankelijk en objectief inzicht in de status-quo van een project mogelijk. Rijkswaterstaat legt de nadruk op integriteit, effectiviteit en efficiëntie. Door de koppeling van tijd, geld, kwaliteit en risico's aan activiteiten wordt het eenvoudiger om aan te tonen op welk moment en voor welke activiteit geld en tijd beschikbaar is gesteld.

De manager projectbeheersing is verantwoordelijk waar het gaat om de project-brede beheersing van het project op de aspecten tijd/planning, geld/budget, kwaliteit, scope en risicobeheersing (conform UPP). De manager projectbeheersing is ook verantwoordelijk voor de project-brede voortgangsrapportages en documentbeheersing. De manager projectbeheersing is zowel toetsend (primair op het functioneren van het systeem en de interne processen van het project) als ondersteunend en is daarmee een belangrijke sparringpartner voor de andere kernrollen. Hij stelt zich onafhankelijk op.

Taken

- De manager projectbeheersing organiseert en geeft leiding aan het projectbeheersingsteam en de medewerkers binnen projectbeheersing
- De manager projectbeheersing stuurt de projectondersteuners aan.
- De manager projectbeheersing is namens en i.o.m de projectmanager intermediair tussen projectorganisatie en lijnorganisatie (capaciteitsmanagement)
- De manager projectbeheersing zorgt voor tijdige terugkoppeling naar projectmanager en lijnmanagement
- De manager projectbeheersing zorgt voor een (geactualiseerd) projectplan
- De manager projectbeheersing zorgt voor een PPI planning
- De manager projectbeheersing zorgt voor een integrale PRI raming
- De manager projectbeheersing levert het projectbeheersingsdeel van de kostenraming (PRI)
- De manager projectbeheersing zorgt voor documentbeheer
- De manager projectbeheersing zorgt voor implementatie en beheersing van het kwaliteitssysteem
- De manager projectbeheersing stelt voortgangsrapportages op
- De manager projectbeheersing beheerst het proces van scopewijzigingen
- De manager projectbeheersing zorgt voor de verankering van het project in de managementcyclus (relatie met managementcontracten)
- De manager projectbeheersing stuurt het risicomanagementproces aan
- De manager projectbeheersing draagt binnen zijn vakgebied risico's aan, actualiseert en beheerst deze binnen zijn vakgebied en voert beheersmaatregelen uit
- De manager projectbeheersing is verantwoordelijk voor alle inkoop die behoort tot de organisatiekosten van het project (de zogenaamde IK (interne)-kosten, zoals facilitaire zaken, huisvesting e.d.), de contractmanager is verantwoordelijk voor alle inkoop die behoort tot de

uitbestedingskosten (de zogenaamde EPK-kosten, zoals bouwcontract, onderzoeks- en engineeringscontracten). N.b. voor IK (interne)-kosten dient afstemming plaats te vinden met de lijn

- De manager projectbeheersing is eerste aanspreekpunt voor reviews, (interne) audits e.d.

Verantwoordelijkheden

- De manager projectbeheersing is verantwoordelijk voor de totstandkoming van de planning, financieel beheer, op tijd betalen, risicomanagement, scopebeheer en documentbeheer
- De manager projectbeheersing is verantwoordelijk voor de juiste beheersing van de projectopdracht conform (SMART) afspraken

Omgevingsmanager

Omgevingsmanagement is verantwoordelijk voor de maatschappelijke inbedding van het project en is daarmee de intermediair tussen de projectorganisatie en haar omgeving. Deze omgeving wordt gevormd door alle partijen die een belang hebben bij het project. De eisen en afspraken met de stakeholders worden vanuit omgevingsmanagement geleverd aan technisch management.

De omgevingsmanager is verantwoordelijk voor de interactie met de omgeving om het project gerealiseerd te krijgen binnen de publieksrechtelijke en privaatrechtelijke randvoorwaarden. In dit verband verzorgt de omgevingsmanager met zijn team het doorlopen van de diverse planologische procedures, het verkrijgen van vergunningen, het opstellen van (bestuurs)overeenkomsten, het (ver)leggen van kabels en leidingen, vastgoedzaken, schadebehandeling en milieutechnische, archeologische en explosievenonderzoeken. De omgevingsmanager houdt zich bezig met de maatschappelijke inbedding in het project en is daarmee intermediair tussen de (project)organisatie en haar omgeving. Publiekgericht Netwerkmanagement staat daarbij centraal. De omgevingsmanager probeert begrip en vertrouwen te kweken in de omgeving en te komen tot effectieve samenwerking met omgevingspartijen. Voor dit alles is intensief contact en overleg op ambtelijk en bestuurlijk niveau nodig. Afhankelijk van aard en context van dit overleg zal dit worden gevoerd door de omgevingsmanager, bijgestaan door de projectmanager en/of de opdrachtgevende directeur of HID. De omgevingsmanager heeft een duidelijke signaalfunctie in het projectteam bij het pro-actief signaleren van onderwerpen vanuit de omgeving die in- en extern invloed kunnen hebben op de kwaliteit van een project.

Taken

- De omgevingsmanager organiseert en geeft leiding aan het omgevingsmanagementteam
- De omgevingsmanager kent de omgeving en verzamelt tijdig benodigde informatie voor de strategie, voortgang, realisatie en organisatie van het project t.b.v. het realiseren van de opdracht.
- De omgevingsmanager voert de regie over de bestuurlijke conditionering, waaronder de planologie, kabels en leidingen, vergunningen, (Bestuurs)overeenkomsten, inpassing/vormgeving, vastgoed, schadebehandeling, archeologie en explosieven.
- De omgevingsmanager legt en onderhoudt contacten op ambtelijk niveau met voor de eigen functie belangrijke personen en organisaties.

- De omgevingsmanager verzamelt eisen en wensen bij omgevingspartijen en brengt deze in bij het projectteam (o.a. bij technisch manager en projectmanager)
- De omgevingsmanager “vertaalt” technische projectinformatie naar taal voor stakeholders en bestuurders.
- De omgevingsmanager voert de regie over communicatie en conditionering
- De omgevingsmanager draagt zorg de communicatie met de omgeving in relatie tot het project. Hij zorgt daartoe voor een communicatieplan, voor de voorlichting en informatie en klachtenafhandeling
- De omgevingsmanager draagt zorg voor een (regelmatig up-to-date te houden) stakeholderanalyse en formuleert een stakeholderstrategie die aansluit op de fase en doel van het project
- De omgevingsmanager zorgt voor de verkeersveiligheid en afstemming met de infraprovider en verkeersmanager
- De omgevingsmanager heeft de regie over omgevings-gerelateerde overleggen buiten het project, niet alleen vanuit het eigen team maar ook vanuit de teams Contract, Techniek en Projectbeheersing.
- De omgevingsmanager levert omgevings-gerelateerde informatie als bijdrage aan de contractbeoordeling bij aanbiedingen alsmede de contractbeheersing
- De omgevingsmanager levert het omgevings-technische deel van de kostenraming (PRI)
- De omgevingsmanager draagt binnen zijn vakgebied risico’s aan, actualiseert en beheerst deze binnen zijn vakgebied en voert beheersmaatregelen uit

Verantwoordelijkheden

- De omgevingsmanager is verantwoordelijk voor intern/extern relatiebeheer vanuit de projectorganisatie en voert daartoe overleg met interne rolhouders, zoals verkeersmanager en infraprovider
- De omgevingsmanager is verantwoordelijk voor adequate informatie-uitwisseling tussen projectorganisatie en omgeving
- De omgevingsmanager is verantwoordelijk voor omgevingsaspecten, zoals communicatieplan, stakeholderanalyse, stakeholderstrategie

Technisch manager

Technisch management is allereerst gericht op het realiseren van het gewenste technische resultaat voor de klant. Hiertoe worden eisen opgesteld die moeten leiden tot realisatie en gebruik van een systeem. Technisch management ontwerpt een systeem naar aanleiding van de vraag van de opdrachtgever. Een belangrijk middel hierbij is het functioneel specificeren. Door het gebruik van technisch management is het mogelijk om te sturen op eisen gedurende de life cycle van een project. Dit betekent: voldoet het systeem zoals we dat ontwerpen, realiseren en gebruiken steeds aan de gestelde eisen? De gebruikelijke systematiek hiervoor is systems engineering (SE).

De technisch manager is verantwoordelijk voor de technisch inhoudelijke inbreng in het project. Om dit goed te kunnen invullen behoeft de Technisch Manager niet over diepgaande technische kennis te beschikken, maar wel over vakinhoudelijke proceskennis. Juist in de planstudiefase is een generalistische vakinhoudelijke proceskennis vereist. Onder verantwoordelijkheid van de technisch

manager wordt de technische scope in de vorm van (functionele) specificaties richting marktpartijen geformuleerd, daarbij gebruik makend van de systematiek van systems engineering. Ook levert de technisch manager een bijdrage in de vorm van technisch inhoudelijke inbreng bij het formuleren van de systeem-, proces- en producttoetsen richting marktpartijen tijdens de realisatiefase als onderdeel van SCB (Systeemgerichte ContractBeheersing). Hierbij levert de technisch manager een bijdrage in de vorm van het aandragen van risico's, mede vaststellen toetsplan en een bijdrage aan de uitvoering van de systeem-, proces- en producttoetsen. Dit alles onder de verantwoordelijkheid van de contractmanager.

Het moge duidelijk zijn dat daarbij nauw moet worden samengewerkt met omgevingsmanagement (wensen, eisen en beperkingen vanuit omgeving) en contractmanagement (vertaling naar contractvoorwaarden en in latere fase technische inbreng bij de contractbeheersing). De technisch manager is verantwoordelijk voor de technisch bijdrage aan de processen vallend onder de verantwoordelijkheid van de contractmanager, omgevingsmanager en manager projectbeheersing. Hierbij is de continue aandacht voor risicomanagement van belang.

Taken

- De technisch manager organiseert en geeft leiding aan het technisch team
- De technisch manager levert een technische bijdrage aan onderzoeken zoals bodem, grondwater, verkeer, milieu, lucht, geluid
- De technisch manager draagt zorg voor het inschakelen van de juiste (technische) kennis t.b.v het project
- De technisch manager draagt zorg voor de evaluatie en toetsing van het technisch ontwerp aan opdracht en overige gemaakte afspraken
- De technisch manager bewaakt de technische scope en levert deze aan bij de manager projectbeheersing
- De technisch manager is betrokken bij de wijzigingen, m.n. die betrekking hebben op de techniek
- De technisch manager levert een bijdrage aan de beoordeling van de aanbiedingen
- De technisch manager voert zijn taken uit middels de "Leidraad Systems Engineering binnen de GWW sector"
- De technische manager levert de topspecificatie (planstudiefase)
- De technisch manager vertaalt de eisen/wensen naar functionele specificaties (valt onder SE)
- De technisch manager stelt het programma van eisen (vraagspecificatie 1, "het wat" en 2) op
- De technisch manager stelt de technische proceseisen t.b.v. vraagspecificatie 2 ("het hoe") op
- De technisch manager stemt de vraagspecificatie af met relevante belanghebbenden
- De technisch manager draagt in de planstudiefase zorg voor dat de technische rapporten, alsmede het MER van voldoende kwaliteit zijn om besluitvorming op te baseren. Hiertoe voert hij overleg met adviseurs/specialisten. Verplichte voortoetsen (MIT/SNIP) worden in overleg met de manager projectbeheersing en de contractmanager ingepland
- De technisch manager draagt binnen zijn vakgebied risico's aan, actualiseert en beheerst deze binnen zijn vakgebied en voert beheersmaatregelen uit

- De technisch manager levert de technische bijdrage aan de contractbeheersing (levering technische risico's, mede vaststellen toetsplan en leveren bijdrage aan de systeem-, proces- en producttoetsen)
- De technisch manager levert input t.b.v. de samenstelling van het overdrachtdossier
- De technisch manager levert een technische bijdrage aan het proces van oplevering en overdracht
- De technisch manager heeft afstemming met landelijke diensten van RWS m.b.t. de technische aspecten van de projectopdracht. Hij schakelt daarbij de benodigde kennis in
- De technisch manager onderhoudt via de landelijke diensten contacten met kennisinstituten m.b.t. de technische aspecten van de opdracht. (zie ook vorige punt)
- De technisch manager levert het technische deel van de kostenraming (PRI)

Verantwoordelijkheden

- De technisch manager is verantwoordelijk voor de toetsing op de correcte uitvoering van het technisch proces conform opdracht (uitgevoerd door de opdrachtnemer)
- De technisch manager is binnen de projectorganisatie verantwoordelijk voor de coördinatie, sturing en advisering ten behoeve van de inbedding van de techniek in het project. Dit in overleg met de projectmanager en omgevingsmanager bijvoorbeeld in geval van zware inpassingseisen
- De technisch manager is verantwoordelijk voor de invulling van de effecten en mitigerende/compenserende maatregelen in de trajectnota/MER en OTB
- De technisch manager is verantwoordelijk voor de aansturing van ingenieurbureau's (o.a. OTB/MER effectstudies) en draagt zorg dat de ingeschakelde marktpartijen producten leveren van voldoende kwaliteit
- De technisch manager is verantwoordelijk voor de totstandkoming van het programma van eisen (vraagspecificatie1, "het wat") en de daaraan gerelateerde producten, alsmede de technische proceseisen (vraagspecificatie 2, "het hoe")
- De technisch manager is verantwoordelijk voor de integrale veiligheid (waaronder interne, externe veiligheid en V&G i.h.k.v. ARBO). Detailafspraken hieromtrent worden onder verantwoordelijkheid van de technisch manager gemaakt met de andere kernrollen binnen het team

Appendix E: Relationships and dependencies between IPM roles

Het IPM-model en de organisatiestructuur vormgegeven in het vijfrollenmodel is een samenwerkingsmodel. De vijf rollen binnen IPM onderscheiden zich ten opzichte van elkaar, maar nog belangrijker: kennen in het kader van de samenwerking relaties en afhankelijkheden. In dit hoofdstuk worden die relaties en afhankelijkheden tussen elke rol nader belicht.

Relatie tussen omgevingsmanager en technisch manager

1. De omgevingsmanager peilt nadat overeenstemming is bereikt over probleem/opgave, voornamelijk in de planstudiefase c.q. de voorbereidingsfase, de behoefte en eisen van de stakeholders en belanghebbenden. De technisch manager kijkt wat technisch wel en niet kan (scope en randvoorwaarden) en stelt daarbij de technische en functionele specificaties op. De technisch manager ondersteunt de omgevingsmanager met mogelijke opties en oplossingen. Bij grote inpassingskeuzes met grote (financiële) consequenties danwel keuzes die politiek gevoelig zijn, wordt de projectmanager betrokken.
2. De omgevingsmanager koppelt transparant de mogelijke oplossingen terug aan belanghebbenden in de taal voor de omgeving begrijpelijk is.
3. De planstudiefase en realisatiefase worden door de onderlinge samenwerking tussen omgevingsmanager en technisch manager beter bijeen gebracht.
4. Overlap van realisatiefase en planstudiefase, de zogenaamde vervlechting, kan meerwaarde hebben voor het resultaat: De creativiteit van de markt wordt benut voordat alles juridisch via een tracébesluit of contract met de markt wordt dichtgetimmerd. Hierin is de relatie van omgevingsmanager, technisch manager en ook contractmanager van zeer groot belang.
5. Bij onderhoudsprojecten kennen we de 'voorfase' (een korte verkenning) uitgevoerd door het district (infraprovider en verkeersmanager), waarbij de omgevingsmanager ook een coördinerende rol heeft. Hij zorgt ervoor dat juridische en conditionerende aspecten en de onderhoudsbehoefte adequaat worden vertaald naar het contract.
6. De omgevingsmanager zorgt er, samen met de technisch manager voor dat de functionele eisen richting belanghebbenden uitlegbaar zijn. (doelgroepgerichte taal).
7. Concluderend: zowel bij aanleg- als bij onderhoudsprojecten is het belangrijk om omgevingsmanagement in vroegtijdig stadium te betrekken om tot optimale samenwerking met technisch en contractmanagement te komen.

Relatie tussen technisch manager en contractmanager

1. De contractmanager moet op basis van het aanwezige risicoprofiel en in relatie tot de diepgang van de uitgewerkte oplossingen de marktbenaderingsstrategie bepalen. De technisch manager draagt daarbij de oplossingen, opties en specificaties vanuit de techniek aan.
2. Er vindt een vertaalslag van technische en functionele specificaties (TM) naar contractuele (CM) bepalingen plaats.
3. De contractmanager is in de verkenningenfase verplicht om een marktscan uit te voeren. Voor de planstudiefase is een PSC en PPC verplicht en een marktconsultatie optioneel. Door toepassing van deze instrumenten komt het tijdstip van inkoop en het soort contract naar voren. Wat is de vermarktbaarheid van oplossingen en opties in een bepaalde omgeving, komen hierbij aan bod.
4. Technisch manager levert een bijdrage in het totale systeem, waarmee de contractmanager de markt moet benaderen.

5. Technisch management stelt vanuit haar expertise toetsen op om de opdrachtnemer op risicovolle processen en producten te toetsen. Technisch management is verantwoordelijk voor de kwaliteit van de toetsen.
6. De technisch manager levert toetscapaciteit aan de contractmanagement (matrix).
7. De contractmanager is verantwoordelijk voor het tijdstip van de uitvoering van de toetsen en tevens voor de acties die naar aanleiding van de toetsen moeten worden genomen. Ook heeft hij de verantwoordelijkheid over betaling van de opdrachtnemer
8. Bij voorgestelde wijzigingen van de opdrachtnemer zullen technische beoordelingen door technisch management worden uitgevoerd. Indien noodzakelijk zal de omgevingsmanager de belanghebbenden moeten informeren en de wijzigingen toetsen aan publiek- en privaatrechterlijke beperkingen.

Relatie tussen omgevingsmanager en contractmanager

1. De omgevingsmanager zorgt, via de contractmanager (of de technisch manager) voor terugkoppeling van omgevingsaspecten naar belanghebbenden. Denk bijvoorbeeld aan bouw hinder of lawaai, specifiek in de realisatiefase.
2. Naarmate meer omgevingszaken bij de markt worden gelegd zal de omgevingsmanager dichter tegen de contractmanager aankruipen.
3. Vanuit de behoefte van de omgeving zal de omgevingsmanager deze zaken via de technisch manager (in specs) en de contractmanager in het contract met de markt, kenbaar maken, afhankelijk van het risicoprofiel.
4. Indien omgevingsmanagement meer en meer belegd wordt bij de markt zal de omgevingsmanager, afhankelijk van de grootte van de risico's aan de contractmanager aangeven welke toetsen in relatie tot de omgeving moeten worden uitgevoerd bij de opdrachtnemer.
5. In elke fase zal de omgevingsmanager de te kiezen of de gekozen contractvorm moeten kunnen uitleggen aan de belanghebbenden en tevens moeten kunnen aangeven hoe de contractbeheersing tijdens de uitvoering zal geschieden (in Jip en Janneke taal).

Relatie tussen manager projectbeheersing en overige rollen

1. De manager projectbeheersing stelt het projectmanagementplan en het (interne) kwaliteitsplan op en raakt daarmee alle rollen en aandachtsvelden.
2. De manager projectbeheersing verzorgt de interne kwaliteitsborging (IKB) en heeft dus raakvlak met alle andere rollen en is deels ondersteunend.
3. De manager projectbeheersing draagt zorg voor het risicomanagement en raakt daarmee alle rollen.
4. De manager projectbeheersing draagt zorg voor kostenmanagement en scopebeheer en raakt daarmee alle overige rollen.
5. De manager projectbeheersing heeft de kostendeskundigheid binnen zijn team en zorgt voor ondersteuning van het technisch team en het contractteam (ramingen).
6. In het kader van risicomanagement worden de overige rollen door de manager projectbeheersing gechallenged.

De relatie tussen projectmanager en overige rollen

1. De projectmanager heeft de eindverantwoordelijkheid van het totale project tegenover zijn of haar opdrachtgever en heeft de algehele sturing en raakt daarmee alle rollen.
2. De projectmanager verzorgt de verantwoordingsrapportage, die door de manager projectbeheersing wordt opgesteld, naar de opdrachtgever.

3. De projectmanager stuurt het team aan en zorgt voor het bewaken van de onderlinge raakvlakken en raakt daarmee alle rollen
4. De projectmanager zorgt voor teambuilding en grijpt tijdig in op het moment dat er niet als team wordt samengewerkt.
5. De projectmanager ondersteunt de overige rollen als dat van hem gevraagd wordt.
6. De projectmanager heeft in het kader van de omgeving vaak, samen met de omgevingsmanager, de bestuurlijke contacten met de belanghebbenden. N.B. De regio is primair verantwoordelijk voor de omgevingscontacten. Dit betekent dat met name een Hoofdingenieur-Directeur of directeur de claim legt op de bestuurlijke contacten.
7. De projectmanager zorgt voor voldoende capaciteit vanuit de lijnorganisatie voor zijn of haar project en laat dit beheersen door de manager projectbeheersing.
8. De projectmanager zorgt voor het instellen van een escalatiemodel, zowel binnen de projectorganisatie als in samenwerking met de opdrachtnemer.
9. De projectmanager laat, als hij die noodzaak ervaart, het projectteam en de werking van het projectteam door een onafhankelijke toetsen.
10. De projectmanager richt zich niet alleen op zijn verantwoordelijkheid richting het projectteam, maar ook naar zijn opdrachtgever. Daarbij heeft hij gevoel voor de invloed (extern RWS zoals besturen, regio-organen, DGP, V&W e.d. als ook intern RWS zoals HID, staf DG, e.d) die op zijn project van belang is. Hij weet mogelijke problemen binnen zijn project tijdig te escaleren.

Appendix F: Agenda for external interviews

Onderwerpen die wij zouden willen bespreken zijn:

- Rol en positie van contract managers binnen Shell
- Meest voorkomende contractvormen
- Meest voorkomende problemen met contracten
 - o In relatie met opdrachtgevers
 - o In relatie met onderaannemers en leveranciers
 - o In relatie met JV partners
- Hoe toezicht resp. controle te houden over kwaliteit van contract management
- Reactie op onze diagnostische tool: gaat dat werken? Is deze compleet
- Afronding

Appendix G: Contract management maturity model results

	Planning & Governance	RWS	Shell	Fluor	Ballast Nedam
G1	The contract manager is involved during the tendering phase or there is a planned transition from the tendering phase to the contract management phase (handover to the contract manager).	4	3	5	4
G2	There are well defined processes and a clear contract management plan, with a focus on outputs and a life cycle approach to performance.	4	4	4	3
G3	Contract management processes are aligned with, among others, wider organisational governance processes, operational boards, and risk structures.	4	5	4	3
G4	Contract management issues and performance are reported through the governance structure with senior level engagement.	4	4	4	4
G5	Regular assessment and evaluation takes place to ensure the quality of contract management activities.	2	4	4	3
G6	Knowledge management is embedded, capturing key data and lessons from contract management process and experience both within the organisation and more widely.	2	5	4	5
G7	Professional contract management guidance is developed, or identified from external sources, and made available to contract managers.	3	4	4	4
G8	There is a process or mechanism in place which segments the contract portfolio in order of importance/complexity. More attention is paid by contract managers to more important or complex contracts.	4	5	4	4

	Resources	RWS	Shell	Fluor	Ballast Nedam
R1	The contract manager has a detailed knowledge of the contract and other relevant issues, such as service level agreements, and on-going supplier performance.	4	4	5	5
R2	The contract manager has the appropriate skills (both specific contract management skills and more general commercial awareness and expertise), with access to relevant training and development. Experienced contract managers are utilised on key contracts.	3	4	5	5
R3	Contract managers have accurate job descriptions, roles are positioned at an appropriate level and salary, and there is a career path for contract management staff.	2	4	4	5
R4	Contract managers have clear objectives and reporting lines and their performance is managed through reviews and appraisals.	3	4	4	5
R5	The contract manager has appropriate delegated authority to manage the contract effectively.	3	4	5	4
R6	Balanced contract management teams are brought together, with an appropriate range of skills; the teams may vary in composition over the life of the contract to meet specific needs.	3	4	4	5
R7	People who managing the bid and award process understand contract management requirements and the implications that awarding the contract will have on managing the contract during its life. Appropriate training and support is	3	4	5	4

	provided.				
R8	Contract management is adequately resourced, in proportion to the importance of the contract (primarily but not exclusively its cost), and there is enough staff to carry out the required activities.	3	3	4	5
R9	The organisation has a contract management 'community' allowing contract managers to share good practice. The community also plays a role in the wider government contract management/ procurement community.	4	4	5	5

	Document and Information Management	RWS	Shell	Fluor	Ballast Nedam
D1	Contracts are stored and logged in a document management system, and are easily accessible when required; for complex contracts, a summary and/or contract operations guide is produced.	4	4	5	3
D2	Contract management software is used for recording and reporting key information and trigger points; relevant on-going contract management information and documentation is retained and managed.	3	4	4	2
D3	There is regular and ad hoc reporting of contract management information.	2	3	4	5
D4	There are mechanisms in place for handling administration around contract closure or termination.	4	4	4	5

	Relationship Management	RWS	Shell	Fluor	Ballast Nedam
RE1	The roles and responsibilities of the contract manager, contract owner and supplier, buyer or other stakeholders are clearly defined and differentiated in the contract documentation and these are well understood by all parties.	3	5	4	4
RE2	Continuity of key supplier staff is desirable (ideally through involvement during the sales process); where this cannot be achieved, there is a handover from the staff responsible for the tendering process.	3	4	3	5
RE3	Both regular structured and informal communication routes between the contract manager and supplier are open and used; customer and supplier staff are co-located where appropriate.	4	4	3	5
RE4	Users are given clear expectations and an understanding of the contract and the services/ performance to be delivered (for example, through newsletters or briefings).	3	4	4	4
RE5	Problem resolution processes are well defined and used, and are designed to ensure minor problems do not escalate and cause relationship issues; a 'blame culture' is avoided (for example, through the use of a 'relationships charter' or similar document).	2	4	4	2
RE6	Relationships between stakeholders are evaluated after project realization in order to create a learning cycle	2	4	4	3
RE7	If there are contracts which would benefit from a strategic relationship with the supplier, buyer or other stakeholders, processes are in place for stakeholder development and relationship management with a view to deliver benefits to all parties.	2	5	4	3
RE8	If possible, joint working or shared activities between parties are initiated for the benefit of both the supplier and customer (for example, process improvement, shared training, task forces or joint project teams).	3	4	4	3
RE9	There is a focus on capturing innovation from the supplier where necessary or valuable	3	3	4	5
RE10	Knowledge management issues between parties are addressed, including knowledge capture from suppliers.	3	3	4	3

	Performance Management	RWS	Shell	Fluor	Ballast Nedam
P1	There are clear and well documented performance management policies and procedures to assess the performance of the supplier, buyer, or other stakeholders in meeting the requirements of the contract	4	4	4	4
P2	These performance management policies and procedures are carefully communicated to stakeholders before signing the contract.	4	4	4	4
P3	Baselines, measurement metrics, methods, data sources, and collection responsibilities are agreed with the supplier before contract signing. Service levels agreements are in place, and are linked to business needs, understood by the supplier, and monitored by the contract manager and/or end users.	3	4	4	5
P4	Reporting is as far as possible on a focused, 'by exception' basis, with supplier self-measurement and reporting where appropriate but with independent checking mechanisms to alert the customer to performance issues (for example, user feedback).	3	4	4	-
P5	Clear processes are in place to handle operational problem resolution and resolve issues as quickly as possible.	3	4	4	4
P6	Regular and routine feedback is given to suppliers on their performance.	3	3	3	3
P7	There are clear contact points for service users both within the supplier organisation and with the contract manager. Users understand what the contract is intended to deliver, and are involved in the assessment of supplier performance where relevant. Users understand escalation routes where issues arise.	3	4	4	4
P8	Changes in user requirements are captured and considered as part of formal change and contract management processes.	4	4	5	5
P9	There are formal performance reviews with suppliers, with documented improvement plans agreed where necessary, covering both operational issues and adherence to key contractual requirements, for example, on data security.	3	4	4	4
P10	The general market (outside of current suppliers, buyers and other stakeholders) is monitored for market trends and compared to performance of current stakeholders	2	4	4	4

	Payment & Incentives	RWS	Shell	Fluor	Ballast Nedam
PA1	Payment and collection procedures, conditions and time frames are clearly documented and communicated to suppliers and buyers (milestones, documentation required, incentives, penalties, etc.).	4	4	5	5
PA2	Payments are always made in accordance with the contract and commercial term.	5	4	5	4
PA3	Incentive structures (financial or non-financial) and penalty mechanisms relate clearly to desired outcomes, and are well managed and governed, with appropriate checks and approval mechanisms.	4	4	4	4
PA4	Payment changes after the contract is let, for example from contract variations or benchmarking/ market testing, are made using contractual provisions and demonstrated to provide value for money.	3	4	5	5
PA5	The contract manager takes action where necessary to avoid the organisation being 'locked in' to onerous commercial terms throughout the contract period, such as price escalation or 'compulsory' maintenance payments.	3	4	4	5

	Risk Management	RWS	Shell	Fluor	Ballast Nedam
RI1	Contractual/supplier risk management is in place with clear responsibilities and processes, identification of who is best placed to manage risk, and supplier involvement where appropriate. There are shared risk reduction programmes or activities available.	4	3	5	4
RI2	All contracts set out risk identification, monitoring and escalation routes in-line with the institution wide risk management plan	3	3	4	4
RI3	Risks are formally identified and monitored regularly, with mitigating actions developed and implemented where possible, and 'obsolete' risks removed from consideration where appropriate.	4	3	5	5
RI4	All contracts provide contingency plans for supplier failure (failure to deliver and or complete supplier failure – bankruptcy); exit strategies are developed and updated through the life of the contract.	3	4	4	4
RI5	For key suppliers and/or buyers, the contract manager monitors the financial health, performance, tax compliance and contract performance.	2	4	4	5
RI6	Contract terms and conditions, and potential ramifications around key issues are understood by the contract manager. Including but not limited to: termination, warranty, indemnity, security, confidentiality and dispute resolution.	4	4	5	5
RI7	Dispute resolution processes are in place, including agreed adjudication procedures, mediation, and arbitration.	3	4	5	5

	Contract Development	RWS	Shell	Fluor	Ballast Nedam
C1	The contract is regularly reviewed (with a view to updating where necessary) to ensure it meets evolving business needs.	3	4	4	5
C2	Processes are in place that clearly lay out the governance of contractual change – who needs to approve what and how it will happen – with a focus on effective and prompt change implementation.	4	4	4	5
C3	There are clear processes for the management of minor changes and contract variations, with a focus on the cost/effort being proportionate to the importance and value of the change.	3	4	5	5
C4	There are more rigorous processes to handle major contractual changes, including clear approval mechanisms and accountabilities, and controls to demonstrate that changes offer value for money.	4	4	5	5
C5	Both parties have a clear understanding of the arrangements and procedures for any extension of the contract (both scope and time) and related issues (varying of conditions, price escalations, etc.)	4	4	4	4
C6	Processes are in place to handle commercial (financial) changes to the contract in a fair and structured manner.	4	4	4	5
C7	Price changes are managed fairly and effectively with the use of mechanisms such as benchmarking, competitive tendering (for example, for major additional works), or other techniques such as open book pricing as appropriate, to test value for money.	4	4	4	4
C8	If the institution makes use of standard model contracts, these model contracts are updated on a frequent basis.	4	5	4	5
C9	Independent contract review mechanisms are in place to secure the quality of the contracts	3	4	4	5

	Market Aspects	RWS	Shell	Fluor	Ballast Nedam
M1	Processes are in place to evaluate and review options around delivering services in-house or outsourcing.	3	3	4	5
M2	Market intelligence is used to maintain an understanding of the market and of alternative suppliers (to inform benchmarking, contingency planning and re-competition strategies).	2	4	4	-
M3	The capacity and capability of potential suppliers is analysed, and linked to wider government analysis	3	4	4	4
M4	There is on-going evaluation of emerging technologies and practices, and identification of opportunities from both immediate and parallel market sectors.	2	4	4	5
M5	Market making is undertaken where appropriate to stimulate competition and ensure the requirements can be delivered by the market; there is an understanding of issues such as switching and bidding costs.	3	4	-	5
M6	A re-competition strategy and plan is put in place in a timely manner; the contract manager feeds into strategy development for the 'new' procurement process.	3	4	-	3
M7	Selection of supplier(s) is not merely based on the lowest price, but with consideration of the total cost of ownership aspect (Best value procurement).	3	5	5	5
M8	The contract manager pays attention to Health Safety and Environment (HSE) aspects of potential stakeholders before contract closure (i.e. the use of child labour).	3	5	5	2

Appendix H: Diagnostic framework data collection information

Explanation for completing the diagnostic framework

Dit diagnostisch model is ontwikkeld om de mate van professionaliteit van de functie contract management binnen Rijkswaterstaat te onderzoeken. Eerst zal even kort aangegeven worden welke informatie zal resulteren uit het model. Daarna zal beschreven worden hoe het model ingevuld moet worden.

Na het invullen van het model kan de volgende informatie achterhaald worden:

- Wat zijn belangrijke/cruciale contract management activiteiten binnen Rijkswaterstaat, en zijn hier verschillen tussen projecten aanwezig.
- In hoeverre worden deze contract management activiteiten in voldoende mate afgedekt. Zijn er belangrijke activiteiten die niet voldoende zijn afgedekt? Ook hier zal een vergelijking gemaakt worden tussen verschillende projecten. Misschien zijn hier verbanden in te ontdekken.
- Welke contract management activiteiten worden niet door de contract manager afgedekt, maar door een andere rol. Dit geeft inzicht in de verschillen tussen de invulling van de rol van contract manager.
- Waardoor is de activiteit niet (geheel) in voldoende mate afgedekt? Wat kan of kon er beter? Dit kan wellicht helpen om contract management in de toekomst te verbeteren.

Om projecten met elkaar te kunnen vergelijken is er tevens ook informatie over uw project nodig. Deze informatie zal verkregen worden middels werkblad 2 (project informatie). Voordat het diagnostisch model ingevuld kan gaan worden, zal dus eerst deze korte vragenlijst beantwoord moeten worden. Op werkblad 2 (project informatie) staat verder aangegeven hoe deze vragenlijst ingevuld dient te worden. Wanneer dit gebeurd is kan begonnen worden met het invullen van het diagnostisch model (werkblad 3)

Invullen van het diagnostisch model:

Het diagnostisch model bestaat uit stellingen die ondergebracht zijn in een aantal categorieën. Iedere stelling gaat over een bepaald aspect of activiteit behorende bij contract management. Per stelling worden drie dingen gevraagd:

1) In welke mate is het aspect of de activiteit van belang?

- Geef een score tussen 1 (heel weinig van belang) en 7 (heel erg van belang) door een 'x' te zetten in het juiste vakje.
- Wanneer het niet bekend is hoe belangrijk de activiteit of het aspect is, kan een 'x' ingevuld worden bij het vakje 'geen idee'
- Wanneer de activiteit of het aspect niet van toepassing is op uw project, vul dan een 'x' in bij het vakje 'n.v.t.'

2) In welke mate wordt het aspect of de activiteit feitelijk afgedekt?

- Geef een score tussen 1 (heel slecht afgedekt) en 7 (heel goed afgedekt) door een 'x' te zetten in het juiste vakje.
- Wanneer het niet bekend is hoe de activiteit of het aspect is afgedekt, kan een 'x' ingevuld worden bij het vakje 'geen idee'
- Wanneer de activiteit of het aspect niet van toepassing is op uw project, vul dan een 'x' in bij het vakje 'n.v.t.'

3) Toelichting

- Bij dit onderdeel is het mogelijk om een korte toelichting te geven op de stelling. Hierbij is het de bedoeling dat aangegeven wordt wanneer het bijbehorende aspect of activiteit niet afgedekt wordt door de contract manager, maar door een andere rol. Het benoemen van deze rol is voldoende. Als de contract manager het aspect of activiteit afdekt, hoeft dit niet vermeld te worden.
- Verder kan bij de toelichting vermeld worden wat de redenen zijn waardoor dit aspect niet (geheel) voldoende is afgedekt (wat kan/kon er beter), maar ook de redenen waardoor het aspect of de activiteit juist wel heel goed is afgedekt.

Het beste is om het eerst het blauwe gedeelte in te vullen (mate van belang), en daarna het paarse gedeelte in te vullen (feitelijk afgedekt + evt. toelichting). Tenslotte is het belangrijk dat het diagnostisch model ingevuld wordt naar eigen inzicht/beleving, afgaande op uw huidig project. Wanneer u pas aan een nieuw project bent begonnen, is het ook mogelijk om dit model in te vullen m.b.t. uw voorgaand project. Probeer de activiteiten relatief van elkaar te scoren, zodat er onderscheid ontstaat. Een '7' score moet daarnaast niet te snel gegeven worden.

Wanneer er na deze uitleg nog vragen of onduidelijkheden zijn kan contact opgenomen worden met:

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Appendix I: Project information

Project Informatie

Naam respondent	<input type="text"/>				
Rol respondent	<input type="text"/>				
Naam project	<input type="text"/>				
Huidige projectfase	<input type="text"/>				
Project duur	< 1 jaar	1-5 jaar	> 5 jaar		(kruis aan wat van toepassing is)
	☐	☐	☐		
Omvang van project	Klein	Gemiddeld	Groot	Heel groot	
	☐	☐	☐	☐	(kruis aan wat van toepassing is)
Projectbudget	<input type="text"/>	miljoen			
Contract type	<input type="text"/>	(RAW, D&C, EPC, DBFM.....)			
Aantal stakeholders	Beperkt	Groot	Zeer groot		
	☐	☐	☐		(kruis aan wat van toepassing is)
Complexiteit	Eenvoudig	Gemiddeld	Groot	Heel groot	
	☐	☐	☐	☐	(kruis aan wat van toepassing is)
Tijdsdruk	Laag	Middel	Hoog		
Budgetspanning	☐	☐	☐		(kruis aan wat van toepassing is)
Innovatiegraad	☐	☐	☐		
Multidisciplinariteit	☐	☐	☐		
Is er sprake van vervlechting of parallellisatie van planstudie en aanbesteding?					Ja Nee
Is er een ICT of installatie component aanwezig?					☐ ☐

Wanneer er nog overige opmerkingen zijn mbt het specifieke project kan dit hier vermeld worden.

GA NU VERDER NAAR HET DIAGNOSTISCHE MODEL

Appendix J: Project characteristics

Naam	Project fase	Project duur	Project grootte	Budget	Contract type	Aantal stakeholders	Complexiteit	Tijdsdruk	Budget-spanning	Innovatie-graad	Multi-disciplinariteit	ICT-component	vervlechting
A2 Hooggelegen	Afronding	> 5 jaar	Groot	190 miljoen	Alliantie (D&C)	Groot	Heel groot	Hoog	Middel	Middel	Hoog	Ja	Nee
A2 Leidsche Rijntunnel	Oplevering	> 5 jaar	Groot	238 miljoen	D&C	Beperkt	Heel groot	Hoog	Hoog	Hoog	Hoog	Ja	Nee
A2 Maastricht	Realisatie	> 5 jaar	Groot	700 miljoen	Infra (D&C)	Zeer groot	Groot	Middel	Hoog	Hoog	Hoog	Ja	Ja
A6 Almere	Contract-voorbereiding	> 5 jaar	Heel groot	250-300 miljoen	DBFM	Groot	Groot	Middel	Hoog	Middel	Hoog	Nee	Nee
A12 Lunetten - Veenendaal	Exploitatiefase	> 5 jaar	Groot	690 miljoen	DBFM	Groot	Groot	Hoog	Hoog	Hoog	Middel	Ja	Ja
A50 Ewijk - Valburg	Realisatie	1-5 jaar	Groot	275 miljoen	D&C	Beperkt	Gemiddeld	Hoog	Middel	Middel	Middel	Ja	Nee
Cluster Stormvloedkeringen	Onderhoud	> 5 jaar	Gemiddeld	10 miljoen per jaar	4 DBM, 1 prestatie-contract	Beperkt	Gemiddeld	Hoog	Middel	Laag	Middel	Ja	Nee
Gemaal Heumen	Definitiefase	1-5 jaar	Klein	2,6 miljoen	-	Beperkt	Eenvoudig	Hoog	Laag	Laag	Middel	Ja	Nee
Kargo	Uitvoering	1-5 jaar	Groot	125 miljoen	D&C	Groot	Groot	Middel	Hoog	Laag	Middel	Nee	Nee
Knooppunt Hoevelaken	Marktvoorbereiding	> 5 jaar	Heel groot	692 miljoen	PD&C	Groot	Groot	Laag	Middel	Hoog	Laag	Nee	Ja
Liggerkoppen	Realisatie	> 5 jaar	Klein	10 miljoen	D&C	Beperkt	Gemiddeld	Middel	Middel	Hoog	Middel	Ja	Nee
Maaswerken	Uitvoering	> 5 jaar	Heel groot	760 miljoen	D&C	Groot	Gemiddeld	Middel	Laag	Middel	Hoog	Ja	Nee
Meppelerdiepsluis	Realisatie	1-5 jaar	Gemiddeld	50 miljoen	D&C	Groot	Groot	Hoog	Middel	Middel	Hoog	Ja	Nee
Omlegging Zuid-Willemsvaart	Realisatie	> 5 jaar	Groot	420 miljoen	D&C	Groot	Groot	Middel	Middel	Middel	Hoog	Ja	Nee
Ooijen Wanssum	Planstudie, inkoop	> 5 jaar	Gemiddeld	210 miljoen	ntb	Groot	Gemiddeld	Laag	Middel	Middel	Hoog	Nee	Ja
Prestatiecontract kunstwerken	Uitvoering	1-5 jaar	Gemiddeld	40 miljoen	Prestatie-contract	Groot	Groot	Laag	Middel	Hoog	Middel	Ja	Nee
Renovatie sluizen	Uitvoering	1-5 jaar	Gemiddeld	45	D&C	Beperkt	Gemiddeld	Hoog	Middel	Laag	Hoog	Ja	Nee

Sambeek/Belfeld				miljoen									
SAA- deelproject A9 Gaasperdammerweg	Aanbestedingsfase	> 5 jaar	Heel groot	1000 miljoen	DBFM	Zeer groot	Heel groot	Hoog	Hoog	Middel	Hoog	Ja	Nee
SAA – deelproject A10- oost/A1	Realisatie	1-5 jaar	Groot	100 miljoen	D&C	Groot	Gemiddeld	Hoog	Middel	Middel	Middel	Ja	Nee
Verruimen Julianakanaal	Realisatie	1-5 jaar	Groot	100 miljoen	D&C	Groot	Zeer groot	Middel	Laag	Middel	Middel	Nee	Nee
ViA15	Planstudie/ contractvoorbereiding	5 jaar	Heel groot	799 miljoen	DBFM	Groot	Groot	Middel	Middel	Laag	Middel	Nee	Ja
Vooroeverbestedingen oosterschelde en westerschelde	contractvoorbereiding	1-5 jaar	Gemiddeld	27 miljoen	D&C	Beperkt	Gemiddeld	Middel	Middel	Middel	Middel	Nee	Nee
VORT 1B	Oplevering	1-5 jaar	Klein	30 miljoen	E&C	Zeer groot	Groot	Hoog	Hoog	Laag	Laag	Ja	Nee
ZSM 2	Afronding	1-5 jaar	Groot	150 miljoen	D&C	-	Gemiddeld	Middel	Middel	Middel	Hoog	Ja	Nee

Appendix K: Detailed diagnostic framework results

	Diagnostic framework results	Importance		Practice	
		Average	Variance	Average	Variance
1.0	Project objectives				
1.1	There are clear project objectives formulated	6,24	1,30	5,83	1,47
1.2	The project objectives are communicated and known sufficiently by all project members	6,24	1,38	5,92	1,08
1.3	During the project it is evaluated if the project objectives are still feasible	5,43	2,25	4,91	2,26
1.4	After project realization, it is evaluated whether the project objectives are achieved or not	5,55	2,35	5,31	2,06
2.0	CM structure and organization				
2.1	The IPM model is used as basis for the composition of the project team	5,96	2,28	6,32	1,26
2.2	There are good agreements between project members about overlapping activities (interfaces)	5,80	1,76	5,24	1,14
2.3	Deviations of the IPM model are clearly defined in the project plan	5,11	4,32	4,72	4,87
2.4	The procurement team (contract team until contract closure) has/had a good composition (in terms of size and skills)	6,38	0,43	5,67	1,00
2.5	The contract management team (contract team after contract closure) has/had a good composition (in terms of size and skills)	6,29	0,59	5,43	0,72
2.6	The tasks and responsibilities of all contract team members are clear	6,04	0,76	5,71	1,04
2.7	The substitution of an IPM role proceeds in a sufficient way and is defined	5,73	1,83	4,57	1,96
2.8	The quality of contract management activities is guaranteed and controlled sufficiently	5,88	0,69	5,05	1,50
2.9	There are agreements between the project manager and the contract manager regarding the mandate towards the client	6,09	1,21	6,27	1,02
3.0	Pre-contractual phase (preparation phase until start of the public tender)				
3.1	The procurement team is well led in this phase of the project	6,00	0,67	5,47	0,92
3.2	There is a specification prepared based on a clear need or demand	6,00	0,44	5,57	1,10
3.3	There is taken care of the preparation of the technical demand specification	6,24	0,42	5,57	1,39
3.4	There is taken care of the preparation of a qualitative procurement plan and strategy	6,37	0,34	6,12	0,93
3.5	Within the procurement team, there is sufficient knowledge available about public tendering rules and procedures (EU)	6,42	0,35	6,13	0,61
3.6	There is taken care of performing value tests (in Dutch: 'meerwaardetoetsen') in a sufficient way	5,69	1,46	5,50	1,42
3.7	There is taken care for sufficient market orientation, market exploration, and market consultation	5,76	0,89	5,92	0,74
3.8	Contracts which are needed in this phase of the project (e.g. hiring engineers) are managed sufficiently	5,75	2,06	5,21	1,45
3.9	There is sufficient knowledge available about different kinds and characteristics of contract types in the project	5,95	0,79	5,88	0,86
3.10	There is sought sufficient advice from procurement specialists regarding all procurement aspects	5,84	0,98	5,73	1,66
3.11	There is taken care for making agreements with the environment which is included in the contract	6,11	1,21	5,50	1,75
3.12	There is taken care of performing financial forecasts which are needed for the contract	6,26	0,40	5,75	0,94
3.13	The award criteria and the selection criteria are designed clearly (SMART)	6,47	0,35	5,81	1,40
3.14	There is taken care of the timely start of the market approach for the realization (in case of 'vervlechting')	6,23	0,33	6,13	0,86

4.0	Contractual phase (public tender until contract close)				
4.1	The procurement team is well led in this phase of the project	6,53	0,25	6,00	0,44
4.2	There is taken care of the preparation and facilitation of the dialogue team	6,42	0,24	6,00	0,57
4.3	Contractors are selected based on the predefined selection procedure	6,33	0,22	5,90	1,49
4.4	There is sufficient legal knowledge available to draft the contract (contract structures, contract conditions,...)	6,53	0,25	6,38	0,54
4.5	There is sufficient knowledge available about general contract terms and conditions (i.e. UAV-89 or UAVgc)	6,41	0,24	6,31	0,52
4.6	The process from drafting the contract to contract closure is fully transparent	6,35	0,35	6,45	0,43
4.7	The contract clearly describes the minimal (quality) requirements for the end product	6,06	0,64	5,71	0,92
4.8	The contract clearly describes how the performance of the contractor is tested in the realization phase	5,94	0,76	5,07	2,78
4.9	There is taken care for the draft of a contract management plan	6,31	0,34	6,29	0,35
4.10	There is a procedure available about how to deal with problems and conflicts	5,88	1,40	5,36	3,23
4.11	There is a procedure available about how to deal with changes	6,18	0,38	5,85	0,90
4.12	It is clear in which way the payments are going to take place, including bonuses, discounts, and penalties	6,41	0,24	6,36	0,66
4.13	The contract close is prepared in a sufficient way	6,23	0,79	6,13	0,86
4.14	There is taken care for the draft of a risk management plan (together with the contractor)	6,00	1,73	5,90	0,69
4.15	There is taken care for archiving and access for the original contract document (in the project database)	6,18	0,73	6,14	1,41
4.16	The contract is tested to the initial request and other appointments (Do we get what we want with this contract?)	6,18	0,50	5,83	1,14
5.0	Post-contractual phase (execution phase until delivery)				
5.1	The contract management team is well led in this phase of the project	6,21	0,80	5,93	0,78
5.2	The contract management team members are performing their tasks properly	6,33	0,51	5,47	0,84
5.3	The contract risks and other risks which can have an influence on the contract are well identified	6,43	0,34	6,06	1,11
5.4	These risks are well controlled and minimized if this is possible	6,38	0,33	6,12	0,57
5.5	Based on the risk portfolio, a testing plan is developed	6,38	0,43	6,12	1,75
5.6	Based on this testing plan, system tests, process tests, and product tests are performed in a sufficient way	6,50	0,35	6,31	0,59
5.7	The quality of these tests is safeguarded	6,29	0,78	5,53	1,54
5.8	Based on the testing results the appropriate steps are taken when this is required	6,38	0,52	6,00	1,29
5.9	The contract changes are handled based on changings suggestions by the client and/or contractor	6,43	0,34	6,29	0,56
5.10	A (potential) conflict is quickly noticed, after which the right steps are taken	6,14	1,93	5,71	1,38
5.11	There is a timely escalation in case of deviations from agreed performances	6,43	0,44	6,00	0,94
5.12	There is monitored on a legitimate invoices and payments	6,57	0,24	6,71	0,21
5.13	It is clear who is in charge of bonuses, discounts, and penalties (according to the contract)	6,52	0,25	6,35	0,82
5.14	The administrative process around contract changes, and extending or ending the contract after realization is well managed	6,52	0,25	5,76	2,30
5.15	The contract is regularly reviewed to check whether the contract still meets the needs of the end costumer	5,40	2,14	4,33	3,42

6.0	CM methods and procedures				
6.1	The project adheres to the guidelines and procedures stated in the 'werkwijzer aanleg'	5,82	1,33	5,37	1,39
6.2	The gate reviews are passed positively	6,13	0,65	5,44	3,80
6.3	The KAd test is passed positively and the feedback is discussed with the client	6,13	0,23	5,14	3,84
6.4	For drafting the contract, there is made use of the contracts buffet	6,05	1,32	5,80	1,86
6.5	'Systeem gerichte contractmanagement' (SCB) is supported and performed by the entire project team accordance 'kader SCB'	6,22	1,21	5,90	1,23
6.6	During the project, there is made use of the project database and hummingbird in a proper way	6,05	1,28	5,42	2,77
6.7	During the project, there is made use of the URSCB-tool in a proper way	4,88	3,52	5,57	2,39
6.8	In case of dealing with request for contract changes, the VTW tool is used in a proper way	5,11	4,21	5,43	2,53
7.0	CM information and communication				
7.1	When collaboration starts between project team and contractor(s), there is a project start-up organized	6,50	0,43	6,56	0,69
7.2	There has been put effort in developing or keeping a good relationship between project team and contractor	6,45	0,34	6,00	1,67
7.3	There are frequent meetings/contacts between project team, client and contractor	6,35	0,75	6,10	1,69
7.4	The 'Bouw Informatie Model' (BIM) is used in a proper way	4,83	3,81	4,40	6,24
7.5	There is (periodic) reported about the contract state and developments to the client and contractor	6,29	0,68	6,38	0,61
7.6	There is sufficient capturing of the communication between the client and contractor	6,36	0,50	6,00	1,37
7.7	The results of the tests are weighted and communicated to the tester and the contractor sufficiently	6,41	0,42	6,53	0,35
7.8	There is sufficient communication between the project team members	6,13	0,81	5,38	2,14
7.9	The provision of information between the IPM roles goes smoothly and takes place at the right moments	6,09	0,95	5,52	2,15
8.0	Performance indicators				
8.1	The client is satisfied	6,17	0,75	5,88	1,48
8.2	The project is delivered within budget	5,83	2,23	5,63	2,86
8.3	The result of the project will provide the intended functionality	6,50	0,58	6,26	0,61
8.4	The project is delivered within the planning	6,08	1,49	5,38	2,61
8.5	The project results or has resulted in minimal negative reactions of residents and other stakeholders	6,21	0,50	5,65	1,40
8.6	The project team is satisfied about the collaboration between the different roles	6,08	1,33	5,57	1,20
8.7	The project objectives are achieved (or are going to be achieved)	6,33	0,64	5,55	1,25
8.8	Inspections from the Auditdienst Rijk (ADR) has not led to determination of unauthorized payments	6,64	0,23	6,44	0,50
8.9	There are no VTW's owing to shortcomings of the contract	5,27	2,20	3,81	3,15
8.10	The project members are satisfied when looking back at the project	6,23	1,18	5,35	2,35

Appendix L: Diagnostic framework scores per project (practice)

[illegible]

3.0																									
3.1	7	-	-	-	5	-	-	6	-	5	-	4	-	6	6	6	-	6	5	6	7	4	-	5	4
3.2	7	-	-	-	5	-	-	6	-	5	-	4	7	5	-	7	-	4	-	6	7	5	-	5	5
3.3	7	-	-	-	5	-	-	6	-	5	-	4	7	-	-	7	-	3	6	6	7	5	-	5	5
3.4	7	-	-	-	6	-	-	7	6	7	-	4	7	6	4	7	-	6	7	6	7	5	-	6	6
3.5	7	-	-	-	6	-	-	6	6	6	-	4	7	6	-	7	-	6	7	6	7	5	-	6	6
3.6	7	-	-	-	5	-	-	4	-	6	-	4	-	6	-	-	-	6	7	6	7	4	-	-	4
3.7	7	-	-	-	6	-	-	6	-	6	-	4	-	6	-	6	-	6	7	5	7	5	-	-	-
3.8	7	-	-	-	5	-	-	7	-	4	-	4	-	5	4	5	-	3	5	6	7	5	-	-	6
3.9	7	-	-	-	6	-	-	6	5	4	-	4	7	6	6	6	-	6	7	6	7	5	-	-	6
3.10	7	-	-	-	6	-	-	6	5	6	-	4	7	6	2	7	-	6	-	6	7	5	-	-	6
3.11	7	-	-	-	6	6	-	6	6	5	-	4	7	6	-	6	-	4	-	6	7	2	-	6	4
3.12	7	-	-	-	5	6	-	6	6	5	-	4	7	6	-	6	-	5	-	6	7	5	-	7	4
3.13	7	-	-	-	6	6	-	7	6	5	-	4	7	5	-	7	-	7	-	6	3	5	-	7	5
3.14	7	-	-	-	6	-	-	-	-	6	-	4	-	-	6	-	-	6	-	-	7	-	-	7	-
4.0																									
4.1	7	-	-	6	5	-	-	7	-	-	-	5	-	6	-	6	-	6	-	6	-	-	-	-	-
4.2	7	-	-	7	6	-	-	-	-	-	-	5	-	6	-	-	-	6	5	-	-	-	-	-	-
4.3	7	-	-	7	6	-	-	5	-	-	-	5	-	3	-	7	-	6	7	6	-	-	-	-	-
4.4	7	-	-	7	6	-	-	7	6	-	-	5	7	5	-	7	-	6	7	6	-	-	-	7	-
4.5	7	-	-	7	5	-	-	7	6	-	-	5	7	6	-	6	-	6	7	6	-	-	-	7	-
4.6	7	-	-	7	6	-	-	6	-	-	-	5	7	7	-	7	-	6	-	6	-	-	-	7	-
4.7	7	-	-	7	5	6	-	6	6	-	-	5	7	5	-	6	-	4	6	6	-	-	-	4	-
4.8	7	-	-	6	6	4	-	6	6	-	-	5	2	4	-	6	-	6	6	6	-	-	-	1	-
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5.0																									
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